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THE AMERICAN QUARTERLY JOURNAL OF AGRICULTURE AND SCIENCE.

CONDUCTED BY

DRS. E. EMMONS AND A. J. PRIME.

VOLUME I.

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ACKNOWLEDGMENT.

We take this opportunity to acknowledge our obligations to the numerous papers, both those devoted to the agricultural, as well as other interests, throughout the country, for the kind and complimentary manner in which they have noticed the enterprise in which we have embarked. They are aware of the difficulties attending our situation, and of course will appreciate the value of our labors, and be able to make all due allowances for any deficiencies in the outset.

As the Editors reside in different places, they would state, that agricultural papers wishing to exchange with this Journal, will confer an additional favor by sending a copy of their paper to Albany and Newburgh.

E. EMMONS, *Albany*,
A. J. PRIME, *Newburgh*.

ERRORS.

On page 223, 10th line from the bottom, for "our," read "one."
On page 246, 3d line from the bottom, for "they never," read "the newer."
On page 247, 7th line from the top, for "plant," read "planet."
In note on same page, for "vessels," read "vescicles."
On page 250, for "tripunctuta," read "tripunctata."

CONTENTS.

VOLUME I—NUMBER 1.

Farmers' Miscellany.

Miscellanies:

TO THE PUBLIC.

An attempt at the present time to establish a Quarterly Journal of Agriculture and Science will perhaps be looked upon by many as premature, and as likely on that account to incur a failure of patronage; or it may even be regarded as unnecessary and uncalled for, so far as it proposes to administer to the general or specific wants of an agricultural community. But a watchful attention to the progress of agriculture for the last ten years, and to the numerous and important discoveries made in the collateral sciences during that period, has inspired us with confidence in the usefulness and ultimate success of our undertaking, and induced us to put in execution the means within our reach for its advancement. To enable our patrons and friends to form an opinion on the utility of the publication we propose to issue, a detailed statement of its scope and design is here exhibited.

The leading features of the Journal will be agricultural. Whatever bears directly or indirectly upon the pursuit of farming, as a matter of course, comes within our plan, and within the legitimate field of our labors. We intend, however, to advocate that system of cultivation which is best adapted to this country. While British and other foreign husbandry will receive a full share of attention, we hope not to be considered singular in the expression of the opinion that the interests of the American farmer should not be identified with those of the European landholder, and cannot always be best promoted by pursuing those methods which are found successful abroad. We are aware, when we speak of American farming as differing in character from that of England and other foreign countries, that the distinction is not so much founded upon essentially different principles, as upon position and circumstances; for the principles of the science have a general application; the means and methods for procuring large and bountiful returns from the earth, and for improving and perfecting the different kinds of stock, are the same here as in England or France: they are founded on general and immutable laws. The food of plants consists of the same elements every where, whether these plants grow in valleys or on mountains, in the warm sunny regions of the south or the cold frosty regions of the north, and the laws of life which govern the vegetable and animal kingdoms are the same in all latitudes and climes. The agents which modify organic bodies, and under whose influence they grow up and decay; by which they are nurtured, and by which they fulfil their destiny, operate uniformly the world over. Heat, light, electricity, and water, awaken every where the dormant forces of the vital atom, and call into action a principle which had lain in a state of rest in the seed or in the bud: they sustain the energies of the being they have just stimulated into life, and maintain its growth and development from the period of its first vital movement through all the stages it has to pass to reach its maturity. The laws, then, by which these changes are effected, and by which the progress of all organized beings to their proper perfection may be either hastened or retarded, vary not: they are fixed and stable. The glorious sun, shedding his bright rays upon the mountain forest and upon the herbs of the valley, transforms and vitalizes the fluids and elements which circulate in the leaf; and this transformation is a necessary result, wherever the conditions of sunlight and vegetation exist. It is a terrestrial law, which reigns wherever vegetables grow, or wherever they are formed upon a terrestrial plan. The leaves of plants turn green in the light of the sun, the yellow rays of that luminary converting the colorless sap into the substance termed *chlorophyl*; and this is a law of light. Can we break this law? No! But although we cannot break any of nature's laws, we may sometimes evade or counteract them. We may spread a curtain over the plant in a garden, or interpose a screen between the sun and the leaves of an herb; and by this arrangement, even although all other conditions necessary to growth are applied, we shall notably interrupt the decomposition requisite to the production of color in the vegetable tissue, and give place to a blanched, etiolated, and imperfect being. But the special mode by which this and all other changes are effected in vegetation are the same every where; so that whether we wish to produce, or to destroy, the law is at our hand: if we know the effect abroad, we are sure of the same effect at home. It is for these reasons, and in them we find cause for admiration, that the modes and rules of culture which are successful in one place, will be successful in all other places, provided we adapt them to the varying conditions of climate and situation.

But to return to the subject of American husbandry. We believe it ought to differ from the English system in some of its specific productions. The English cultivator, for instance, impelled by the humidity and comparative coolness of his climate, which favor the growth of the turnip and other root crops, employ these articles very extensively in sustaining and fattening their cattle. Now the American farmer is not driven to the use of these watery products. Our Indian corn, or maize, ought to be the principal food for fattening our domestic animals. The *zea mays* is the very prince of vegetables: its seeds or kernels furnish, to the live stock which feed on it, an abundance of oil or fat to line the cellular tissue, of fibrin to enrich the blood and enlarge and strengthen the muscles, of the phosphate of lime to give solidity to the bones, and indeed of all the elementary principles requisite to the due performance of the functions of nutrition and respiration. A field of maize, with the tall stems of the plants waving in the gentle summer breeze, and spreading their long pointed leaves to the brilliant light of an American sky; or with the autumnal stalks bending under the weight of the golden grain of the ripened ear, forms a glorious rural spectacle, and is that crop which of all others clothes the husbandman's landscape in its richest beauty. But this plant owes all its importance to its intrinsic value as an article of food; and could the English farmer grow it, his turnip crop would be comparatively but little esteemed. In this connection, we hesitate not to say, that we regret that many of our agricultural writers advocate the culture of the root crops in imitation of the English system of husbandry, in preference to that of maize, which is so well adapted to our superior climate.

The condition of the American farmer differs from that of the same class in any other country. He is not only the owner of the soil, but he works it with his own hands. Let not this condition be changed. He may be comparatively poor: he has not his thousands to spare for the purchase of compost, nor his hundreds to pay for the erecting of brick and mortar fences. For his labor he requires a speedy return: indeed this is often indispensable for his own and his family's comfort. We do not mean by this remark to advocate what has been termed the *skinning process;* but as our farmer is not wealthy, and as he performs his own work, his returns are wanted when his crops are harvested. His true policy in cultivation is, notwithstanding, the preservative policy: his system must still be that which husbands the strength of the soil.

It is moreover the peculiar lot of the American farmer to be placed in proximity to vast and rich forests, superior to anything in the old world; with a soil deep and black, the debris of numerous ancient generations of organized beings both vegetable and animal, intermixed with the fine silt of rivers and lakes. The compost heaps of the English farmer can hardly vie with the rich soil which is spread by the hand of nature over the western prairies and beneath the western forests. For this reason, the older and partially exhausted soils of the Atlantic slopes must come in competition with the new and exuberantly rich soils of the west under a great disadvantage, particularly in the cultivation of some of the staple productions. The western farmer spreads his wheat broadcast over thousands of acres. In those wide-spreading fields, no fence interrupts the wave of the bending grain as the breeze glides over its surface; and such are the facilities for the transportation of produce, that wheat and flour are poured upon the Atlantic board, as from an inexhaustible magazine which has been accumulating its treasures for ages. Towards this almost boundless territory, the tide of emigration continually sets; and from thence an untiring industry sends back to the less fertile regions the products of her labor, as from an overflowing granary, in such profusion that the drill husbandry, from which the largest returns are derived, can scarcely hope to compete. Still, let but new avenues of industry be opened, and if ever two days' labor are required to grow that which in the west requires only one, the east need not yet despair of securing wealth and prosperity under the influence of her indomitable perseverance, and in the multitude of resources at her command.

From this discussion, we return once more to the consideration of the proper object of our Journal. Especially we wish it to be understood that we aim to promote the advancement of that system of husbandry which shall be the most profitable, and the best adapted to circumstances when all the peculiarities of location and place are taken into consideration, together with the competitions which spring up between rival communities, the plans of industry which may be devised, the special kinds of stock and produce which the markets of the day may require, and, in fine, all those conditions which modify personal and general interests when viewed in their broadest bearings, and as they most affect the prosperity of the American farmer. The present is distinguished from the past by a wonderful energy in prosecuting scientific research. Not only are old fields broken up anew, but new ones are entered with astonishing zeal. The impetus which is thus given to discovery, in all countries where intelligence has a vigorous reign, can hardly be conceived by one who has not a good share of industry in his readings, or who does not make it his business to post up facts of the preceding years. The American farmer and gentleman, then, who beyond all other men is most interested in the progress of knowledge, will do himself injustice if he neglect the opportunity and means of becoming acquainted with those discoveries which the indomitable energy of the present age is continually making. It may appear, to be sure, that there is an extraordinary eagerness for discovery in pure science, but that this does not become of much practical importance. This, however, is not the true view; for such is the utilitarian spirit of the age, that no sooner has a discovery been made, than it is appropriated to some of the branches of industry: every thing is caught up and applied to the promotion of the arts, or the improvement of domestic economy.

We would not incur the charge of prolonging this address unnecessarily, but wish yet to say a few words as to the means we possess, and may command, to enable us to carry out the plan of our work. Many gentlemen of both practical and scientific acquirements, who are especially occupied in researches for the advancement of science and agriculture, are already engaged as contributors to our Journal. Our own individual connection with the geological and agricultural surveys, has placed within our reach much important matter relating to agriculture, both in this and other States of the Union. We propose also to extend our researches south and west, for the purpose of seeking out new sources of information on subjects most interesting and useful in the sphere of our labors, and of rendering our publication what its title imports, a Journal of American Agriculture. It will be our personal endeavor to multiply the means for increasing the products of the earth, and to encourage the prosecution of those inquiries which may lead to the discovery of new sources of the fertilizing agent, particularly the phosphates and carbonates, the inorganic elements which constitute so essential a portion of many of our most valued vegetable productions. This inquiry is scarcely begun in this country; and though we may be disappointed in our expectations from it, we believe no one will venture to deny its importance and necessity. But while we thus explicitly state the main scope and range of our work as it regards agriculture, we wish it to be understood that we do not design to confine it wholly to this department. We intend to record the discoveries, and to lay before our readers the most interesting facts, in science at large, so far at least as our pages will admit; always, however, aiming at judicious selection, and extending only so far as may enable our readers to keep pace with the progress of knowledge. It will be a part of our object to give occasional abstracts of the proceedings of scientific bodies, and notices and reviews of new publications. Without attempting a dogmatic course, we shall assume the right to express our opinions on matters pertaining to the subjects discussed in the journals and other scientific publications of the day; always, however, with a proper respect for the views and opinions of others, and under the conviction that we are all liable to err.

In conclusion, we feel deeply the responsibilities of the task we have undertaken. We are not unaware of the labors we shall be called to perform if we are faithful, and wish to be useful; nor of the vexations and embarrassments which attend the conducting of a public journal. But we do not rely wholly upon our own resources and personal exertions. We respectfully solicit our friends, and all who feel interested in the promotion and diffusion of agricultural information, to aid us in this undertaking; and, at the same time, we are pledged to furnish at least a moderate remuneration to those contributors who may supply us with communications suitable to our pages.

E. EMMONS,
A. J. PRIME.

Albany, January, 1845.

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FOOD OF PLANTS.

BY THOMAS HUN, M. D.

If we put a seed into the earth, it will, under suitable conditions of moisture, heat, and light, germinate, grow and become a plant weighing many thousand times more than the original seed. Whence does it derive the materials out of which its substance is formed? In what shape do these materials exist before entering into its composition? In other words, what is the source of the food of plants, and what is the nature of this food?

As to the source of the food of plants, it is plain that it must be in the soil, or in the atmosphere, or in both, for with these alone is the plant placed in communication. The question remains, in what proportion does each of these contribute to the formation of the plant, and what particular constituents does each furnish?

The question of the food of plants is of great practical importance, for all agricultural processes have for their object to place plants in the conditions most favorable to their growth and development; and as a due supply of food is one of the most essential of these conditions, it follows that these processes must be founded on a knowledge of the articles of food required by plants in general, and by each particular kind of plants.

Until a few years ago, the knowledge possessed on this point was so defective, that it furnished no certain basis for any system of agriculture, and all scientific farming was looked on with great distrust. It was considered safer to trust to a certain routine of practice which was found to work well in many cases, but the reason of which was unknown, than to have recourse to scientific principles which, however plausible they might seem, rarely led to any profitable application. But practices founded on blind routine must in many cases be misapplied, and the art pursued under such a system must remain stationary. Of the imperfection of the art of agriculture it is unnecessary to speak, and as to its improvement it may be affirmed with great truth that while all the other mechanical arts have been making such wonderful progress, this one, which occupies more men than all the rest together, has scarcely partaken of the movement, and that with the exception of some improvements of its instruments, for which it is indebted to other arts, it is now, in all essential respects, at the same point it was two thousand years ago.

Agriculture is however destined no longer to remain stationary. Recent improvements in organic chemistry are changing the whole aspect of vegetable and animal physiology, and rendering these sciences susceptible of practical application. The mode in which plants are supplied with food, and the kind of food they require, are becoming better understood, and the theory of manures is becoming more perfect; in a word, a science is springing up which will revolutionize the whole art of agriculture, and enable it to take its rank among the mechanical arts founded on fixed scientific principles. In a few years it will be considered as absurd for a man to undertake the management of a farm without having acquired a theoretical knowledge of agriculture as it would be to attempt to practice engineering without a knowledge of geometry.

In this paper, I propose to point out in as plain a manner as may be, what are the materials out of which the substance of plants is formed and the sources whence these materials are derived, and thus explain the action of various substances used as manures. I have nothing new to add to what is contained in the treatises of Liebig, Dumas and others, on this subject; I only hope to call attention to their views and render them intelligible to a class of persons who do not possess the knowledge of chemical principles which these works suppose in their readers.

Let us first of all see what is the composition of the matters found in plants, and we will be better prepared to understand the nature of the food and the changes it undergoes.

A superficial examination of the composition of plants shows that they contain gum, starch, sugar and other matters of like nature, which are not found in the soil nor in the atmosphere. The plant must, then, by virtue of forces peculiar to itself, form these matters out of the materials it derives from these two sources.

But we must look more closely into the composition of plants.

If we burn a plant in the open air, a large portion passes off in the form of vapor of water and of gas, and a quantity of ashes remains.

This ash of plants which cannot be dissipated by heat, is found on analysis to be composed of salts of soda and potash, alumina, silex and other earthy and saline matters. These matters are essential components of the plant, but do not seem to have made part of its organized tissues. They are simply deposited in these tissues, and are called the *inorganic constituents of plants.* Liebig has called especial attention to their importance in vegetation.

Those parts which pass off in a gaseous state during combustion are the organized parts and organic products of the plant. If we collect these gases and this vapor, we find that on ultimate analysis they may all be resolved into four elements, carbon, oxygen, hydrogen and nitrogen. There are also some traces of sulphur and phosphorus.

We can thus arrive at the first grand division of the constituent parts of plants, viz., the inorganic constituents, composed of earthy and saline ingredients which remain after burning, in the form of ashes, and the organic matters composed of the four simple substances I have mentioned, and which pass off in the form of gas and vapor.

Carbon, oxygen, hydrogen and nitrogen are then the elements out of which all the organic matters of plants are formed; but these elements are combined in a manner very different from that in which they are combined in dead matter, and this leads me to point out the difference between organic and inorganic combinations.

The chemist in his laboratory can obtain from starch, gum, albumen and other organic matters, the elements of which they are formed: he can separate them into carbon, oxygen, hydrogen and nitrogen, but he cannot by any means within his reach cause the elements again to combine so as to form these organic matters. These matters are formed only in the living plant and under conditions which the chemist cannot imitate.

Thus gum is formed from three elements, carbon, oxygen, hydrogen, united together in certain definite proportions. The chemist can cause these elements to unite in various ways; the oxygen and hydrogen will combine and form water, the oxygen and carbon will form carbonic acid, the carbon and hydrogen will form carburetted hydrogen. But he cannot by any possible means cause the three to combine and form gum.

So in the case of organic matters containing four elements, viz., carbon, oxygen, hydrogen and nitrogen. These elements will unite by ordinary chemical processes to form various compounds. The carbon and oxygen will form carbonic acid; the hydrogen and nitrogen will form ammonia, and these compounds will again unite to form carbonate of ammonia. But this substance is very different in its properties from albumen, which is found in living plants.

These compounds of the three or four simple substances which are formed only in the laboratory of the living plant, and which cannot be reproduced by the chemist from their elements, are called proximate principles. They are very numerous, and it is not necessary here to enumerate them, but for understanding what is to follow, the composition of the most important of them must be known.

Some of these proximate principles contain only three of the elements I have mentioned, and then these three are always carbon, oxygen and hydrogen. Others contain four elements, and then nitrogen is added to the above three. The former are called *non-nitrogenized*, the latter *nitrogenized* principles. This is a most important distinction, and its applications are numerous in vegetable and animal physiology.

Of the nitrogenized principles there is a class in which the oxygen and hydrogen exist in the proportions to form water, so that they may be considered as compounds of carbon with water, or more properly with the elements of water, for it is not proved that water exists as such in them. This affords a convenient way of stating their composition.

		Carbon.		Water.
Starch,.........	=	12	+	10
Cane Sugar,.....		12	+	11
Gum,..........		12	+	11
Sugar of Milk,...		12	+	12
Grape Sugar,....		12	+	14

From this table it may be seen that these principles are convertible into each other, simply by adding or subtracting the elements of water. Some principles as, gum and cane sugar, are identical in composition though different in properties. Such instances of substances having different properties while their composition is the same, are also found in inorganic compounds. They are called isomeric. Their differences are supposed to depend on a different arrangement of their atoms.

Among the *non-nitrogenized* principles, there are others in which the oxygen and hydrogen are not united in the proportions to form water. These are the oils and acids.

The nitrogenized proximate principles are albumen, fibrin and casein; they are identical in composition with the principles of the same name found in animals. These three principles are nearly identical in composition, differing only in the proportions of sulphur and phosphorus which exist in them in very minute quantities. They may all be resolved into a principle called protein, composed of carbon, oxygen, hydrogen, and nitrogen, combined with sulphur and phosphorus.

Thus, fibrin,..	=	Protein	+	P.	+	2	S.
Albumen,....	=	Pr.	+	P.	+		S.
Casein,......	=	Pr.	+	S.	+		

These nitrogenized principles are of great importance in nutrition, since all the organized tissues of animals are formed from them. They are the only proper supporters of nutrition, and vegetable food is nutritive in proportion to the amount of nitrogenized principles it contains. The non-nitrogenized principles serve as supporters of respiration and not as supporters of nutrition.

Animals whose organized tissues are composed of these principles are incapable of forming them from their elements, and hence must receive them ready formed in the flesh of other animals or in vegetables. All the albumen, fibrin and casein now existing in animals must have previously existed in vegetables, which are the grand agents for forming organic compounds for the use of animals.

Plants contain then, two classes of substances:

1. Inorganic constituents consisting of salts of soda and potash, of silex, alumina, &c., which are deposited in, but do not form a part of the organized tissues. These constitute mainly the ashes of plants when burned.

2. Organic matter composed of three elements : carbon, oxygen, and hydrogen—or of four elements, nitrogen being added to these three. These elements are united together in the living plant under conditions which cannot be reproduced by any artificial means, and form what are called proximate principles.

Now that we have an idea of the composition of plants, we proceed to the consideration of their food.

As we have established two classes of substances entering into the composition of plants, viz., the organic and the inorganic matters, so we may establish a corresponding division of their food. I will consider each of these divisions separately.

1. Of the materials out of which the organic matters or proximate principles of plants are formed.

There are four articles of food out of which plants form all their proximate principles or organic constituents. They are

1. Water, composed of hydrogen and oxygen.
2. Carb. acid, " " carbon and oxygen.
3. Ammonia, " " nitrogen and hydrogen.
4. Nitric acid, " " nitrogen and oxygen.

It will be seen that the two first of these substances (water and carbonic acid) contain the elements of the non-nitrogenized principles of plants. For if from the carbonic acid we subtract the oxygen, we have carbon remaining, which by its union with the elements of water in different proportions, forms starch, gum, sugar and the other principles of that class.

For the formation of the nitrogenized principles we must have, in addition to these elements, nitrogen, which is derived from ammonia or from nitric acid.

Those substances which constitute the food of plants, are derived from the soil and from the atmosphere. Formerly, great importance was attached to the soil, as furnishing materials for the organic constituents of plants. It has been shown however, from more recent researches, that the atmosphere is the great reservoir of food, and that the supply derived from the soil though in several respects important, is comparatively small.

The atmosphere is composed principally of two gases, oxygen and nitrogen, in the proportions by volume of 208 of the former to 792 of the latter. It contains also $\frac{1}{2500}$ by volume of carbonic acid gas, and a variable quantity of watery vapor. Besides this, it is constantly receiving ammonia from animal decomposition and animal excrements, but by reason of the solubility of this gas in water, it unites with the vapor and is thus carried to the earth in the form of rain and snow. Although the amount of ammonia in the atmosphere is too small to be detected by chemical analysis, yet its presence in snow and rain proves its existence there, and besides we know that from various sources it is constantly passing in the atmosphere.

Carbonic acid, ammonia, and water, are the constituents of the atmosphere which afford nourishment to plants. The proportion in which they exist is small, but when we take into account the immense extent of the atmosphere, we find their absolute amount to be very great.

The composition of soils is more variable than that of the atmosphere. In a general way, it may be said that the soil consists of earthy and saline matters, which constitute its basis, and are derived from the disintegration and decomposition of rocks, and of a quantity of vegetable matter called vegetable mould or humus. This matter during its decomposition, gives out carbonic acid. Besides these, soils contain matters derived from the atmosphere, such as water impregnated with carbonic acid and with ammonia.

According to Liebig, the great value of the soil for vegetation depends on its earths and alkalies, which seem to supply the inorganic constituents of plants. The humus or mould is comparatively unimportant except at certain stages of vegetation, in furnishing carbonic acid to the roots.

I shall now proceed to examine each of the articles of food I have enumerated.

1. *Water.* This substance is also a necessary ingredient in the food of animals, but in them it serves the purpose of a diluent or solvent of the alimentary principles, and does itself contribute directly to nutrition. It serves this same purpose of a solvent also in plants, for the carbonic acid, the ammonia and the inorganic constituents are introduced in a state of solution in water. But water is also directly nutritive in plants; its elements combine with the carbon of the carbonic acid and form the non-nitrogenized proximate principles.

The part played by water in vegetation is then doubly important, for it not only serves as an indispensable article of food which is converted into the substance of the plant, but by its solvent properties it serves to introduce the other articles of food from the soil and from the atmosphere.

The necessity of water for vegetation and the sources whence it is derived, are so generally understood that they require no further illustration.

2. *Carbonic acid.* Carbon is the preponderating element of plants, constituting more than fifty per cent of their weight. It is introduced in the form of carbonic acid, which is derived from the soil and from the atmosphere.

The carbonic acid derived from the soil is absorbed by the roots, passes into the trunk and from thence into the leaves and ends by being exhaled, without change, if no new force intervenes.

"Such is the case with plants vegetating in the shade and during the night season: the carbonic acid of the soil permeates their tissues and is diffused in the air. Plants are commonly said to produce carbonic acid during the night; this is incorrect: plants then only transmit unchanged the carbonic acid which their roots have pumped up from the soil.

"But suppose this carbonic acid, whether derived from the soil or from the atmosphere, to be in contact with the leaves and green parts, and the light of the sun to fall on them, immediately the whole scene is changed: the carbonic acid disappears; minute bubbles of oxygen are evolved from every point of the leaves and the carbon is fixed in the tissues of the plant.

"And it is a point most worthy of remark and fitted to arouse attention, that these green parts of vegetables, the very ones that have been found capable of exhibiting this wonderful phenomenon, the decomposition of carbonic acid, are also possessed of another property, not less peculiar, not less mysterious.

"If we attempt to transfer their images to a prepared plate of the apparatus of M. Daguerre, the green parts are found not to be reproduced, not to be formed; it is as if the whole of the chemical rays essential to the photographic phenomenon had disappeared, had been absorbed and retained by the leaf.

"It would seem, therefore, that the chemical rays of light vanish entirely in the green parts of plants—an extraordinary absorption without doubt, but easily explained when the enormous expenditure of chemical force necessary to the decomposition of a substance so stable as carbonic acid is required.

"Let us next inquire concerning the part played by the carbon thus wonderfully fixed by vegetables. What is its business—what its destination? For the major part unquestionably, it combines with water or its elements, and it thus gives origin to substances of the highest consequence in the economy of plants.

"Twelve atoms of carbonic acid being decomposed and abandoning their oxygen, there will result twelve atoms of carbon, which, with ten atoms of water, will compose either the cellular or the ligneous tissue of plants, or the starch and dextrine which are their derivatives."*

Such is the important part which is played by carbonic acid as an article of the food of plants. Introduced into their interior, whether by the roots or by the leaves, it is, under the influence of the sun's rays, decomposed in the green parts, its carbon remains in the plant and the oxygen is exhaled into the atmosphere. The carbon then unites with the water or its elements, and forms starch, sugar, gum and the other non-nitrogenized principles.

The action of plants is in this respect precisely the reverse of what takes place in animals. The latter consume the carbon in their food, which ultimately combines with the oxygen introduced by the lungs, and is converted into carbonic acid, which passes into the atmosphere, and is by plants again resolved into carbon and oxygen. For this reason plants have been called apparatus of reduction, and animals apparatus of combustion.

The carbonic acid is derived from the soil, where it is genera-

* Dumas' Balance of Organic Nature.

ted by the decomposition of vegetable matter, and from the atmosphere. The main source of carbonic acid is, however, the atmosphere. "How can this be otherwise when the enormous quantities of carbon which trees, the growth of centuries, for example, have laid up, are contrasted with the very limited extent to which their roots extend? Very certainly where the acorn, whence sprung the oak which is now our admiration, germinated a hundred years ago, the soil where it fell and struck not did not contain the millionth part of the charcoal which the oak now incloses. It is the carbonic acid of the atmosphere which has furnished all the rest; that is to say, almost the whole mass of the noble tree."

"But what can be more clear or conclusive upon this subject than the experiment of M. Boussaingault, in which peas sown in sand, watered with distilled water and fed by the air alone, nevertheless found in this air all the carbon necessary to their development, flowering and fructification."*

Liebig has insisted strongly on the fact that the vegetable mould is of much less consequence in furnishing carbonic acid to the nits of plants than has been previously supposed. According to him, this vegetable mould is more important as furnishing the inorganic constituents of plants in a soluble state than as furnishing carbonic acid.

Plants are, however, dependent to a great extent on the carbonic acid of the soil. During germination the plant derives its nourishment from the supply laid up in the seed. By the time this supply is exhausted the roots and first green leaves are formed. The latter organs can now take in carbonic acid from the atmosphere, but the quantity absorbed will be in proportion to their surface, which is very small. If then the plant is vegetating in a soil which furnishes no carbonic acid to the roots, so that the whole supply must be derived from the atmosphere by its leaves, its early growth will be slow and the season far advanced before it arrives at maturity. But if the roots can take in carbonic acid the process of growth is more rapid, the leaves are formed in greater abundance, and as the leaves increase, the capacity for taking in carbonic acid from the atmosphere is increased, and thus

* Dumas' Balance of Organic Nature.

the growth of the plant is accelerated, not only by the amount of absorption by the roots, but also by the increased absorption by the leaves.

On this depends the importance of furnishing to young plants in the spring of the year manures capable of furnishing these nits with carbonic acid. For the same reason the earth is broken up to admit air to vegetable matter of the soil, and thus favoring its decomposition, during which it gives off carbonic acid. When the roots are thus freely supplied with carbonic acid, the plant sends out leaves which themselves are organs for introducing nutritive matter from the atmosphere. We thus gain time, so important for a crop which is to be produced in a single season, but which is of little moment to forest trees which are to continue during a long succession of seasons.

Ammonia or Nitric acid.—This is the third article of food for plants. It furnishes the nitrogen they contain.

Carbonic acid and water contain the elements of all the non-nitrogenized principles of plants. The nitrogenized principles, fibrin, albumen, and casein, require the concurrence of nitrogen, which can only be introduced in the form of nitric acid or some salts of ammonia.

Although plants are surrounded by an atmosphere containing seventy-nine per cent of nitrogen, yet they are incapable of introducing and assimilating it in that form. Some experiments of Boussaingault, which seem to him to prove that plants abstract nitrogen from the atmosphere, admit of being differently explained. It is more probable that the nitrogen was obtained from the minute quantity of ammonia in the atmosphere.

Wild plants contain less of the nitrogenized principles than those which are cultivated for food. Indeed, the value of vegetable products as food for animals, depends mainly on the quantity of nitrogenized principles they contain.

One of the great problems in agriculture, is to furnish plants with a supply of nitrogen at a cheap rate. Water and carbon are in general provided by nature in sufficient abundance; and for wild plants, ammonia is furnished sufficiently from the sources I will presently point out. But for plants which are cultivated with reference to the amount of nitrogenized principles they contain, it is necessary to surround the roots with manures containing an additional amount of nitrogen.

Let us now see what are sources whence the ammonia is derived for the use of plants.

The flesh of animals, and a large portion of the blood, consists of nitrogenized principles, fibrin, albumen, gelatine, which during its decomposition after death, gives off the nitrogen in the form of carbonate of ammonia.

During life, the animal tissues are continually undergoing a change, receiving new matter from the products of digestion, and giving up their old materials which are thrown off in the excretions from the lungs and kidneys. By the former, (the lungs,) is thrown off the carbon, in the shape of carbonic acid, and by the latter, (the kidneys,) the nitrogen in the shape of urea, which by exposure to the atmosphere, is speedily converted into carbonate of ammonia.

Thus it is that all the nitrogen which enters into the food of animals, and which is directly or indirectly furnished by plants, after making part of the living tissue of the animals, is ultimately restored to the atmosphere in the shape of ammonia, or its carbonate.

Just as animals consume the carbon of vegetables, and afterwards restore it to the atmosphere in the shape of carbonic acid, that is in a shape adapted for vegetable nourishment, so do animals restore the nitrogen they consume in their food to the atmosphere, in the shape of carbonate of ammonia, which again serves for the nourishment of vegetables.

The ammonia or carbonate of ammonia, which is thus disengaged from animals after death, and from their excretions during life, being volatile, passes into the atmosphere. By reason of its affinity for water, it combines with the vapor of the air, and descends to the earth in the form of rain or snow, and is applied to the roots of plants. Ammonia never exists in the atmosphere in sufficient quantity to be detected by chemical analysis, but its presence in rain and snow water, proves that it must have previously existed in the atmosphere.

Plants, also, can absorb ammonia directly from the atmosphere by means of their leaves. This seems to be proved by the experiments of Boussaingault, to which I have before alluded. He found that some kinds of plants in a soil of pure silex, moistened with distilled water, were capable of growing and forming nitrogenized compounds. In this case the nitrogen must have been derived either from this gas as it exists in the atmosphere, or from the ammonia which is present in very minute proportion. The latter explanation is on many accounts the most probable.

According to Dumas, nitrate of ammonia is also generated by a combination of its elements, by the action of electric sparks in thunder storms, which is carried to the earth by the rain.

From these sources ammonia is constantly passing into the atmosphere for the support of the vegetation in the earth. But this general supply does not furnish a sufficient proportion for cultivated plants, and hence the necessity of manures, which are capable of producing it in greater abundance.

The manures which furnish the most abundant supply of ammonia, are urine and the excrements of animals, but particularly the former. But owing to the volatility of the carbonate of ammonia which is generated by the manures, it is liable to pass at once into the atmosphere, instead of contributing to the nutrition of the plants around whose roots it is deposited. Different modes have been proposed for fixing this ammonia, by converting the carbonate into a salt which is not volatile. This is effected by adding some mineral acid, such as sulphuric or muriatic, which gives rise to a sulphate or muriate of ammonia, which is not volatile, and remains permanent, so that the whole of it may be absorbed into the plant. The addition of these acids has the further advantage of destroying the ammoniacal smell of putrid urine, and for these two reasons it is resorted to in the manufacture of poudrette.

According to Liebig* "the evident influence of gypsum (sulphate of lime) upon the growth of grasses—the striking fertility and luxuriance of a meadow upon which it is strewed, depends only upon its fixing in the soil the ammonia of the atmosphere which would otherwise be volatilized with the water which evaporates. The carbonate of ammonia contained in rain water is decomposed by gypsum in precisely the same way as in the manufacture of sal ammoniac. Whether sulphate of ammonia and carbonate of lime are formed, and this salt of ammonia possessing no volatility, is consequently retained in the soil."

* Agricultural Chemistry.

"In order to form a conception of the effect of gypsum it may be sufficient to remark that 110 pounds of burned gypsum fixes as much ammonia in the soil, as 6,880 pounds of horse's urine could yield to it, even in the supposition that all the nitrogen of the urea and hippurci acid were absorbed by the plants, without the smallest loss in the form of carbonate of ammonia. If we admit with Boussingault, that the nitrogen in grasses amounts to $\frac{1}{100}$ of its weight, then every pound of nitrogen which we add increases the produce of the meadow 100 pounds, and this increased product of 100 pounds is effected by the aid of a little more than four pounds of gypsum.

INORGANIC CONSTITUENTS OF PLANTS.

All the organic parts of plants are formed by means of transformations which take place in the substances I have named, to wit, water, carbonic acid and ammonia, or nitric acid. But there are other constituents which also require notice.

In all plants there is a certain amount of mineral substances which remain after burning, in the shape of ashes. These substances vary in different plants, and are more abundant in some than in others. They consist, for the most part, of salts of soda and potash, silex, alumina, lime, magnesia and some others.

Liebig has insisted very strongly on the necessity of these mineral ingredients for plants, and has shown that no matter how abundantly a plant may be supplied with water, carbonic acid, and nitrogen, it will not flourish if the inorganic constituents are wanting. Thus wheat, rye, peas and beans, contain a large proportion of the alkaline and earthy phosphates, and will not flourish in a soil destitute of them, however rich it may be in other ingredients.

The inorganic constituents are originally derived from the disentegration and decomposition of the rocks which form the basis of the soil, and that portion of them which is removed with the crops must be restored in the shape of manures, or by allowing the ground to lie fallow while a new supply is generated by the further disintegration of the rock.

When lands are exhausted by successive crops, the exhaustion depends rather on the absence of the inorganic constituents than of the sources of carbonic acid and water. This exhaustion of the soil may be prevented to some extent, by raising successively crops of substances requiring different constituents, and on this the system of alternation of crops is founded.

The principal source from which the soil is to be supplied with the inorganic constituents of plants, is the urine and excrements of animals and different animal remains. Urine contains a large proportion of alkaline and earthy phosphates, and on them depends its value as a manure, more than on the nitrogen it furnishes. The same is true of bones, which have been found to be so valuable as manures. After being buried a few years they contain no animal matter, and furnish only food for the inorganic constituents of the plant.

Guano is a substance which has recently been brought into use as manure. It consists of the excrements of birds which has accumulated for a great length of time, and it furnishes to plants both nitrogen, and alkaline and earthy phosphates.

These matters must not only be present in the soil, but must also be soluble in water, and several substances are employed as manures, the efficacy of which depends on their capacity of forming soluble combinations of the silex, alumina, &c.

WHAT IS TO BE DONE FOR AMERICAN AGRICULTURE?

Ever since the attention of agriculturists in England was awakened to the immense benefits to be derived to their noblest of arts, by the aid offered by science, there has been a vast amount of speculation afloat in this country upon the same subjects. If, instead of speculation, it had been the well grounded result of investigation and careful experiment, it would have been, even at this time, amply sufficient to have redeemed American farming, and placed it upon a secure and profitable footing. If the activity and zeal displayed, instead of being set to work loosely and without any definite object, had been first enlightened and then cautious—slow and prudent, and directed to particular results—if instead of being distributed over the whole broad field of agriculture at once, it had been guided with discretion to the improvement of some single branch of husbandry—the effects at this day would have been incalculable. Great revolutions, such as are necessary in farming, cannot be produced in a day or a year. It is not sufficient only to inform and enlighten the few—to arouse here and there one to the task of personal reformation—it is not sufficient even, that the leading agriculturists of the country should be aroused to the application of new principles and practices—but in such a country as this the whole mass must work together in order to produce any result that will be appreciable to any but the closest observer. It is true that the tendency of knowledge, among a free people, is to spread and diffuse itself among all—yet when the prejudices, and those ingrained into the nature of the mass of American farmers, are considered—when it is remembered that they have to unlearn every thing in order to learn any thing—that a man must be convinced he is wrong before he will learn to do right—must be conscious of his ignorance before he will consent to be instructed—when all these circumstances are taken into the account, it cannot perhaps be matter of surprise to any that so little progress has as yet been made in this country in rational farming. As long as a man believes he has arrived at perfection, it is the veriest folly to try to improve him. It is a question then of no small importance—" What is to be done for American Agriculture ?"

It is matter of congratulation, no less to the patriot and the political economist than to the farmer himself, that something has already been done. A different system is beginning to prevail, and although it may not appear to a superficial observer, yet by one who refers to the practices of former years and compares them with the present, much will be seen to convince him that farming is undergoing a slow and gradual but sure change for the better. Call it *rational—mental—scientific*, or what we will—its efforts are beginning to be felt and will continue to increase. We see this in the large tracts of land that have been and are being redeemed from waste—in the restoration, in some parts of the country, of exhausted soil—in the improvement of stock and the disposition to obtain improved breeds—in the multiplied production of better farming implements, which can only be made in such abundance to supply an increasing demand—but in nothing more than in the growing desire for information shown in the increase of agricultural papers and books. And we hail all these as indications of the dawning of a new era in farming.

In replying to the question at the head of this paper, we shall consider only what individuals ought to do. The question of what government ought to do, will be examined at another time.*

I. The farmer must acquaint himself with the principles of his art. Its foundation is laid in knowledge, and its successful practice depends upon individual skill. Of late years the sciences have laid open vast resources for the farmer. Geology, Botany, and especially Chemistry, have already taken rapid steps towards revolutionizing the practice of agriculture. It no longer answers for a man to quote his father as the best authority. We must go higher now and follow the laws of *Nature*. Let us not be understood to mean that every farmer must become a chemist in the strict sense of the term, although to a certain degree he must be one. He is a practical chemist already, and he should be in a measure a theoretical one; that is, he should be a *reasoning* man, in respect to the operations he carries on. He should be able to see the cause when a certain effect is produced, and to understand why the various processes which he follows are necessary, and what are wrong and what are right. This does not involve necessarily an acquaintance with all the technical terms of science, terms now so much the dread of the uneducated farmer. But he should understand the names of things he uses, and not ask the chemist who labors for his benefit, to perform the impossibility of finding names for substances which a man can comprehend without finding them out. Nothing is more common than this complaint, and nothing more wrong. A great beauty and excellence in the names applied by modern chemistry is, that for the most part, the name of the substance defines and explains its composition, so that by seeing the name of a compound we know of what it consists. Take an example—the acid commonly called "oil of vitriol." This is an unmeaning term, and conveys no idea of that substance any more than if it were written in the Chinese tongue. But the name "sulphuric acid," which is the proper one, indicates at once that sulphur is the essential ingredient, and a slight knowledge of chemistry tells us that oxygen is the other. The farmer is familiar with "plaster of Paris;" does he know such a substance as "sulphate of lime;" a name which at least shows the presence of sulphur and lime! On the contrary, fault is often

* An able article on this subject will be found on another page.—Eds.

found with writers because they will call it gypsum; a name sufficiently unscientific to please any one.

But it is not after all, the names which most concern the farmer, although in order to be a rational one he must understand them. The substances themselves are what he is interested in, and their application in his business. He ought to understand the relative value of different manures and their adaptedness to particular soils or crops; the preparation, improvement and management of manures in order to secure their highest effect; the composition of soils and plants and the effects produced by the latter growing in the former, to exhaust them and render them unproductive; in fine he must know the whole relations of the vegetable, mineral and animal world. The farm should be regarded an out-door laboratory where every process is regulated by rule as strict as the chemist obeys in his. If we should stop to give instances to substantiate the value of this kind of knowledge, we should soon fill a volume, for there is no process in the whole art that would not bear us out. Therefore we need not do it. We are well aware of the prejudice which has heretofore existed against book farming; a prejudice which is rapidly disappearing and which was the child of ignorance.

It cannot be possible that agriculture alone of all the arts must stand aloof from the aids offered by science. All other industrial occupations owe their elevation and importance to it. And what may not farming be, when the farmer in the full realization of the dignity of his calling, becomes the thoroughly informed man he ought to be. And there is no sufficient reason why any man in this country should be ignorant of all the improvements that have been made in agriculture, and equally true is it, that knowing them, there is no reason why he should not put them in practice. We are a reading people. We mingle with each other. What one does, is seen and known by all. The distinction of classes is only nominal, and in all that pertains to the common good, all meet on common ground. The interchange of thoughts and views is free as the air we breathe. The means of acquiring knowledge are cheap and abundant, and in every man's power. I say again, there is no reason why any man should not be well informed in all that concerns his business. But before all are so, the barriers raised by prejudice and early training must be broken down, and that patriarchal respect for old customs and old usages and old ways must be done away.

The education and elevation of the farmer is not a Utopian scheme, even for the present generation. And for the next we may expect men competent to fulfil their destiny as the foundation and support of this republic. England and Germany are in advance of us, but when we move it is with rapid strides. They have laid the foundation in their investigation and discovery of the laws of organic life, and we must build upon it. The practical farmer in this country has not been behind the man of science. The latter has but just begun to arouse himself to his duty, as the former is looking to him for counsel. Where they occupy the field together, what results may we not anticipate? It has, perhaps, been to the hindrance of improvement that the scientific men have not taken the lead, and have left practical men to guide themselves in the to them untrodden fields of science. It is that fact that has caused speculation to be substituted for true knowledge, and thus, although a large and extensive desire has been manifested by intelligent men to adopt new measures, yet from want of proper direction, their notions of what they want have often been so indefinite as to lead to no beneficial result. We would not be understood as depreciating the very laudable efforts made for improvement by our agriculturists. On the contrary, we are rather disposed to censure those men, who from their studies are capable of giving an intelligent direction to that spirit of enterprise which might at this time have effected vastly more than has been done. But neither can go alone. The theories of one and the facts of the other must eventually meet, and thus a firm superstructure may be raised.

A few years ago farming was regarded as little better than a menial service, and the farmer was looked upon as little elevated above the serf or the slave. It was forgotten that agriculture, the manufacturing and the commercial interests, were all inseparably connected in the prosperity of the state; or rather, in the words of another, "that the land and the owners, and the cultivators of the land, form the *primary essentials*, and the mercantile and manufacturing establishments, the accidental adjuncts of our state—and that the ruin of the solid walls and foundation of the stupendous fabric of the greatest nation upon earth, would involve in one common destruction its richest appendages and most ornamental decorations."* No country can—and this country especially cannot, foster too fondly its agricultural interests. It is now, and must continue to be our national wealth. And this is at the present time eminently the direction of public feeling. To whatever cause it may be attributed—whether to the wish to be free from the anxieties and cares and insecurity of commercial life—to the sense of the greater security of the landed interests—whether to these selfish considerations, or the return of a healthy state of moral feeling, urging the conviction of the holier and happier influence of rural pursuits upon themselves and their children—to whichsoever of these circumstances it is attributed, it is a gratifying fact that many wealthy and intelligent men are forsaking the large cities, and devoting themselves to agriculture. And to them much of the credit is due for the improvements that have already been made. What farther duties devolve upon them we shall have occasion to consider hereafter. We rejoice that they have begun to raise the farmer to his proper position in society.

But the education of the present generation of farmers we regard as of small importance compared with that of their children. Here is our great reliance. This subject is one which has of late been much discussed, and has arrested the attention of the executive committee of the New-York State Agricultural Society, and the officers of the common schools of that state. They have taken some action upon it, and have recommended the introduction of agricultural books into the district libraries, and that society has offered premiums for text books to be used in the schools; with what result is yet to be determined. But laudable as this movement is, we regard it with comparatively little anxiety. The mere *agricultural* education of the young is a matter of small moment in comparison with their *general* education. In our common schools, a large majority of the pupils are children of farmers. Three fourths of our whole population are employed in tilling the soil. Upon these in a great measure, depends the prosperity of our free institutions. In civil relations no class ranks higher, or can command more power. Our legislators are—or should be—largely chosen from among them, for theirs is the commanding interest. How important then, that they should be well instructed in all that concerns the citizen as well as the farmer. Education does not

* London Quarterly Review, March, 1844. Article—Agriculture.

necessarily unfit any one for the business of life, and we would see our youth growing up, reading—thinking—reasoning men. Make them such, and we make them intelligent farmers.

We do not intend here to go into the full consideration of the methods of education adapted to our farming population, nor of agricultural schools and colleges. This will afford ample material for a further article. As far as agricultural information is concerned, there is no want of sources from which to derive it. Periodicals devoted to this subject are numerous and increasing. Books have been written and published, both practical and scientific, and all at little expense. A new literature is fast going through the process of formation, and we may soon expect to see the farmer's library as well stored as that of the professional man. Then will agriculture be raised, as it should be, to the dignity of a profession, and its followers cease to be regarded as mere machines to toil and dig, forgetful of their higher nature.

II. Preparation for farming upon correct principles is an individual concern. Every man must do it for himself. But when we come to the application of these principles to practice, there is much that one or a few may do for the benefit of the whole. What a man knows, he knows for himself; but from what he does, thousands may learn to do the same. And in this country, whose inhabitants are celebrated for "having their eyes open," what is done by one is seen by all. And one of the best stimulants for a young, or even an old farmer—if free from prejudice in favor of the way his father did—to improvement in the management of his farm, is to visit those that are well conducted—to examine the manner in which they are managed—the implements, the stock, the fences, the buildings, and the whole condition of it. We were forcibly struck with the value of this, upon reading the fact that an English proprietor, in order to give his farmers an idea of the benefits of improved methods, had paid their expenses while travelling to visit a district where farming was conducted upon scientific principles. The effect was, that they improved from that time, by adopting the plans they had witnessed. But farms conducted upon such principles, are too rare in this country to be easily found; and if they were to receive the visits of all our farmers who need the example, we fear their enterprising proprietors would reproach us for the recommendation.

The neighborhood of our large cities and the borders of our great thoroughfares are rapidly becoming occupied by a new class of agriculturists. Men of wealth who are retiring from business, and who are indisposed to settle down in inactivity, are purchasing small farms and turning their attention to the cultivation of the soil. These are the men to whom the country must look for example in this great field. Accustomed to the brick and mortar of the city, and often unacquainted with the simplest of the principles or processes of husbandry, they have all to learn. They can also bring intelligence and wealth to the business. Why may we not expect them to take a noble and decided stand in favor of modern improvements ? At the same time, let us recommend them to be cautious and prudent, and have an eye to the general advancement of the art. Some cases have come under our notice where gentlemen of this class, no doubt with a laudable ambition to show large results, have bestowed an amount of labor and expense upon crops which would be ruinous to the common farmer. It makes no difference to them at what cost—but the only good we can see flowing from it, is the showing the capabilities of the soil when tasked to its utmost limit. But this is not what is wanted, unless it can be done with profit. It is not the effect produced by manuring with a compost of a large number of costly materials, which more than swallow up the proceeds of the crop—nor that of applying an immense quantity of manure to result in the same loss—these are not what the American farmer wants—but to learn how he may reap the greatest product at the least expense. Economical farming is the thing desired—to develop the whole resources of the individual farm in its soil well tilled—its yard manure—its marl—its muck—the waste of the house and the farm—all, in fine, that can add to its productiveness, and that with the least outlay.

There are also operations which are attended sometimes with considerable expense, which nevertheless repay largely in their effects, and add greatly to the capacities of the farm. They have been little practiced in this country, but in others have been followed by the very best results. And to some of these we would briefly call the attention of the class of whom we are now speaking. The first is *deep ploughing*.

As ploughing is generally practiced in this country the soil is very rarely loosened to a greater depth than six inches—perhaps not often so deep. But there are benefits to be gained from deep ploughing when judiciously done. The effect of rain falling upon and passing through the soil is to wash down to too great a depth to be reached by the roots of plants those soluble substances which are their food. Not only the mineral parts of the soil, but the manures which are applied, are washed out and oftentimes accumulated in the subsoil in large quantities. These, if turned up and mixed with the soil, would add greatly to its fertility. The mere loosening the earth to the depth of ten or twelve inches will be very useful by allowing a greater extent of the roots of plants. At the same time, caution is necessary lest the subsoil contain substances which may be injurious to vegetation. In such cases the use of the subsoil plough should precede deep ploughing, to allow free access of the air to assist in the chemical changes necessary, and also to partially drain the soil by affording a free exit to superfluous moisture. This latter process has never yet been very extensively introduced into this country, and it is our belief that our agriculture has suffered much from the want of it. The surface soil has been tilled over and over, while the process of deterioration has been going on in the older sections, till its productiveness seemed almost lost. Deepening the soil would unquestionably vastly add to its powers, if it does not in a great measure restore them.

But these processes are far too little appreciated in this country. Indeed, the difference between them is not known by many, and when subsoil ploughing is spoken of, they suppose that it implies bringing the subsoil to the surface. But this is by no means the case, the process only consisting in tearing up the subsoil in the furrow which another plough has made, and leaving it to remain in this broken state below the next furrow turned upon it. The value which is attached to this in this country may be inferred from the fact that among all the numerous implements exhibited at the late fair of the New-York State Agricultural Society, and also at that of the American Institute, in the city of New-York, in October last, we searched in vain for a subsoil plough, although we heard numerous inquiries for them by persons wishing to see what they are. Wherever they have been used, although attended with extra cost, this has been more than repaid in immense produce. But this is not the only gain. The additional ease of tilling the soil afterwards, is a consideration of no small importance in all cases, and especially in those heavy, cold lands with a retentive or impervious subsoil, which are much benefited by the operation.

Another process, which has not found its way into this country to any great extent, is thorough draining. The effects of this upon English farming have been most wonderful, and we know of nothing which now is exciting greater attention in that country. Since its introduction immense tracts of land which before were worse than unproductive have been reclaimed and reduced to tillage, and are now among the most fertile. Although attended with considerable expense, yet the money is not thrown away—for land which rented for two to five shillings the acre before draining, readily brings twenty, thirty, and even as high as forty shillings, after this is done. We might quote abundant facts in this connection were it necessary, or in the scope of this article. A writer in the Gardener's Chronicle states that "Draining in the best manner seldom costs more than £6 per acre, and can be often done effectually for half that sum," and that cold, wet lands which will not average sixteen bushels the acre, "when properly drained, with the same labor and manure, will average thirty bushels." Thorough draining is not so extensively necessary in this country as in England, yet it would be difficult probably to find a farm where it could not be employed to a greater or less extent with great advantage. The partial system of draining which is generally practiced is productive of very little permanent good.

The example of wealthy, independent farmers is necessary to the introduction of these improvements, and when they are once seen in their practical benefits, enough will be found to adopt them. Before they are generally received, men must be convinced that there is no risk nor danger of loss attending them. Once let them see that by the application of improved methods of farming they may in a very few years not only pay the interest, but actually receive both the whole cost in increased products, and they will no longer hesitate. In England, where most of the land is held under leases, the proprietor usually, either alone or in connection with the tenant, makes the improvements. But in many cases the tenant himself, where he holds on a long lease, makes them himself, anticipating with all certainty a large remuneration in the increased fertility of the soil. In this country, where every man tills his own land, it seems an impossibility to convince many that all the improvements they put upon their land is so much added to its real value—not only its productive value from year to year, but its market value.

The limit of productiveness in the soil is not known—the extent to which its fertility may be increased. And the question is not, is this soil adapted to wheat, or something else, but whichever is most profitable to the grower must be compelled to grow upon any soil. This is true scientific farming, and when at the same time the greatest amount is raised at the least cost, we have all the demands of the art fulfilled.

III. The application of scientific principles to agriculture is the business of the practical farmer—the investigation and development of them to the chemist and naturalist. Why they have hitherto not directed their labors more to this end, is difficult to understand. One thing, however, is certain, that the labor and time employed would have been but poorly repaid. It cannot be expected that they should work without pay any more than it can be expected of the farmer. And when the latter is fully awake to the value of the aid to be derived from the former, it will be found that he is ready and competent to the business. It is not long since we received a communication from a practical farmer, setting forth the benefits of scientific knowledge in agriculture—giving a history of the progress of improvement abroad, and urging the raising a fund *to employ a chemist from Germany* to analyse soils; and also suggesting that Professor Johnston be invited to visit this country, in order that his opinion might be obtained with regard to the improvement of our agriculture. It is not wonderful that such should be the feelings of a man desirous of knowledge in his occupation, for almost all the books on the subject are written by Europeans, and almost all authorities quoted are of the same parentage. This, we do not believe, is altogether the result of a preference for foreign opinions, although we know that the idea is somewhat prevalent that they are better than our own. The science of agriculture is the same the world over, but its application to practice must vary with the climate, and, in a measure, with the habits and condition of a people, and other circumstances. As far as mere science is concerned then, both theirs and ours is the same, but our farmers would find themselves greatly astray if they were to follow those systems out in their practice.

It is therefore the duty of the scientific men of this country to lay their hands to this enterprise, and to direct their efforts to the improvement of American agriculture. While they hold back, the farmer will wander but half enlightened. As we have said before, both must go together. The methods by which they are to advance the science of farming are too well understood to require any thing more than mere mention, at this time. The analysis of soils, and especially of the ashes of our various cultivated plants, must lay the foundation. The latter we regard as the most important, because of the impossibility of determining the value of the soil on a farm, by examination of one or even many specimens. If portions of the soil from different parts are mixed, the indications derived from analysis will of course not be definite with reference to any one part nor the whole farm, from the known varieties of soil which often occur in close proximity to each other. For the same reason the analysis of one specimen is not to be relied upon, in forming an opinion of what may be needed to improve the whole. The analysis of plants, determining their exact constituents, is calculated to lead to correct conclusions as to what is necessary to perfect their organization, and is attended, in the end, with vastly less labor.

The subject of manures, in respect to their relative value—the subject of adulterations—fixing the quantity to be applied, and the period to apply them—the relative value of different kinds of food for stock, and its applications to the rearing and fattening of animals and to the business of the dairy, and many other subjects of this kind demand the labor and investigation of the chemist. The vast field of vegetable and animal physiology, as yet scarcely entered upon, offers great inducements for research. The improvement of breeds of cattle suited to our various climates is a subject of great importance in this country at the present day. Indeed, the whole world of science in its application to various branches of husbandry, lies open to the scientific man, and the wants of this country call for his aid.

IV. The introduction of new articles of culture is a subject worthy of attention by the American farmer. He is not restricted by climate to the cultivation of a limited variety of products. Our country embraces all climates and is suited to the plants of almost all zones. It is unnecessary here to enter into an examination of particular ones, but it is hoped that their importance will attract that attention hereafter which they deserve. It has already called forth some notice, but not so much as it ought. The culture of silk is exciting increased interest every year. The proceedings of the Silk Convention held in the city of New York, in the month of October last, displayed a most gratifying zeal in this pursuit. It is now demonstrated that this climate is favorable to the business, and may we not expect that the time is not far distant when the amount of imports from foreign countries will be very much diminished, if we cannot enter into the full faith that we shall ye become exporters of the article.

The cultivation of hemp is assuming at the present time no small share of importance, and under the new modes of preparation for use, bids fair to become of great consequence to the country. The olive—madder, and other articles which we have hitherto drawn from other nations, may be cultivated in this country with profit, and it is only necessary that the enterprise of our agriculturists should be awakened and directed to them. The following statement of the amount of some of these products imported to the United States from foreign countries, will show their cost to us, and what may be saved by growing them ourselves. In the year 1842 the value of imported silks, was $10,095,382; hemp, $1,119,559; olive oil, $138,247.

We have attempted briefly to show what may be done for American agriculture. That the subject has not been examined in all its bearings is true—indeed it were impossible in the span of a single artice. We hope however to have opportunities in future, in more practical papers, to set forth the subject more at large. That something must be done is felt by all. Our farmers are groaning under low prices—the new states are running a strong opposition with the old, and the only way for the latter to equalize themselves with the other, is to make use of all the improvements which are in their power.

Again—in the old states, many are adopting, and many more will adopt, new methods, and the rest must be left behind. They cannot compete with them whilst they stick to old practices, any more than they could with old fashioned implements. Thus two laws govern the two cases—the best implements and the best methods will insure success—and those who adhere to old implements and old methods must do it at *their own loss.*

EDUCATION OF THE AMERICAN FARMER.

There is nothing remarkably strange or remarkably wrong in the disposition of Americans to seek after new things, or to be dissatisfied with old. Many look upon a thing with which they have become familiar, as they look upon a coat which they have worn for a time, and consider that on this account it is really worn out and must be changed.

In some matters this disposition to change is of little or no consequence, and is not likely to be followed by injurious effects. When we come, however, to other matters, as our institutions, this disposition to change is to be looked upon with concern and apprehension, lest on the one hand, we should injure establishments which are doing all that is possible, and doing it well, or on the other hand, attempt to substitute in their places those which are inferior in point of utility, and more expensive in their arrangements. In these cases some higher principle must actuate or control our determination or judgments than those which govern us when we change our hats or our garments. Our inquiry in such cases, what is the fashion ? ought certainly to be made with a very jealous eye.

If, for instance, the fashionable or popular cry should be for some great change in our educational institutions—institutions which have produced great and good men, as our statesmen, our judges, our leaders in trying times ; men honored for attainments at home and abroad, whose discoveries in science and the arts have benefited the nation—we should listen to it with great caution and distrust. By these remarks we do not wish to be understood that we believe our institutions may not sometimes be improved by introducing changes both into their organization and in their courses of instruction, but we mean to be understood that an old thing is not to be abandoned simply because it is old, nor a new to be introduced because it is in accordance with the popular ery, or the fashion of the times. If, however, they have ceased to be useful; if they no longer answer the purposes for which they were designed, let them be abandoned; or if they are no longer adapted to our circumstances, and cannot fill the place they once did, then let them be replaced by others, and by those which are better.

These remarks are made in consequence of the opinions which have been freely expressed in some quarters, particularly in agricultural meetings, that our colleges and higher schools of learning are not adapted to fulfil the wants of the farmer; or in other words, that he needs an institution of a different character, and founded upon a different plan; for as they are not to be lawyers or clergymen or physicians, but are destined for a different sphere, so their education should be adapted to fit them to move in that sphere, or to be more definite, their education should be agricultural. This view of the subject is very plausible, and it is not strange that many should fall in with it, and believe that it is the very thing which will do for them.

But let us see how much real soundness there is in the position. In the first place, if this view of the subject is the right view, then it would apply to all persons who design to be educated: and the lawyer must have his, the physician his institution, and so on But again, in order to get at the merits of the question, how the farmer shall be educated, we must understand first what the collegiate course of study is designed for. We answer, they are designed to develop the mind. All the collegiate exercises and studies have no other end than the development of the intellectual powers; the student is trained by a systematic course, which though it is in mathematics, or languages, yet it has no reference at all, *necessarily* to his future business; it looks not to the question whether he is to become a clergyman, lawyer or physician, farmer or watchmaker. The whole course of instruction is to be considered as preparatory; it is only to lay a foundation; it is disciplinary. In this disciplinary course, however, he acquires something more, it is true, than the mere rudiments of knowledge; much of it is eminently practical, but still the course is designed for discipline and for development of the intellect. For securing this object, it proceeds in regular gradations from the less to the more difficult and abstruse studies; it is intended to lead the mind step to step, advancing upward, as the intellect acquires power by previous exercises. If these are not the main objects of study in early life, we know not what the objects are.

If, then, we are right in this position, what follows when we inquire what institutions are required for the education of farmers' sons? Shall institutions be established which have no regard to the development of the mental powers—institutions which shall take the narrow view that of simply fitting the sons of farmers how to plough; to sow and to reap, or carry their acquirements a little farther, how to analyse soils, to distinguish rocks or the different objects in nature. This is well and right and important, so far as it goes, but it is essentially defective; and in order that an institution for farmers' sons should be adequate to meet their wants and necessities, it would still have to embrace in its course of instruction that which is disciplinary—that which shall develop the intellectual powers. Taking this view of the subject then, we conceive that so far as institutions are concerned enough already exist to meet the wants and necessities of community. This is the view not only as it regards the attaining the full objects of education, but it is the true one so far as economy is concerned. A new institution must have its full board of instructors, its buildings, apparatus, and its endowments; whereas the institutions already established have all these requirements supplied.

However, that the old and useful institutions may be more useful to the agriculturist, let one of their present officers, a professor of chemistry, give a course of lectures on agricultural chemistry, which shall embrace the modes of analysis of soils and of the organic substances. Or to be still more useful, let the ordinary course be varied somewhat so as to give to a class of pupils who intend to pursue agriculture, personal instruction; or superintend a particular course of study which is deemed most suitable and best adapted to meet the particular inquiries of the farmer. To be brief, however, on this subject we need only say, that there is no doubt in our minds but the institutions already established are either in their present organization and course of study fitted to supply all the wants of farmers' sons, or they may with trifling alteration in their course of study be adapted to meet them. We intend here however, to speak only of the capabilities of our present institutions, not of the course of education which is particularly adapted to the farmer. We, however, in this matter, should take the view that it is not simply the farmer who is to be educated ; it is the man and citizen, and any plan or course of education which leaves out of view this sphere must be essentially defective, must be unsound and tend to foster a narrow and confined view which belongs only to place and business. The principles on which our institutions are founded are not worn out; though they are ancient, they are founded on those which will not essentially change ; they are not, it is true, inflexible and unyielding in their adaptations. Like communities and like individuals, the progress of mind must carry them along, the discoveries in science which they themselves have been instrumental in making, must add from time to time to the course of study. They must then enlarge the field of their operations ; they must adjust themselves to the conditions of society which they have actually brought about. But we do not believe for all this, that for every wind which blows, they are to change the course of their educational voyage which they are conducting, that they are to steer for another port, though it may be nearer than the one for which they have set their sails and their compass.

But still it is a happy feature in our institutions that while they move forward on the sea of human affairs, that while on this or that side the breeze may spring up : still they can gently give to its impulse, by swerving from an upright position accommodating themselves to the varying forces, and even if need be, outride the storms which rise by stiffly adhering to the principles upon which they are founded, and keeping clearly in view the chart which experience and observation has constructed for their guidance.

THE CLAIMS OF AGRICULTURE UPON GOVERNMENT.

The whole number of persons in the state of New-York, engaged in agricultural employments, according to the last census, is 455,954 ; the whole number devoted to commerce is 28,468 ; the whole number employed in manufactures is 173,193. It will then be seen from this short statement, that the agricultural is, numerically speaking, the great interest in this state ; and the same holds true of all the other states in the Union, with the exception of Massachusetts, Rhode-Island and Pennsylvania.

The fact just stated, that the pursuit of agriculture is the one in which the great mass of our population are engaged, is sufficient to show that no other interest can have a greater claim upon the attention of government; and looking to the past action of the legislature, in the encouragement given to the formation of agricultural societies, we think there is evidence to believe that this conviction is a general one. Certainly we are not aware that any complaint has been made in any quarter against this use of the funds of the state. No formal argument, therefore, seems necessary to prove that government should do something for agriculture; the obligation has been already acknowledged, and to a certain extent acted upon by our own and other states. It may, in fact, be looked upon as an established axiom in political science, that *all* the leading interests of the nation—agricultural, commercial, manufacturing, have claims upon the legislature,—claims which cannot be in any case neglected without producing ultimate injury to all. In all these departments of human labor there are some things which can be done only through the collective energy and influence of the state; the resources of no single person, of no individual corporation, are adequate to their accomplishment. And as government exists not for its own sake, but for the benefit of the governed, the inference seems an obvious one, that where there are benefits which the governed cannot individually secure, and which can be attained for these by government, they are entitled to count upon its aid.

The equitable adjustment of these particular claims is undoubtedly attended with no small difficulty; how, in other words, shall government lend its aid to any one of the three great interests before mentioned, without exciting the just jealousy of the others? We are disposed to look upon this as one of the most important problems in political science; it is one which has long been discussed, both in Britain and in our own country, but it has not yet been satisfactorily resolved. Some, indeed, very confidently affirm, that the true answer to it will be found in these two words—*free trade*; but while this theory is "very fair to look upon," it is still nothing but a theory, for not one of the great family of nations has ventured to adopt it.

However, it would be beside our purpose to enter into any speculations on this point; one of the principles of our national policy always has been, and is now, protection;—equitable, indeed, even handed, yet decided protection to all those great interests in which our citizens are engaged—to the merchant, the mechanic, the farmer;—all have tasted in a greater or less degree of the pleasant fruit of governmental aid. The question which we propose to discuss in this article is the practical one, what *can* the government (federal and state) do for the farmer? keeping of course within those limits respecting which there is no dispute—in what way can the most effectual aid be given to that particular pursuit, in which the vast mass of our population are employed? and which is, in truth, the basis and support of every other—agriculture.

Now, in the discussion of this question it may be observed, that there are various ways in which the legislature may lend its aid to the farmer, apparently to his great benefit, while in the ultimate result, if he is not absolutely injured by it, he at least derives no substantial good. For example, bounties may be given to encourage the production of certain articles, which are quite unsuited to the particular localities in which they are attempted to be raised. Some years since, the state of Maine expended (annually) a large sum in this way, with a view to induce her own farmers to cultivate wheat. And so the state of New-York *might* make an annual appropriation for the purpose of introducing the culture of tobacco; now it is not difficult to show that in such cases the farmer is rather injured than benefited, because his energies are misdirected; he is put upon the cultivation of something for which his soil or his climate may be altogether unsuited, and which the farmer of some other state will raise for him at a far less cost. We do not mean by these remarks to intimate that bounties should never be offered, but there is danger of carrying out the thing to an unwarrantable length,—of overlooking the great physical fact of the diversity of soil, climate, &c., and that no single locality, however highly favored, can produce every thing. To attempt every thing is to gain nothing. In our judgment, the only object of a bounty should be, not to *force* the cultivation of some thing new, but effectually to test the capabilities of the state; and to do this it certainly is not necessary to keep up a *system* of bounties.

Another illustration of well-intended but ill-judged legislation for the benefit of the agriculturist, may be drawn from the long established policy of Great Britain. Her landed interest has long been the object of her special regard and special legislation ; she has steadily aimed to secure to her own farmers all the advantages of her own markets, to shut out all possible competition. But with the progressive development of the resources, and the extension of the commerce of that great empire, other interests have been created, and though it cannot be said that they have been wholly uncared for, yet the landed has been the grand interest. The result of this special legislation for the farmer's good is, that those interests have been rendered antagonists striving for the mastery, whose natural state is one of mutual co-operation for a common good. It has been well observed by a writer in the London Quarterly Review, "that the agricultural and commercial portions of our population are embarked in the same bottom, forming the complex cargo of the great galleon of the state, in which they must sink or swim together."

We are free to confess that we are not at all desirous to see any such legislation in behalf of the American farmer. So long as our tariff is based upon the principle of protection, he unquestionably should have his share of it. But we regard this as a matter of little moment, because our agriculturists are as sure of our home market without a protective tariff as with one.

The great thing, we apprehend, which the farmer needs, is to know how to make his land in the highest degree productive, at the least possible expense. We look upon this as the grand problem in agricultural science ; and it is one which cannot be satisfactorily resolved without the efficient and judicious interposition of the legislature. And when we consider how intimately the solution of this problem is connected, not only with the primary profit of the farmer, but the physical happiness of all classes of the community, no man will, surely, venture to say that this interposition should be denied. It is a fact which may well seem strange to us, that while the mechanic, the manufacturer, the man of commerce, by applying the discoveries of modern science to their respective pursuits, have increased their wealth to an extent which arithmetic can hardly compute, the farmer, until within a very short period, has remained quite unconscious that the same science might be applied with the same prospect of success to his employment—the most ancient and the most important of all human arts. But the revelations dimly seen, or rather prophetically guessed at by Lavoisier, and since his day fully unfolded by Davy, Johnson, Liebig, and others, establish beyond all doubt the existence of a most intimate relation between chemistry and all the occupations of the cultivator of the soil. Indeed, the discoveries of agricultural chemistry have rushed upon us so rapidly, as hardly to give us time to form a just estimate of their individual magnitude and importance; and while it would be absurd to say that they open to the farmer a future of indefinite progression in the productiveness and the productions of the soil, this much may be affirmed, that they prove the impossibility of *now* fixing their limits.

In an admirable article on agriculture, in a recent number of the London Quarterly Review, it is stated, that "between 1801 and 1841, the population of the British empire increased from 16,-300,000, to 26,800,000; and these increasing numbers have been sustained with food almost entirely by the augmented productions of our own improving agriculture. By extensive enclosures, draining, &c., an amount of new and efficient forces have been called into action among the more energetic and intelligent part of the cultivators of the soil, especially in the northern and eastern portions of the island, which has been very nearly adequate to meet, from our home supplies, the increased demand for food arising from the addition of 10,000,000 to the population of the empire in the first forty years of this steam-rate century." We introduce this passage simply to show how the productiveness of a country may be increased—even one which has for many centuries been under cultivation. The results of particular instances of improvement, as given in the article already quoted from, are truly astonishing; and what is worthy of especial remark is the fact that the most surprising of these results should be placed to the credit of agricultural chemistry.

Now, how shall the problem of greatest and most profitable productiveness, at least expense, be resolved? In this important work, there is doubtless much which the American farmer must do for himself, but at the same time he needs, and must have, the aid of the state. For,

1. The first step towards improvement is a conviction that we have not yet reached perfection. But it is well known that convictions of this sort are not very easily awakened in the minds of persons moving constantly in the same limited circle, comparing themselves with none but their immediate neighbors. Such men are commonly prepossessed in a degree commensurate with their ignorance, that no improvement can be made. How strong and widely extended, for example, has been the prejudice among our agricultural population, against "book farmers?" This illiberal sentiment still exists, though we believe it is beginning to give way. What now can be expected of such men in reference to what is, not merely a practical art, but a science of the highest order, requiring a combination of various subordinate sciences in order to consummate its perfection. It is an established fact that the sciences of chemistry, of animal and vegetable physiology, of mechanics, form the foundation both of the theory and practice of that most important art, whose object is to obtain supplies of food, by co-operating with those laws which regulate the growth and multiplication of the animal and vegetable productions of the earth. Agriculture, says Liebig, is both an art and a science; its scientific basis embraces a knowledge of all conditions of vegetable life, the origin of the elements of plants, and the sources whence they derive their nourishment. Now looking to the vast mass of our agricultural population, in their present character and modes of thinking, it is vain to expect that they will, individually, make those experiments without which there can be no useful discovery.

2. But even if they had the disposition, the great majority of our farmers have not the means of making the requisite experiments fully to test the virtues of various soils and manures. The farmer's whole capital—we speak of the class—is invested in his land and the usual means of its cultivation; his farm probably is not without some incumbrance upon it; he can, therefore, spare neither his land nor his time, for experiments which may turn out well, and may subject him to loss.

3. Neither can the gentleman-farmer—to use a term which has become somewhat common—be depended upon for the determination of the great question before mentioned. We of course must be understood as speaking of them generally. There are no doubt many exceptions to the remark just made; there are men possess-

ing the means, the disposition, and the intelligence necessary for the successful prosecution of this work. But without enlarging on this topic, or meaning to intimate that the labors of this class of agriculturists have been wholly useless, we have only to refer, in proof of our assertion, to the pages of our agricultural papers. These record a vast multitude of experiments, and they sometimes announce stupendous results—29 to 70 bushels of wheat to the acre—but they are for the most part quite silent as to the expense of production. We have read of composts containing from twenty to thirty different ingredients ; now, not to speak of the costliness of such a composition for enriching the soil, a circumstance which puts it quite out of the reach of the mass of our farmers, the experiment in a scientific point of view is worthless, because in such a combination of agencies it is impossible to determine which of them are hurtful or useless, and which are beneficial.

The work, therefore, if ever done effectually, must be undertaken by the state ; she has ample resources ; she will, of necessity, call science to her aid ; and she will aim to elevate and benefit the agricultural interest, not merely in a particular locality, but throughout her entire extent. But the practical question arises, in what way shall the state lend its aid ? In reply to this inquiry, we beg to observe,

1. That the general government owes a duty to agriculture—to American agriculture, and this duty is all the more urgent inasmuch as it can be fully discharged without withdrawing one dollar from the national exchequer. The pecuniary means of performing the great work to which we have adverted, have been furnished through the singular generosity of a foreigner. We of course refer to the Smithsonian bequest. It certainly must be regarded as disgraceful to our government, that scarcely a single step has been taken towards the fulfilment of the benevolent design of the testator, though several years have elapsed since the money was received. We do not mean to attempt an outline of the entire system of instruction which should be pursued in the Smithsonian college : all that we mean to say is, that the diffusion of useful knowledge in reference to that branch of human industry, which is the basis of all others, and in which two-thirds of the whole population of the United States are engaged, should be one of the prominent objects of its erection. By the devotion of one-

fifth of the sum in the hands of government to this object, the interests of agriculture throughout the entire Union might be vastly benefited; the erection of the institution near the seat of government would greatly help to diffuse its blessings far and near.

As we have already intimated, we would not wish the Smithsonian college to be a mere agricultural school; there are other equally important branches of knowledge, which should not and need not be overlooked; but we regard this subject as one which eminently deserves the early and earnest attention of the friends of agriculture in all the states. It is high time that the money be used for the noble purposes for which it was given.

2. We believe that a better use might be made of the sum which has been placed by the legislature of our own state at the disposal of the State Agricultural Society. The existing law will soon expire by its own limitation, and in any future act, we deem it of great importance that those who may have the management of the fund, should be directed to reduce the number and increase the amount of their premiums. In this way, we believe that much good will be done, and at least expense to the state; so far, at least, as respects experimental agriculture, if we may be allowed to coin a phrase. Many a farmer might be tempted to undertake the raising of some new production by the offer of a premium of one hundred or five hundred dollars, who would not venture on the experiment for five or twenty dollars. Take, for example, the article of hemp; the question whether it can be profitably cultivated in our state, might by the offer of a high premium be settled in a single year, or in two years at most.

3. The establishment of a permanent department or a Board of Agriculture, is a subject well worthy of serious consideration. The fact that the state society has for some years been employed as the agent of the state, seems to us to be a virtual acknowledgement of the want of some such department of government. Why then, shall we not have one responsible like all the other branches of the government to the legislature and the people? The interest to be watched over is a commanding one; it, more than any other, affects the general welfare. It deserves a department, and we fondly hope that the day is not far distant when we shall have one.

4. The promotion of agricultural science is another duty which

the legislature owes to our farming population. This branch of our subject is amply large enough to merit a separate discussion. We have neither the room nor the time to enter into it with the fulness which it deserves, but we hope to be able to do so in some future number. The numerous and urgent proposals to establish agricultural schools, would seem to indicate a deep conviction in the public mind of the importance of the object itself; but how can it be best attained is a question to which different answers are given. An agricultural college, and the introduction of the study into our common schools, have been suggested. In regard to the first of these projects, we can only say at present, that the establishment of a college where the young farmer may at a small expense obtain the *whole* education which he needs to fit him for the duties of active life might be useful; but to found a *mere* agricultural school, in our judgment, would be a very unwise scheme. We entertain the same opinion in regard to the other suggestion, viz., the introduction of the study of agriculture into our common schools. If these schools were what they should be—if they were conducted by men who made teaching their exclusive business, the proposal might not be objected to; but looking at our common schools as they now are and are likely to remain for years to come, notwithstanding all the efforts to elevate, we cannot but deem the plan above mentioned as worse than foolish, for the result can be nothing else than the imparting of that "little knowledge" which is always "a dangerous thing." No. Let the study of scientific agriculture be introduced into our *academies*, and some good may be expected to be done. But we shall not pursue the subject further, as we hope to recur to it again in some future number.

SOUR SOILS.

It is highly important that, whilst facts are examined and carefully treasured up by the agriculturist, errors should also be searched out and guarded against; and this not less in practice than in theory. All the processes of agriculture are based upon theory of some kind. No farmer works by guess. He has his reasons for all he does, and can least of all, be induced to try anything new, unless there are reasons for it, and such reasons as strike his mind as good and sufficient. Yet it is not to be denied that for many things he has only the show of reason, whilst in fact there is none at all. We will not say this is the case in regard to the subject placed at the head of this article, although we believe there exists no such thing as a sour soil. We offer no apology for differing from the farmer or the man of science in this respect, though both of them may be implicated in what we consider an error. We are well aware of the almost universal belief in it, arising, as we apprehend, in the practical man, from observing the benefit often arising from the application of alkalies and alkaline earths to the soil. The little knowledge which almost every one possesses of chemistry teaches him that when an acid and an alkali unite they form a *salt*—a compound generally of a mild and inactive kind compared with the substances which go to form it, and therefore it is thought, that when that class of substances is applied to soils which they call *sour*, an amelioration is produced by their uniting with the peculiar acid which exists there. But does the benefit result from their neutralizing a free acid which was injurious to vegetation ? Let us examine it a moment.

What acid or acids are found by actual analysis, in a free state, in the soil ? and which are prejudicial to vegetation, or which favor the growth of certain plants ? It cannot be carbonic, for this, every one knows, is an essential part of the food of plants, and in the quantity in which it is commonly found, instead of being prejudicial, is an actual source of life and vigor. Examine the analysis of soils given by the most correct analysts. We find, it is true, that *inorganic* acids, (sulphuric, phosphoric and muriatic) are present in variable quantities in almost all soils. But we find also the alkalies, (potash, soda, lime and magnesia) and the oxides of iron and manganese as invariably present. True, we are not told in so many words, that they are combined with the acids, but it cannot be supposed that these substances should exist uncombined by the side of each other, in circumstances the most favorable for union. The moment they come in contact they unite and form salts, and in this form they are found. The analysis of a large number of soils from various parts of the state of New-York, during the last two years, confirm these views.

Are the *organic* acids found in the soil ? It is granted on all hands that these are formed by the living and growing plant, and depend upon the plant in which they are formed for their peculiar character. The oxalic acid of the sorrel, tartaric of the grape, citric of the lemon, and malic of the apple, and a host of others, may be formed by those plants growing in the same soil. Liebig says, "We have no reason to believe that a plant in a condition of free and unimpeded growth produces more of its peculiar acids than it requires for its own existence;" and he also says, that all of them "are in combination with bases."

During the process of germination a seed gives off acetic acid to the soil. But it does not remain there uncombined. If seeds are caused to germinate in powdered chalk or carbonate of lime, after a time *acetate of lime* may be washed out from the chalk, (Braconnet). And it is possible that the acid is sent out for this very purpose, to dissolve the lime and return with it into the circulation of the plant. At all events, it is always found in the soil combined with lime.

Oxalic acid is not known to exist in the soil or in the water which reaches the roots of plants So says Johnston ; and yet the production of sorrel, which abounds in this acid, is supposed by many to depend upon the sourness of the soil. But observation proves that if this is the case, lime, the ordinarily recommended remedy, will not so neutralize the acid as to prevent its growth, even when applied in large quantities. Thus, Mr. N. Darling of New-Haven, Conn., mentions having seen it growing near an old limekiln, luxuriantly, through a considerable thickness of lime. In the Cultivator for August, 1844, it is stated that Doct. Beekman, of Kinderhook, "had several loads of good lime spread on some land which was much infested with this plant. It was spread in the central part of the field very thick. After a lapse of two years, *no effect whatever* has been discoverable, either for or against the sorrel." It is but just to state here that numerous instances are mentioned of this plant being eradicated where lime was used. In the Cultivator for July, 1844, will be found a letter from J. J. Thomas, containing some curious facts in this connection. One is, that this weed disappeared from the land of Mr. Dell, after the use of lime. Is it not, to say the least, probable, that in all such cases a course of active tillage has done more than the lime ? But oxalic acid has never been found in the soil.

Some physiologists have attributed to the roots of plants not only the power of absorbing food, but also of throwing off those matters which are taken up with the food and are not necessary for the growth or sustenance of the plant. Amongst the experiments instituted to determine this point, we find but one in which there is any evidence of an acid being excreted, and in this case it was united with a base. When the ground upon which the poppy had been grown was washed, a considerable quantity of *acetate* of lime was found.

But if free acids exist in soils they must be dissolved in the water which passes through, and will then appear in springs and wells, which we believe is never the case, although these waters always contain some salts. There is an apparent exception to this, but it is only apparent, in the case of carbonic and sulphuric acids as they exist in some springs and as they are produced beneath some soils in overwhelming quantities, so as to destroy all vegetable life. The presence of these acids depends upon some local cause for which there is no remedy.

Nothing has been said thus far of humic acid, which is known to abound in soils chiefly composed of vegetable matter, because this acid is utterly insoluble, and can therefore have no injurious effect upon vegetation. We are only considering such free acids as are prejudicial, and which of course must be soluble. It cannot be assumed that soils abounding in this acid are *from this cause* unproductive. They are so, not because they contain the acid, for it is generally admitted to be, under proper circumstances, an abundant source of nourishment to plants, but because the acid is insoluble, and cannot in this state be conveyed into the mouths of plants.

But after all, the question must be decided by analysis. It cannot be reasoned thus—because such a plant grows upon a soil, that soil is sour. The only evidence of its being sour is the actual finding an acid in it, and if one is there it can certainly be found. Besides, this question cannot be decided from the effect of alkalies, and till some acid is found in the soil, the cause of the benefit following their use, must be looked for in something else than their neutralizing power.

MANURES.

PART I.

THE RELATIONS OF ORGANIC TO INORGANIC MATTER.

Manures are the food of plants. This is a fact which has been well understood through all the ages of agriculture, so far as the mere circumstance of applying them to the soil in order to secure a reasonable crop; but the *how they operated* to bring this about, or *why they were applied at all*, have been points not so well comprehended. That plants are beings of a delicate and complicated organization seems to have been long known, but this knowledge was of a general kind and led to no practical good. It has been left to the science of the present day to unlock this storehouse of exhaustless knowledge, and to astonish even the wise men of the nineteenth century with the wonderful developments that are almost daily made of the relations of organic and inorganic matter. A seed falls into the ground, and, watered with the genial showers of spring, soon sends up a tender shoot. It reaches upward—expands—throws out its branches and leaves to the light and air, and its roots reach downwards and pierce into the soil. Year after year it grows and spreads till it becomes a tall oak or the gigantic pine. It opens its blossoms and for a few days they rejoice in the glad sunshine and then fade and fall. Next succeeds the fruit—the seed—that strange product which is for the sustenance of the animal world. Whence have the materials been derived, which have served to build up the frame of the plant and perfect its fruit? Have they all come from the soil in which it grew, or from the atmosphere? We prepare the soil and manure it, and sow it with wheat. Does the crop depend upon the soil, the air, or the manure, for sustenance?

In the early part of the seventeenth century, Van Helmont advanced the theory that water was capable of supplying to plants all they need to perfect their growth, and thought he had demonstrated the truth of his theory by .experiment. In the following century, Jethro Tull maintained that plants only required earthy particles for their nourishment, and that it was only necessary to pulverise the soil to secure an abundant crop. He supposed that the only use of air and water is to aid in reducing the soil to the state of extreme division. Others have said that the vegetable matter in the soil was the great source of fertility, and till the light of analytical science was thrown upon the subject, every thing relating to it was vague and uncertain. It may now be considered as settled that plants are dependent upon the earth, the air, and water, for sustenance, and that deprived of either they cease to exist. The earth furnishes the mineral ingredients without which the plant could no more flourish than without those it derives from water and the atmosphere.

But in order to obtain a full comprehension of the action of manures and their individual value, it is necessary to take a more particular view of the relation which plants sustain to the earth on which they grow. That physician would be deservedly exposed to ridicule, who, ignorant of nature and character of disease and of the operation of medicines, should attempt to cure his patient by administering a potion consisting of numerous ingredients, hoping some one in the compound might reach the case. So ought the farmer to be placed by his side, who remains ignorant of the nature of soils and plants, and the action of manures, and applies a *fertilizer*, as he terms it, composed in a similar manner, in the expectation that his crop will have the sagacity to select what it needs and reject what it does not need. Such is not rational, neither is it economical farming. The object of the farmer ought to be to get the greatest yield from the least outlay—to apply those manures which will supply the wants of the crop, and at the same time render the soil permanently productive. We say this cannot be done without knowledge, and that, not a general knowledge that manures must be applied, but a particular and minute understanding of what constitutes a fertile soil, and what plants need to develop their powers in the greatest perfection. A full investigation of these subjects would far exceed the bounds of an article or even a series of articles in this Journal. The reader is referred to the various standard works on agriculture, for a full discussion of these points, and particularly to the lectures of Prof. Johnston, which is in our estimation the best work of the kind yet printed. In the meantime let us proceed as far as our limits will allow, and as essentially introductory to the consideration of individual manures, to examine the relations of plants to the soil.

When we look around upon the old settled and long cultivated portions of this country, and reflect upon what they were in the days of our fathers, we cannot but notice an alarming change. The soil has experienced a wonderful degeneration—it has lost its fertility. It has been tilled—it has been manured—it has been watered with the rains and dews of heaven, and with the sweat of toil, but its productiveness is gone—or as the owner says, it is *worn out*. But the land does not wear out. Some radical change has taken place which unfits it for the production of the crops it once bore, or any other. Here luxuriant crops of wheat once grew, there tobacco and there cotton were raised in abundance, but now the impoverished soil refuses a return. And what is the cause? This we will attempt briefly to elucidate.

When a portion of any plant is burned, the greater part disappears; a small portion of ash only being left. The quantity left by some plants is greater than that left by others, and the different parts of the same plant leave unequal quantities, and in all cases the residue is small when compared with the bulk of the plant. This will be evident from the following table:

Quantity of ash in 100 *lbs. of*

Wheat, ...	1.18 lbs.	Potatoe, ...	2.65 lbs.
" Straw, ...	3.51 "	" leaf, ...	4.79 "
Rye, ...	1.04 "	Turnip, ...	7.05 "
" Straw, ...	2.79 "	" leaf, ...	2.96 "
Oats, ...	2.58 "	Hay, ...	9.00 "
" Straw, ...	5.74 "	Red Clover, ...	7,70 "
Barley, ...	2.35 "	Parsnip, ...	14.34 "
" Straw, ...	5.24 "	" leaf, ...	15.76 "
Beans, ...	2.14 "	Elm wood, ...	1.88 "
" Straw, ...	3.12 "	" leaf, ...	11.80 "
Peas, ...	2.46 "	Oak wood, ...	0.21 "
" Straw, ...	4.97 "	" leaf, ...	4.50 "

The above tables are quoted to show the quantities of ash left after burning different plants, that the quantity is always very small, varying from one to fifteen per cent, and that different parts of the same plant give different quantities. The constituents of this ash are substances with the most of which every one is familiar. They are potash, soda, lime, magnesia, alumina, silica, iron, manganese, chlorine, iodine, sulphur and phosphorus. These do not exist in the plant in their simple form, but variously combined with each other and with another class of substances to be mentioned hereafter. Till a very recent date they were regarded as not essential to the vegetable structure, being considered as being only accidentally present, from the fact of the plant growing in the earth. They are now however, regarded as not only important, but essential in the economy of vegetation, and it is the opinion of Liebig, that the presence of these substances exercises the whole control in perfecting the plant. If they were not necessary to the healthy growth of the plant, or were only accidentally present, we should expect that sometimes one would be found in plants of the same species, and sometimes another in greater proportion than at other times, or that plants of whatever kind growing in the same soil would contain the same quantities. But this is not the case. The variation is very slight in plants of the same kind, and those proportions may be considered as uniform. Nor do plants of different species, nor even those of different varieties of the same species, growing in the same soil, contain the same quantities. In the tables quoted above, a remarkable difference appears in the quantity of ash left by various plants, and the difference is as remarkable in the constituents of this ash. Thus, the straw of wheat gives more than three per cent of ash, in which the principal mineral ingredients are as in the following table compared with those of oats, yielding nearly six per cent, and beans more than three per cent. The quantity is what is found in 1,000 lbs. of straw.

	Wheat, lbs.	Oats, lbs.	Bean, lbs.
Potash, ...	0.20	8.70	16.56
Soda, ...	0.29	0.01	0.50
Lime, ...	2.50	1.52	6.20
Magnesia, ...	0.32	0.22	2.09
Sulphuric acid, ...	0.37	0.79	0.34
Phosphoric acid, ...	1.70	0.12	2.26
Silica, ...	28.70	45.88	2.20

A remarkable difference will be observed in the proportions of these substances in the different straws, and especially in the potash and silica. While the wheat straw contains potash 0.20, and silica 28.70 lbs., the bean contains potash 16.56, and silica 2.20 lbs. in 1,000.

Healthy and perfect plants of the same kind, will always be found to contain the same number of these substances, and in the same or very near the same proportions. This constancy of composition, whether the plants are grown upon the same or different soils, is indisputable evidence that these substances are indispensable.

These portions of the vegetable structure are all derived from the earth, and a fertile soil always contains them. Not always, it is true, in the same proportions, but they must be there in some quantity, or it is unproductive. The amount of some one may be very small in comparison with the mass of soil, and yet in connection with others give it a character of high fertility, as every farmer has seen in the application of a minute quantity of gypsum to a field of red clover.

It will now be readily understood, to what this *wearing out*, or degeneration of the soil is attributable. In successive crops these substances are taken from the soil, and have not been restored in equal quantity in the manures that have been applied. The grain—hay—milk—butter—cheese—beef—wool, &c., have been taken to the market, and all that was contained in them of a mineral nature, was so much robbed from the soil. The process of deterioration may not have been apparent, for originally the supply was large. But such a drain kept up for years has had the effect of impoverishing the soil and leaving it at last, in a measure at least, unproductive. The amount taken off in any one year was small, but continued for a number of years makes a large quantity, and if the whole has not been restored in the shape of manures containing the very substances carried away, the land must eventually cease to be productive. At the same time another cause has been operating to bring about the same result. By the processes of cultivation some of these materials, which formerly existed in the earth in an insoluble state, are rendered soluble. They are taken up by the rain which falls, and carried down with it in its passage to the subsoil. In this way lime is often entirely exhausted from a soil.

It will be understood from what has been said, that all crops do not exhaust the soil of the same substances in the same proportion.

From this cause land which has ceased to be productive of one plant may yet be well calculated for another. And this has given rise to rotation in crops, now so extensively practised.

Another cause of unproductiveness in a soil may be merely mentioned here, and that is the presence of noxious substances. But this will be referred to more at length in another place.

All this might have been prevented and may be remedied. It is possible not only to restore a soil to a former degree of fertility, but the limit of its productiveness is not known. Besides, we know not the effect which a continued cultivation of wheat, for instance, on a highly improved soil may have upon the qualities of that grain. We know indeed, that all our cultivated plants have been produced from a naturally inferior stalk, and that those grown upon a poor soil are inferior to those grown upon a rich one, and that cultivation has been the means of making them what they are. Have they reached the limit of improvement ? is a question it is hoped will not be answered till proper efforts have been made to answer—*no*. We believe not, and we also believe that as long as the soil is continued in a condition of progressive improvement, so long we shall find a corresponding improvement in not only the quantity but the quality of all cultivated plants.

But the relations of organic to inorganic matter may be traced yet farther. The vegetable world is the food of the animal world ; the connecting link between the highest and the lowest orders of creation. The plant or its seed is eaten, and, behold, bone is made—muscle—fat—milk, and all the varied products of animal life. Whence all these ? It will hardly be believed by those who read it now for the first time, that these are not really formed by the animal, but are the ready made products of the vegetable, which have only to be appropriated and put in their proper places in the body. Such is, nevertheless, the fact ; these very materials, as such, being found in the structure of the plant. But the connection does not stop here. Plants and animals die. Their bodies decay and return to the earth and air from whence they sprung, to become again food for a new generation—to become, in fact, *manures*. And thus the eternal circle goes on. How wonderful then this relation, thus briefly noticed. The earth is the great storehouse and source of vegetable food. The plant receives it and prepares it for the animal, both of which must be eventually converted into food for a new race, thus linking the whole creation together in an unbroken chain.

But another branch of the subject yet remains to be considered. We have seen that plants contain but a small proportion of mineral or *inorganic* matter. The *organic* substances on the other hand are by far the most abundant. They compose the great bulk of the plant, constituting generally more than ninety per cent of it, although they are few in number, and three out of four of them, when pure, being always found in the form of gas. They are oxygen, hydrogen, nitrogen and carbon. Unlike the inorganic matter, these are not derived solely from the earth. Indeed, it is a point not yet settled whether some of them are not derived exclusively from the atmosphere. That there is a sufficient amount in the atmosphere to furnish plants with all they require, may be true, and yet at the same time it may not be true that they receive them all from this source. If it be true, then a great error has existed, and still exists, and is increasing in extent under the authority of science, in the preparation of farm-yard manures and composts for application to the soil. Instead of preventing thorough decomposition in the dung-heap, or checking it when it has reached a certain point—instead of using gypsum or charcoal to arrest the gases as they escape from decomposing animal matter—instead of ploughing in green manures or adding any vegetable or animal matters to the land, the proper course would be to decompose all such substances as perfectly as possible, or actually burn them, thus suffering all the volatile parts to escape into the atmosphere, whilst the ashes alone are retained to be applied to the soil. Liebig himself, to whom this whole theory is often imputed, says, that *humus* is of use in the soil as a source of carbonic acid to enable the plant to gain time, that is, to increase rapidily in growth in a short period; thus admitting that this gas is derived from the soil in part, while he adds, that by this means "space is obtained for the assimilation of the elements of the soil necessary for the formation of new leaves and branches; meaning the inorganic substances."—(*Familiar Letters on Chemistry*, *Letter* 15*th.*)

But the experiments of Saussure seem to show, that the plant may not only derive its carbon from the soil in the form of carbonic acid, but that it has also the power of absorbing it in other forms and assimilating it. Practically considered, safety lies on the side that makes both the soil and the atmosphere the sources from which these elements are drawn. It is well known that the roots will absorb them if presented to them in a liquid form, and if introduced into the circulation they will no doubt be appropriated by the plant.

Nothing in a solid form can enter into the circulation of plants. It is by means of water that they receive all their food which they take in by their roots, that fluid being the solvent of all they require. By their leaves they absorb gases and probably water also. But before any thing can enter the minute pores of the roots, it must be dissolved in water. But this is not the only use of water. It is composed of two of the gases mentioned above, viz., oxygen, and hydrogen, and is an abundant source from which the plant can receive them. And it may be proper before closing this paper, to consider in a few words the sources whence the plant derives its organic constituents.

Carbon constitutes a very large portion of the vegetable. From forty to fifty per cent, nearly or quite one-half, of all plants consists of this substance. This is derived from several sources. First, by their leaves from the atmosphere. When wood or coal is burned in the open air, the principal product is carbonic acid, i. e. carbon united with oxygen. During the process of respiration, animals give off from their lungs this same substance. About eleven ounces of this gas are said to be thrown off from the lungs of a healthy man in twenty-four hours. This mingles with the air, constituting about $\frac{1}{1000}$ part of its weight, the quantity varying somewhat under different circumstances; in the vicinity of large bodies of water, it being less, and at night more than in the day. From this source it is absorbed by the leaves of plants, which are furnished with numberless pores, serving as mouths. It is the opinion of one class of vegetable physioligists that it is in this way that they obtain all their carbon, making no use of their roots for this purpose.

But it is probable that it is taken up largely by the roots, both that which is brought down from the atmosphere in rain, and also that which is formed in the soil by the decomposition of animal and vegetable matters. These organs indeed, may be considered the true mouths of plants, by which they receive by far the greater part of their food, both organic and inorganic.

Although there are various sources from which plants may derive their hydrogen, yet water may be considered as the chief one. Of this substance it constitutes two parts in three; and being the only medium by which they can receive their food, it is constantly passing through their organs, and is there decomposed, furnishing both hydrogen and oxygen to them. Ammonia is a compound of hydrogen and nitrogen, and may have a part to perform in furnishing this gas.

Plants are surrounded with the atmosphere containing oxygen, are constantly supplied with water containing it, and are always absorbing carbonic acid of which it is a constituent; and therefore no one will be at a loss to find the source from which plants procure this gas.

Although nitrogen forms a large part of the atmosphere and a very small part of plants, it does not appear that they obtain this substance from this source.

We have just stated that ammonia consists of hydrogen and nitrogen, and it is an abundant product of the decay of animal and vegetable substances. This is the substance commonly called hartshorn. It is known to exist in the juices of some plants already formed, and is absorbed in large quantities by water. It exists in the atmosphere in very small quantities at all times, and being washed down by rains, is brought in contact with the roots. Thus passing into the circulation, it is decomposed and its nitrogen appropriated.

Another source is nitric acid (aquafortis.) This is also one of the products of decaying animals and vegetables. Besides this, it is produced during thunder showers, by the effect of the lightning upon the air, causing its elements to enter into a chemical union, and being absorbed by the rain is brought down and taken up by plants. The effect of some salts of this acid as manures, depends, without doubt, upon thissubstance.

We have thus examined as fully as our space will allow, the constitution of plants, and their relation to the soil. It yet remains, before entering directly upon the subject of manures, to consider some circumstances which modify their action. This will be done in the opening of the next number.

PHOSPHATE OF LIME.

It is an object of great importance to discover phosphate of lime in its pure state, or even mixed with other materials, in sufficient quantity to supply the wants of agriculture. We fear, however, that this desideratum will not be realized very soon. Although it cannot be said to be rare, yet it is not known to exist in large beds, and very rarely in small ones. The common mode of its occurrence in the mineral kingdom is either in small disseminated particles, or in crystals varying in size from a needle to five inches in diameter. When occurring in crystals it is never in sufficient quantity to meet at all the wants of farming; and in fact, these crystals are so highly esteemed by mineralogists, and so high a value placed upon them, that no one would ever think of spoiling them, or of devoting them to any other purpose than to adorn the cabinet. There are only two localities known in New-York which can possibly yield an amount sufficient to render it an object to the farmer. One of these places is seven or ten miles west of Port Kent, on Hogback mountain, at the iron ore bed of Messrs. Thomlinson & McDonald, or which is known in the Geological Report of the 2d District, as the Rutger's ore bed. At this bed it forms in some parts, nearly one-half the mass of the vein or bed; at others considerably less. It is, however, the principal stoney matter of the bed near the surface. The phosphate of lime of this locality may be obtained at the place where the ore is separated. The kind of stoney matter mixed with the ore is feldspar and hornblende, mostly the former—hence, the whole material separated from the ore could be preserved and ground like plaster, and used as a fertilizer. The best way of using such a powder, would be to put a small quantity in the earth with the seed, or apply it as directly to the growing plant as possible. Let it be understood, however, that this locality is not of very great importance; the washing of the ore, however, would supply several farmers with this invaluable substance. We have mentioned this locality that it may not be lost, to those certainly who live in the immediate neighborhood; for they ought to secure it for their gardens at least. In the course of a year, if the ore continues to be worked, several tons of it might be procured. In using it, it should be reduced to an impalpable powder.

The color of this phosphate is red or reddish. It sometimes appears in large crystals upon the walls of the vein, but it is so extremely brittle that it will be very difficult to procure it in a good form for the cabinet; still, it is an interesting variety.

Another locality of phosphate of lime deserving of the attention of the agriculturist, is that of the Sandford ore bed in Moria or Westport. It is washed out of the ore in the same way as the former. Its color is a duller red than the former, or rather brown, and is always in small grains, and appears somewhat like the flesh-colored feldspar.

In addition to the above localities of phosphate of lime, one other is deserving of notice, which we had forgotten when we commenced our notice of the preceding. It is at Crown Point, and the mineral is known as the cupyrchroite. We discovered its locality while engaged in the survey, and as the external characters are so dissimilar to phosphate of lime, we considered it a new mineral substance. Our experiments at the time showed it to be a phosphate, but we conjectured that it contained another substance in combination. We still entertain this opinion. But the analysis of Dr. Beck shows that phosphate of lime enters largely into its composition; and as it forms a vein in the rock more than a foot wide, it is possible it may be of some importance to the farmer. It is a dull green, and fibrous and obscurely mamillary, or in the form of segments of a sphere. This substance is intermixed with silex in little masses in the interior, and on that account will not pulverize so easily as it usually does. We have not examined it, however, with the view of determining how much this locality can furnish at a reasonable expense. At the time we discovered it, we considered it rather in the light of a trap dyke, or an earthy vein; it was concealed, however, partly by soil, and hence we may be deceived as to its width, nature of the deposit, as well as to its extent.

FERTILIZERS IN THE ROCKS.

Our attention in the course of the agricultural survey, has been turned to the character of the rocks as fertilizers of the soil. The first inquiry was—do the rocky masses themselves admit of being applied as manures? and in the second place, what elements do they contain which renders them valuable as fertilizers to soils? In answer to the first question, we have ascertained that some at least of the shales—limestone shales, as they may be called—are of great importance to agriculture. We stated in one of the meetings held at the geological rooms, some of the results of the analysis which we had made: showing that they are rich in saline matter, and mostly free from the astringent salts which are injurious to vegetation. These examinations are the first which have been made in this country in this matter, and we propose to pursue them. New-York, in every district, except the Atlantic, is rich in the shales, particularly the western, or the wheat growing district. In order to use these shales, the best mode will be to raise them, throw them into heaps in prepared places and then let them crumble and decompose. The debris of the heaps may be mixed with a compost or with barn-yard manure. If the decomposing matters are astringent, mix them with sufficient lime to neutralize the salt, which will probably be mixtures of the sulphates of iron and alumine; these will be decomposed, and gypsum will be one of the resulting compounds. In addition to these salts there will be found sulphate of magnesia, which ranks high as a fertilizer.

Besides the shales, the limestones themselves are deserving of examination; but, as I have not yet advanced far in this inquiry in regard to them, I merely speak of them in this brief manner, hoping by and by to lay some important results before the agricultural community.

Of the materials which it is possible the fossiliferous limestones may contain, we may state the high probability of their being rich in phosphate of lime. Derived as they all are from primary rocks, all of which are occasionally known to embrace this substance, we can hardly doubt of its presence—especially when we connect it with the fact that much organic matter has been enclosed in the rocks themselves, in combination with organic remains. All animal matter contains more or less of the phosphates, and hence as these remains of organic bodies are still enclosed in our rocks, we conceive that it must be locked up still in these sedimentary masses. Bearing upon this subject, we may state that the recent examinations of Mr. Benjamin Silliman, Jr., of the corals, bears out this conjecture. Thus, Mr. Silliman found as much as nine or ten per cent of the phosphate in some of his examinations of the corals. Is this substance likely to be lost when these corals are enclosed in their rocky beds? If a limestone with a few per cent of this substance could be found, its value for agricultural purposes would be greatly increased.

All these facts and suggestions have a practical bearing, and we are anxious the farmer should be able to avail himself of all the aids which science can afford. On this subject we propose to give from time to time, the results of our inquiries.

Phosphate of lime, we have already stated in another article, occurs in the white limestones, such as those in Orange, St. Lawrence. and Jefferson counties. Of the origin of this substance there is a difference of opinion, and we hope we may be excused for occupying a short space in our columns in the discussion of this point, although it has no practical bearing; yet we believe that all enlightened agriculturists will be pleased to know as much as possible of those subjects which relate to the history of important materials—one so important as phosphate of lime.

Mr. James D. Dana, [*Journal of Science p.* 135, Vol. XLVII,] maintains that the phosphate of these limestones, although now in superbly finished crystals, originated from organic structures, from corals, which after being enclosed in their rocky prison, were exposed to intense heat, and hence were decomposed; the phosphate of lime separating from other matters composing the original coral, assumed the form and condition we now find it. In this exposure, the whole rock is supposed to have undergone an entire change, passing from an earthy to a highly crystalline mass. The idea is, that these rocks were originally deposited in the ocean, enclosing in their several beds and layers the organic bodies which then lived upon those beds; or, in that ocean—mere sediments—but by the exposures we have already spoken of, have been changed and brought to the condition we now find them. Magnesia is another element of corals, and as many limestones are magnesian, it is inferred that these limestones have also a similar origin. Proceeding still farther, Mr. Dana infers that the magnesian minerals, as serpentine, steatite, pyroxene, tremolite, spinelle, chrondrodite, all have a similar origin; a derivation from organic matter. But now let us enquire, are these generalizations necessary? Are they probable? 1. As it regards the phosphate of lime, we have given two localities [p. 60, 61,] where it forms the gangue of iron ores; and again it exists in gneiss, mica slate and granite. Is it of organic origin here? There is no proof of it. It is only when contained in limestones that phosphate of lime and magnesia are supposed to have this origin. The question must turn then, on this point: are the relations of these limestones in St. Lawrence, Jefferson, Essex, and Orange counties, such as to bear out and sustain the hypothesis? We answer in the negative, and would add in support of our negative, their relations are such as to overthrow—to entirely overthrow it—to demolish it. The limestones which are richest in phosphate of lime and other magnesian minerals, are universally enclosed in gneiss or granite—they are in veins or beds; one in particular, which is rich in these minerals, projects out of the hypersthene rock, or comes up from below. How a sedimentary, coraline rock could get into this position remains to be shown. That it has been acted upon by heat is not denied, but that this and many other masses like unto it were originally sedimentary rocks, not a fact in existence has ever been observed to sustain the hypothesis. Again, the magnesian limestones of Berkshire county, the Stockbridge limestone, which is truly a sedimentary rock and stratified, has never furnished to my knowledge a crystal of phosphate. It is here that we ought to find it, inasmuch as it is granular or crystalline, and may have been formed at a period when animals dwelt in the seas upon whose bottom it was deposited. But once more and we shall drop the subject. We wish to be understood not to deny the possibility of changes of the kind Mr. Dana speaks of. We deny the propriety of the application he has made of the facts to the limestones of the counties mentioned above. For a full account of this origin we refer the reader to the Geological Report of the 2d District.

FREE MARTINS.

When a cow produces two calves, one of them a bull calf, and the other a cow calf, the cow calf is known by the curious name of *Free Martin*.* The male becomes in due time a perfect and useful bull, but the female is generally supposed to be incapable of propagation.

This belief is prevalent, not only in this country but elsewhere. An opinion so wide spread and so fully believed, not only by the ignorant and vulgar, but experienced and intelligent cattle breeders, would seem to be worthy of some degree of credit. It certainly merits investigation.

The first point of inquiry, is to determine whether it is an *invariable* rule that free martins will not propagate. In order to ascertain how far this opinion, so generally received, might be correct, I made careful inquiries among many who were engaged in rearing cattle, and also examined such journals and books as would be likely to furnish information on the subject.

It soon appeared beyond a reasonable doubt, that free martins *were not necessarily barren;* yet as a general rule, subject to a few exceptions, they will not breed.

A gentleman of veracity, residing in Buffalo, and well known to many agriculturists throughout the state, informed me that he reared a free martin on his own farm, and that she afterwards calved. This animal is still living, and is on the farm of L. F. Allen, Black Rock. An English gentleman informed me of an other instance in England, which occurred under his own observation. The heifer died of disease, and on examination after death was found to be pregnant.

Two cases of free martins propagating are recorded, and a third related on hearsay evidence in the American Agriculturist, Vol. III. No. 3, March, 1844, by Joseph Cope of Pennsylvania. An anonymous writer in the Farmers' Magazine, for November, 1806, describes a free martin, belonging to Mr. Buchan of Killingtringham, which had a calf, and proved to be a good milker. Another writer in the same Magazine for November, 1807, raised a free martin, which bore when two years old a fine male calf.

* Cattle; their Breeds, Management and Diseases, &c., by W. Youatt. Philadelphia, 1836, p. 538.

These are the only free martins I can ascertain on sufficient evidence to have propagated, while there is abundant evidence, equally good, of a very considerable number which had been faithfully tried and proved barren.

It would hence appear that the rule is, singular as it may seem, that the female twin is unfruitful, yet in a few rare instances she is capable of breeding.

It becomes then an inquiry not of physiological curiosity alone, but of practical value, to learn upon what the barrenness depends, and how the fruitfulness or unfruitfulness of the calf may be known in early life.

It is established with tolerable certainty, that the free martin when incapable of propagating is anatomically deficient, or deformed in some of the organs of generation ; and these deficiencies or deformities very plainly and with a great degree of uniformity, modify her external form and appearance. We accordingly find heifers of this description coarse and masculine in structure ; and in the head and horns especially they exhibit a very marked approach to those of the ox : the teats are smaller than is usual in the heifer : she manifests no propensity to breed. The external appearance of the vagina is the same as in other cows.

Some of these distinctions are of course not developed until she has arrived at the age of bearing. The internal structure is marked by still greater differences ; these, however, are not to be seen except by post mortem examination.

The first, and so far as I know, the only scientific investigation, was made by the accurate and distinguished anatomist John Hunter. He examined three of these free martins, and found in them all a greater or less deviation from the form of the female, and the addition of some of the organs peculiar to the male ; they were in fact *hermaphrodites*.

The subjoined description of one of them is taken from the Philosophical Transactions, Vol. LXIX. p. 289.

" Mr. Abuthnot's free martin, seven years old. The external parts were rather smaller than in the cow. The *vagina** passed on as in the cow, to the opening of the *urethra*,† and then

* *Vagina* is a technical term ; the common name I believe is *bearing*.

† *Urethra* is the passage for the urine from the bladder.

it began to contract into a small canal which passed on to the division of the uterus into two horns, each horn passed along the edge of the broad ligament, latterly toward the *ovaria*.

"At the termination of these horns were placed both the *ovaria* and the *testicles*. Both were nearly of the same size, which was about as large as a small nutmeg. To the ovaria I could not find any fallopian tube.

"To the testicles were *vasa deferentia*, but they were imperfect. The left one did not come near the testicle; the right one only came close to it, but did not terminate in the body called the *epididymis*. They were both pervious and opened into the vagina near the opening of the urethra.

"On the posterior surface of the bladder, or between the uterus (womb) and bladder, near the two bags called *vesicula seminales* in the male, but much smaller than they are in the bull, the ducts opened along with the vasa deferentia. This animal then had a mixture of all the parts, but all of them were imperfect."

Mr. Hunter also states that in external form they bore a marked resemblance to the ox.

Free martins, however, even when barren, are not always hermaphrodites; they may be simply deficient in the sexual organs peculiar to the female. In this case their form is not necessarily masculine, yet it is so in the majority of instances.

About a year since I examined a free martin of this description, reared by Frederick I. Betts, Esq. of this place, (Newburgh). She was about three years old, and in external form and appearance presented nothing different from other cows. She manifested the sexual propensities, even to a greater degree than usual; indeed she was almost constantly in season; yet she never became pregnant, although faithfully tried.

In the structure of the internal organs of generation, there was no mixture of male parts, but a very marked departure from the natural structure of the female.

The *vagina* externally presented the usual appearance of a heifer which had never borne a calf. It passed on, as in the heifer examined by Mr. Hunter, to the opening of the urethra, when it begun to contract into a small canal, which passed on for six inches, where it terminated in a closed sac, one inch from the mouth of the uterus.

The *uterus* was perfect in structure, but exceedingly small.

The *ovaries* were small, corresponding in size to the womb; their structure presented no well marked difference from other cows.

The *fallopian tubes* were also perfect, but likewise small.

The womb and appendages, in fact, very nearly resembled the same parts in a calf a few weeks old. The following estimate of the size and weight of the vagina, uterus, &c., of a cow, a calf, and the free martin referred to above, will exhibit the extent of the deficiency in size, &c.

Cow, after two years old.

Length of vagina 14 to 20 inches; circumference of vagina about 8 inches. Length of the womb 12 inches; circumference of the womb $1\frac{1}{2}$ inch; weight of the whole from 1 to 2 pounds.

Calf, four weeks old.

Length of the vagina 6 inches; circumference of vagina $2\frac{1}{8}$ inches. Length of the womb $2\frac{1}{2}$ inches; circumference of the womb $\frac{5}{8}$ths of an inch; weight of the whole 1 ounce.

Free Martin.

Length of vagina 8 inches; circumference of vagina near the mouth 2 inches; circumference of vagina at the middle $\frac{5}{8}$ths of an inch. Length of the womb $2\frac{3}{4}$ inches; circumference of womb $\frac{3}{4}$ths of an inch; weight of the whole $1\frac{3}{4}$ ounces.

In taking the length of the womb, I measured from the mouth to the extremity of one of the horns of the womb. I took the measure in this way, because there is more uniformity in the size of the horns, than in what is usually termed the body.

The accompanying plates will aid in understanding the structure of these parts.

Fig. 1 represents the natural appearance of the vagina, womb and ovaries, as they appear externally when removed from the body.

a. is the external view of the vagina.

b. represents the situation of the mouth of the womb, which is fully exposed in Fig. 2.

c.c. are the ovaries.

e.e. the two horns of the womb.

Fig. 2. represents the same parts, with
a. the vagina, slit open to show
b. the mouth of the womb.
c.c. the ovaries.
d. the urethra opening into the vagina.
e.e. the horns of womb.

Fig. 3 represents the same organs, as found in the free martin belonging to Mr. Betts; the vagina being slit open to show its extent and termination, an inch beyond. The mouth of the womb is represented by the dotted lines *b.*

From these dissections it would appear that there are two varieties of free martins.

The first, and by far the most common, are probably hermaphrodites. They are more or less masculine in appearance, and manifest no desire for the male. They will even work, it is said, with an ox; I knew an instance of the kind in this county. This variety, so far as I can learn, *never breed.* This conclusion, made as it necessarily is, from comparatively slender materials, may be erroneous; yet I think there is sufficient evidence to afford a reasonable ground for the opinion. It is worthy of notice that the Romans called their barren cows *tauræ*, as if they had something of the bull about them. But it is not stated that these tauræ were free martins, although the supposition is not improbable. Columella* speaks of "*tauræ* which occupy the place of fertile cows, and should be sent away." Varro† also calls the barren cow *taura.*

The second variety of free martins resembles other cows externally, being feminine in appearance and exhibiting the usual sexual propensities. Those belonging to this class *may breed*, or they *may not*: generally, however, they will not. I know of no external mark by which the barren of this latter variety may be distinguished from the fruitful. Future investigations may discover some external mark, but at present it is mere guess work.

A free martin calf, then, that resembles a male in external appearance, and especially about the head, may safely be condemned as unfruitful; and even if she is not masculine in appearance, she may still, in nine cases out of ten, be also condemned as

* Lib. vi. cap. 22. † *De Re Rustica.* Lib. ii. cap. 5.

equally useless for breeding. The farmer that raises a free martin for a breeder will, in ninety-nine cases out of a hundred, be disappointed in his expectations.

If these conclusions are correct, they afford a most singular anomaly to the usual order of generation. Why twin heifers or twin bulls should be fruitful, and a free martin barren, is utterly inexplicable upon any known or supposable principle of physiology. Yet, strange as it may appear, observation would seem to establish the fact as a general rule, and we are obliged to admit it, notwithstanding our unbelief and its apparent inconsistency. The subject is well worthy of further investigation, and farmers having free martins born on their farms would confer an especial favor upon many others, if they would have them carefully examined, after death, by some person acquainted with the natural structure of the organs of generation. It is not necessary to keep the animal until grown, if this is not convenient, as the organization of the parts can be sufficiently seen in the youngest calf.

There have been instances of the cow producing three and even four calves at one birth; but there is, I believe, no mention in these cases of the procreative power of the female. I examined one cow whose womb contained *four* calves; all of them were females, finely formed, well developed, and bearing a close resemblance to each other. In each of these calves the organs of generation were perfect; and had the calves been born and reared, there was no anatomical reason why they should not all have proved good breeders.

I also met with two heifers which were barren. In one there was a fibrous plug, closing the mouth of the womb, and which, according to the prevalent opinion of generation, would necessarily prevent impregnation.

In the other, the womb had two mouths, instead of one. Yet this does not necessarily cause unfruitfulness, for I subsequently dissected a cow whose womb contained a calf, and yet had two mouths.

There are many other interesting topics connected with these investigations, which I may resume on some other occasion.

Newburgh, January 1st, 1845.

NEW PUBLICATION.

A treatise on the forces which produce the organization of plants, with an appendix containing several memoirs on capillary attraction, electricity and the chemical action of light, by JOHN W. DRAPER, M. D., Prof. of Chemistry in the University of the city of New-York.

THE title of this book and the high reputation of its author, strongly incited us to give it an early perusal. We were wishing also to furnish our readers with some abstracts from its pages that we might be instrumental in awakening in them, if need be, a taste for a higher order of inquiry than is found in the ordinary treatises on the physiology of organic beings. Probably no field has ever been opened so rich in facts, so important in results, and at the same time so attractive to the philosophic mind, as an inquiry into the nature of those forces which produce organization; and if the mystery which hangs over the production of organic bodies, if the secrets which belong to life are ever dispelled or revealed, it will be by labors in this field of research. It is true that it is not a new field, one that is just opened or just entered, for many keen sighted men of former days, men profound in knowledge and skilled in philosophic analysis have made those forces the subject of anxious and serious inquiry. That these inquiries have been eminently successful we by no means assert. Surrounded as they necessarily are with great and serious difficulties, partly from the nature of the forces themselves, but mainly from the circumstance that they become known to us solely from their effects, it can hardly be considered strange that they should have often terminated unsatisfactorily, or without obtaining positive results. Still those inquiries have been at least partially successful; and hence instead of losing their interest, they are at the present time awaking and exciting more attention than at any former period. The work of Professor Draper is divided into two parts. The first is a compilation, as we call it, of the views of modern philosophers on subjects relating to the forces concerned in organization, or those which have a hand in developing vegetable and animal bodies, as the action of the imponderables, light, heat and electricity. The second part is made up of memoirs written at different times and published in the journals of the day. Among them we find one on capillary attraction. Another on the various phenomena of light and heat, the rays of the solar spectrum. Another of still more importance treats of the *tithonic ray*, or the chemical rays of former writers. These essays are well illustrated, and the peculiar doctrines supported by numerous well devised experiments, the manipulations and arrangements of which are neatly demonstrated by diagrams on copper. Of the first part we feel bound to say that it is written in philosophic language, that it bears the impress of a philosophic mind, and that an air of importance and originality appears throughout the whole production, and that even the commonplace ideas are so well expressed that they bear the aspect of new thought and original suggestions. It may truly be called a labored treatise, a well-wrought production abounding in valuable matter, which, though it cannot be claimed as original or new, still, the labor expended in putting together the materials, entitle the author to a share of the credit which is awarded to originality.

Having expressed our views of the general merits of the work, we proceed to notice some of the doctrines which Prof. Draper has expressed, and which he has attempted to maintain. We must premise, however, that of these doctrines we find it necessary to make a selection, and to confine ourselves within narrow limits, for it is impossible to notice, even summarily, all the opinions and doctrines which are expressed in the first part of the work. The treatise is introduced with some general views of the influence of physical agents on organization and life, in which he has given brief expositions of the nature of organized combinations, the changes which are effected by physical laws, and how they effect the extinction of living races, also on the relations of organized forms to the atmosphere, and closing with a notice of that law which secures or which emancipates the higher races from the direct dominion and action of external agents. Prof. Draper, in the second section of the introduction, takes this early occasion to express his decided dissent from the views entertained by many physiologists in regard to the existence of a vital force. As this is one of the leading doctrines of the work, we shall extract the passage in which he announces his views.

"In this work the existence of the Vital Force of physiologists—as a homogeneous and separate force—is uniformly denied. The progress of science shows plainly that living structures, far from being the product of one such homogeneous power, are rather the resultants of the action of a multitude of natural forces. Gravity, cohesion, elasticity, the agency of the imponderables, and all other powers which operate both on masses and atoms, are called into action, and hence it is that the very evolution of a living form depends on the condition that all these various agents conspire. There is no mystery in animated beings which time will not at last reveal. It is astonishing that in our days the ancient system which excludes all connection with natural philosophy and chemistry, and depends on the fictitious aid of a visionary force, should continue to exist; a system which, at the outset, ought to have been broken down by the most common considerations, such as those connected with the mechanical principles involved in the bony skeleton, the optical principles in the construction of the eye, or the hydraulic action of the valves of the heart."

Such, then, is the view of Prof. Draper of the vital force; which, though we are not yet ready to subscribe to, we are aware that the tendency of the in-coming philosophy is to support them. We, perhaps, are not informed of the whole argument which disprove on the one hand the existence of a vital force, and on the other demonstrates that what has been attributed to it belongs wholly to physical forces, as gravity, cohesion, elasticity and the imponderables. We see not why we may not subscribe to the doctrine that the evolution of a living being has some dependence upon those agents or upon the joint action which they conspire to produce, and yet consistently maintain the separate existence of a homogeneous vital principle. The evolution of a complex or even simple structure may depend on physical agents, that is, without those agents the evolution could not proceed. The seed of a plant, for example, contains a vital principle according to most physiologists; still, this principle will remain at rest, will not of itself evolve a fabric or organic body, in the absence of heat and moisture; and though the evolution is thus dependent, it by no means militates or overturns the doctrine that prior to evolvement that principle had an existence in the germ or seed. So the green scum upon stagnant water which appears to be evolved by the agency of light and heat; the living atoms which dance upon the water, the monad which floats there and teems in every dead pool, living atoms generated in death, are no more the products of sunlight and caloric, than the principle at rest in the egg and seed. There is something before evolution, something behind the curtain, which to be sure we cannot see, which makes it possible for light, heat and electricity to evolve the specific being. But what is still more important, we cannot conceive how, even by the joint action of light, caloric and all other physical agents combined, a given being is just what it is—how those forces should develop from a germ one specific being and not another. The early stages of all organic beings are so similar that it is extremely difficult to detect any differences among them ; and modern observations have established the fact that at one period the higher and more perfect beings pass through stages during development when their organization is that of some lower and inferior tribe. Now, on the principle that the mere mechanical forces develop a being, and impress upon it its type, or give it its characteristics, we are wholly in the dark how such certain results can take place—how the chick, for example, when it is in that stage where it is taking on the organization of a fish, it should not go on in its development and become a fish rather than a fowl. There must be, then, it appears to us, a principle, call it if you please a vital principle, in organic beings which holds some control over physical force, independent of it, and gives such a direction to all those movements which will end uniformly in the production of a specific being in any given instance. How beautifully this is illustrated in fermentation. Do we see the leaven in the flour ? No : but still it is there—we know it by its workings ; every particle is moved ; it pervades the whole mass ; it prepares it for the oven ; so, though we are unable to see the vital principle in its simple homogeneity, we may still see it in its action. Inquiries however, of this nature, we confess, are on the outskirts of the boundaries of our knowledge ; they are surrounded with a dim haziness or twilight, so that it is impossible for us to separate clearly the known from the unknown. It is therefore important when we push our observations into this dim circle, that we mistake not on the one hand that which is only probable for that which is certain, and that we continue to feel dissatisfied with our evidence so long as it is possible to push our observations farther. There is undoubtedly sufficient light already evolved upon this and kindred subjects, to encourage us still to push forward our investigations ; at the same time, however, we should bear in mind that we shall sooner or later reach those ultimate facts of which no account can be given, except that they bear the sole impress of the finger of Deity.

Professor Draper evidently belongs to the sanguine class of philosophers, if we may be permitted to judge of character from many expressions which he has recorded. There are no mysteries in animated beings, says Prof. D., which time will not reveal. Admit it, and admit also that physical agents are the prime movers of organized atoms or beings, from beginning to end, we still assert that not a whit of this mystery would be removed, rather we are inclined to say, that it would be increased. Undoubtedly organized beings are subjected to conditions; the living cell as well as man was adapted to pre-existing physical agents. There is a terrestrial plan, and the physical agents, ponderable and imponderable, must mould and shape that plan; so far as movements are concerned, they may exalt and sustain those movements, they may give a higher degree of sensibility; still they cannot originate the smallest spark of vitality, though if need be and if proper conditions exist, they may blow it into a flame when once the spark has been struck out.

We have, perhaps, dwelt too long upon the introductory chapter. We proceed, then, without farther comment, to the subjects of the first chapter of the work. It is entitled, "On the action of the sunbeams in producing organized bodies." Light is here shown to be the agent in developing the green color of vegetables; it directs their growth. Leaves placed in carbonated water in sunlight decompose the carbonic acid: the oxygen is disengaged and escapes in bubbles: the carbon enters into combination with other principles or elements already in the tissue of the plant, and forms with them the mucilage or some other compound, which administers to its growth. Living leaves in air, perform the same func. tion, absorbing the carbonic acid, where it is decomposed as before, and even more energetically than when immersed in carbonated water.

Chapter II. treats of the flow of sap in plants. It is due to the carbonization of water in the leaves by the light of the sun.

We shall condense Prof. D.'s views on this subject, as it will enable us to economize both our time and space.

1. Capillary attraction is the physical cause of this movement. The constitution necessary for capillary attraction to take place, is

that the fluid into which the fine tube is plunged, should be able to wet the tube ; thus water wets a glass tube, and hence rises above its hydrostatic level, but quicksilver will not wet glass, therefore it does not rise. It is not necessary that the instrument should be in the form of a tube in order that the fluids may be elevated above their hydrostatic levels ; a sponge, the cellular tissue, or any porous body, is, to all intents and purposes, a capillary instrument, capable of lifting water ; even the passages between cells are exceedingly short tubes.

2. From these facts the following law is deduced, viz: When two fluids are brought together in contact in a porous solid, or series of capillary tubes, which is wetted by both, but unequally, that one which wets the porous solid most, or for which the attraction is strongest, will pass most rapidly through it, and may drive the other entirely before it. To make the law plainer, it is observed, that the structure of plants and animals is like a congeries of capillary tubes, particularly in vegetables, the leaf and the spongiole of the root.

Now for the application of the principles to the circulation of sap. The ascending sap is derived from the ground by the action of the spongioles ; it passes upward by the woody fibre and ducts of the alburnum to the upper surface of the leaf. A change takes place here by sunlight ; it obtains carbon, and forms a thin watery solution, becomes a mucilage ; this mucilage being now elaborated sap gains the under surface of the leaf, and returns back through the cellular tissue, finding its way by the medullary rays to all parts of the plant. The descending sap in the spongiole is mucilage, and from this fact is derived the reason why water will enter the spongiole from without. The experimental fact and proof is deduced from the following : Put sweetened water in a bladder and immerse it in simple water, the latter flows in, and the former out. The bladder is a congeries of capillary tubes ; the flowing in and flowing out is nothing more than capillary attraction. It is the mucilage or the descending sap which reaches the spongiole which enables the water to enter, and having entered, rises in the stem. So in the leaf, with the mucilage on one side and the water on the other, the latter drives the former before and makes it descend, the tissue of the leaf having a greater attraction for water than for mucilage.

This, then, is the doctrine of the circulation. Is the doctrine proved? We say, not clearly so. The assumption upon which it is partly founded, is not, to our mind, well established. The ascending fluid is not water with some saline matter in simple solution; it is already mucilage long before it reaches the leaf. What is the ascending sap of the sugar maple but mucilage, or a fluid already partially elaborated?

2. The analogy between the spongiole of a root and a bladder is assumed also; for in order that the analogy should hold good, the mucilage in the spongiole should flow out while the water in the earth flows in. This is far from being proved.

3. No provision is made in this theoretical circulation, for the growth of the branches, or for the flow of sap before the expansion of the leaves.

As our views in relation to the circulation of sap differ somewhat from those of our author, we propose in a very few words to give an exposition of them. We must observe, however, that we have never been satisfied with any explanation which we have yet seen.

Water holding in solution carbonic acid, together with the saline matters which are common in soils, is received into the spongiole and ascends through the newest parts in the greatest abundance. It partakes of the nature of nutritious matter soon after it is received into the tissue of the plant. It reaches the dormant bud in which the rudimentary leaves and branch are folded. It furnishes the nutriment whose elaboration now completed in the still imperfect parts by light, and the leaves are in consequence developed, or in other words grow; the basal leaves first, the others in succession, and as long as leaves remain whose foundations were laid in the bud the branch elongates, and it seems or appears to elongate solely by the development of the leaf at the termination of the branches. In about three or four weeks after the sap begins to rise the branches have attained their full growth; all this is effected by the ascending sap. While the leaves and branches are thus arriving to maturity the sap only flows feebly downward, but during this process sap accumulates in the newer parts, especially between the bark and wood last formed. Here it becomes pulpy and soft and penetrable. The ascending sap in the mature leaf undergoes those changes which have been so frequently described by writers upon physiology, and then passes through the inosculating vessels between the upper and under surface of the leaf and circulates downwards, or the full flow downwards is now established and its progress deposits the matter which is to form the next annual layer, which is in fact nothing more than a fibre or root proceeding from each leaf, penetrating through the already formed pulpy matter of the ascending sap. It, however, descends, passes into the root, where it deposits the matter which is to elongate this part of the plant. The whole end of the circulation is this: by the ascending fluid the buds become leaves and branches; by the descending aliment the roots extend outwards and downwards, while both currents assist in the formation of the annual layers.

This exposition, however, leaves out of view the special force by which the currents were moved, and it is rather a statement of what is effected by the ascending and descending fluids. The roots may require the elaborated sap, that which has undergone a change in daylight.

But there are many instances where the woody fibre is formed by the descending sap—the pandamus, for example; and then there are still other cases where a tree has survived accident, and has increased in diameter by the descending fluid. Thus, when the entire bark, near the root, has been destroyed, we have seen it survive the injury, the whole root, together with an inch or two of the trunk being in a state of perfect dryness, like a piece of seasoned wood, and yet the upper part was covered with leaves, and several annual layers were already deposited down to the injured part. It is evident, then, that plants possess the power of accommodating themselves to circumstances, and their circulation will go on though not a spongiole exists, or a root from which a spongiole can spring.

A tree from which a ring of bark four or five inches long has been removed, will frequently survive the injury, and its trunk, both above and below the removed ring, will increase in diameter. Two pine trees opposite the cantonement at Plattsburgh, are still standing and growing in this condition. The growth upon the lower margin is upwards, and laps upon the dry portion of the ringed part, so that should those trees continue to live and grow, this part will entirely close up by a deposition from below, while not a single layer is deposited upon the apparently dead part at the upper margin; but two inches above the upper margin the diameter of the trunk has increased, since the injury, nearly twice as much as that below; the shape, too, of the upper margin is different from the lower, the former being quite oblique, the latter direct. There is no branch below the wound.

The third chapter of Prof. Draper, on the chemistry of plants, treats of the circulation of the blood, or rather the mechanical cause of the circulation. In this essay, contrary to the common notions which prevail, the movement of the blood is not due to the action of the heart, or at least it plays quite a subordinate part. What, then, is the power which moves the blood? Prof. Draper maintains that this power is obtained from the affinity which arterial blood has for carbon. Thus, p. 36, § 114, "The oxygenizing action of the arterial blood is, therefore, the true cause of the systemic circulation." The principle upon which this power is based is, "*that if two liquids communicate with one another in a capillary tube, or in a porous or parenchymatous structure, and have for that tube or structure different chemical affinities, movement will ensue; that liquid which has the most energetic affinity will move with the greatest velocity, and may even drive the other liquid entirely before it.*"—p. 35.

Now for the facts and their application: the arterial blood going from the heart outwards into the parenchyma or cellular structures, contains an excess of oxygen, which it has just received in the lungs; this oxygen is ready to combine with or burn out any carbon in those structures, hence it moves towards them. When, however, this affinity is satisfied, or when the oxygen is neutralized by carbon, and perhaps by hydrogen, it is prepared to leave these structures. It is then, however, venous blood. Now, as the movement in the arteries is sustained by the affinities of the oxidized blood, and as it moves towards them, the venous blood is driven before the arterial. We will not, however, dwell upon this subject, but refer our readers to the book itself, only we wish to make two inquiries: first, admitting the chemical affinity which is supposed to exist between oxidized blood and the parenchymatous structures, shall we not be obliged to admit also that this affinity acts at sensible distances? and second, how and by what force is the circulation carried on in the lymphatics and lacteals?

Passing over those chapters which are devoted to the consideration of the physical constitution of the sunbeams and the prismatic spectrum, we shall detain the reader a moment only with the contents of chapter sixth, in which it is satisfactorily and very beautifully shown which of the rays in the sunbeam decompose carbonic acid, and at the same time turn the vegetable organs to green.

It is probably known to all of our readers, that light, as it comes to us from the sun, contains several distinct principles, each principle impressing the visual organs in its own specific manner, each producing a sensation which we call light; thus, one produces red light, another yellow, and another violet light. These principles are separated from each other when light passes through a triangular prism of glass, and each color, when the rays have passed through the glass, occupy upon a plane upon which they are received, a certain position, but shading gradually into each other. In common language, the rays are called different kinds of light

As it has been shown that light exerts a very important influence upon plants, an interesting inquiry arose, viz: by which of the rays of light are vegetables most affected? Is it the compound white light, or is it one individual ray, which decomposes carbonic acid, and gives the green color to them? To give a satisfactory answer to these questions many experiments have been made with the different kinds of rays. In some experiments, light was made to pass through colored glass, or colored solutions—as the yellow, red, orange, violet. By a series of experiments made by colored glass, the fact has been discovered that the different kinds of light act very differently upon plants; thus, yellow light gives the green to vegetables by decomposing carbonic acid, whereas plants exposed to the action of the other rays, the same effects were less and less in the proportion to their illuminating power.

As colored glass does not transmit a pure ray, or one unmixed with the others, Professor Draper first employed the rays separated by the triangular prism of glass, and exposed plants directly to each kind of light, by a set of tubes. By this arrangement the light was made to fall upon the plants growing in boxes, and arranged in such a way that a comparative estimate could easily be made of the effects of each ray upon the same plant.

This plan of experimenting resulted in a very gratifying manner.

confirming the experiments which had been previously made in Europe. Under yellow light transmitted through a tube, so as to exclude all extraneous light, decomposition of carbonic acid takes place in the leaf.* When, however, a plant or leaf is exposed in carbonated water to a violet ray, no such change ensues. Digestion then in the leaf is promoted by the light of the solar beam, and that kind of light which illuminates the most is also the most energetic in promoting the growth of plants. For this reason in part, vegetables growing in a clear bright sky, are greener and more vigorous than those growing in a darker region or one frequently overcast with clouds. The effect of light is seen by the position which the growing branches always assume : in a greenhouse, or in a pot standing in a window, they always direct them to that quarter from which they receive the most light. The south sides of trees in open fields grow the fastest upon that s'de. The rings of growth are thicker than upon the north side. Trees in a forest produce their branches mostly at the summit. But light, however, is not the sole agent in promoting a vigorous growth. The presence of carbonic acid in the atmosphere, vapor, and temperature, exert their share of influence. We do not, however, subscribe to the doctrine that there ever was a period when a greater amount of carbonic acid existed in the atmosphere, than at the present. Admit this fact, and it would then be necessary to admit another, viz., that the light of the sun was also greater, for, by an increase of light only, could an additional quantity of carbonic acid be digested. For ourselves, we believe that the present volume of the inorganic forces was established as early as the creation of organic beings.

The twelfth and last chapter of Professor Draper's work, is "*On the nervous agent in plants.*"

It is well known that in order that a being should possess sensibility, it must be provided with a nervous apparatus or system, and furthermore, in order that it may hold relations to the external world, this system is equally necessary. Plants have not been

* It is proper to add in regard to the effects of colored light, that they do not seem to be sustained by experiments reported in the Journal of the Franklin Institute, where yellow light appeared to destroy, or at least injure, the vitality of seeds. In the experiments referred to, the blue and green rays appeared to exert the least favorable influence on seeds, and the young plants which were produced from them.—EDS.

provided with a nervous system. They are, therefore, insensible to what we term pain; neither can they hold those relations to the external world which are held by sensible beings. But as plants are thus deprived of a nervous system, is there any thing in nature which supplies its place? Professor Draper answers this question in the following paragraph, p. 102.

"If thus, in animal existence, we find the various nervous machines divided off, and the impressions of light, of sound, of taste, committed to a separate apparatus, how is it with plants? The rays of the sun are the true nervous principle of plants!"

We have not noticed this paragraph for the purpose of comment, but have given it to our readers for their consideration. It is, we confess, a beautiful idea. It is, however, too imaginative to be admitted into a philosophical treatise. The resemblance and analogies between plants and animals, are too distant; the types upon which they are constructed are too dissimilar to admit of the comparison; and in fact, we scarcely allow ourselves to compare the organs of vegetables with those of animals. We might as well call the solar beams the muscular system, as the nervous, inasmuch as plants bend towards the light.

We have already expressed our views generally of the work of Prof. D. It contains probably, all that is known of those forces which modify the growth of plants; or in other words, it contains a full exposition of what is termed the chemistry of plants. The subject is, however, followed out so much into details, that it takes a very wide range, embracing therein considerations relative to botany, physiology, geology, chemistry and natural philosophy. The work is in quarto of 324 pp., well printed, and on good paper.

FARMERS' MISCELLANY.

DRAINING.

BY JESSE RIDER, SING-SING.

I THINK that the nearer we can bring theory and practice into juxtaposition, so as to compare the deductions of reason with the truths of experience, the more likely we shall be to come to correct conclusions in regard to both. I look upon a theory as worth but little unless it is to aid in some practical operation; and that practice which is not enlightened by some general principles, which which when arranged are the theory of the operation, must be very poor indeed. Therefore it is that the theories of the learned, and the practices of the unlearned, should go together in the same work. It will tend to reduce theory to practice, and practice to theory, and thus aid us in coming at the truth.

In accordance with the foregoing, I have determined to furnish a little of the practical to mix up with your theoretical cogitations, hoping that nobody will be the worse off for what I write, in case any body should happen to read it. But before I proceed to farming operations, I think it is best to put the farm in a state fit for cultivation, by as thoroughly draining the parts requiring it, as is possible, and in the most judicious manner. And first,

OF THE LAND THAT SHOULD BE DRAINED.

In my view, any upland that is too wet to admit red clover to grow freely with other grasses, *ought to be drained*, and lowland should be brought to bear timothy and red-top as the dominant grasses, by the same process.

In this section of country, I think that the upland generally claims attention; first, the smooth and handsome slopes and ridges. When in grain, the parts requiring it are pretty clearly indicated by the absence of a crop ; but they are never so readily distinguished as when the land is in grass. The cold water that issues to the surface and flows over the land, is not congenial to the growth of the better kinds of grasses, but favors that of the coarser sort, which thrive, not so much because of the absence of better kinds, as because the better kinds cannot grow there. The coarse grass, then, indicates the parts to be drained.

In draining upland, it is desirable to bring the surface of the parts requiring it as near as may be to the same degree of dryness as the parts adjacent, in the same enclosure, because the land thereafter is to be subject to the same treatment ; thus, if the balance of the enclosure is dry land, suitable for Indian corn, the parts drained should also be brought to a state suitable for Indian corn ; but if the surrounding land, though too wet for grain, be dry enough to grow timothy and clover, it is best adapted to the cultivation of grass, then the draining of the wetter parts should be in reference to bringing them to the same state, and for the same purpose.

A great deal of upland is light enough to bring the best of the cultivated grasses in profusion, without an admixture of wild grass, and yet too wet in most seasons for corn. Such land frequently has its wet spots, which require draining to improve the quality of the grass. Now the question is, is it all to be made corn land, or grass land ? I say, unhesitatingly, that it should all be adapted to grass ; therefore, the wet spots should be drained in reference to that purpose merely.

Some land is naturally adapted to grain, other land to grass. It is more profitable to till the former and pursue a rotation of crops, than to leave it all the time in grass. In fact, the grass will so far run out of most grain land in a few years, as to impose the necessity of ploughing it up to renew the grass, if for no other purpose. But it is so clearly designed for tillage, that it is the most profitable use that can be made of it. Not so with grass land, for if that is to be made into grain land, it would require drains so numerous to take away the moisture which would be a surplus for a grain crop, as to make the outlay too great to be realized in returning profits.

What I would call thorough draining for the production of grass, would not, in most cases, be thorough enough for the cultivation of grain. I suppose that the lowlands of Scotland afford the best instances of thorough draining heavy land for tillage, and the plan there adopted is, as I have been told, to lay the drains in parallel lines at a distance apart of about two rods, and have them lead off into large open ditches, through which the water passes away.

At two rods apart it will take about eighty rods of ditch to drain an acre, which in this country will cost to dig and fill in a proper manner, from fifty to eighty dollars, when perhaps one-quarter the expense would fit it for the production of grass.

As to draining bog swamps, such as exist in this part of the country, I will say but little, hoping the owners will take my advice with most of them, and let them renew their covering of maple, ash, birch, and elm, of which they ought never to have been more than temporarily deprived; for true it is, that when cleared it is the most incorrigible and hopeless of land—only one degree removed from solid rock on the score of profit, and oftentimes worse than nothing.

The draining they get is generally confined to setting the outlet and cutting a main ditch through to take off the water, so that cattle need not go by water to feed off the bogs. But as it is they frequently mire and die in such places. And I have noticed that those who think most of bog pasture continue to have the least hay in the spring. They generally keep too much stock, which makes a little bog grass in the spring a perfect god-send to them. Their cows come home with dirty bags and sore teats, and therefore a good excuse for kicking. After all, bog grass is but little earlier than clover on good dry soil, and if the time spent in draining swamps was bestowed on the upland, it would be of much more advantage to the owners in most cases.

The peat and muck of all bog swamps with which I am acquainted, rests on a bed of blue clay, which compels the water which falls upon them to escape laterally into drains, or by evaporation. Such swamps generally lie so level, that although they may be filled with open drains, the soil, from its spongy and retentive nature, will be too wet in the spring of most years for a crop to come forward with any chance for success. Indeed, I see no way of reclaiming such land but to throw it into large ridges, at great expense; and then I think it would have to be dressed largely with alkalies to dissolve the muck, to secure permanent fertility. But if the time spent in ridging was employed in removing the muck and peat to the upland, it would be much better paid.

I do not think these remarks, in relation to the bog swamps east of the Alleganies, apply with as much force, and perhaps with very little force, to the swampy grounds west of the mountains; for I have observed, in travelling through the western states, that most of the swamp lands or wet prairies are covered with grass, some of which is of good quality, instead of the unsightly bogs which cover acres soon after they are denuded of wood, and that they are easily drained, and when drained make the best of corn and grass land, in fact vieing with the bottom lands in the production of corn.

The muck appears to be more open and porous, so that when drained the superabundant rain which falls upon it soon settles away so as to leave the surface soil dry enough for the roots of cultivated plants to thrive in. And I have been assured that in draining for the cultivation of grass, the water should not be settled more than eighteen inches below the surface, or it would be too dry for timothy grass; an instance of which I saw myself in Indiana, where the owner had drained too thoroughly for grass, and in order to restore it had been obliged to partially fill up the ditches.

I suppose the difference between the soils of the eastern and western swamps cannot be known without a chemical analysis of each; and as Dr. Dana has already analysed the soils of ten different swamps in Massachusetts, it only remains to procure the analysis of the soil of some western wet prairie to make the comparison, the result of which I would very much like to see.

A large portion of the land which requires draining lies between the swamps and streams and the uplands immediately contiguous to the former, and offers great advantages for draining by having sufficient descent to carry off the water. Such border land appears to need nothing more to bring it to a good state for the production of grass, than to cut off the springs and leaches that are generally confined to the borders of the upland; and therefore, the first drains should be made near the upland, and running, as near as may be, parallel to the dividing line between the wet and dry land. Experience proves that the drains may oftentimes be made a rod or more below the first issuing of the water, which instead of continuing to flow to the surface above the drain will find its way into it beneath the surface, and thus by digging further down the descent we not only dry the parts above, but also cut off the springs to a lower depth and perhaps save the necessity of digging another drain below the first. But if the water from a lower depth still issues to the surface below the first drain, there is no remedy but that of cutting another drain below the first one, and running as near as may be parallel with the line of issues; and this should be repeated until all the water is intercepted before coming to the surface; and the various drains should be so planned as to concentrate as much as possible into other main drains which run direct as may be advisable, to the place for discharging the water, so that the fewer there are of them the less the expense in effecting the same result.

In draining ridges and upland, the land which is too wet and that which is already dry enough, very often run into each other so imperceptibly as to make it a matter of opinion where the first drain should be made. My way is to run so near to that which I am sure is dry enough, as to make it all equally dry above the drain, having reference to that breadth of land from which the water will draw under into the drain, as before stated. The judgment must direct how far below the next drain should be made, unless it be left for time to determine it. A pretty sure way would be to strike a level from the bottom of the first or upper drain, which would determine at what distance the water could again come to the surface.

If the surplus water on the surface of land which has a descent be more the result of the nature of the subsoil, than because of springs and leaches discharging on it from the land above it, the office of the drain is not to cut off the water from coming to the surface, but to receive the surplus of that which falls upon it, and which without a drain to receive it and carry it away beneath the surface, will have to float off, and thus by accumulation increase the evil complained of. In such cases, where there are no perceptible issues from the land which lies above it, but few drains are required to furnish the subterranean outlets.

And it is very often the case that other land lying below is flooded by this foreign water, which has enough to do of itself to dispose of *its* share of that which falls from the clouds, but when it is overcome by this foreign supply it is reduced to the same state of the land from whence it flows; therefore all that is required is to gather it in from its sources by the requisite number of drains and carry it through that which is naturally dry enough with a single drain, and the work is accomplished much easier than might have been anticipated.

It will readily be perceived that in thorough draining it often requires great consideration and good judgment so to lay them out and concentrate them into a main drain, as to secure the intended result with the least length of drain.

In treating upon drains made upon ridge or upland, the presumption is that they are all to be covered; if so, I am opposed to ocating any main drain in the lowest part of any hollow or low place through which the surface water naturally runs, from the fact, that before the raw surface gets a covering of grass to protect it, it may be washed away by a flood, and the drain partially or wholly choked up by the water finding its way in and carrying with it earth, gravel, and small stones. The same thing might take place in case the land was ploughed; but I am opposed to ever ploughing land that is blind drained, unless, as I have before observed, it lies in with other land which is too dry for permanent meadow or pasture ground, unless there is some overruling necessity for it; for it is just the kind of meadow land which is most profitable, and can be made to produce a much heavier burthen than any newly seeded land.

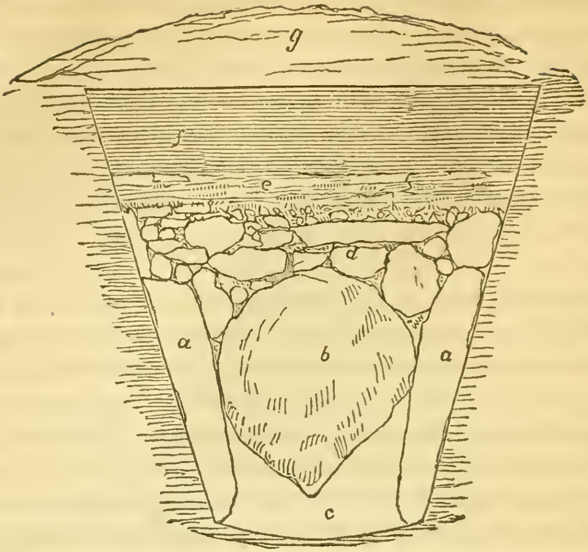
The soil of muck land that is drained, is beforehand stiff, wet, and heavy; after draining, some five or ten years must elapse before it is completely lightened and ameliorated, unless the operation is forwarded by enriching it with manure.

Filling a drain being attended with considerable expense, and lifting one which has become choked up, being still more expensive, I would advise that whenever they are dug through a mucky or alluvial soil the banks be made sloping, and the earth scraped back and spread over the surface of the ground, so as to mow or pasture quite to the bottom of the ditch; which, when neatly done, will look very well, and be no great impediment to business operations on the farm. That makes the ditch a permanent affair, by preventing the banks from slipping in and filling it up. Whenever it needs cleaning or deepening, the earth from the bottom will afford an excellent top dressing for the grass ground in the vicinity. In fact, I consider one of the advantages of draining consists in bringing up the subsoil and mixing it with that of the surface.

OF DIGGING AND FILLING DRAINS.

After having fixed on the site for a drain and staked out one side of it, begin at the lower end and stretch a line between the first two stakes, then have the ditches with the spade cut through the sod by the side of the line, then set over to the other side of the intended drain and renew the operation there. The work is then rightly begun, which is half the battle. The sod is now to be thrown on one side of the ditch and the loose earth on the other, because we want the sod after the stones are in, to place grass side down upon them, to prevent the loose earth from getting in before the covering of the ditch can sod over.

In regard to the size and shape of the drain, I prefer having them three feet wide at the top, three feet deep, and not to exceed fifteen inches wide on the bottom ; but that breadth of bottom does not admit of trunking the drain, or in other words, making a bridge for the water, neither do I want that it should for my method of filling, which is this : Get flat stones, or those that are flat on one side at least, and set against the sides of the drain with the thinnest ends or sides down, and the flattest sides against the banks of the drain ; they should be from eighteen inches to two feet high as they stand in the ditch, and are kept firmly to their places by a third stone between them, as round or dumped as we can get it, and of a size to wedge in, and thus crowd the flat stones against the banks of the ditch, but it must not go near the bottom of the drain unless it has a thin edge down, which would do no harm. The water course is beneath the keystone. But of all this I can give a better idea by the annexed cut or figure of the drain, (being an end view,) and its filling.



a.a. Side stones.	*e.* Covering of sods.
b. Keystone.	*f.* Filling of earth.
c. Water course.	*g.* Covering of earth.
d. Filling of stones.	

After the keystones are in, I proceed to put in the largest of those which are on hand; but there is this to be observed, that the flattest stones, and the larger their surface the better, so they be not too high, are first selected and placed with their flattest sides against the sides of the ditch to keep the banks to their places, and then of the stones that are thrown in promiscuously care should be taken to have them lie as level as may be, with their flattest sides up to intercept earth in its passage down; the nearer we come to the top the smaller the stones should be, and break joints with them as much as possible, and my practice is to break some on the top of the filling with a hammer, to the end that every crevice may be filled up. Then invert the sods upon them, and last of all with a road scraper, scrape on the loose earth and round it up over the drain.

In this section of country we sometimes have severe frosts without a covering of snow on the earth to prevent its getting in deep. Sometimes it freezes to the depth of two feet or more; and I see no reason why it should not work upon, and loosen the surface of the banks and cause them to run in and fill up the drain, unless they are protected by stones as I have mentioned.

There are advantages in constructing and filling drains in the manner here represented, which I will mention. There is much less hard-pan to pick up and throw out; there is scarcely a possibility of the banks working in through the action of frost, or their being filled with earth, so long as the land remains in grass; they will be much easier taken up in case that operation ever has to be performed; it takes far less stone to fill them, and when filled, if they should wash out at the bottom, the stones cannot settle down and obstruct the water course, because their pressure is lateral against the sides of the drain. I will venture to say that this is the very best method of filling a drain where the materials can be procured without too great expense. The materials should be on hand before the ditch is dug, and when dug it should be filled immediately.

Another way of filling drains of this shape is to set flat stones, or those with thick ends and thin ones, on the bottom, with the smallest and thinnest ends down, leaning against the side stones, and against each other; then put the largest you have next on top which will leave the greater space for water to circulate among those which are on the bottom; a little practice will make all familiar; then finish filling as before directed.

DISEASE IN POTATOES.

BY M. SUTTER.

According to the last census, 108,298,060 bushels of potatoes were raised in the United States. Unfortunately, within the last two years, this crop—of importance inferior in this country to none, except *perhaps* the wheat crop—has suffered severely from disease. What the average diminution from this cause may be through the nation, it is impossible to estimate from any data in my possession. In some sections, however, it may safely be set down at fifty per cent, and in others as high as, or higher, than seventy-five per cent. Some individual cases may have occurred, where the crop has been a total loss. The failure of such an article, which has formed the chief dependence of the poorer classes for food, is calculated to excite intense alarm, and the investigation of the cause of the disease, and some remedy for it, becomes a subject of the highest importance. It is not my intention to offer any thing as to its nature or cause, for notwithstanding all that has been written upon it, I regard it, as yet, utterly in the dark. The surmises in regard to the disease, afford a striking example of the too great tendency in our farmers to frame theories, without sufficient ground. Instead of collecting facts, and making extensive observations, and then comparing them, the discovery of every new fact and sometimes a *false fact*, has given rise to an explanation which has seemed entirely satisfactory to the mind of the individual who has noticed it, but unfortunately to no one else. I do not say this is true in all cases, for there are some which may approach to the truth. But I must be pardoned if I bestow upon others all the ridicule with the pen, which I have upon reading them. I shall, in what follows, endeavor to state the individual conjectures about the origin of this disease, and some reason for not giving full belief to them.

1. *Chemical defect*—either in the soil or in the tuber, produces a tendency to decay.
2. *Unfavorable weather*—occurring about the time the tuber was forming.
3. *An insect*—injuring the root—directly, or by its ravages in the stem.
4. *Honey-dew*—a substance about which nothing is known.
5. *Improper care*—in keeping the root through the winter.
6. *Manuring in the hill.*
7. *Manuring the land.*
8. *Atmospheric causes.*
9. *Fungus.*
10. *Degeneracy in varieties*—from long cultivation.
11. *Degeneracy in varieties*—from propagating by seed.

This is a full list, so far as I have seen or heard of suppositions upon the subject. I will now proceed to state them more fully.

1. *Chemical defect.* It is very natural for a chemist to suppose this to be the case at first view ; but when it is remembered that there is hardly any portion of world where the potatoe is culti-

vated and the disease has not prevailed—that all soils have been alike liable to it, and that portions of the crop may be found perfectly sound even in the same hill where others decay, it cannot be decided that this is the cause. And if it does not result from defect in the soil, it cannot be supposed to be so in the tubers. As will appear hereafter, plants growing side by side may be one bad and the other sound.

2. *Unfavorable weather.* In the summer of 1843 a long and severe drought occurred, followed by heavy rains and continued hot weather. Just at this time the disease was first noticed in this country. Of course the weather was universally set down as the cause, and the trouble was not looked for again. But in 1844, a season totally different from the former, it occurred to a greater extent than before, and this could no longer be regarded as a sufficient reason.

3. *An insect, or worm.* I was inclined to pass over this as utterly undeserving notice, farther than mere mention. But I have concluded to insert some clippings from a few papers, showing up the notion. The "Massachusetts Cataract" contains a communication from Henry M. Paine, on the subject. He states that he has examined the diseased potatoes with a microscope magnifying nine thousand times. He found an insect near the juncture of the stalk and root, with "a body shaped like the soldier ant, and legs like the hairy garden spider."

The editor of the "Newsletter," Westfield, Mass., says the disease is not owing to an epidemic influence operating as a disease, &c., but to an insect that has made it a nidus for the perpetuation of its species." He says farther, that from some of the infected potatoes "may be seen the insect in its pupa state, escaping; in others, you may, on boiling, find the rudiment of the insect in embryo: and in others, no insect will be found, they having escaped into the ground."

A writer in the "Washington Post," Salem, N. Y., says, after describing the appearance of the disease, "The perforations in the skin appear to be made by the different kinds of worms. The most numerous are about half an inch in length, of a brown color, body oval when full size. The other is a small brown worm, body round, and the size of pin wire, an inch in length; on the potatoes are small white spots, resembling potatoe starch, which I at first mistook for mould, but proved to be the castings of these destructive borers."

The following is from the "Massachusetts Spy:"

"In connection with all its stages, except its most advanced decay, but more especially in its incipient attacks, are found *maggots* or *larvæ*, and other creatures which I shall call *insects;* and even in the most decayed specimens, there are, apparently, traces of their mischievous work. The larvæ or worms average about a line in length—are slender, with dark heads, semi-transparent bodies, and are sluggish in their movements.

"The insects are, some, invisible to the naked eye, others, a mere visible white point—and others still, nearly a line in length, with numerous short legs, long antennæ, of a white color, extremely active and shy."

And this from the "Utica Daily Gazette:"

"They bear the appearance of having been eaten out by an insect, and in many cases I discovered a small green colored maggot in the cavity. On scraping off the outer bark from the vine I discovered that the leaflet buds had the appearance of having been eaten out, leaving the holes through which I conjectured the insect had passed. Those vines attached to a sound and ripe potatoe were solid and partially green. Is it not possible, and highly probable, that all this evil may thus be caused by an insect?"

These are a few, from the legion I have met with on this point. But it is far more probable that the insects, worms, &c., are attracted by the disease, than that they are the cause of it. When I planted my potatoes last spring, as soon as the puces touched the ground, I observed that they were covered with a little black insect, which all hopped off suddenly when disturbed. Perhaps they deposited the egg to produce the disease.

4. *Honey-dew.* I have noticed a great deal of late in agricultural papers about this substance, but without finding out what it is, and now it is lugged in to account for the potatoe disease. This substance has been seen on the *vines*, and perhaps it caused the tubers to rot. Well—*perhaps* it did.

5. *Improper care in keeping the tuber through the winter.* This is an imported opinion, and worth just about as much as Yankee ones. It supposes that the tubers are stored in heaps and thus become heated, producing weakness. But they have always

been stored in this way as long as I can recollect, and if this would have injured them, it ought to have done so years ago. But I aver, that if there is vitality enough in the eye of a potatoe to sprout and to reach the surface of the ground, this cause cannot operate. The new roots are sent out from the bottom of the new shoot immediately after it starts, and then draw nourishment from the ground. These shoots may be entirely separated from the old potatoe and planted, and will produce a good crop.

6. *Manuring in the hill*; and 7. *Manuring the land*. These amount to one and the same thing. It has been observed, in some cases, that where manure has been freshly applied, the disease has been worse than where none had been used. A writer in the "Newburgh Telegraph," says:

"We planted a small patch of potatoes upon a very heavy soil, turned over a few weeks before planting. From this we had twelve bushels, about half of which turned out bad. In an old garden, separated from this by a fence, where no manure was applied last year, and, as far as we can ascertain, for two or three years, we gathered sixteen bushels, not one of which was bad. The latter, however, it might be mentioned, were planted earliest."

And further, that a farmer in that county stated, that in the same field, where it was manured, the crop was an entire loss, while in a portion that had no manure, the crop was good. A writer from Columbia county, in the same paper, states his experience as the same.

8. *Atmospheric causes*. The following from the Amherst Express, suggests this opinion.

"I strongly suspect that the strange disease, which for several years has so deeply affected the sycamore, plane, or buttonwood tree, (*Platanus occidentalis*,) is analogous to that which has now assailed the potatoe. I was struck with the resemblance, when cut open, between a partially decayed branch of the sycamore, and a potatoe in the same state. I do not believe that in either case the disease results from parasitic plants or insects : two fruitful sources of disease to plants. Why may it not be some atmospheric agency, too subtile for the cognizance of our senses, like those which bring such epidemics as the influenza and the cholera over particular districts or continents? Modern science has shown us that many of the most powerful agencies of nature are concealed from common and even acute observation. May there not be others yet undiscovered, which deeply affect the delicate machinery of organic life ?"

9. *Fungus.* I cannot do better on this point than present the curious and interesting communications of Mr. Teschemacher, of Boston, unless they occupy too much space. It is the only examination conducted scientifically which I have seen. They are taken from the "New England Farmer."

NUMBER ONE.

Mr. Breck—Mr. James Brown having kindly brought me some of the potatoes infested with the disease which has this year committed such ravages on this vegetable, I proceeded at once to investigate the subject.

The peculiar smell, and the reputed poisonous qualities of this diseased potatoe, made me nearly certain that it was a species of fungus—a position which I think has been confirmed by my examination with the microscope.

The appearances which I examined were—

1st. A nearly black discoloration of the potatoe, just below the skin, penetrating about one-sixteenth to one-quarter of an inch into the substance, and apparently through the skin, in little black, indented tumifications, like pustules. It is probable that in these holes the vegetation of the fungus first begins, and spreads underneath.

2d. On the surface of the skin, where these pustules were enlarged, there had been produced a greyish, slimy substance, of a very offensive smell.

The black mass, divided in a drop of distilled water, exhibited under the microscope a number of long and oval, very irregularly shaped dark bodies, interspersed among the cells of the potatoe. Many of these cells appeared lacerated, but this might partly have been produced by the mechanical action of dividing, although I think not altogether. The greyish slimy mass was semi-transparent and indistinct, even mixed with distilled water, and exposed to the strongest light I could throw.

In order to discover a remedy for this disease, I decided on applying various substances to this fungus, with a view of effecting its decomposition, and examining their action under a microscope.

The first application was salt, and the action of this was so instantaneous and decided, that I did not proceed to any other.

A portion of the dark substance was placed on a piece of glass, on the microscope-stand, in a drop of distilled water, and then thoroughly examined. A little salt, on the fine point of a penknife, was then added ; a nearly instantaneous change took place —the dark-colored masses separated, much of them seemed to pass away, and instead appeared numerous dark slate-colored bodies, which I easily recognized as the spores, or reproducing bodies of the fungus. With the grey, slimy substance, the effect was still more striking : all the indistinct slime disappeared—the mass became clear and transparent, and left nothing but these innumerable dark globules floating about in the drop of water.

It seemed to me, that the salt destroyed all the vegetation of the fungus, leaving nothing but the reproducing spores, which are indestructible by salt. The spores of fungi are the bodies by which they are reproduced and spread, and are analogous to the seeds of other vegetables, and these spores are generated in such enormous quantities, that many fungi, like this on the potatoe, spread with inconceivable rapidity ; but in order to vegetate, they require certain favorable conditions and circumstances, which yet require much investigation. These favorable circumstances are, in my opinion, prevented by salt, as it destroys the fungus vegetation. Therefore, wherever the disease existed this year, I recommend a liberal supply of salt to be spread on the soil, and trust it will eradicate the evil. It is, at all events, a remedy which cannot do much injury, if it does not succeed.

During the examination of the black substance, I of course recognized the grains of starch, which appeared sound ; but wishing to know whether the fungus had affected them, I added a little iodine. The grains immediately took the usual purple color, and I think were not at all injured ; indeed, it appears to me, that the injury takes place by the rupture of the cellular parts of the potatoe.

I am aware that it requires some practice to judge well of the appearances under the microscope ; but I repeated these examinations six or seven times, and always with the same results : still, I should be very glad to have them repeated by others, whether their correctness be confirmed or not.

My microscope being made by myself, is of course very inferior to those now manufactured in London and Paris ; and it would be very desirable that some of our scientific societies would import one of these, the cost of which is too high for persons of moderate incomes. It might be made accessible, under certain conditions, to those desirous of undertaking such investigations as these ; for there are many cases where the action of various substances on the causes of animal and vegetable disease are examined to very great advantage under the microscope, and effects seen which cannot be observed in any other way.

Should any gentleman, possessed of one of these superior instruments, be desirous of examining this disease, I would request of him to look at the action of the sulphate of iron, sulphate of soda, or of ammonia, or of any other substance which can be cheaply applied to the soil as a preventive, and to give notice of his observations either in your or some other periodical, for I see with delight anything that can bring nearer to each other science and agriculture. Yours,

J. E. Teschemacher.

Boston, Oct. 1844.

NUMBER TWO.

To the Editor of the N. E. Farmer—

Not having seen any communication objecting to the views I have taken of the cause of the disease in the potatoe, and which subsequent examinations have only tended to confirm in my own mind, I resumed the investigation of the subject. The results I now offer to you for publication. I have first to notice the idea that this disease arises from worms which are found in the decayed potatoe—and remark,

1st. That the worms are the same which are found in all rotten potatoes, from whatever cause the decay may arise.

2d. The potatoe decays previous to the worms appearing, for the worms are never found in the sound part of the potatoe, eating their way in or depositing their eggs, nor have I ever seen the worms in that part of the potatoe in which the fungus has already commenced vegetating: it is only in the most rotten part that the worms exist, after the fungus has caused this decay.

3d. Salt instantly kills the worms, as any one may satisfy himself, with the assistance of the common compound microscope.

Under the full impression of the existence of the fungus in the potatoe, two questions present themselves.

1st. Is the fungus the cause of the decay, or merely a growth on the tuber already diseased from some other cause?—and

2d. When and in what part of the plant the disease originates, and how it is propagated and disseminated?

The probability is that the fungus is the cause of the disease—for the fungus appears on the skin of the potatoe, and can be traced by its gradually dark color penetrating from the outside by degrees into the sound inside, the outside fungus developing itself first, and producing slime and rottenness, while the inside yet remains firm and sound. If the fungus resulted from the potatoe first becoming rotten, and thus forming favorable circumstances for its vegetation, then the presumption is that we should occasionally, although perhaps rarely, find parts of the potatoe rotten *without* the fungus, which I, at least, have never yet seen. I have often seen heaps of rotten potatoes, without ever before observing this peculiar fungus, which, on account of its smell, cannot be mistaken. If this was therefore a disease merely affecting the rotten potatoe and not the sound one, it would have been long ago and much more often observed. Dr. Wallroth, an excellent German botanist, who appears to have closely studied the fungus family, observes in the *Linnea*, (a botanical periodical, published in Germany,) Vol. XVI. for 1842, that he has ascertained the disease called there the *potatoe scab*, or *wart*—a kind of swelling or tumor, ending in rottenness—to be a species of subterranean fungus, which he calls *Erysibe subterranea*, and of which he gives a long scientific description. I am not sufficiently versed in this subject, to decide whether this description agrees exactly with the disease at present under discussion, but it appears to me to differ in several particulars.

The second question, as to the origin and propagation of this fungus, is one which presents great difficulties in its solution. These arise partly from the knowledge of the propagation of the fungus family being yet in its infancy, and partly from the want of means of pursuing the study of this microscopic subject properly. From the almost universal accounts of the tops of the plants having first died down, and thus indicated the disease, it has suggested itself to me, even if this fungus is really a subterranean species, whether it has not been propagated and disseminated by spores floating in the atmosphere and attaching themselves to the *stalk* of the potatoe, on that vegetating and extending themselves downwards until they reached the point of junction with the tuber, there producing decay, and the death of the upper part of the vegetable, and afterwards disseminating themselves through the tuber.

A parallel to this probably exists in the *mushroom*, a fungus which is naturally produced from horse droppings, when by being kept dry for a considerable time, they have arrived at a favorable state for the development of the spores. These spores have probably attached themselves to the stems of hay which has been eaten by the horse, have passed through its stomach and remained in an inert state, until favorable circumstances have produced their development in the droppings.

I regret that I had not commenced this investigation early enough to have examined the stalk and its junction with the tuber, with the microscope, on the first appearance of its drooping, as all the proof now to be expected from experiments, can only be of a negative character: however, here are such results as I have obtained:

1st. One of these much diseased potatoes was cut in halves; each half was placed on half a sound potatoe, in perfect contact, placed under a bell glass in a damp, dark atmosphere, temperature 57° to 62°. In five days the sound potatoe was not in the slightest degree contaminated with the fungus or the worms.

2d. A whole diseased potatoe covered with black spots, was placed under a glass, in the same circumstances as experiment No. 1, in contact with a whole sound potatoe. The fifth day the sound potatoe remained uncontaminated and without worms.

3d. A whole and much diseased potatoe was buried two inches below the soil, which was damp but not wet. A sound potatoe was buried in the same soil, two and a half inches distant from it, the temperature kept as before—57° to 62°. In five days this latter remained quite sound.

It is possible that five days is not long enough; I have therefore left them all in the same state, and shall not touch them for three or four weeks.

As I do not seek to establish any favorite theory, I trust my remarks may incite to observation and provoke discussion, and provided the practical and useful truth on this subject be discovered, I do not care much whether it be by myself or by others.

J. E. Teschemacher.

10. *Degeneracy in varieties from long cultivation.* Some have thought that some varieties were less subject to the disease than others. A writer in the "*Democrat*," Northampton, Mass., says: "We have a field of 'Mercers' that have nearly all rotted, while 'Carters' adjoining appear *much less injured.*" But on the other hand, the writer in the Amherst Express, already quoted, says: "The 'Carter' potatoe is the *most decayed.*" Indeed, no variety seems to have been exempt. If the disease is owing to degeneracy of this kind, a very ready remedy suggests itself, viz: to raise new varieties from seed. But new ones have suffered as well as old.

11. *Degeneracy in varieties, from propagating by seed.* This has just been suggested by a scientific friend at my elbow, and differs from No. 10. Every one at all acquainted with the laws of breeding animals knows that too close breeding, or breeding *in and in*, has a tendency to produce effeminate, weakly kind. It is not only so among animals, but the same is the fact in the human race. This theory supposes that it holds also among plants, and that the disease supervenes from the varieties having become degenerated—from raising successive generations from one family by seed. Another friend suggests its analogy to scrofula in man. The former of these, I confess, strikes me as the most probable theory I have yet heard. But it is attended with difficulties like all the rest. If this be the true cause, or either of them, I see no hope for the potatoe, inasmuch as an unhealthy plant must extend a disease resulting from such a cause to all that are raised from it even by seed. We must then go back to the original stock from the mountains of Chili and Peru. This I believe is the sum of the prevailing theories; and as we said before, they all leave us in the dark yet, and we must expect to be there till some more systematic observations are made throughout the country by cultivators. The chemist cannot tell what it is by analysis, any more than he could detect the cause of the small pox by analysing the body of a man that has died with it. Intelligent, observing far-

mers, who are not ready to frame a theory from one isolated fact, are the persons to whom we must look to find out the cause. It has been said that the disease was imported from Europe to this country. If so, perhaps it was brought over for us to detect the cause, and cure it and send it back.

The only remedy we have seen recommended as proving effectual, is a small quantity of lime thrown into the hill.

Wampanuxet, Dec. 19, 1844.

FARMER'S CLUBS.

During the long evenings of winter, the farmer may find much time for mental improvement. We have often thought how much time is wasted that might be used in profitable cultivation of the mind. If every evening were employed in examining and learning one new idea only, it would amount in one year to three hundred and sixty-five—and that is more new ideas than will often be found in a whole book ; or in the active years of a man's life, from five years old to fifty-five, he could number no less than 18,250 new ideas ; and this supposing he learns only one a day. But when it is remembered that one thought is the father of a multitude, and the more the mind knows the more its capacity is increased, we may take it as settled, that in the ordinary days of a man's life, an amount of knowledge beyond computation may be acquired if only our leisure time is profitably occupied alone. But by interchanging our ideas with each other, we are furnished with another aid in acquiring knowledge.

There is probably no one way in which so much has been done for the improvement of farming, as by farmer's clubs. Wherever they have been established in this country, they have given a new life and interest to the business. But in Great Britain they are laying the foundation of a total revolution in the condition of the tillers of the soil. An idea is generally prevalent, that in that island the large landlords are the persons who take the lead in these meetings. To a degree this is true. Yet, if any one will read the foreign Agricultural Journals, he will see that the tenantry are also wide awake to the benefits derived from these social meetings, and that in many of them they are the active members. And they not only talk of mere practical matters, but unlike our farmers, they are not startled at the technical words and terms, but grapple with the hard names of chemistry, like men of science, so that it is sometimes highly amusing to witness their familiarity with these matters, though they never saw the inside of a laboratory in their life. But they have learned by hearing others, and they talk understandingly. We know that farmers in this country, that boasts of its general knowledge and education, are apt to ridicule such notions and complain that men who write for their benefit will not find some other words for the names of things they write about, that they can understand, as if oxygen or hydrogen would be any more comprehensible with another name.

But if they will meet together and make themselves familiar with these things, they will cease their complaints. In their meetings they can talk over those matters in which they are all interested, and we venture to say there is no neighborhood in which *some one* will not be found who can explain all hard words.

We have among our own best friends, some farmers, who can talk like a book, as the saying goes, and communicate facts of vast importance and interest, and who, if they would form such associations amongst their neighbors, would aid not a little in stirring them up to improvement. Ideas which one man may think of little consequence, because he has known them all his life, may be entirely new and of great benefit to others. And there is no man who has not something in his head that will be new to somebody. The march of the world is forward now, and there is no class of men who have suffered so much undeserved neglect as the tillers of the soil. They need, as a mass, a strong lift to bring them up. And we rejoice at every aid that is held out to them. Let them be induced to form clubs—meet together sociably, and talk over what they have done and are doing, and what more can be done by them—learn what peculiarities of tillage each one may have, and if they are not able at first to talk very learnedly, we venture to say that the sense of their ignorance thus brought home to them, will stimulate them to seek for information where it can be found. It will open the way for knowledge to creep in, and they will be better prepared to become scientific men.

The idea of *book farming*, seems to be lawfully repugnant to some men; but book farming is only the filling up of the very practices which every man has followed, who ever drove a plough through the soil, or carted a load of manure upon it. That it does reprobate, and most deservedly, the murderous practices which have almost made deserts of some of the finest and most productive parts of our country, is most true. But it teaches also the methods to be pursued in order to renovate the exhausted land and make it once more a garden.

We have escaped from our subject—but let us go on a little farther. What has been the cause of this ruinous system? We believe in many cases it is the fear of expense. Many men will not take the trouble to estimate the additional gain which would accrue to them from restoring to their soil, a portion at least, of what they have taken away. The prospect of a small gain, quite hides the view of a great gain, preceded by a trifling outlay, and so they content themselves, looking upon their farms growing poorer every year, but we venture to say, no faster than they are.

Another class is really ignorant of what ought to be done. We cannot easily forget the surprise of a farmer, who calls upon us very often, when, in talking to him about the use of *urine*, as a manure, a few days since, we told him its value and how he might save it by the use of charcoal; and he burns charcoal on his own farm. He opened his eyes upon a new fact, and went away exclaiming: "I'll try it! I'll try it!"

Now to return, for we do not wish to speak of that class of farmers who are too lazy to till their land properly. In these agricultural meetings, a thousand facts would be circulated; what one man reads will be told to those who do not and will not, and in this way, before they know it, they will be as much book farmers as any. We are all creatures of imitation, and one man will do what he has seen his neighbor do with success. And knowledge is catching, when there is any in circulation, even by the most indifferent. Let our friends in the country try the experiment, and see if it does not succeed.

PLOUGING.

NEXT to the free manuring of the soil, nothing is of more importance in agriculture than ploughing. Indeed, it may be said to rank before manures, inasmuch as their application can be of little service, unless the ground is prepared to receive them, by means of the plough. It is not our intention here to say anything of the mechanical part of this process, but simply to set forth some of the principles upon which its use depends.

It pulverizes the soil. Every one knows the benefits arising from this process. A free access is given to the air, and the gases which are always floating in it. The carbonic acid and ammonia which we have often spoken of as the essential food of plants, circulate through all the soil, and are equally distributed to the roots of plants. These, unobstructed, can also extend themselves farther in all directions, and find an abundant supply of nutriment.

The access of the air also assists in the decay of any vegetable or animal matter which the soil may contain. This, whilst the air is excluded, lies inactive, or is converted into substances which are injurious. But by the action of the oxygen of the air, a thorough decomposition takes place, and the elements of the plants are restored to the soil to become the food of a new race. Besides this, there are certain compounds of the metals with oxygen; which in one form, are active poisons to all vegetable life. This is where they are united with only one portion of the oxygen, but when they are combined with more, the effect is different. Now, when the admission of air is not free, the decaying substances in the soil take away the oxygen from these higher forms of combination and leave one which is injurious. Some of the salts of the metals are produced in the same way, which destroy vegetation.

The action of the air upon the inorganic parts of the soil, is not less worthy of notice. All soils contain portions of rocks, in an undecomposed state, which consist of elements of great fertility. By ploughing, these are turned up to the air and thus exposed to decay more or less rapidly; restoring the very elements which may have been exhausted by previous cropping.

The germination of seeds is aided by pulverizing the soil. For this process to take place, the presence of oxygen is necessary. Now, seeds buried deep in the ground, or even at a slight depth, and surrounded by compact earth, cannot grow. This is always found to be the case in ploughing land that has been laid down to grass. New kinds of plants will start up in abundance, and seeds, no doubt, may lie buried in the soil for many years in an inactive state, merely for the want of air.

There are numerous other benefits arising from ploughing. It drains the surface of superfluous water, and on the other hand counteracts the effects of drought, by assisting the moisture to ascend from below. If done in the fall, it kills the larvæ of insects, which have been laid in the ground to winter, and also buries the seeds of many weeds too deep to germinate.

But ploughing as done in this country, is only turning over the surface. *Deep ploughing* is rarely practised. And we have often heard men mistake it for *subsoiling*. But the latter process consists only in stirring up the subsoil with a plough constructed for the purpose, without bringing any of it to the surface; whereas in deep ploughing the lower portions of the soil are all brought to the surface, or mixed with the surface soil. There are benefits resulting from this when practised right.

It is a fact, perfectly plain to any one, that the rain falling upon the soil and passing through it, must, gradually at least, dissolve all the soluble substances it meets with, and carry them down to a greater or less depth into the earth. And not these only, but those substances which are not already soluble, but which are in a finely divided state, will be washed down in the same manner. We may suppose that, in this way alone, a surface soil, when nothing is applied, may from year to year be drained of its most valuable parts, and at the same time an accumulation of them take place at a depth below what the plough ordinarily reaches. Under these circumstances, the under soil will contain the elements of great fertility, whilst the surface soil may be very unproductive. It will readily occur to any one, that in such a case the proper course will be to plough deep—to turn up this under soil and make it the top soil. This is undoubtedly true. The fact is, that the plough is very rarely carried to any considerable depth—from four to six inches being probably as deep as almost any farmer ploughs. Hence the soil below this will be constantly becoming richer, whilst the surface becomes poor. Now, if the plough were to be carried from six to twelve inches deep, this fertile portion would be brought to the top and furnish a new soil.

That this is correct in principle, there can be no doubt. Yet caution is necessary in putting it into practice. Those substances which are valuable as food for plants are not the only ones which sink down through the soil. Many will be found which are actually injurious, and which, if brought to the surface, would destroy all hope of a crop. The solid state of the under soil prevents also the free access of the atmosphere, and therefore this soil will not have undergone that thorough decomposition which is necessary to fit it to be productive. Deep ploughing should therefore be done either

I. Gradually. Year after year the plough may be driven deeper, bringing up and mixing with the surface soil the lower portions, which will thus, without material injury, be gradually incorporated and form a deep soil. This will probably be found the best course, as there is little risk in it of doing injury to the present soil by mixing too large a quantity of noxious substances with it. Or,

II. There are many soils where, if deep ploughing is practised in the fall and the lower portions exposed to the winter's freezing, they will be so broken up and changed, as to be ready for a crop in the following spring. In this case, the land should again be ploughed crosswise in the spring, so that the old and new soils may be thoroughly mixed together. By this means also, the destruction of many injurious insects whose larvæ have buried themselves beneath the reach of ordinary ploughing, is insured. The more thorough the draining of the soil, and the chance given to the roots of plants to extend themselves deeper, are important advantages connected with this process. Farmers generally do not seem to appreciate the fact, that plants are highly organized beings, deriving their food by their roots, from the soil, and, of course, growing perfect in proportion as they have a better opportunity to supply themselves by reaching out their fibres in all directions.

Where the lower portions of the soil contain such substances as are injurious, and which cannot be mixed directly with the upper, thorough draining should be practised; and this, together with the use of the subsoil plough, will, after a sufficient time, prepare the way for deep ploughing.

GARDENING—LIQUID MANURES.

The paramount importance of giving to growing plants an abundant supply of manure, cannot be too deeply impressed upon the mind. Many persons use it as if they feared its effects and were going into a very careful experiment to ascertain whether or no it may not do hurt; whereas it is a fact that every one ought to know, that a plant cannot reach any thing like perfection without it. We have heretofore given a full list of the kinds of manures most commonly used in this country, and the modes of preparing and applying them. We wish now to call the attention of those engaged in horticultural operations to the use of *liquid manures.*

The constitution of plants is such that they can receive no food except that which is dissolved in water. In itself, water is probably of very little use to them. They could easily obtain the elements which compose it, and which it affords to them, from numerous other sources; but as a solvent to prepare nourishment for them, it performs a very important office. The extremities of the roots consist of a loose, spongy structure, covered with a thin sort of membrane, pierced with numberless small holes which are the terminations of the sap vessels. These are essentially the mouths of plants, and through these they imbibe all their food. Of course they can only take up that which is immediately in contact with them, and when this is exhausted, they extend their fibres in quest of more.

Again—the slow decomposition which takes place underneath the surface of the ground, by which manures are rendered soluble, furnishes a very small portion of food at a time to plants. The supply is constant, it is true, from this source, but it is scattered through the soil, and the roots must either extend themselves to find it, or depend upon the circulation of moisture in the ground to bring it to their mouths. The former is a slow process, and the latter often a very precarious one; so that, in dry seasons, the products of the garden may be very much shortened, or even cut off, for want of water.

We believe that liquid manures might be very extensively and economically used, in the large way in agriculture. But we intend these remarks to apply particularly to gardening, where the sphere of operations is not so large as to make the process look formidable. The benefits arising from this mode of application may readily be inferred from what has been said. The manure is applied in a form ready to be immediately taken up by the plant—it may without trouble, be made of any strength—and it is applied directly to the roots. A correspondent of the London Gardener's Magazine, speaking of the cultivation of the ground at Ghent, says :—" Liquid manures may justly be considered the summum bonum, as, if applied when the corn is sprouting, or just before a rain, it has an effect which no other manure can have. It destroys insects and throws a surprising degree of vigor into the crops." The Chinese, who are said to excel all other nations in the knowledge of gardening, make a very extensive use of this practice, thus manuring the plants rather than the soil, and by this economy are enabled to produce large crops with their limited quantity of manures.

When writing at large on the subject of manures, we noticed a kind of liquid manure recommended by Dr. Dana, of Lowell, amounting to this—to one hundred pounds of peat, add one pound of potash and fifty gallons of water, in any convenient vessel, and stir the mixture occasionally for a few days, when the liquid may be drawn off and applied to the roots of plants. The vessel may be repeatedly filled and used again.

Any of the kinds of manure commonly used may be stirred up in water, and after having stood for a sufficient time to extract the soluble matters, applied in the same manner. Urine, made very weak with water, would be a very useful application to vegetables two or three times in the season.

ADAPTATIONS OF NATURE.

The insect tribes, and the vegetable kingdom, march on harmoniously together under the genial influence of the sun, which warms both into life at those periods to which both are adapted ; if one is retarded by the absence of the necessary temperature, the other is also immature and undeveloped, and thus waits for the favorable condition in which it may securely and with certainty fulfil the law of its being.

GERMINATION OF SEEDS.

Three circumstances are necessary in order to fit a seed to germinate, viz: heat, moisture and air. If either of these are wanting, the process of vegetation will not go on. No seed will germinate at a temperature below the freezing point of water, and as a general thing not less than ten degrees above that point. About forty degrees of Farenheit's thermometer is the lowest, and above that to eighty degrees—the temperature varying according to the character of the seed, whether it be of a plant belonging naturally in the hot, warm, or cold regions of the earth. Some seeds will bear a greater degree of cold than others, without losing their power of germinating. The severest cold of our winters leaves them uninjured, whilst others perish.

Moisture is also necessary. Not a great quantity of wet, but so much as the earth will naturally hold. Too much water is injurious; the effect of it may be seen, if any one will put a pint of peas in a bowl and fill it to the top of the peas with water; after they have been left two or three days, those on the top will be found to have sprouted, whilst the lower ones are only swelled, and in a few days these latter will be found to have rotted without having begun to grow. With many seeds the process of germination is materially hastened by soaking in water or the solution of some salt. Boiling water may in some cases be used, and there are seeds which will not lose their power of growing even by being boiled for one or two minutes. A better plan than to immerse them in water, when the quantity is not large, is to wrap them in a wet cloth and place it in a damp and dark place till germination commences. Soaking in soot water, tar water, and in solutions of salts, has been supposed to prevent rust and other diseases to which grain is subject, and also to prevent the depredations of insects. This, we apprehend, is not the case. The only benefit we can recognise as arising from it is a rapid growth, produced by the stimulating and nourishing properties of the substances used, which enables the plant to reach a size too great to be injured before the insects are produced. We know of no well authenticated experiments which show its effects in preventing rust or other diseases. If such is the case, it arises probably from the same cause—the rapid and healthy growth of the plant.

Seeds will not germinate if air is excluded. The oxygen is absolutely necessary to produce those chemical changes which take place in a growing plant. Hence seeds which are buried deep in the earth may remain for years in a sound state and yet not grow, because they are out of the reach of the air. Facts of this kind are familiar to every one. When a well or pit is dug, plants often spring up of kinds which have not been seen in the same region before. They have retained their power of germinating for years, and as soon as they are brought under the proper influences this process takes place. This shows that seeds should not be planted too deep, and indeed experiment has fully shown that seeds planted not over one-half inch below the surface will grow quickest.

Light has also an effect to retard germination. One change which takes place during the process, is the formation of carbonic acid, by the carbon of the seed uniting with the oxygen of the air. Now the well known effect of light is to cause plants to retain the carbon and set the oxygen free, and the effect is probably the same upon seeds. While exposed to the light, there is the struggle between the opposing principles, and germination is slow to begin. But in darkness the carbon is separated, and that action which is called life commences.

Amongst other uses to which charcoal may be put in horticultural operations, may be mentioned, that it hastens the germination of seeds. If they are sown in pure charcoal, or in earth which is largely mixed with that substance pulverized, they will be found to sprout and send up their first leaves several days in advance of those sown in earth only. At least this is our own experience, and it is our opinion that seeds which have been kept so long as to lose their power of growing, under ordinary circumstances, may be revived by the use of this substance. Whether seeds may be said to be *alive*, is to us a question. We know of no form of life in organized beings unattended with specific action. We are inclined to think that life is developed in them by the circumstances mentioned above.

CHARCOAL—ITS PROPERTIES AND USES.

This substance has excited great attention of late in some portions of the country, although no accurate experiments have yet been made to test its value as a manure. In theory, it is certain that it possesses properties which are calculated to render it a very valuable substance in agriculture. And this arises from a power not peculiar to charcoal. All porous bodies have the property of absorbing the different gases in greater or less quantities. Charcoal, *after it has been heated to redness, and cooled without being exposed to the air*, will absorb ninety times its own volume of ammoniacal gas, and considerable quantities of others. If heated and cooled under water, and then placed in a confined portion of atmospheric air, it will absorb all the oxygen and leave pure nitrogen. Now, upon this property of absorbing gases depends its use as a manure. In itself, it has no valuable properties. It is one of the most indestructible of substances. Exposed to heat of the greatest intensity, if air is excluded, it suffers no change. Moisture has no effect upon it, and there is no chemical agent which will act upon it. It has been said by some writer, that, after being in the ground for several years, it becomes converted into a sort of coaly earth. But, on the other hand, it is a well known fact that fence posts are often charred at the bottom, in order to preserve them from rotting, and it succeeds for a great number of years. In this case, no such change can have taken place. It is, at any rate, very doubtful if it is ever converted into earth, or, of itself, furnishes any food for plants. But it does absorb gases, and by the powerful condensing force which all porous bodies possess, they are made solid in the pores of charcoal. One cubic inch of charcoal will condense ninety cubic inches of ammonia, or thirty-five of carbonic acid. And, holding it with all this force, how are they to give it off to plants? One class of theorists will say, that the vital power of the plant can separate it. But it is locked up in the pores of the charcoal, where not even the most minute fibre of the roots can penetrate. Others say, it is by the power of fixing gases that it does good, but they do not account for the giving them out. What then is it? Let us look a moment at another fact.

Water absorbs, at the common temperature and pressure, from seven hundred to eight hundred times its volume of ammoniacal gas, and when boiled will not part with the whole of it. Now notice the difference: charcoal absorbs ninety, and water eight hundred times their volume. The superior force of the water is seen at a glance. And what must be the result? Why, simply this: If charcoal is put upon land as a manure, however much gas it may have in its pores, the first shower of rain will separate it and carry it with it into the earth, ready for the use of the plants. In the mean time, the water takes the place of the gas in the pores. As soon as they become dry, and perhaps before, the process of absorption commences again, and again it is washed out.

This view of the case would indicate the use of charcoal as a top dressing to crops. And this we believe to be the correct plan. Buried in the soil, it adds to its looseness, but is not exposed to alternate dry and wet, as when on or near the surface.

But its action in compost heaps, or as an absorbent of the urine of man and animals, depends upon another principle. The general opinion seems to be, that its use is to absorb the gases, ammonia, &c., which are given off during decomposition of animal and vegetable substances. That this is not the case will readily appear, if any one will reflect a moment upon its well known action on animal matter. If meat which has begun to putrefy be packed down in charcoal, it is not only deprived of all bad smell, but the process of putrefaction is immediately stopped. No more gases are formed, and of course none can be absorbed. Its effect in this case is to stop the process of decay. In the same manner, any animal or vegetable substance, if exposed to the action of charcoal may be preserved for any length of time unchanged. What the power is by which this is done we do not pretend to say.

It is not, then, by absorbing gases that it is so useful in these cases, but simply through this power of preventing decay and preserving these matters in their unchanged state. Thus, when used in the compost heap, or when saturated with urine, all the substances it comes in contact with are brought under its influence, and when applied to the soil are gradually separated from it by the rains which fall upon them, and there undergo the decay which fits them to become food for plants.

Charcoal has the property also of preserving vegetable as well as animal substances from decay. And it is probably on this account that it has been found useful in propagating plants from their cuttings. Many remarkable experiments have been made with it, and with great success. Even leaves have taken root in finely powdered charcoal, kept constantly wet.

INORGANIC PARTS OF PLANTS.—STRAW AS A MANURE.

Besides the four substances which we have often mentioned—oxygen, hydrogen, nitrogen and carbon—as forming what are called the organic elements of plants, a number of others are always found in them, which they derive from the earth; and these have been called *inorganic*. They are all of mineral origin, being produced by the decay of rocks, of which they form a component part. We have said, they were always found in plants, and this is strictly true—they being as absolutely necessary for the production of a perfect plant as those first mentioned. But the quantity is not at all times the same, nor the same in all parts of the plant. Thus, during one period of its growth, one substance, as potash, may be found to abound; whilst, at another period, the relative proportion of this particular substance will be found to have very much diminished. And the whole proportion of inorganic matter may be very different at one period from another. Thus it was found that "plants of the same wheat, which a month before flowering, left 7.9 per cent of ash, left when in flower, only 5.4, and when ripe 3.3 per cent"—(Johnston)—showing a remarkable diminution in the quantity of ash, or rather, perhaps, increase in organic matter.

Different parts of the same plant exhibit, also, a very material difference in the same respect, and presenting a very strong practical bearing to the farmer. We shall refer to this below. The fact is shown by the analysis of the straw and grain of different plants. According to Springel, whose analyses are thought to be very correct, when 1000, lbs. of wheat straw are burned in the open air, 35.18 lbs. of ash are left. When the grain itself is burned, 11.77 lbs. are left. We give some of the most remarkable differences between the quantities of inorganic substances, of which this ash consists, in the following table:

	Grain.	Straw.
Potash,	2.25 lbs.	0.20 lbs.
Soda,	2.40 "	0.29 "
Lime,	0.96 "	2.40 "
Silica,	4.00 "	28.70 "
Phosphoric acid,	0.40 "	1.70 "

Here can be seen at a glance, the greater quantity of potash and soda in the grain, whilst the straw abounds in lime, silica and phosphoric acid. The silica, as might be expected, is vastly more abundant in the straw than in the grain, being, in fact, the back bone of the plant, by which it is enabled to bear its burden of grain erect. And experiment has demonstrated that upon whatever soil the plant is grown, if it attains a healthy growth and ripens its seed well, the quantity and quality of the ash is nearly the same.

As we said before, this has a very important practical bearing. It shows the process by which soils become impoverished, and also serves to point out the method by which they may be continued fertile or improved and restored when exhausted. And we have been led to these remarks by having often heard it said, and lately by a highly intelligent farmer, that if the straw was every year restored to the ground from which it was taken, the soil would produce good crops of wheat forever. An examination of the above table speaks a different language from this. The straw and the grain deprive the soil of very different substances. By restoring the straw, the lime, silica and phosphoric acid would be mostly returned, but the potash and soda would be taken away. Thus gradually these would be diminished, and although from year to year little difference might be noticed, yet after a number of years, if the extremes are compared, we do not doubt that a vast change would be discovered. The practice of returning the straw to the land is a good one, but at the same time it will be perceived that other manures, and those containing the substances taken off in the grain, are necessary to keep the soil in a really productive state. And well conducted experiments will determine exactly what those manures should be ; and this is one great aim of agricultural science.

We would recommend, in this connection, to all who are engaged in agricultural pursuits, to study the 2d No. of Johnston's Agricultural Chemistry. The whole work is one which should be in the hands, and its contents in the head, of every farmer. There is not its equal to be found ; and, if carefully studied from the beginning, there is no reason why the whole should not be understood. The author has conferred a lasting blessing upon his race.

INJECTION OF WARM WATER INTO THE UTERUS OF THE COW AS A MEANS OF EXPEDITING DELIVERY.

This method of promoting delivery in lingering cases was by Dr. Dick, an eminent veterinary surgeon of Edinburgh. Having been consulted by a person in the neighborhood, whose cow was in great distress with a prospect of an unfavorable issue in her accouchment, six or eight quarts of warm water were injected into the uterus after elevating the animal's hind quarters by a bundle of straw. Within five minutes the calf was safely expelled by the natural efforts. The instrument employed was a common syringe, fitted with a large flexible pipe of gum elastic. The liquor amnii had escaped at an early stage, and the animal had become nearly exhausted. After the water was injected the calf floated in the uterus freely. It is unquestionably an important method, and one which may be resorted to again under similar circumstances, and should be remembered by the person who may have a valuable animal suffering and in danger of losing her life.

NECESSITY OF AIR, MOISTURE AND WARMTH.

For the successful culture of all crops it is necessary that the roots should be supplied with air, moisture and warmth. The condition necessary to supply air and warmth are the same. First, looseness of soil. Second, a proper depth beneath the surface. Whatever may be said of the carbonic acid in the atmosphere, as the food of plants, farmers certainly will not infer from it that it is no matter how the roots are served. As no seed will germinate without air, so plants will not thrive if their roots are deprived of it. Too much moisture in the soil prevents the access of air as perfectly as a dense or compact soil from any other cause. Hence the necessity of providing passages and ways by which water may pass off. This is as necessary as guano, or any other nitrogenized substance. A wet soil is cold from the evaporation constantly going on at the surface. The moisture which passes into the atmosphere is immediately replaced from the water below rising by capillary attraction to supply its place, and constant circulation is thus preserved from below upwards; even an upward current of moisture goes on in the coldest weather in the winter. Let a pit with water be covered with boards, and the under surface of these boards will be covered with frost during the most severe weather of winter. How much more rapid is the escape of water in warm summer weather than the winter? As the evaporation in one case exceeds the other, so in the same proportion with the temperature.

MEANS FOR IMPROVEMENT.

Could our farmers be induced once a year to visit their brother farmers in their vicinity, it would promote very materially their interests. There are many farmers who sincerely believe that they know quite as much as their neighbors; this, to be sure, may be true, but after all, it is very likely that they are not so well acquainted with some kinds of rural economy as others. Then, again, intercourse with their distant neighbors, for the special purpose of being benefited, will serve more than one purpose—it will benefit both parties, the visiting and the visited. Emulation, which is often the spring of business, will be excited. We do not care who the individual is, or what business he is in, without emulation, without ambition to excel, very little, comparatively, will be done. Farmers, then, visit your neighbors to see how they manage their farms and their stock, and when you have done this, go home and improve upon their modes of management. Beat them, if you can.

OVER RIPENED SEED.

There are many instances where seed for culture, or sowing, is cut before it can be said to be fully ripened. Wheat cut while it is in the milk—maize, too, which from an early frost has not certainly ripened—will grow if cut up immediately and properly dried. In some instances, too, it has been found that unripe potatoes are better for seed, produce a better crop, and more certain, than those which were not raised or dug till they were perfectly ripe. Thus in the Agricultural Report for 1843, in the Journal of Agriculture, and the Transactions of the Highland and Agricultural Society of Scotland, p. 99, it is stated that the *under ripened seed* of the potatoe crop raised in the bad season of 1841, produced crop without failure in 1842, in the alleged *unfavorable season*, in consequence of heat and drought, while the *over* ripened seed raised in the fair season of 1842, has caused an extensive failure in 1843, in a favorable season. These are very important facts, and as the report very properly inquires, should not unripe seed be planted in all cases?

THE RELATION OF CLAY TO SANDY SOILS.

There seems to be one remarkable association of soils; thus, wherever a sandy tract exists it is rarely disconnected with clay; clay, as such, in this state, underlies every tract of sand which we have seen. It is not always accessible, but in many instances it is so, and it requires only a slight examination to find it. It will frequently be found cropping out beneath the sand in ravines, and on the borders of streams. The Hudson river sands always rest upon clay, and that is the order in which the two deposits are situated with regard to each other, sand above and clay beneath. When clay is the surface material, it is because the superincumbent sand has been removed by diluvial action. From these facts it will be seen, that the both kinds of soils may be frequently ameliorated by mixture, and even is more practicable than most farmers are aware. The position too of these soils is important, on account of the certainty of procuring water; the clay beneath is impervious, in consequence of which it will throw up water when the sand is penetrated.

THEORIES.

Those formulas of belief termed *theories*, which, although they may have been but distant approximations to the true, yet are far more satisfactory than to remain in the mere possession of facts unconnected by expressions signifying the existence of relations. Hence we find in the spirit of philosophy that spirit which attempts to reduce all facts to order and to express all relations in their simplest forms. All this is eminently observable in the higher intellects, as Newton's, Des Cartes, Hippocrates, Boerhave, Cullen, Linnæus and Cuvier. But philosophy is not limited to a few great and overshadowing intellects, it exists in the human mind. We observe it in that spirit which attempts to systematize all knowledge and all facts. We observe this not only in the astronomer when he attempts to express in general formulas the sum of present knowledge, or to set down the general results of his observations, but also in the mechanic and laborer, where he simplifies his processes and brings under one operation what before required many. If then we find this spirit in man, what high hopes may we not entertain of his advancement, and where shall we limit his attainments or set bounds to his achievements.

EXPERIMENT.

FISHKILL LANDING, *Nov.* 25, 1844.

MY DEAR SIR—I tried an experiment on my farm, which, so far as results are concerned, proved highly satisfactory; but the philosophy of the experiment, the true cause of those results is yet to me very questionable. Pray expound: for in agriculture as well as other matters in life, there are more things in heaven and *earth* than are dreamed of in our philosophy.

The lot experimented upon contains thirteen acres of a gravelly loam, which prior to my possession of it, had been exhausted by "*taking every thing off and putting nothing on*," and was foul in the extreme with weeds and stones.

The first year I raised corn and potatoes, manuring in the hill, and obtained of course but a small crop. In the fall I ploughed it again and picked off the stones. The next year I sowed oats, three bushels and three pecks timothy, and one peck clover per acre, lightly top dressed, harrowed three times, and rolled the whole in carefully. The oats yielded thirty-five bushels per acre. In the month of September I thoroughly mixed one ton of plaster and one ton of leached ashes, and sowed it in the thirteen acres as evenly as possible. When winter came on there was a thick coating of vegetable matter on the ground of over three inches in thickness, (the grass had not been pastured or cut) and towards the close of the winter, (in February,) I sowed forty bushels of powdered charcoal, (or dust, as we call it,) to the acre on the snow. The grass came up early this spring, and last harvest I cut three tons to the acre of handsome and nutricious hay as can be found in the country. Portions of the timothy was four feet high by measurement, and the heads averaged in the highest portions of it eight inches in length. It was cut just after the blossom had covered about two-thirds of the head, and with care the whole was cut and housed without loosing a pound by rotting or bleaching, notwithstanding the continued rains we had last harvest.

Your own investigations and experiments in scientific agriculture, will I presume readily suggest the *modus operandi* of the plaster, ashes and charcoal; but not so with myself. I am still unsatisfied with any solution from books, analogy or practice, but lean more in favor of the potash of the ashes than any thing else —could the charcoal under the circumstances act other than mechanically? Will you favor me with a scientific (practical) solution of my experiment, which I consider not of so much importance "*per se*," as per circumstances of soil, &c.

Very truly your friend,

ROBT. C. RANKIN.

Our correspondent has not given the full account of his experiment and the condition of his land which we wish; but there is but little mystery as it appears to us in the fine crop of hay which was obtained after such a plentiful application of gypsum, ashes and charcoal. The peculiarity in this experiment consists in the application of the charcoal to the snow which then covered the ground. In thus applying it it is very possible that some advantage is gained. Snow, especially fresh fallen snow, is rich in ammonia, and it seems to us highly probable that charcoal may absorb the ammonia freely and store it up for the use of the vegetables. Spent ashes too, it is well known, are well adapted to grass and grain whose straw yields a large amount of silica.

ROAD WASTES.

INTERSECTED as our country is with roads and channels of communication, they furnish a great amount of drained surface which may be turned to an important end by the farmer whose lands lie adjacent to them. Every rain and every shower washes the road and carries off to parts unknown, the droppings of animals intermixed with the fine earthy materials. Most of these substances now go to waste ; even some farmers are so abominably slovenly and wasteful as to milk and yard their cows in the road before their doors and then let the soluble parts run off down the gutter. But even though the waste of roads contained no soluble matter, still the water itself will irrigate the field, and increase the quantity of hay in meadows at least one-fourth their ordinary yield. Let every farmer then who can save the road wastes open shallow drains over his meadows in such a way that the current shall run slow and evenly, and gradually spread itself over the field. It will also reduce his road tax and give him a better way for travel.

GRUBS AND WIRE WORMS.

Some soils appear to be infested with worms in an unusual degree. What is the cause and what is the remedy for this condition ? The first inquiry we should make is, what is the nature of the soil in which these pestiferous insects abound ? According to our observations the soil is unusually lean and poor. They do not infest it until it is worn out, or has become exhausted by culture. There may be exceptions, but so frequently have we witnessed the fact that we have been disposed to set it down as established, that a lean soil is at least more subject to the grub, wire worm, &c., than a soil which is in good heart and condition. We are supported in this position by the fact that not only whole fields are greatly infected when worn out and poor, but particular patches of a field become infested, when by any cause they have been subjected to unusual exhaustion. This last year we observed a field planted with corn, one part of which was remarkably fine ; but another portion was entirely destroyed by the wire worm. Now this portion was poor and lean, was exhausted by the roots of a large oak. This, to be sure, is not so clear a case, and standing by itself, we should not place much reliance upon it. But in addition to this, we know of farms which being run down, as it is termed, have become so entirely infested that it is difficult to cultivate them. Then again, the fact that a soil is usually in this condition when poor, is agreeable to analogy. Animals are not infested with worms until they are lean and poor. Children poorly fed, are the subjects in which worms most abound. On the other hand, children and the young of all animals which are supplied with abundance of nutricious food, are rarely if ever afflicted with parasitic worms. We may look at the subject in another point of view. Animals which are well fed resist the effects of worms. So a soil which is rich, produces plants which are capable of withstanding the injuries of worms. A feeble plant which would be inevitably destroyed by a worm, might, if vigorous, continue to grow and finally outlive the injury. If the views we have expressed are but partially correct, we think we are warranted in the conclusion that one of the best remedies for worms is high cultivation; and as a preservative means, that cultivation which preserves the soil in a good condition is the one which will ensure it against these animals. But admitting that we are not correct in the view we take of the subject, still, we are satisfied that most of the remedies which have been proposed are worthless. Salt, for instance, is not unfrequently recommended, which is to be sowed broadcast over the field. Now, it would seem that if a person would reflect a moment, they would see that the small quantity of this material to which we are restricted, would not have the least effect on the worm; and so of any substance whatever which has hitherto, or which can be recommended for this specific purpose. Soaking the seed in bitter, saline or poisonous substances is by far a more direct method of effecting the object; still it is a question whether even their good effects do not originate from the vigor which the young plant derives from the solution. We leave this subject at this time with one additional recommendation, viz: preserve the birds from the deadly fire of the rascally boys of the neighborhood. We would extend protection even to the crow, that black coated vagabond, as he has been called; every humane farmer, however, will of course see that the birds are not only not destroyed, but protected; and every selfish, narrow contracted one, we should expect, would guard his interest so far, as to prevent the destruction of animals which are of so much importance to him as robins, sparrows, swallows and bluebirds, together with hosts of others equally useful.

EXTRACTS

FROM

DOMESTIC AND FOREIGN JOURNALS.

THE importance of obtaining correct analyses of our cultivated vegetables is beginning to be appreciated in the country, and we are happy to see so good an example set by the agricultural societies of Winyaw and All-Saints. We make no apology for extracting from the Southern Agriculturist the entire articles containing the analyses of rice, cotton wool, cotton seed, Indian corn, and the yam or sweet potatoe.

AN ANALYSIS OF RICE, RICE STRAW, CHAFF, &c.

AT a meeting of the Agricultural Society of Winyaw and All-Saints, in Georgetown District, in November, 1843, it was proposed that an analysis be made of the grain, straw, chaff, &c., of rice. This was agreed to, and the task committed to Professor C. U. SHEPARD, of the Medical College of the state of South-Carolina. The following analysis is the result of his chemical investigations, and was handed to Col. ALLSTON, the chairman of the committee appointed to carry the proposition into effect.

Charleston, S. C., April 6th, 1844.

DEAR SIR,

I hasten to lay before you at the earliest moment in my power, the report on rice, concerning which I have had communications with yourself and Dr. Parker. I hope it may not disappoint the expectation already formed of the work by yourself, or the society for which it has been executed.

The task has greatly exceeded in difficulty the estimate I formed respecting it at the outset; it having occupied me closely in my laboratory for at least three weeks. The results given in the report are generally deduced from the averages of repeated analyses.

If the society publishes my report, I should feel obliged if a copy would be forwarded to the Hon. Mr. ELLSWORTH, of the Patent Office, Washington, whom I have led to expect such a favor.

And I have the honor to remain,

Most respectfully, your obedient servant,

CHAS. UPHAM SHEPARD.

Hon. R. F. W. ALLSTON.

CHEMICAL EXAMINATIONS OF THE RICE PLANT AND RICE SOIL IN SOUTH-CAROLINA.

1.—*Of Clean Commercial Rice.*

Burned in a porcelain capsule under the muffle, until all combustible matter had disappeared, a blebby glass-like ash remained, weighing 0.404 per cent, or less than half a part in one hundred of the rice consumed.* Corrected statement of mineral constituents of clean rice=0.487 per cent.

Composition of 100 *parts of this residuum.*

Phosphate of lime (bone-earth,) with decided traces of intermixed phosphate of magnesia,..	76.20
Phosphate of potassa, nearly 5 per cent,.... Silica, sometimes as high as 20 per cent.,... And the following salts in traces only. They are enumerated in the supposed order of their abundance, viz: .... Sulphate of potassa, ... Chloride of potassium, ... Carbonate of lime,....................... Carbonate of magnesia, ...	... 24.80

2.—*Of the Cotyledon, commonly called the eye or chit of the grain.*

Ignited under a muffle on a porcelain plate, it burns with a bright light, and the ash flows into a glass. From the intimate way in which it adhered to the plate, it was impossible to determine its weight, or even its composition, in a satisfactory manner. The expression 6.824 per cent, however, may be taken as an approximation to the weight of the residuum. In composition, it appears scarcely to differ from the ash of clean rice, except in being somewhat richer in lime, and in the phosphoric and sulphuric acids.

3.—*Of the fine Rice Flour, as it comes down on the bulk.*

It gives, on burning, a bulky, porous ash, weighing 10.746 per cent, of the flour consumed. Corrected as above=12.30 per ct.

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* It being requisite to determine the inorganic ingredients of rice, and of the various parts of the entire plant, as it may reasonably be supposed they are returned to the soil again on the decomposition of the plant and its parts, (whether taking place spontaneously or otherwise,) and not to give those ingredients in all cases as they are actually yielded to us in the process of destructive analysis, I shall subjoin many of the constituents of the ashy residua not as found, but rather as the principles of chemistry authorise us to deduce them, in accordance with the above requisition.

Composition of 100 *parts of this residuum, as follows :*

Silica, with traces of combined potassa, ...		38.02
Phosphate of lime, with traces of phosphate of magnesia,		54.60
Phosphate of potassa, (rich in this salt,)		
Sulphate of potassa, ...		
Sulphate of lime, in traces, ...	and loss, ...	7.38
Chloride of calcium, "		
Chloride of potassium "		
Lime and magnesia, "		
		100.00

4.—*Of coarse Rice Flour, from the bulk.*

It gives, on burning, a bulky, porous ash=11.23 per cent. Corrected statement=11.831 per cent.

Composition of 100 *parts of this residuum, as follows :*

Silica, with traces of combined potassa, ...		69.27
Phosphate of lime, with traces of phosphate of magnesia,		28.94
Phosphate of potassa, (rich in this salt,)		
Carbonate of potass, in traces, ...		
Sulphate of potassa, "	and loss, ...	6.79
Lime and magnesia, "		
Chloride of calcium, "		
Chloride of potassium, "		
		100.00

5.—*Of the Husk, commonly called chaff, or offal.*

Burns with little or no flame, into a perfectly white, silicious skeleton of the husk. In weight it equals 13.67 per cent.

Composition of 100 *parts of this residuum, as follows :*

Silica		97.551
Phosphate of lime, with traces of alumina and oxides of iron and manganese, ...		1.023
Carbonate of lime, ...		0.294
Phosphate of potassa, ...		
Sulphate of potassa, in traces,	and loss, ...	1.132
Chloride of potassium, "		
Carbonate of potassa, "		
		100.000

6.—*Of the Rice Straw.*

Burns into an ash, which is a semi-fused, glassy frit. It weighs 12.422 per cent.

Composition in 100 *parts, as follows :*

Silica,	84.75
Potassa, with probable traces of soda, combined with the the above silica,	8.69
Phosphate of lime, with traces of oxide of iron (and manganese,)	2.00
Carbonate of lime,	2.00
Alumina, in traces, ... Phosphate of potassa,.. Carbonate of potassa,.. Sulphate of potassa, ... Chloride of potassium, } and loss,	2.56
	100.00

7.—*Rice Soil from Waverly Island.*

Silica, with fine sand, one-third of which is feldspathic and slightly magnesian or talcose; and contains alumina with from 2 to 4 per cent of potassa, mingled with soda and magnesia,	47.75
Alumina, partly combined with humic acid,	12.35
Peroxide of iron (combined with humus,) with decided traces of phosphate of lime, (bone-earth,)	4.15
Carbonate of lime, with traces of magnesia,	0.40
Water of absorption, ... 8.50 Humus, (organic matter,) 23.50 }	32.00
Chloride of calcium, Sulphate of lime,.... Sulphate of magnesia, Sulphate of potassa,.. Chloride of sodium,.. } and loss,	1.35
	100.00

8.—*Rice Soil from Woodville, Main, Waverly.*

Silica, with fine sand, as above,	57.50
Alumina, partly combined with humic acid,	10.45
Peroxide of iron (combined with humus,) with decided traces of phosphate of lime,	4.60
Carbonate of lime,	0.40
Carbonate of magnesia,	0.58
Water of absorption, 7.50 Humus, ...17.80 }	25.30
Chloride of calcium, Sulphate of lime,.... Sulphate of magnesia, Sulphate of potassa,.. Chloride of sodium,.. } and loss,	1.17
	100.00

9.—*Rice Soil, from Matanzas on the Main.*

Silica, with fine sand, as above,		60.50
Alumina, partly combined with humic acid,		8.15
Peroxide of iron (combined with humus,) with decided traces of phosphate of lime,		3.00
Carbonate of lime, with traces of magnesia,		0.85
Water of absorption, 9.00	}	27.50
Humus, 18.50	}	
Chlorides of calcium and of sodium,	} and loss,	1.00
Sulphates nearly as above,	}	
		101.00

10.—*Rice Soil from Dr. Parker.*

Silica, with fine sand, as above,		41.25
Alumina, (combined with humus,)		9.25
Peroxide of iron, (combined with humus,)		3.30
Phosphate of lime,		0.55
Carbonate of lime,		0.85
Carbonate of magnesia,		0.45
Water of absorption, 9.50	}	43.00
Humus, (with odor of ammonia,) 33.50	}	
Chloride of calcium, abundant,	}	
Chloride of sodium,	}	
Sulphate of lime,	} and loss,	1.35
Sulphate of magnesia,	}	
Sulphate of potassa,	}	
		100.00

Additional particulars, with some consequences from the foregoing.

[1.] 100 parts by weight of rough rice (from which the remains of stems and glume-leaflets had been separated,) gave

82.10 parts of grain, and
17.90 " husk.

100.00

[2.] 100 parts of unhusked grain, gave

95.238 parts of non-cotyledonous grain, and
4.762 " cotyledons, or eyes.

100.00

[3.] 100 parts of non-cotyledonous unhusked grain, gave

94.3 of grain without husk, cotyledon or epidermis,
5.7 of epidermis, or inner coat.

100.00

[4.] 100 parts of rough rice, then has

17.900	husk.
3.909	cotyledon.
4.456	epidermis.
73.735	clean grain.*
100.000	

[5.] The ratio of rough rice to the straw of the harvested grain, deduced from taking the mean of fifteen separate experiments, gave the weight of the grain 53.5, that of the straw, including the panicle or stems, 23.6.

But as many of the leaves appear to have been mutilated, I am disposed to assume as a probable approximation to the truth, the weight of the grain as just double that of the cut straw. And as some observation of the stubble and roots strongly favors the idea of their equaling together the weight of the straw, I shall still farther venture to consider the rough rice of a ripe, harvested plant as equal in weight to that of the entire stem, leaves and root.

[6.] Let us next attempt an approximation towards an appreciation of the mineral constituents of these different portions of the rice plant.

The ash in 100 parts of rough rice equals .7462 parts. And as the ash in 100 of the husk, equals 13.67, that in 17.90 parts of husk must equal 2.446 parts. By difference, therefore, between 2.446 and 4.752, the ash of the cotyledon, epidermis and clean grain, in 100 parts of rough rice, will equal 2.316 parts.

But the percentage of the ash in clean rice being known, we are able to state what the amount of ash is. In clean rice of 100 parts rough rice, it is 0.297 parts. The general statement, then, will stand thus, for 100 parts rough rice.

Ash in the husk, ...	2.446	parts.
" cotyledon and epidermis,..	2.019	"
" clean grain, ...	0.297	"
	4.762	

[7.] The straw, (including the stubble and root,) having been assumed as equal in weight to the rough grain, the ratio of the mineral ingredients of the former to the latter, stands as 12.422 to 4.762.

[8.] Considering a single rice plant, in its dry, mature state, to weigh 100 grains, (a supposition which will often accord with the fact,) we shall have of mineral matter in the different parts of the plants, the following number of grains :

* From losses sustained to the clean grain, in the process of milling, it is not probable that above 70 parts of commercial rice are afforded by 100 of rough rice.

In the stubble and root,	....	36.08
" straw and pan leaves,	....	36.08
" husk,	....	14.20
" cotyledon and epidermis,	.....	11.70
" clean rice,	....	1.94
		100.00

As, however, in the milling, nearly one-sixth of the cotyledon still adheres to the grain, for all practical estimates, it will be nearer the truth to state the mineral ingredients of clean rice at 2 per cent those of the whole crop, and to diminish, therefore, the residuum of the cotyledon and epidermis by 0.06 per cent, making the percentage statement to stand thus:

Stubble and root, ...	36.08
Straw and leaves, ...	36.08
Husk, ...	14.20
Cotyledon and epidermis, ...	11.64
Clean rice, (commercial,)	2.00
	100.00*

[9.] If the foregoing views are correct, it becomes plain, at a glance, that the planter who sells his crop in the condition of rough rice, robs his lands of 27.84 per cent of the mineral ingredients of this species of produce; while, on the other hand, he who sells it as clean rice, subtracts from them but two per cent of these ingredients.

But the true value of these constituents cannot be rightly estimated by their numerical proportions, since the mineral ingredients of the cotyledon and epidermis consist of above fifty per cent of the most precious saline substances, while in those of the stubble, root and husk, the like constituents scarcely rise to ten per cent.

[10.] From the extreme slowness with which the husk suffers conversion into humus, unless fermented with stable litter, this portion of the rice plant appears to be almost wholly neglected by the planter. But as it contains above thirty per cent of carbon, it must be capable, when incorporated with the soil, of performing, to a considerable extent, the functions of humus, *i. e.* of gradually giving rise to carbonic acid from combining with the oxygen of

* It may be useful to present here, also, a *per centum* view of the incombustible constituents of the rough rice.

Husk, ...	51.00
Cotyledon and epidermis, ...	41.81
Clean rice, ...	7.19

It scarcely need to be stated, that the cotyledon and epidermis are found in the coarse rice flour, intermingled largely with the husk, and with from three to four per cent of powdered clean rice. The cotyledon and the epidermis are richer than the clean rice in saccharine matter and gluten, which materially augment the value of rice flour as a feed for cattle and swine. These principles are thus returned to the soil under the most favorable conditions for agriculture.

the air, and of raising the temperature of the soil by its eremacausis, or slow combustion. Besides, its minutely divided silica is in a more favorable condition for absorption by the rootlets of plants, than that which is offered to them by the soil itself. We may add to these supposed useful properties of the husk, the mechanical service which in certain stiff, compact lands it is capable of exerting, by keeping the ground open to the access of air, and as an absorbent of moisture. As it is unlike to the stalk and leaf, in not containing alkali, it might, perhaps, be found advantageous to add wood ashes along with it to the soils on which it is applied.

The extraordinary results, so fully proven of late, to flow from the use of minutely divided charcoal, would perhaps authorise another mode of treating the rice offal, which is to burn it with a smothered combustion in small kilns, or in heaps partly covered with soil, whereby it might be converted into a species of charcoal. I should anticipate from such a preparation of the husk, whether applied alone, or previously mixed up with putrescent matters into a compost, the most marked effects.*

I conclude this report with the hope that this inquiry, which is by no means supposed to have exhausted the subject, or to have reached that rigid accuracy of result which it is to be hoped may one day be obtained, may afford the rice planter more valid reasons than he before had, for husbanding those mineral elements of his crop with a religious care, the neglect of which, with whatever apparent impunity it may at first be attended, cannot fail in the end to involve him in a hopeless struggle against nature.

C. U. SHEPARD.

Charleston, April 6th, 1844.

AN ANALYSIS OF COTTON WOOL, COTTON SEED, INDIAN CORN, AND THE YAM POTATOE

1*st. Cotton Wool.*

One hundred parts by weight of cotton-wool on being heated in a platina crucible, so long as a brightly burning gas continued to be emitted, lost 86.09 parts—the residuum being a perfectly charred cotton, which on being ignited under a muffle until every particle of carbon was consumed, lost 12.985, and left an almost purely

*I need scarcely to add, that the different composition of the stem and leaves of the rice, would scarcely justify a similar procedure with these parts of the plant, since unless the temperature be regulated with great care, the silica would form with the the associated alkali, a true glass, which for agricultural purposes, would be nearly as inoperative as common sand.

white ash, whose weight was rather under 1 per cent or, 0.9247. Of this ash, about 44 per cent was found to be soluble in water. It contained 12.88 per cent of silicious sand, which must have been acquired adventitiously in the process of harvesting the fibre. Deducting the sand from the ash, the constitution of the latter is as follows:—

Carbonate of potassa (with possible traces of soda,)	44.19
Phosphate of lime with traces of magnesia, ...	25.44
Carbonate of lime, ...	8.87
Carbonate of magnesia,...........................	6.85
Silica, ...	4.12
Alumina (probably accidental,)	1.40
Sulphate of potassa, ...	2.70
Chloride of potassium, ... / Chloride of magnesium, ... / Sulphate of lime, ... / Phosphate potassa, ... / Oxide iron in minute traces, . } and loss, ...	6.43
	100.00

But since it is obvious that the carbonic acid in the above mentioned salts must have been derived during the incineration of the cotton, the following view will more certainly express the important mineral ingredients abstracted by the cotton from the soil for every 100 parts of its ash.

Potassa (with possible traces of soda,)	31.09
Lime, ...	17.05
Magnesia,................................	3.26
Phosphoric acid, ...	12.30
Sulphuric acid,...........................	1.22
	64.92

For every 10,000 lbs. of cotton wool, then, about 60 lbs. of the above mentioned ingredients are subtracted from the soil in the proportion indicated by the numbers appended, *i. e.* omitting fractions.

Potassa,..................................	31	pounds.
Lime, ...	17	"
Magnesia,.................................	3	"
Phosphoric acid, ...	12	"
Sulphuric acid, ...	1	"

Several queries were submitted to me along with the sample to be analyzed, relative to the effect of soils on cotton. I regret to state that the almost total ignorance in which we are still left respecting the composition of the varieties of this fibre, and the soils producing them, prevents me from hazarding any explanations on the subject. This is the first destructive analysis ever made (at least so far as my knowledge extends,) of the cotton wool. Nor am I acquainted with the properties of the soil which afforded it. Prior to any deductions, it is clear we must know the composition of each variety of cotton, as well as that of the soil it affects. At present I can only venture on connecting together two facts, which appear to occupy important relations to one another. The soil of St. Stephen's, which is said by F. A. Porcher, Esq., to be a stiff clayey loam, produces the strongest and finest fibre of the Santee varieties. The Sea-Island qualities are supposed to owe their superiority to the use of marsh mud, which I have ascertained to be a clayey admixture, rich in alkalies and alkaline earths. Whether the similarity between these two staples is influenced most (if it is affected at all,) by the chemical or mechanical qualities of the soils producing them, it is impossible to decide. It is also conceivable that the two sets of qualities may conspire to one and the same end.

2d. Cotton Seed.

One hundred parts, heated as above, lost 77.475, and the thoroughly charred residuum burned under the muffle, left 3.856 parts of a perfectly white ash. The composition was found to be as follows :

Phosphate of lime (with traces of magnesia,)..........	61.64
Phosphate of potassa (with traces of soda,)	31.51
Sulphate of potassa, ...	2.55
Silica,..	1.74
Carbonate of lime,..................................	0.41
Carbonate of magnesia,............................	26
Chloride of potassium,.............................	25
Carbonate of potassa, Sulphate of lime, Sulphate of magnesia, Alumina & oxides of iron & manganese in traces } & loss,	1.64
	100.00

In comparing the above table with that afforded by the cotton wool, a marked dissimilarity presents itself. The ash of the cotton seed is fourfold that of the fibre ; while the former has also treble the phosphoric acid possessed by the latter, as will the more clearly appear, when we present the analysis under another form, corresponding with the second table under cotton wool.

Phosphoric acid,	45.35
Lime,	29.79
Potassa,	19.40
Sulphuric acid,	1.16
	95.70

From the foregoing analysis it would appear difficult to imagine a vegetable compound, better adapted for fertilizing land, than the cotton seed ; nor can we any longer be surprised at the well known fact, that soils long cropped with this staple, without a return to them of the inorganic matters withdrawn in the seed, become completely exhausted and unproductive.

3d. *Indian Corn.*

One hundred parts heated to redness in a crucible, so long as a brightly burning flame was emitted, lost 81.05 parts. The completely charred residuum on being ignited beneath a muffle, upon a platina foil, until all the carbon was consumed, left 0.95 parts, or less than 1 per cent of an easily flowing clear glass. This ash has the following composition :—

Silica,	38.45
Potassa, (with traces of soda)	19.51
Phosphate of lime,	17.17
Phosphate of magnesia,	13.83
Phosphate of potassa,	2.24
Carb. lime,	2.50
Carb. magnesia,	2.16
Sulphate of lime, Sulphate of magnesia,	.79
Silica, mechanically present,	1.70
Alumina, traces,	
Loss,	1.65
	100.00

Omitting the silica as an unimportant loss to the soil, and the carbonic acid which is a product of the analysis, we have in every 100 parts of the ash of the Indian corn, the following important inorganic constituents :—

Potassa,	20.87
Phosphoric acid,	18.80
Lime,	9.72
Magnesia,	5.76
	55.15

That is to say, for every 1,000 pounds of Indian corn sold from an estate, the land is robbed of 9½ lbs. inorganic matter, whereof about 5½ lbs. consist of principles of prime value to all species of crops.*

4th. Sweet Potatoe, (Yam.)

The tubers analysed, though fresh from the market, were obviously drier than when first harvested.

One hundred parts of the thinly sliced tubers on being thoroughly dried at a temperature of 200°, lost 58.97 per cent of water.

One hundred parts of the undried potatoe gave 1.09 parts, or rather over 1 per cent of a white ash stained in points of a bluish green color.

Its composition was as follows :—

Carbonate of potassa, (with traces of soda)	60.00
Phosphate of lime,	14.57
Phosphate of magnesia,	5.60
Carbonate of lime,	5.39
Carbonate of magnesia,	3.80
Chloride of potassium,	4.60
Sulphate of potassa,	4.35
Silica,	.70
Chloride of calcium, / Sulphate of magnesia and lime, / Alumina, / Oxide of iron and manganese in traces, } and loss,	.99
	100.00

One hundred parts of the ash from the sweet potatoe tuber, contains then the following inorganic principles which must have been withdrawn from the soil.

Potassa,	43.59
Phosphoric acid,	11.08
Lime,	10.12
Magnesia,	3.80
Potassium,	2.42
Chlorine,	2.18
Sulphuric acid,	1.90
	85.09

* In a recent number of the Boston Journal of Natural History, I observe some observations by Dr. Charles T. Jackson, on the inorganic constitution of Indian corn, wherein Dr. J. supposes phosphoric acid to be present in the grain, in a free or uncombined state. The experiment which led him to form this conjecture, did by no means succeed in my hands as described by him; for although the grain was repeatedly incinerated upon a bright platina foil under a muffler, still the metal lost none of its polish or malleability. Neither can I agree with Dr. J. in his opinion of the presence of ammonia as a base in Indian corn; the volatile alkali obtained by him, being a product rather than an educt of the analysis.

Tabular view of some of the foregoing results.

	In Cotton wool.	Cotton seed.	Indian corn.	Potatoe.
Weight of ash,	0.9247 p. c.	3.856 p. c.	0.95 p. c.	1.09 p. c.

Essential inorganic ingredients absorbed from the soil.

	By Cotton wool.	Cotton seed.	Indian corn.	Potatoe.
Potassa, ...	31.09	19.40	20.87	43.59
Lime, ...	17.05	29.79	9.72	10.12
Magnesia, ...	3.26	trace	5.76	3.80
Phosphoric acid,	12.30	45.35	18.80	11.08
Sulphuric acid, .	1.12	1.16	trace	31.90
Chlorine, ...	traces	traces	——	2.18
Potassium, ...	——	——	——	2.42

One thousand pounds of each crop give of organic ingredients, of the 1st, 9½ lbs.; 2d, 38½ lbs.; 3d, 9½ lbs.; and of the 4th, 10 9-10 lbs.

The proportions of inorganic matter that may be regarded as most important, are—In the 1st, 64-100; in the 2d, 95-100; in the 3d, 55-100; in the 4th, 85-100 lbs.

If equal weights of cotton wool and Indian corn be taken from the same area of land, the deterioration to the soil in organic principles should be nearly the same. The yam, if compared with either of these crops would appear to rob the soil of a still heavier weight of saline matter, although it is noticeable that the proportion of phosphoric acid abstracted by it is considerably less, and that no portion of it is thus withdrawn in the condition of phosphate of potassa.

Finally, under the same weights, the cotton seed removes about four times as much of these ingredients as the yam, and six times the quantity that passes off by the cotton wool, or the Indian corn. Moreover, the proportion of phosphoric acid (the most valued mineral constituent of a soil,) in the cotton seed is nearly double that in Indian corn, and treble that in cotton wool and the yam; whereby the inestimable qualities of the cotton seed as a fertilizer, become still further apparent.

The following letter from Professor Shepard to F. A. Porcher, Esq., has been communicated for publication since the foregoing report.

Charleston, April 22d, 1844.

To Frederick A. Porcher, Esq.

Dear Sir—I thank you for calling my attention to the analysis of Sea-Island cotton wool, by Dr. Ure, as quoted in the valuable Memoir on Cotton by the Hon. W. Seabrook. It is the first notice I ever had of any chemical examination besides my own, of the ash of cotton wool, and it is proper that I should submit a few remarks to your society respecting the different results arrived at in the two cases.

If the example analyzed by Dr. Ure, was a fair one, of which I confess I entertain some doubts, several discrepancies would appear to exist between the two varieties examined. Before alluding to these, however, I beg leave to state, that in my analysis, both of the wool and of the seed, I contented myself with the determination of the proportion of the phosphates, without establishing rigorously the ratio of the magnesia to the lime; neither did my analysis give by itself the chloride of potassium, (muriate of potash.) Yet I am able to add, from a recurrence to my notes, that this compound fell short of three per cent. I am greatly surprised, however, to find the oxide of iron so high in the Sea-Island variety, since in that of the Santee it cannot equal half a part in one hundred. Should the absence of carbonate of magnesia in the Sea-Island variety be verified, and the extraordinary content in the latter of chlorine and sulphuric acid be established, the inorganic difference between the two staples, will, to say the least, be as remarkable as those existing in their physical qualities.

Comparative Statement.

TABLE I.

	Sea-Island.	Santee.
Earthy phosphates,	17.4	25.44
Carbonate of lime,	10.6	8.87
Carbonate of magnesia,		6.85
Chloride of potassium, (muriate of potash,)	9.9	3.00 ?
Sulphate of potassa,	9.3	2.70
Silica,		4.12
Peroxide of iron,	3.0	0.50 ?

TABLE II.

In this table the acids are separated from their bases, and the carbonic acid is omitted.

	Sea-Island.	Santee.
Potassa,	35.24	31.09
Lime,	10.28	17.05
Magnesia,	3.20	3.26
Potassium,	5.70	1.50 ?
Phosphoric acid,	9.84	12.30
Sulphuric acid,	4.75	1.22
Chlorine,	4.20	1.50 ?
Peroxide of iron,	3.00	less than 0.50
Silica,		4.12
Phosphate of potasa,		1.50 ?
	76.11	73.99

Very respectfully, yours,

CHARLES U. SHEPARD.

[From Transactions of Highland Ag. Soc.]

EXPERIMENTS AND OBSERVATIONS ON THE PRODUCTION OF BUTTER.

BY PROFESSOR TRAILL.

The produce of the dairy forms so important a branch of agricultural industry, that it appears surprising how few attempts have been made to investigate the comparative merits of different methods, employed in various places, for the production of butter and cheese. The qualities of these articles are well known to differ greatly in our own country; yet each district has gone on for long periods to follow its own methods, as if each had attained perfection in the art. This is a proof either of the want of any fixed principles to guide us in the practice of these important economical operations, or of their being unknown to the majorty of farmers.

The subject long engaged the attention of the late estimable Dr. Gerard of Liverpool and myself, and for several years, especially in the years 1806 and 1807, we carried on many experiments; in some of which we were assisted by our friend, Dr. Bostock, now of London.

It was originally intended to comprise in our investigations the whole subject of the production of butter and cheese; but our professional avocations, and other interruptions, prevented the completion of our plans, after we had performed numerous experiments on the production of butter. The hope of being one day able to complete them, has hitherto prevented any account of them being published. On the death of Dr. Gerard, the whole papers, in a state of great confusion, came into my possession; and I now propose to lay before the Highland and Agricultural Society of Scotland the principal results which we obtained.

We had a dairy of four, sometimes of five, cows at our disposal; but, after numerous preliminary trials, we found that the numerical results, on the quantity of the butter obtained, were most uniform and satisfactory when we made each experiment on a few pints of milk only. It is true that the proportional yield of butter was sometimes greater from a large than from a small quantity of cream or milk; but the different experiments were found to be most accordant on being repeated, when we operated on quantities not exceeding six English pints for each churning. This probably arose from our being then able to carry on the process in glass vessels, which permitted us to see the progress of the operation, and to collect the product more perfectly; and also from our being enabled to use, in experiments on this small scale, a more delicate balance to ascertain the weight of the butter obtained.

We were also thus enabled to make the comparative experiments on the same milk, on the same day—points of essential importance—as the richness of even the same cow's milk is liable to vary considerably from day to day, as we found from experiment, according to her food, her health, and possibly, too, according to the state of the weather. We also found that the time which had elapsed from the last calving had much influence on the quantity of the butter. The quantity of butter was smallest, and the proportion of cheesy matter greatest, just after calving; and generally speaking, the milk of those cows which yielded the *least* quantity of milk, was richest in butyraceous matter. Thus the quantity of butter afforded by a quart of milk of a small Alderney cow was considerably more than from a quart of the milk of the large Lancashire breed.

We proposed to ourselves various objects; such as ascertaining accurately the temperature acquired by milk in churning, (which, I may state in general terms, without detailing the experiments, we found to range from 5° to 8° of Fahrenheit;) the effect of external temperature on the production of butter; the effect of adding water to the churn, as is practised in many places; but, above all, to ascertain the comparative advantages of churning—

1. Sweet cream alone.
2. Sweet milk and cream together.
3. Sour cream, or that slightly acid.
4. Sour milk and cream together.
5. Scalded cream, or what is called *clouted cream*, as practised in Devonshire.

Each of these five methods of preparing the milk afforded very different results; and, as these investigations seem to be the most important, I shall give them more fully than the rest, selecting, from numerous experiments, those which were most carefully performed, and are, therefore, most worthy of confidence. Although the absolute quantity of butter differed with the season and condition of the cattle, yet as the five methods were practised at the same time, on equal quantities of the mingled milk of four or five cows, the comparative results of each series may be considered as not far from the truth.

It is well known that the milk first drawn from the cow is far inferior in quality to that last drawn; the latter is technically, in Lancashire, called the *afterings*, and in many towns generally sold as cream. It seemed also an object of interest to ascertain the comparative quantity of butyraceous matter yielded by the first and last part of the milking, as also the quntity of *caseine* or curd in each.

The principal results of the experiments made, are—

1. That the addition of some cold water during churning, facilitates the process, or the separation of the butter, especially when the cream is thick and the weather hot.

2. That cream alone is more easily churned than a mixture of cream and milk.

3. That butter produced from sweet cream has the finest flavor, when fresh, and appears to keep the longest without acquiring rancidity; but that the buttermilk, so obtained, is poor, and small in quantity.

4. That scalding of the cream, according to the Devonshire method, yields the largest quantity of butter; which if intended for immediate use, is agreeable to the palate and readily saleable; but if intended to be salted, is most liable to acquire, by keeping, a rancid flavor. The process of scalding is troublesome; and the milk, after the removal of the cream is poor, and often would be unsaleable from the taste it has acquired from the heating.

5. That churning the milk and cream together, after they have become slightly acid, seems to be the most economical process on the whole; because it yields a large quantity of excellent butter, and the buttermilk is of a good quality—a point of some importance when buttermilk is largely used as an article of diet, as it is in Lancashire.

6. That the keeping of butter in a sound state appears to depend on its being obtained as free from uncombined albumen, or caseine, and water, as it can be, by means of washing and *working* the butter when taken from the churn.

[From the Journal of Agriculture.]

ON THE WASTE PIECES OF LAND IN CULTIVATED FIELDS.

BY MR. PETER MACKENZIE, STIRLING.

When a piece of ground is enclosed for a garden, it is with the intention that every square foot of it should be put to some useful purpose; for from the centre of the ground to the bottom of the wall vegetation will thrive; and persons accustomed to cultivate every part of the ground of which they have charge, often wonder, as they pass along the highways and byways of their neighborhood, why so much land is allowed to remain undisturbed, in what is considered well cultivated fields. The ground I mean is that which is sometimes called the borders of the field. I have often inquired for a reason why it is not brought into cultivation as well as the rest of the land, and have never received anything like a satisfactory answer. I have been told by some that they have just been accustomed to such things, and think no more about it; by others that they do not like to go too near the hedges, for fear of destroying the roots of the thorns—but a little reflection soon convinced them that the leading roots of quicksets are generally placed beyond the reach of the plough; and it will be found that the root of a healthy hedge will not be confined to the space that is left unbroken up, but will often be found in the ploughed land. I think it could easily be shown that the farmer is a great loser by allowing so much of his land to remain in an uncultivated state; he must pay for it all, and it must be a great drawback on the productive part of the farm to make up for the deficiency of the unproductive. The space left by the plough untouched is, at least, three feet from the fence, and where open ditches are left in the field it is much more. Supposing a field to be one hundred yards, by five hundred, this will give ten acres, one rood, twelve poles, twenty-seven yards; and with a border three feet wide, left unploughed, will take from it twelve hundred square yards, which is about one rood; and if we take fields of less size than ten acres, the increase of waste land will be greatly augmented. But taking it at one rood to every ten acres, this will give two and a-half acres to every one hundred acres; this is surely too much land to be allowed to be in a state which is worse than useless, for we will be able to show that it has a very baneful effect upon the cultivated crop of the farmer; and if we extend our calculation to the fifteen millions of acres in Britain that are employed in the cultivation of wheat, barley, rye, oats, beans, peas, clover, ryegrass, roots and cabbages, by the plough, it will be found that an enormous quantity of land is in a great measure lost, and I believe the waste is greater in many parts of England than in Scotland. When we bear in mind that many of the fields are small, and separated from one another by enormous double hedges, surely something might be done to lessen the quantity of land that is, from year to year, permitted to be unproductive; five acres for every three hundred acres is worth the looking after, and land, too, in most cases, the best in the country. Supposing the land to be, on an average, worth £2 per acre, and the farm consisting of two hundred acres, what does the farmer get in return for his £10 of rent which he pays for the borders of his fields? The botanist would, perhaps, meet with the richest harvest; he would not be long in collecting one hundred or one hundred and fifty species of plants, all more or less injurious to the farmer. Among the most conspicuous will be the spear thistle, *Cnicus lanceolotus*, common ragwort, *Senecio Jacobæa*, black knapweed, *Centaurea nigra*, and many others that might be named, that prove a lasting scourge to the land, wherever they are permitted to multiply. When they are allowed to ripen their seeds, the winds of summer and autumn disperse them over the country; and, although they do not make much appearance at first, they are not the less sure of coming at their appointed season. Those of them that are biennial and perennial plants, will make little show for a time; but, when the second year of their existence comes round, they will show themselves in gay colors, and, if allowed to remain undisturbed, will scatter a numerous progeny around them ere they die. The nourishment that docks, thistles and ragworts extract from some fields must be very great; for in some pastures they are very abundant. So convinced was a cottager of the evil effects of permitting weeds to grow and seed among his crops, that he not only kept them out of his own garden, but assisted in destroying those of his neighbors, that they might not seed and come over upon him. By a little extra labor, much land might be reclaimed from the borders of fields, and instead of proving a loss to the cultivator, might become a benefit to the country; for it shows but an imperfect state of cultivation when so many enemies to the crops are permitted to live and die unmolested. In gardens, as well as in fields, the destruction of weeds is often very imperfectly gone about; there are some weeds, such as the *Poa annua*, groundsel and chickweed, that are constantly shedding their seeds, and remaining also in flower at the same time; and, if particular attention be not observed, the old weeds will not be long off the ground, before another race will be pushing their way to supply the room of those that had been removed; and, if they are only left for a short time, they will play the part which their forefathers did before them—shed their seed—and, if left undisturbed, would soon become possessors of the land.

One important step towards the eradication of agricultural weeds, would be to have as few open ditches as possible in the fields under cultivation. Some time ago, I was told, by one of the leading agriculturists of Britain, that there should be none; for they are not required where land is properly drained. Ditches are commonly formed where thorn hedges are planted, in order to supply earth for the benefit of the roots of the plants; but it is allowed by many farmers that, if the land be well prepared, quickset hedges will thrive better in soil that is not thrown up in the usual way of planting, the roots not being so far from the influence of the sun or air as those that are planted in the common way, and that they will seek nourishment from both the fields which they divide, instead of being confined to one. Open ditches are often found to be very inconvenient when a hedge requires its annual cutting; a ditch four feet wide is too much stride across and work freely, and in many cases, the searsement next the hedge, by frequent cleaning, and the action of the weather, is worn away, so that the person who works with the switching-bill has to stand in the ditch ; and when the ditch is two and a-half feet deep, and the hedge four feet high, the work is both unpleasant and slowly performed ; for the highest part of the fence is the place where the shoots are strongest, and, of course, most difficult to cut. It will be seen that more than one advantage will be gained by banishing open ditches from fields where it can conveniently be done, and, in many cases, it can be done with little expense and trouble. They can be made into drains, and filled with such materials as are commonly used in draining land, and the filling with soil is done very simply—by means of the plough taking earth from the headlands or sides of the field, so that, in a short time, the farmer may have the cultivated part of his farm considerably enlarged at very little expense ; for I have been informed, by those who have tried the experiment, that they were more than paid for their trouble by the first year's crop. More land could be broken up by the plough than is commonly done. It is the practice of some farmers, after ploughing as much as can be properly done by two horses, afterwards to use one, and by altering the line of draught, are enabled to come a little nearer to the fence. Still there is some land left—could it not be brought into cultivation in the same manner that the acute angles of fields are managed, namely, by digging ? A laborer or two would not be very long in digging what may be left by the plough ; they could do it on day's wages or piece-work, as may be found answerable. It is done by nurserymen and market-gardeners, who have generally higher rents to pay for their land than farmers, and if they find a remuneration for their outlay, would it not be profitable also for the agriculturist ? It would increase the produce of the farm in that which would be useful, and also cut off the source from which many of the foes of the cultivated crops are propagated ; and the nearer the farm can be brought to that of a well cultivated garden, the better will it be for the producers of food as well as for the consumers ; and surely it would add to the prosperity of the country, when, instead of the thistle shall come up the wheat, and instead of the cockle, shall come up the barley. If such simple means were adopted for increasing the produce of the farm, it would enable many tenants to look forward with a lighter heart towards the rent-day, and also to banish from their grounds many of the enemies that assail the labors of their hands.

[From the Britannia.]

CULTURE OF THE GRAPE VINE.

A Descriptive Account of an improved Method of Planting and Managing the Roots of Grape Vines. By CLEMENT HOARE. *Longman.*

THE results of Mr. Hoare in the management of vines are so wonderful, considering the simple means he takes to produce them, that we should be inclined to view his assertions as too marvellous for belief, if we did not know that he is himself one of the most successful cultivators of the vine who ever lived in England, and if he did not assure us that he "has not recommended any point of culture the merits and advantages of which he has not himself for years repeatedly and carefully tested." We glance at a few of the principal topics in this ingenious treatise, which we earnestly commend to the notice not only of the horticultural world, but of every one who loves a garden, and desires to see it yield at a very small cost an ample supply of delicious grapes.

For the management of vines in greenhouses, Mr. Hoare strongly reprobates the practice of planting the roots in richly manured borders. His theory is, that grapes are formed and brought to perfection, not from any nourishment received from their roots, but by solar heat and light alone, and that the roots of vines in this country are so far from requiring any stimulative power, that they require to be checked, that the growth of the branches may not be too rapid. This check, he explains, is afforded in warmer countries than our own by the great dryness of the climate and the superior heat of the sun, so that the tops of the shoots as they advance in growth are turned into a kind of jelly, and rapidly harden into wood, which thus becomes firm and close in texture, and bears buds at very short intervals. But from that check not existing to the same extent in England, our climate being more humid, and our sun less fervent, the vine has a natural tendency to luxuriance in growth, the branches are long and tender, and the buds on them at much longer intervals. This theory is explained with delightful clearness in Mr. Hoare's treatise, and illustrated by a decisive example :

Some few years since the author received a bundle of vine cuttings from one of the most celebrated vineyards in Spain. They were the entire growth of the year, as each had a portion of the preceding year's wood attached to it. The longest shoot measured eight and a half feet, but the average length was about eight feet. The wood was perfectly cylindrical, and of the closest texture, and almost as hard as heart of oak. The buds were large, prominent, and highly symmetrical, and stood out in bold relief on the sides of the canes. They were produced so near to each other as to be only one and three quarters of an inch apart. Now, a corresponding shoot produced in this country by an established vine would be about twenty-five feet in length, and the buds would be, on an average, distant from each other betwixt four and five inches. The shoots produced in these different countries, therefore, would each contain pretty nearly the same number of buds ; and the question immediately arises, what was the cause of the great disproportion that existed in the length of these shoots? Simply, no other than the greater intensity of the light and heat which the Spanish shoots enjoyed over the English shoot. Nature was as long manufacturing one and three quarters of an inch of wood in Spain as she was four and a half inches in this country ; but then, in the former instance, the bright light of the sun, and the intensity of his rays, would not let the shoot go ahead. Their united influence caused it to linger in its growth, and its watery sap, therefore, was turned into a jelly-like substance almost as fast as it was produced, and then fine fruit buds were the natural consequence. And these shoots may be considered as types of all others produced within the vinous latitude.

It follows, then, that in England the roots of vines do not want stimulating, but that the soil for them should be like that which they enjoy in the finest countries, dry, rocky and warm. He considers it extremely detrimental to a vine that its roots should be in a soil where perhaps the temperature is 34 or 40 degrees, while the branches should be luxuriating in a temperature of 70 or 80 degrees. He would, therefore, for all vines in greenhouses prepare an artificial bed for their roots, as he prepares an artificial climate for their branches and fruit. The principle on which he would form this bed, for we do not here pretend to enter into details, is that of making a pit in the earth, three feet deep, and four or five feet square, lining it with solid brickwork, so that the roots of the vine shall not pierce through, and filling it with broken bricks, mortar, charcoal, and bones. These materials should be used in equal proportions, without admixture of any other substances. The bricks should not be too hard-burned, and the mortar should be old. Those, with the charcoal, should be in lumps, about the size of an egg. The bones, if hollow, should be broken in half, that the roots may creep into the cavities. Any will do, but they should be of animals that have arrived at maturity, from their greater hardness. These substances should be well packed, and the vine-root carefully placed in them. The flooring should be of firm brickwork, with one row of bricks loosely laid, that they may be taken up to afford the roots moisture when required.

The result of this treatment is that the roots, being furnished with the largest possible extent of surface, and with the best nutriment in the shape of bones, will give vigor to the vine, and that grapes will be produced six weeks earlier than on other vines, while the bed will last good, if not forever, for an immense number of years.

All this part of the treatise may be read with much advantage by those who possess greenhouses. We come now to that more novel part of the volume, intended for those who would like, with little cost or trouble, to grow grapes in the open air.

In commencing this part of his subject, Mr. Hoare lays it down as a rule that the roots of a vine will strike equally well upwards as downwards. The great requisites for the soil are warmth, moderate dryness, and great extent of surface. He proposes to secure those requisites by building of good brickwork a hollow column, three feet in diameter and five feet high. He prefers circular erections because the vine may be easier trained, and during the height of summer the sun will shine all around it. The base of this column should be formed of solid brickwork level with the earth, and four feet square. When that is finished the erection of the column should be commenced on it; half bricks will do, if they are perfectly strengthened at four equally distant parts of the circle by one course of whole bricks. When two courses of bricks have been thus laid down over the foundation of brickwork, the interior of the column should be filled with the substances before described, broken bricks, old mortar, charcoal, and bones, all being closely packed. A half circular hole should now be cut in a brick on that side of the column facing the south, for the stem of the vine to be brought through. It should be one and a half inch in diameter, and the like hole should be cut in the brick meant to fit on it, so that the cavity may be round, and the dimension of it one and a half inch. The vine should now be planted. It should be three years old, and the bole of earth round the roots be loosely bound round in flannel well soaked in soap-suds. So much of the stem should be left outside the column as contains three good buds. The soil should be a little raked away for the roots to lie in, and the substances should then be packed closely round the roots, care being taken that they are so placed that no mice shall creep in through the hole made for the stem of the vine to pass through. The next course of the bricks should then be laid on, the soil being filled in as the column rises, and so on until the column rises within three courses of its intended height. Then a course of bricks is laid over the well packed substances at top, being jointed with mortar only, and not laying a bed of it. With two more top courses the column will be finished, care being taken so to lay them as that they shall slope towards the centre of the column, forming a cavity to catch moisture, which, piercing through the brickwork, will descend to the soil. In this cavity mignionette or any shrub of the kind may be placed, which will give it a pretty finish, and hang over from its top. The hole for the stem of the vine may be filled in with moss to give it a pretty appearance. As the vine grows it is to be trained round the column, and with moderate care, Mr. Hoare asserts, may be made to bear fifty pounds of fine grapes in one season. The cost of the column, he believes, should not exceed 25s., but we hardly imagine it could be properly erected for that sum.

It is easy to believe that such columns, when erected in suitable situations, and the vines are well trained around them, and clusters of grapes appear, must add to the beauty of grounds. They may be planted singly or in groups; and the cost is so slight, and the gain in fruit, according to our author, so certain and so large, that the experiment is well worth trying. We have but given an outline of Mr. Hoare's plan. Those who are desirous of further information must consult this pleasing treatise. They will find it full of instructive details, the result of extensive management, directed by an intelligent mind, and of long experience. The manner of the remarks is clear and pleasing, and the whole treatise of eminent utility to those who have the care of vines, or who propose to engage in their culture.

[Abridged from the Scottish Journal of Agriculture.]

ON THE EFFECTS OF SOAKING SEEDS IN CHEMICAL SOLUTIONS.

There was perhaps no object in the exhibition of plants in the society's show, at Dundee, in August, 1843, which attracted such general attention as the remarkably strong and vigorous oats growing in soil, exhibited by Mr. James Campbell, of the Educational Seminaries of that town. The soil in which they grew possessed no peculiar property, except that it had not been manured for eleven years. The vigor of the plants, according to Mr. Campbell, was entirely to be ascribed to their seed having been subjected to a process by which they were soaked in certain chemical solutions. Mr. Campbell has, since the show, in the most liberal and disinterested manner, placed the particulars of his process in the hands of the society, for the benefit of agriculturists generally; and to further his good intentions, the society has thought it proper to publish his own explanation of the method of conducting the process of preparing the seed, as it is given in a letter to the secretary.

"I steeped the seeds of the various specimens exhibited in sulphate, nitrate, and muriate of ammonia, in nitrate of soda and potass, and in combinations of these; and in all cases the results were highly favorable. For example—seeds of wheat steeped in sulphate of ammonia on the 5th of July, had by the 10th of August, the last day of the show, tillered into nine, ten, and eleven stems of nearly equal vigor: while seeds of the same sample, unprepared, and sown at the same time in the same soil, had not tillered into more than two, three, and four stems.

I prepared the various mixtures from the above specified salts exactly neutralized, and then added from eight to twelve measures of water. The time of steeping varied from fifty to ninety-four hours, at a temperature of about 60 degrees Fahrenheit. I found, however, that barley does not succeed so well if steeped beyond sixty hours.

Rye-grass and other gramineous seeds do with steeping from sixteen to twenty hours, and clover from eight to ten, but not more; for, being bi-lobate, they are apt to swell too much and burst.

The very superior specimens of tall oats, averaging one hundred and sixty grains on each stem, and eight available stems from each seed, were prepared from sulphate of ammonia. The specimens of barley and bere were prepared from nitrate of ammonia; the former had an average of *ten* available stems, and each stem an average of thirty-four grains in the ear; and the latter an average of also ten available stems, with seventy-two grains in the ear.

The other specimens of oats which were next the most prolific, were from muriate of ammonia; and the promiscuous specimens of oats were from nitrates of soda and potass—strong, numerous in stems (some having not less than fifty-two), and not so tall as either the preparation from the sulphate or muriate of ammonia.

It was objected by some that the tallest oats were too rank, and would break down before coming to seed; but I have no fear of that, as they were strong in proportion to their height; and should there even be any ground for the objection, I am confident that a combination of sulphates of ammonia and soda, or potass, would rectify the excess of height, and render the grain equally productive.

I have at present a series of experiments going on in the country, with seeds prepared in *seven* different ways, and sown in pure sand, and in a tilly subsoil, taken six feet from under the surface, and in which there is no humus or organic matter of any kind. Along with the prepared seeds are also some *unprepared*, and I expect to be able to form a comparative estimate of their growth by visiting the place in October.

At all events, from the experiments which I have already tried, I am quite satisfied that, even *without* the application of common manures, double crops, at least, may thus be raised; and under the application of the ordinary manures, crops *tenfold* greater than usual.

The various salts were prepared by me from their carbonates. I am, &c."

[From the Spectator.]

MODEL FARMS IN IRELAND AND SCOTLAND.

An important step has been made to promote agricultural education in Scotland. During the late agricultural meeting in Glasgow, a number of gentlemen favorable to the establishment of elementary schools for the purpose, met in the merchants' hall; when, besides gentlemen connected with the Agricultural Chemistry Association of Scotland, several strangers attended, including Lord Wallscourt, Lord Clements, Lord Ranelagh, Sir Robert Bateson, Sir R. Houston, and others. The Lord Justice Clerk took the chair; and Professor Johnston explained the object of the meeting. Mr. Skilling, superintendent of a model farm at Glassnevin, near Dublin, under the Irish Board of Education, made a statement of the measures carried out by the board since 1838. There are now three thousand teachers under the board; there are seven training establishments to supply teachers, but there will shortly be twenty-five; and it is intended to plant one in every county of Ireland. Mr. Skilling described the plan pursued at the Glassnevin training school, established in 1838; the class of labor is limited to spade husbandry, only the spade and wheel-barrow being used:

"The scholars, amounting to sixty or seventy, were lodged near the farm, and fed from it. After being engaged on the farm in the mornings of five days in the week, they went into the town for their literary education; but the *whole* of Saturday was appropriated to examinations. They had a garden, and, in connexion with it, a competent gardener, who lectured for one half hour in the morning; and he (Mr. Skilling) also lectured to the young men on agricultural subjects. At stated periods, the teachers attended the farm, and witnessed every practical operation which was going on upon it. They observed every system of cropping, and got explanations on every subject with which they were unacquainted; and the result was, that when they went away at the end of the course, they were found to be vastly improved in the scientific knowledge of agriculture and its practical details. During the course, they were enabled to obtain a considerable knowledge of agriculture, chemistry, and geology; they also received practical information as to the principles of rotation in cropping, the cultivation of green crops, and the like. The practical errors which existed as to the management of land were also pointed out to them—such as the loss caused by bad fences, seedling-beds for weeds, &c.; and on the other hand, they were shown the advantages of draining, and opening and turning the land, and the beneficial results of these on the general management."

This model farm had not only paid its rent, but returned a profit of £150 or £170 a year. Afterwards, five boys educated in a training school at Larne, in the north of Ireland, were introduced and examined:

"They seemed to belong to the better class of peasantry, being clad in homely garbs; and they appeared to be from twelve to fourteen or fifteen years of age. They were examined, in the first instance, by Mr. Gibson (inspector of schools) on grammar, geography, and arithmetic; and scarcely a single question did they fail to answer correctly. They were then examined by Professor Johnston on the scientific branches; and by Mr. Finnie of Swanston and Mr. Alexander of Southbar, on the practical departments of agriculture. Their acquaintance with these was alike delightful and astonishing. They detailed the chemical constitution of the soil, and the effect of manures, the land best fitted for green crops, the different kinds of grain crops, the dairy, and the system of rotation. Many of these answers required considerable exercise of reflection; and as previous concert between themselves and the gentlemen by whom they were examined was out of the question, their acquirements seemed to take the meeting quite by surprise; at the same time that they afforded it the utmost satisfaction, as evincing how much could be done by a proper system of training. The youths and their teachers retired amidst much applause."

Lord Clements bore testimony to the eagerness for instruction evinced by the peasantry near his property, in the wildest part of Connaught; men twenty years of age coming from a distance of many miles to attend the school. Mr. Atlee, the teacher of an agricultural school, on Lady Noel Byron's property, at Ealing, reported the success of that establishment; there were at that moment five hundred applicants for admission to the farm as boarders.

Principal Macfarlan advocated education in agriculture; but exhorted the meeting to carry on their improvements in accordance with the feelings of the people, not shocking their habits by rash innovations. He moved a resolution, that elementary instruction should be afforded to the rural population of Scotland. This was seconded by Mr. Alexander of Southbar, and carried unanimously.

Colonel Lindsay, of Balcarras, declared that the people of Scotland must make haste lest they should be behind in the progress of improvement—

"He must congratulate these young men from Ireland on the admirable display they had made. To be a Scotsman was often found a recommendation in procuring employment elsewhere; but these young men from Ireland would soon show to Scotsmen that they were behind the Irish, and that, if they would maintain their high character for industry and intelligence, they must be instructed as they were. These lads from Ireland had evinced so much agricultural information, that, when ready for employment, they had only to ask to obtain it. He was almost ashamed to admit his belief, that there was not a similar class of youths in Scotland who would answer the questions as these Irish lads had done."

[From the American Agriculturist.]

INCUBATION.

In an impregnated egg previous to the commencement of incubation, a small spot is discernible upon the yolk, composed apparently of a membraneous sac or bag, containing a fluid matter, in which swims the embryo of the future chick, and seemingly connected with other vesicles around it.

1st Day. In a few hours after exposure to the proper temperature, the microscope discovers that a humid matter has formed within the limits of the embryo. At the expiration of twelve or fourteen hours, this matter bears some resemblance to the shape of a little head; a number of new vesicles also successively appear, foreshadowing the different parts of the future body of the chick; those first formed, and most easily distinguished, may afterward be recognized as assuming the shape of the vertebral bones of the back.

2d Day. The eyes begin to make their appearance about the 30th hour, and additional vessels, closely joined together, indicate the situation of the navel. The brain and spinal marrow, rudiments of the wings, and principal muscles, become observable. The formation of the head is also evidently proceeding.

3d Day. The beating of the heart is perceptible, although no blood is visible; after a few hours, however, two vesicles, containing blood, make their appearance. One forming the left ventricle, the other the great artery. The auricle of the heart is next seen, and, in the whole, pulsation is evident.

4th Day. The wings now assume a more defined shape, and the increased size of the head renders the globules containing the brain, the beak and the front and hind part of the head, distinctly visible.

5th Day. The liver makes its appearance, and both auricles, now plainly seen, approach nearer the heart than before. That splendid phenomenon, the circulation of the blood, is now evident.

6th Day. The lungs and stomach are distinguishable, and the full gush of blood from the heart is distinctly apparent.

7th Day. The intestines, veins and upper mandible become visible, and the brain begins to assume a distinct form.

8th Day. The beak for the first time opens, and the formation of flesh upon the breast commences.

9th Day. The deposition of matter forming the ribs takes place, and the gall bladder is perceptible.

10th Day. The bile is distinguishable by its green color, and the first voluntary motion of the body of the chick is seen, if separated from its integuments.

11th Day. The matter forming the skull now becomes cartilaginous, and the protrusion of feathers may be noticed.

12th Day. The orbits of sight are apparent, and the ribs are perfected.

13th Day. The spleen gradually approaches to its proper position in the stomach.

14th Day. The lungs become enclosed within the breast.

15th, 16th, and 17th Days. During these days, the infinity of phenomena in this wonderful piece of vital mechanism elaborate it into more perfect form, and it presents an appearance closely approaching the mature state. The yolk of the egg, however, from which it derives its nourishment, is still outside the body.

18th Day. On the eighteenth day, the outward and audible sign of developed life is apparent, by the faint piping of the chick being, for the first time, heard.

19th, 20th, and 21st Days. Continually increasing in size and strength, the remainder of the yolk gradually becomes enclosed within its body; then, with uncommon power, for so small and frail a being, it liberates itself from its prison in a peculiar and curious manner, by repeated efforts made with its bill, seconded by muscular exertion with its limbs, and emerges into a new existence.

The position of the chicken in the shell, is such as to occupy the least possible space. The head, which is large and heavy in proportion to the rest of the body, is placed in front of the abdomen, with its beak under the right wing; the feet are gathered up like a bird trussed for the spit, yet in this singular manner, and apparently uncomfortable position, it is by no means cramped or confined, but performs all the necessary motions and efforts required for its liberation, with the most perfect ease, and that consummate skill which instinct renders almost infallible.

The chicken, at the time it breaks the shell, is *heavier* than the whole egg was at first.

An egg will not hatch *in vacuo.*

The infinite wisdom of the Great Architect of the animal frame is remarkably manifested in its providing the chick with a sharp and hard substance on the tip of the bill, by means of which it is enabled to fracture the shell to liberate itself from its imprisonment. Its own bill is too soft to enable it to break the shell therewith, and in two days or less this hard and pointed substance disappears, the young bird no longer requiring to use it.

Equally extraordinary and wonderful is the fact that the germ of the chick is provided with the ability to keep itself always on the top of the yolk of the egg, to the end that it may take the heat from the parent bird when setting, to produce incubation.

[From the Transactions of the Highland Society.]

REARING CATTLE, WITH A VIEW TO EARLY MATURITY.

The production of beef at the quickest and cheapest rate being the object in view, the first requisite is a stock of cows possessing qualities suitable for this purpose. Accordingly, they should be good milkers, able to keep at the rate of two and a half to three calves each, of a kind known to have a tendency to fatten readily, and to come early to maturity, and of a structure likely to produce a vigorous, well-grown steer. In other words, they must be good short-horns; only having more regard to their milking properties than is usually done by breeders of bulls. And here it may be well to notice, that it is in general highly inexpedient for the beef grower—the farmer who depends largely on his regular cast of fat cattle—to attempt breeding his own bull. It is only a few individuals in any district who have the taste and skill requisite for this difficult department of the business, not to mention the large capital which must necessarily be invested in it, the precariousness of the return, the greater liability to casualties of such high-bred animals, and the additional expense of their housing and maintenance. On Tweed-side, the breeding of bulls is confined to a very limited number of persons, chiefly Northumbrians, who, by devoting their whole attention to this department, are able, from year to year, to furnish a class of bulls which are steadily improving the general breed of the district. The contrary practice is at this moment compromising the character of this valuable breed of cattle in several districts of Scotland into which they have been more recently introduced. Made wiser on this point by experience, the farmer of the Border purchases from some breeder of established reputation a good yearling bull, which he uses for two or three seasons, and then replaces by another in like manner. This bull serves his own cows and those of his hinds, and some of the neighboring villagers; and thus, though his own stud be limited to six or eight cows, he can select from the progeny of his own bull as many calves as he requires to make up his lot, and has them more uniform in color and quality than could otherwise be the case. As the male parent among sheep and cattle is known to exert by far the greater influence in giving character to the progeny, and increasingly so in proportion to the purity of his breeding, it is evidently much to the advantage of the beef grower to spare no reasonable trouble and expense in obtaining a bull of thorough purity, and then to select his calves with the most scrupulous attention. From overlooking all this, how often may lots of cattle be seen, on the best of land too, which can only be fattened at an enormous expense of food and time, and, after all, are so coarse in quality as to realize an inferior price per stone! Occasionally a few beasts of the right sort will be seen in such lots, which, by going ahead of their fellows to the extent of £4 or £5 a piece of actual market value, shew what might have been done by greater skill or attention on the part of the owner. It is very desirable to have all the cows to calve betwixt the 1st of February and the 1st of April. If earlier, they will get almost dry ere the grass comes, and calves later than this will scarcely be fit for sale with the rest of the lot. When a calf is dropped, it is immediately removed from its dam, rubbed dry, with a coarse cloth or whisp of straw (this being what the cow would do for it with her tongue, if allowed), and then placed in a crib in the calf-house among dry straw, when it receives a portion of its own mother's first milk, which, being of a purgative quality, is just what is needed by the young animal. For a fortnight, new milk is the only food suitable for it, and of this it should receive a liberal allowance thrice a day; but means should now be used to train it to eat linseed cake and sliced Swedish turnip; and the readiest way of doing so is to put a bit of cake into its mouth immediately after getting its milk, as it will then suck greedily at anything it can get hold of. By repeating this a few times, and placing a few pieces in its trough, it will usually take to this food freely; and whenever this is the case, it should have as much as it can eat, that its allowance of milk may be diminished, to meet the necessities of the younger calves which are coming in succession. This is of the greater importance that it is always most desirable to avoid mixing anything with their milk by way of helping the quantity. When a substitute must be resorted to, oatmeal porridge mixed with the new milk is perhaps the best.

Sago has of late years been much used for this purpose; but an eminent English veterinary surgeon has recently expressed a very decided opinion that its use impairs the digestive powers of the animal, and predisposes to disease. The sour smell invariably found in a calf-house, where porridge or jelly of any kind is mixed with the milk, is proof sufficient that indigestion is the consequence. An egg put into each calf's allowance, and mixed with the milk by stirring with the hand, is a good help, and never does harm: but, with this exception, it is best to give the milk warm and unadulterated, however small the quantity; and along with this, dry farinaceous food, turnips and hay, *ad libitum.* If more liquid is needed, a pail with water may be put within their reach, as this does not produce the bad effect of mixed milk. Indeed, in this it is best to keep as closely as possible to the natural arrangement according to which the calf takes its suck—at first frequently, and then at longer intervals, as it becomes able to eat of the same food as its dam. The diet of the cows at this season is a matter of some consequence. Swedish turnips yield the richest milk, but it is too scanty, and calves fed on it are liable to inflammatory attacks; globe turnips should therefore form their principal food during the spring months. Care must also be taken that they do not get too low in condition in the autumn and winter, and for this end it is well to put them dry at least three months before calving. Some may think this long; but, on a breeding farm, milk is of little value at this season. The cows, when dry, are kept at less expense, and, by this period of rest, their constitution is invigorated, greater justice done to the fœtus, now rapidly advancing to maturity, and so much more milk obtained after calving, when it is really valuable. When the calves are from four to six weeks old, they are removed from their separate cribs to a house where several can be accommodated together, and have room to frisk about. So soon as the feeding yards are cleared of the fat cattle, the calves are put into the most sheltered one, where they have still more room, and are gradually prepared for being turned to grass; and, when this is done, they are still brought in at night for some time. At six weeks old, the mid-day allowance of milk is discontinued, and at about fourteen weeks they are weaned altogether. When this is done, their allowance of linseed cake is increased: and as they have been trained to its use, they readily eat enough to improve in condition at this crisis, instead of having their growth checked, and acquiring the large belly and unthrifty appearance which used to be considered an unavoidable consequence of weaning. The cake is continued until they have so evidently taken with the grass as to be able to dispense with it. They are not allowed to lie out very late in autumn, but, as the nights begin to lengthen and get chilly, are brought in during the night, and receive a foddering of tares and clover foggage. When put on turnips, the daily allowance of cake (say 1 lb. each) is resumed, and continued steadily through the winter and spring, until they are again turned to grass. This not merely promotes their growth and feeding, but (so far as five or six years' experience can determine the point) seems a specific against black-leg, which was often so fatal as altogether to deter many farmers from breeding. It may be well to state here distinctly the particular purpose for which cake is given at the different stages of their growth. At first, the object is to accustom them to a wholesome and nutricious diet, which will supplement the milk obtained from any given number of cows, so as to admit of a greater number of calves being reared, and at the same time have greater justice done them than could otherwise be practicable. At weaning time, again, it is given to help the young animal over the transition from milk to grass alone, without check to growth or loss of condition. During the following winter, however, the special object of its use is to prevent black-leg, as, but for this, turnips *ad libitum* would be sufficient. When put to grass as year-olds, they decidedly thrive better on sown grass of the first year than on old pasture, differing in this respect from cattle whose growth is matured. They are laid on turnips again as early in the autumn as these are ready ; and it is a good practice to sow a few acres of globes to be ready for this express purpose. It does well to give the turnips upon the grass for ten or fourteen days before putting them finally into the feeding yards; and then, if they can be kept dry and warm, and receive daily as many good turnips as they can possibly eat (globe till Christmas and Swedish afterwards), they will grow at a rate that will afford their owner daily pleasure in watching their progress, and reach a weight by the 1st of May which, if markets are favorable, will reward him well for his pains. The leading features of this system are uniform good keeping and progressive improvement ; in other words, to get them fat as soon after their birth as possible, and keep them so till they reach maturity. The details given above are a description of the expedients generally adopted by the breeders of this district for securing these objects.

[From the last Report of the Commissioner of Patents.]

SILK.

During the past year the silk business in this country has been steadily advancing. A greater interest is evidently felt in the subject; the evidence is decisive, that it needs only patient perseverance to accomplish greater things than its warmest advocates have ventured to hope for. A well represented national convention on the subject was held at New-York in October last, at the time of the fair of the American Institute, by the direction of which a great number of letters and communications from persons engaged in the business in all parts of the United States have been published in a pamphlet called " *The Silk Question settled.*" The statements contained in this publication furnish the most complete view of the condition of the business of cultivation of the mulberry, raising and feeding worms, and the manufacture of silk, with the methods best adapted to success, that has before been presented to the public. Twelve states were represented by the appearance of a delegation in person, and communications were received also from the residents of eight more. From the various other information, as well as from this publication, it is evident that there has been an increase of attention to this crop all over the United States. In New-England it does not probably equal that of some other sections of the country. Some scattered notices may help in estimating the crop of the first year ; but much reliance will be placed on the publication just mentioned, and we shall endeavor to condense some of the important results and conclusions on account of their eminently practical bearing and utility. The greatest increase in the crop seems to have taken place at the west. The states of Ohio, Tennessee, and Indiana, have several enterprising men whose influence has been felt in urging forward this business, and the advance is most encouraging. It is very difficult to fix on any ratio, and the estimate of the table will probably, in many cases, fall far below the actual progress ; but there is sufficient to show that there is a steady increase from year to year. In the New-England states, Connecticut and Massachusetts stand foremost in their attention to silk. In Connecticut, the effect of the exertions of some ardent friends of the cause, previous to the revolutionary war and just about the close of the last century, is still felt ; and several establishments, especially in the town of Mansfield and vicinity, show what might have been done through the whole country had the same perseverance been manifested, in spite of early discouragements, and the same willingness to be contented with moderate profits. The experience of that little town warrants the belief that is expressed by some of its inhabitants, that " the time is not far distant when we, as a country, shall raise our own silk and manufacture it, and ultimately compete with foreign nations." From Massachusetts we learn that " the country has taken hold of it in earnest ; each year, for some years, has doubled on the preceding. Last year (1842) 400 or 500 were engaged in that business in Massachusetts, and more than double that number in New-England." Several establishments for its manufacture are found in this state in successful operation. In parts of Vermont there are also individuals who are devoting considerable attention to the production of silk; but, as the climate is so much colder here, and in Maine and New-Hampshire, than in any other New-England states, they are less favorably situated for the business. It is, however, increasing, and among other things on this subject, it is stated that several thousand dollars worth of the eggs of the silkworm have been sent to the West Indies. There is a bounty given by the state government; and one person expresses his opinion that "five acres of trees, of the age of four years from the seed, will produce more net profit than can be realized from 200 sheep, or a dairy of 20 cows; and he adds, "I trust the day is not far distant when the raising of silk will be considered as profitable a business as that of raising wool."

In New-York, the number of persons who are waking up to the importance of this subject is increasing. At the fair of the New-York State Agricultural Society, the crop of nineteen persons in a single district of the country was 2,150 lbs. In Monroe county, the quantity offered for the state bounty was said to be 2,256 lbs.; the year before, it was 1,695; in 1841, 1,539 lbs.

There are two or three fine establishments for the manufacture of silk in New-Jersey, and for some time there was formerly published a paper relative to this subject in this state.

Pennsylvania formerly gave a bounty on the production of cocoons or silk, but the law, it is said, has been repealed. This has exerted some unfavorable influence, and probably prevented the progress of the crop as much in this large state, as would have been the case had the encouragement been continued. The following statement shows what has been the progress of the silk culture at Economy, in five years, commencing in 1838:

Years.	No. of lbs. of cocoons.
1838,	1,400
1839,	1,800
1840,	2,400
1841,	4,400
1842,	5,500
In five years,	15,500

The largest crop raised at one establishment in Europe, 200 years after the culture of silk was introduced, it is said, was 3,000 lbs.

In Maryland are some ardent friends of this object; and though some have been unsuccessful in past years, in respect to the multicaulis, yet the belief is expressed that the silk business is yet destined to do well.

For the southern states this business of silk culture is admirably adapted, and yet comparatively little has been done with regard to it there. The climate is so much milder, and the means of taking care of the worms are so abundant, that there is every facility for raising large crops. On this subject we have the opinion of some residents in that part of the country. One of them writes thus: "The great difficulty in all matters of improvements in the south, is, it is too small a business—too much trouble, or too long to get the return. My own opinion is, that it is to us of the south the greatest business that has ever presented itself. An old negro, competent to feed young children or chickens, with the aid of a few small chaps from four to eight years of age, can make as much as grown hands can in the field, and this without any expense of gin-house and machinery." "It seems to me a business peculiarly appropriate for the south. We can commence feeding on the 20th of April, (this year on the 16th—last year on the 24th.) We can feed without taking our field hands, or any extra building; and what is done thus is entire gain." In Georgia we are informed to this effect: "One family has made thirty yards of beautiful silk, and has made it up into ladies' dresses, and it is not inferior to the best French or English in appearance." One of the members of Congress from this state also informs us that he has a suit of silk of the manufacture in South Carolina. An experiment is mentioned as commenced in Louisiana, at Baton Rouge, by a gentleman from France, which seems to promise success. The amount of silk cocoons the past year in Tennessee is estimated by one concerned in the manufacture at from 20,000 to 25,000 lbs. In 1840 it is said that there were raised in that state but 1,237 lbs. A fine manufactory here, under the superintendence of an experienced silk-weaver from London, is said to have produced splendid specimens of satin. It is also said that one hundred hands could now be employed in manufacturing the quantity of cocoons produced; and the opinion is expressed that "ultimately no other business will equal it." Governor Jones, of that state, has been presented with a full suit of domestic silk, by the silk-growers there, in acknowledgment of his efficient services to the cause of American industry.

In Kentucky we notice, in one of the journals, that five hundred skeins of beautiful sewing silk have been manufactured in one family; and it is evident that the attention to it is greater than formerly.

Ohio has one of the finest establishments in the country, which manufactures one thousand bushels of cocoons annually, with a capital of $10,000, and employing from forty to fifty hands. The amount of cocoons produced in the Ohio valley is estimated "at least sufficient to keep two hundred reels in operation."

Much attention likewise is paid to the silk business in Indiana; and the success experienced justifies the expectation that the culture of silk will hereafter become a great business there.

In Michigan, Mississippi, and Wisconsin, also, by the accounts given, the attention is more directed to this crop than heretofore.

The whole crop is estimated at 315,965 lbs. of cocoons.

The resolutions passed by the convention at New-York on the subject, express the strongest confidence in the prospects of the silk culture. Arrangements were made for collecting a fuller account of the state of the business the next year, by issuing a circular embracing a great variety of items; the results of which effort will, doubtless, be more cheering than any heretofore attempted. More than one hundred and fifty witnesses have given their testimony, which is embodied in the pamphlet to which reference has already been made. The questions which were put and answered for the convention, related to a great variety of particular points connected with the culture and manufacture of silk. Some of the results it may be well to notice at this time.

1. *Varieties of the mulberry tree.* The Canton, Brosa, Alpine, Italian, multicaulis, and common white mulberry, are all mentioned, and preferences are variously expressed. The Canton seems to be quite a favorite in the state of Massachusetts, and the northern climate generally. The silk worms are stated by one person to leave the other varieties for the Canton. The soil and climate are said to be "peculiarly adapted, and more congenial" to its growth "than even China, its native soil," as remarked by Dr. Parker, missionary to China. "The tree grows more in this continent than in China. It is said there to attain only about four feet in the season, while in our country it grows six to eight feet in a season, after being headed down in the spring, and growing in a dry soil enriched by the decomposition of the foliage on its surface." "I do not know," says one who has great experience, "of any compost so enriching as the foliage of the Canton mulberry." In the middle and western states the Italian and multicaulis seem to be preferred, while some judges seem to think very highly of the white mulberry. One, whose opinion is entitled to much weight, says: "I cultivate them as I do corn, and replant the multicaulis every three years." The mode of planting is of considerable importance. In a trial made by one of the most ardent friends of the cause, after laying his trees "the whole length in the furrow, manuring them with a cheap compost made principally of peat wood properly prepared," they were destroyed by the frosts of winter; but on being "*set deep, one root* in a place, in dry, sloping land, (or ridged, if flat,) rich enough to make good extended roots," the plants went safely through the winter. Thus managed, he says, "they are essentially safe from the perils of winter anywhere between Canada and the gulf of Mexico." It is not the degree of cold that does the injury in this and similar cases, but "freezing and thawing." "Trees, too,

ought not to be so thick as to prevent the sun from reaching their leaves, and the air to circulate freely among them."

2. As regards the *kinds of worms*, the preference is very decidedly given to the peanut variety, and next to the sulphur. The sulphur are larger than the other. One person mentions that in a trial he made, he found that it took four thousand four hundred peanut cocoons, or two thousand two hundred of the sulphur, to make a bushel. The former gave twenty-two ounces, and the latter fourteen ounces of raw silk. The peanut bushel weighed fifteen pounds—the sulphur nine and a half pounds; and it took three hundred peanuts, or two hundred and forty sulphur, to weigh a pound. The four thousand four hundred peanut gave twenty-two ounces, and the four thousand four hundred sulphur twenty-eight ounces of raw silk. He says he generally obtains one hundred pounds of cocoons from an ounce of eggs. The number of cocoons for the pound varies from two hundred up to four hundred: the peanut variety is said to require three hundred. By another, the peanut is said to take four thousand to make a bushel weighing fourteen pounds; of the Nankin peanut three thousand six hundred, weighing thirteen pounds; and of the mammoth sulphur three thousand, weighing ten pounds nine ounces. The thread of the silkworm has been found to be from eight hundred to nine hundred yards on a single cocoon.

3. The *causes of failure* in raising the silkworm are generally attributed to the want of ventilation, as one writer remarks: "The failures in feeding, that came under my observation, in a proportion of ninety-nine to one hundred, have been for the want of sufficient ventilation." Another says, "I consider the *diseases* of silkworms to be produced by vicissitudes in the weather operating upon the moist effluvia from the worms and the litter. The remedy is the free circulation of air, and the free use of lime." Again, another observes: "I have seen all the diseases that the silkworm is subject to; and I believe the nearer we get them to a state of nature the greater the success." Another likewise says: "I am more convinced than ever that water does not hurt the worms. I believe if I had sprinkled my leaves with water this season, when the weather was very dry and hot, I should have saved my worms." And yet another: "I am inclined to think the cause of failure in many, perhaps in most cases, where the multicaulis is used for feeding, arises from using leaves that have not sufficient growth or thickness, and are not ripe. The young and under leaves have not sufficient nutriment, or in other words, not *sufficient material* to produce silk. The worm fed on such leaves passes through its various and wondrous changes, lives the time prescribed by nature for its existence, then either stretches itself out and dies, or winds a thin indifferent cocoon, because it has not

silk *enough to wind a better*." "I consider unslaked lime a powerful disinfector of disease among silkworms; and very (I would say absolutely) necessary to be used in warm weather." In an other case, when the worms were dying by thousands, of the yellows, they were put out; and, says the informant, "I let it *rain on them two days and two nights*; let them dry, covered them with lime, and they commenced eating." The use of lime in another case is mentioned with success in staying the disease. The remark is made in another communication: "Some of my worms this season were wet by the rain leaking through the roof, but I could not see that they were injured by it. Care was taken, however, to dry their food in rainy weather as much as possible." Another recommends that, if attacked by the yellows, they should be placed in the open air.

4. As respects the *mode of feeding*, there are several points very clearly established; that the practice of feeding in the open air, or *open feeding*, (as it is termed,) *early* feeding, in contrast of *late* feeding, and, in most climates, the *one crop system*, are important particulars to be regarded. The following remark is made in a communication from Vermont: "And now I have come to the conclusion that these three things are indispensably necessary for the successful culture of silk: 1. *Plenty of feed*—it matters not so much what kind, whether white or multicaulis; 2. *Plenty of fresh air*; and last, though not least, *cleanliness and plenty of room*. And with them there is no more difficulty in raising silk, than there is in raising sheep or pigs." Another from the same state says: "The worms were fed in *an open building*—so much open, that the wind would frequently blow the leaves from the shelves where the worms were feeding." The testimony on this subject is almost universal. One says "I have found, on close observation, that nothing imparts such vigor to the worms as a good dry breeze of air. A most excellent authority, with reference to this subject, speaking of his own experience, says: "The result of the whole is, in my judgment, *the more air the better*; only guarding against sudden gusts of wind, that will disturb your leaves or bushes. As to ordinary turns of cold weather in our summer months, their effect is to render the worms torpid. Of course, they will not, in this state, eat and grow; and there is loss of time in getting them through; but this is the only loss to be apprehended. Upon returning warmth, they revive and go on with their wondrous labors, apparently uninjured by their temporary interruption." It is also said: "We think there is a decided advantage in using finely-chopped leaves the first two or three weeks—the whole leaves appear to smother the worms." A correspondent from Mississippi remarks: "This season I fed worms with leaves well wetted with dew—so much so, that shaking them on the floor would pretty well sprinkle it, which we generally did,

Heretofore, we gathered dry leaves in time, or even wiped them dry; but it was so tedious, we resolved merely to shake the water off, and our worms grew apparently more rapid than they ever had before. As a fact to prove this, they began to wind the twenty-fifth or twenty-sixth day." An experienced hand mentions that, particularly at the time of moulting, it is very necessary to avoid disturbing them by noises or sudden starts—such as throwing their food on them, or loud talking and laughing, &c.—as it injures them. A similar universal testimony is given in favor of *early feeding*. The *one crop system* is likewise very generally approved, though a number of crops are successfully raised in the warmer climates. By the use of Gill's feeding and ventilating cradle, and the tent system, it is said the expense is lessened one-half, while the amount produced is double. As to the *kind of wood* to be used for the winding, one person remarks that, after a variety of experiments, he found the bass wood the best of the whole; "the leaves are large and do not curl much; and, by setting them up close, the worms will crawl in between the leaves, and deposit their cocoons frequently four or five on a leaf, so that it is very easy gathering them. The floss comes off very clean; and, there being plenty of room, there are very few double ones." Another recommends paper, folded in a fan-like shape, suspended over the worms—the wide-spread part within their reach. Small bundles of straw of about the size of the wrist, crumpled and bent so as to stand out, spread out *downwards*, tied within the feeding frames, near the lower end, are said to be excellent for the purpose.

5. In regard to *the method of preparing silk* for the manufacturer, the following considerations are deemed of importance: A silk-dyer says: "Most people clean the silk with soft soap—destroying the native gloss in freeing it of its gum, owing to the vegetable alkali the soap contains. Many dyers use nothing but the best of white soap. About twenty-five pounds of good white soap dissolved in sufficient clean soft water, is used for one hundred pounds of silk; put the silk loosely in thin bags, boil gently two and a half hours, cool and wash it well in a running stream, and beat occasionally to free it from all impurity." The Piedmont reel seems to be considered the best of any of the reels in use, and great consequence is attached to a uniformity of reeling. One who had great experience on these subjects remarks: "While on the subject of reeling, perhaps I shall be excusable for mentioning what, to me, proves a source of deep regret. I mean the inexperience of those in different sections of our country, who reel their own silk without knowing the necessity of its being done in a particular manner to suit the manufacturer. Lots of silk are offered for sale, which, to look at it, appear perfectly good; but, on examination, are not saleable at any price, because they cannot be worked." Another, also, alluding to the same thing, says: "Raw

silk must be reeled only in large quantities, of a uniform quality and fineness, in order to be employed in manufactures." "The proper business of families, and the only business adapted to them in the silk culture, is the feeding of worms and the production of the cocoons." Again: a gentleman well versed in the business of silk, asserts that "two reelers shall each take one bushel of the same parcel of cocoons, and one shall produce from her portion a pound of silk worth $6; while the other shall produce the same quantity worth only $3—the latter being not even the value of the cocoons before she began to reel them." The establishment of filatures in great central points, which shall furnish a near market to those who grow the cocoons, is most desirable. Already there are a number in successful operation.

6. The *manufacture* of silk has been carried to great perfection. It is said: "A large establishment in Baltimore manufactures immense quantities of silk and worsted vestings, employing some fifteen or twenty Jacquard looms, and working up large quantities of domestic silk; and yet they dare not let it be known that their goods are manufactured in this country." But there are other manufactories in various parts of the country which furnish sewing silk, fringe, tassels, gimp, satin, velvet, and other silks. The uniform testimony of those employed in these establishments, (some of whom have followed the business for twenty or twenty-five years in England,) is, that they never saw finer, or as fine silk, as the American when carefully prepared. It is said to give a stronger thread than foreign silk, and, by many manufacturers, is altogether preferred. The experiment of making paper from mulberry leaves, which is said to have been successful in France, is to be fully tried in this country the present year. It is said that a discovery has been made that pongee silk is produced from the fibrous bark of the mulberry, and that it has never passed through the silk worm. It is also said, on the same authority, that "there is nearly one hundred per cent difference in the use of foilage in raising cocoons. That, to produce one hundred weight of cocoons, from twenty to twenty-two hundred weight of foilage of grafted trees, propagated by grafting buds, cuttings, or layers, is necessary; while from twelve to thirteen hundred weight of leaves from seedlings will accomplish the same result."

The *profit and feasibleness* of the raising and manufacture of silk are also fully established. One person, who produced raw silk, says that his net profit was equal to $60 per acre. At a large establishment in Massachusetts, the profits are estimated at thirty-seven and a half per cent. To show the kind of manufacture, and the amount of capital invested, and nature of expenses, we insert the following account with reference to a fine manufactory in Ohio: "My factory is in full and successful operation, producing more goods than at any time previous. Our operations, as per factory books, and account stock taken August 8th, for the past sixteen months, is as follows, in a condensed form, viz :

Cash value of factory buildings,	$1,340
do do machinery, engine, and permanent fixtures,	4,060
1,067 bushels cocoons purchased,	3,600
280 pounds reeled silk purchased,	1,400
Contingent expenses, &c.	604
Wages paid factory hands, &c.	3,152
Dyeing, dyes, &c.	607
Wages paid weavers,	1,610
8,000 bushels of coal, at five cents,	400
	$16,773

In buildings,	$1,340
In machinery, &c.	4,060
Manufactured 3,731 yards of velvets, vestings, dress, and other silks, &c.	6,324
1,006 cravats and handkerchiefs,	1,396
850 pairs of gloves and stockings,	875
70 pairs of shirts and drawers,	325
10 pounds of sewings,	100
Contingent credits,	1,000
Cocoons, reeled and other prepared silk, warps in looms and other stock, coal, &c., per invoice,	3,180
	$18,600

7. As to *the adaptation of our country for the object*, the evidence is equally clear. An able advocate of the enterprise remarks that "the climate of our country approximates closely to that of China in the same parallels of latitude ; our geographical position is similar to that country ; the boundaries of our land and sea are like theirs ; and our prevailing winds in summer are like their land winds. The dry warm atmosphere of both countries in seasons is well adapted to the growth of silks ; in fact, (to say a great deal in a few words,) this and China are the only legitimate silk growing countries. In Europe artificial means can only give to the eggs the forwardness which the atmosphere here gives. Throughout Europe the question is, 'How shall the eggs be hatched ?' Here it is, 'How shall they be kept back until we are ready for them ?' England may compete with us in the manufacture of silk, but she can never grow a pound." "All that is needed is the enterprise and industry of the people of the country, to bring silk into the list of American staples." Another says : "I fully believe that this precious and invaluable product may be cultivated anywhere and everywhere in our extended country and

continent wherever our favorite Indian corn can be grown." Another also: "I cannot doubt that the business is destined shortly to become a great and important branch of national industry, and a vast and inexhaustible source of national wealth." Another still, remarks: "Our experience is, that the silk culture is much the most profitable of any branch of husbandry in this section of country; and we feel confident that it will, ere long, spread through the Union, and become second to none except the cotton growing interest, even if it does not take the lead of that also." "It may be associated with the farming business of the country; and females and children can attend to it, so that it may be carried on without interfering with either domestic or agricultural concerns; while they will give at little expense a very considerable added profit." In France, ladies have done much in this enterprise. It is to be hoped that the whole country will soon be led to awake to the importance of the subject; and that, instead of silk being found among our list of imports, it will, ere long, occupy a place among the staplés exported to our foreign markets, and producing additional wealth to our extended country.

[From the last Report of the Comr. of Patents.]

WATER-ROTTING HEMP.

The subject of hemp, in all its management, is one of decided interest throughout the west. At present, Russia furnishes most of the hemp for our navy; not because it grows more luxuriantly, or that the fibre is better than the growth of this country, but because it is better prepared for manufacturing than in this country. It is to the interest of the farmer, manufacturer, and the nation, that we produce at least enough for our own consumption; and what we lack is mainly in the mode of rotting and cleaning. It is decided, by universal experience, that water-rotted hemp is better for perhaps every purpose than dew-rotted. The communication from the pen of the Hon. H. Clay, here annexed, contains most valuable information; and we ask our many readers to give it a careful perusal, and endeavor to put themselves in possession of the advantages afforded.

Ashland, May 28, 1843.

Dear Sir—I received your letter, requesting information as to my method of preparing my water-rotted hemp for market. I water-rotted last winter and this spring, eight or ten tons, in vats fifty feet long, twelve feet wide at the bottom and fourteen at the top, and four and a half feet deep. The hemp is first put in the vats carefully, the water then introduced, and when the hemp is sufficiently rotted the water is let off. It is very buoyant, and requires great pressure to keep it immersed in the water. It did not succeed well at first, and I am not now entirely satisfied with my contrivance. Weights of logs or stones, or both, will answer; but are inconvenient to remove. I think the best plan will be to sink posts at the distance of six or eight feet apart on each side of the vats, but along side of them. At the bottom let there be hooks in the posts, on which should be laid a log or beam, and then cover them up with earth to the top of the vats. At the top of the posts let there be also hooks, to receive logs passing across the vats from one post to the opposite post. I know that this arrangement, if properly executed, will keep the hemp down in the water.

The length of time of the immersion of the hemp depends upon the temperature of the water; it will remain in cold water six or seven weeks; whilst in very warm weather six or seven days, or less, will be sufficient. You can only determine when the hemp is sufficiently rotted by experiment—taking out a handful, and, when dry, applying it to the brake; but you will soon learn to decide on that point.

When the hemp is rotted enough, it should be spread on the ground to dry—or, which is better, on short grass. If it be not sufficiently rotted, the process may be completed by the rain and dew, without injury. After it is rotted sufficiently, it is broken out in the same old method that has long been practised with dew-rotted hemp. There are now in progress in my neighborhood various experiments to save labor, by breaking out hemp with horse power; some of which, I think, will succeed.

I am not yet able to inform you of the best mode of handling and preparing the article for market. I have just sent (for the first time) three or four tons to the eastern market, as specimens; and I shall know what is the best method when I hear how they are received. I had the hemp put in bales of two or three hundred weight, pressed by a powerful screw, and covered and tied up with cotton bagging. One parcel was hackled so much as to take off one-fourth in tow, but this tow is not lost; the other parcel I sent off as it came from the brake, clean, and divested of showers.

I intend to engage more extensively this year in water-rotting my crop, and I am very sanguine of success. American hemp, as prepared, is undoubtedly as good as Russia hemp.

Wishing you great success in your enterprise, I am, respectfully, your obedient servant.

H. CLAY.

Bernard Myers, Esq.

THRIFT, OR NOTHING IS USELESS.

FROM THE GERMAN OF ZSCHOKKE.

John Schmid was an old soldier with a wooden leg: he was so poor, that for some years he was obliged to solicit alms from door to door in the villages near to that in which he lived, which was situated on the lake of Constance. Now, however, old John Schmid sits at his ease in his arm-chair; he is in independent circumstances; yet few people guess how he came by his wealth. One affirms that he discovered a secret treasure; others have gone so far as to hint that he made a compact with the Evil One. When such hints are dropped in my presence, I fail not to reprove the speakers. I know better the means by which the old soldier got rich, and I will tell you how it was.

John Schmid had three sons, whom he had brought up well in spite of his poverty; for he not only furnished them with good advice, but with a good example, and suffered many privations that he might send them to school. One morning in spring, as the old man was dividing amongst them the bread which was to break their fast, he said, 'My children, you are now old enough to gain your own livelihood; but you must not beg while there are other means of obtaining it—that would be taking bread out of the mouths of those who may want it more than you. Pierre,' he continued, turning to the eldest, 'you are fourteen years old, and have sharp eyes—use them to seek employment. You, Gabriel, though a year younger, have strong arms, set them to work. You, George, though only eleven, have stout legs, profit by them.'

'But what,' exclaimed the three boys at once, 'would you have us to do?'

John Schmid answered, 'I know that you have neither land to cultivate, wood to fell, nor flocks to tend; but there are many things that are thrown away as useless, but which with a little industry may be collected and made profitable. By and by I will show you how. Do not spend the money which you will earn in obedience to your wants, but economise it for the necessities of the future, be it ever so little. Could you save only a batz a day, each would amass at the end of the year, twenty-four florins.'

Upon this John Schmid set about showing his sons how they might earn their bread. He desired them to go in different directions to collect the following articles: first, bones, the largest of which they could sell to the turners, who made them into various useful and ornamental articles, while the smaller were required by farmers for manure. Secondly, pieces of broken glass, to be disposed of to the glass-workers for recasting. As it was spring, he charged them to get together all the rose-leaves and elder-blossoms which fell in their way, and for which apothecaries give good prices. He also reminded his sons, that by a little inquiry, the chemists would point out what other plants and roots they required. Upholsterers would purchase cows' hair, saddlers, coachmakers and chairmakers, horse-hair. Besides these articles, he mentioned rags for paper-makers, bristles for brush manufactures, quills, pins, hedge-wool, bird-weed, and several other things which might be turned into money, with no other trouble than that of seeking out and collecting them.

The sons did as they were desired, under the guidance of their father. During the spring and summer they collected and sold with such success, that their profits daily augmented.

When autumn came, they sought things of a different kind. Wherever they could obtain permission, they gathered wild fruits, some of which could be made into vinegar and other useful articles. From the woods they obtained quantities of acorns and the seeds of other species of trees, for which they obtained a good price, sometimes from foresters, at others from grain-dealers. They also got together heaps of horse-chesnuts, and took them to the mill to be ground. The miller thought they were going to eat this bitter flour, and made himself merry at the expense of their curious taste; but John Schmid's sons let him laugh, and took their horse-chesnut flour to the book-binders, card-board-makers, and others who make use of paste, the glutinousness of which it increases. Immediately after a warm shower, the young Schmids sought for mushrooms, which they sold to the epicures in the neighborhood.

Having saved a quantity of birch twigs, rushes, and osiers, the old man and his sons occupied the winter months in making brooms, chair-bottoms, and baskets, so that their cottage appeared both like a warehouse and a workshop. In this way the spring returned, and old John Schmid thought it advisable to see what had been gained during the year. On opening the box in which the cash was deposited, he found that each of his three sons had contributed more than a batz a day of savings, for the money-box contained one hundred and four florins and twenty-three kreutzers. At the sight of the hoard the sons were delighted, for they had never before seen so large a sum at once. John Schmid immediately carried the money to a wholesale tradesman in a large town, and deposited it with him at interest.

John Schmid, now no longer a beggar, employed himself solely in helping his sons sell off the merchandize they had collected. This went on for four years, during which the family had amassed six hundred and fourteen florins! As, however, their riches increased, the young men grew independent in their manners, and disputed amongst themselves; one accusing the other of not working hard enough, of selling too cheaply, or of extravagance in treating himself to a cup of wine rather too often. Poor old Schmid!—do all he could, he was unable, on some occasions, to settle these discussions. Nothing seemed likely to cure the evil but separation; and addressing his sons, he said, 'Take each of you one hundred florins, and seek your fortunes in the world; industry and economy always prosper. The rest of the capital shall remain in the hands of the banker, in case that any unforeseen misfortune should fall on any of us so as to need it. But while it remains untouched, the interest will be added to the principal.' To this the young men agreed; and taking each his apportioned sum, bade adieu to their father. They took their departure, each in a different direction. Pierre went eastward, Gabriel westward, and George towards the south. John Schmid grieved to part with his children, but he knew it was for their good, and bore his regrets in silence.

Years rolled on. John Schmid grew old and weak, but he would not touch a kreutzer of his children's capital. At length he fell ill; and some of his neighbors, pitying his lonely state, sent him relief; others declared they had poor enough of their own to support, and though he had lived in their village for twenty-one years, threatened to send him away as a stranger. Upon this old John wrote to the merchant who held the money, saying, 'Send me three hundred florins of the capital I deposited in your hands; for I am aged and weak, and for fourteen years I have not heard of my children. Doubtless they are dead. It will not be long ere I follow them to the grave.'

The honest merchant promptly replied to the old man's demand. 'I return you,' he wrote, 'the sum you ask. The balance remaining is perhaps greater than you imagine. It has increased, by little and little, to more than one thousand florins.'

When the money arrived, the peasants stared with wonder, and declared that John Schmid must be a conjurer. But the old man himself, in spite of his riches, was unhappy. He wished to join his sons, whom he thought to be no more. He would often exclaim, 'I shall die in solitude; no son is left to close my eyes. However, he recovered from his illness, and it was destined that he should not die alone.

One Sunday evening he was seated with other peasants under a linden tree, when a servant on horseback rode up, and inquired if any one could direct him to the cottage of John Schmid? The villagers, full of astonishment, replied, 'You need not seek him in his house for he is here.' As they stared and whispered inquiries to one another as to what was to come next, two handsome carriages entered the village, and stopped before old Schmid's door. Three well-dressed gentlemen and two ladies descended from the coaches, and as old John made his appearance, threw themselves successively into his arms. 'My dear father,' said the eldest, 'can it be possible that you have forgotten us? I am Pierre. I have become a wholesale grocer at Varsovie, in Poland, and this lady is my wife.' Then the second spoke :—'I am your son Gabriel, and also bring you a daughter-in-law. I, too, reside at Varsovie, and deal in corn.' Presently the third son came forward. 'I,' he said 'am George. I have recently returned from India, where I made a fortune by commerce. Seeing by the Gazettes that my brothers were in Poland, I joined them, and we all agreed to travel hither to seek you, and to make you happy for the rest of your life.' Poor John Schmid was quite overcome, and shed tears. He invoked blessings on his children. 'To you,' exclaimed one of them 'we owe all our good fortune. Had you not taught us that nothing, be it ever so despised, is useless—had you not made us industrious, persevering and economical, we should still have been mendicants.'

The rest of John Schmid's life was spent in happiness, for one or other of his sons always remained with him. The money, which had accumulated during their long absence, was drawn from the merchant in whose hands it had so much increased, and employed in building a school for the gratuitous education of poor children.

To those who, like me, were aware of the means by which the Schmids grew rich, their rise in the world is known to be the certain result of integrity, industry, and perseverance in turning to account things generally considered useless. Spite, however, of all I can urge, one or two of the most prejudiced villagers shrug their shoulders when John Schmid's name is mentioned, and insinuate that he must have made a compact with a certain nameless person.

SOURCE FROM WHENCE PLANTS DERIVE THEIR INORGANIC MATTER.

M. M. Wiegmaun & Polstorff instituted the following experiments for the purpose of determining the source of the inorganic elements in vegetables. The plants upon which the experiments were made, were the vicia sativa, hordeum vulgare, or barley, polygonum fagopyrum, nicotiana tobaccum, or tobacco, and trifolium pratense. Two kinds of soil were employed; the first consisting of sand in which all the soluble and inorganic matter was removed by heating and dry solutions. The second, a mixture of this sand and the following substances, and in the proportion stated.

Fig. 1.

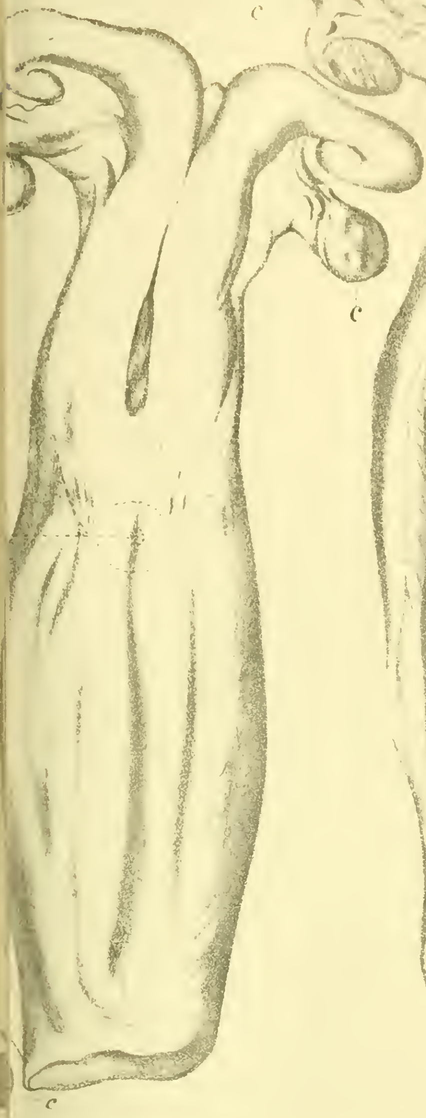
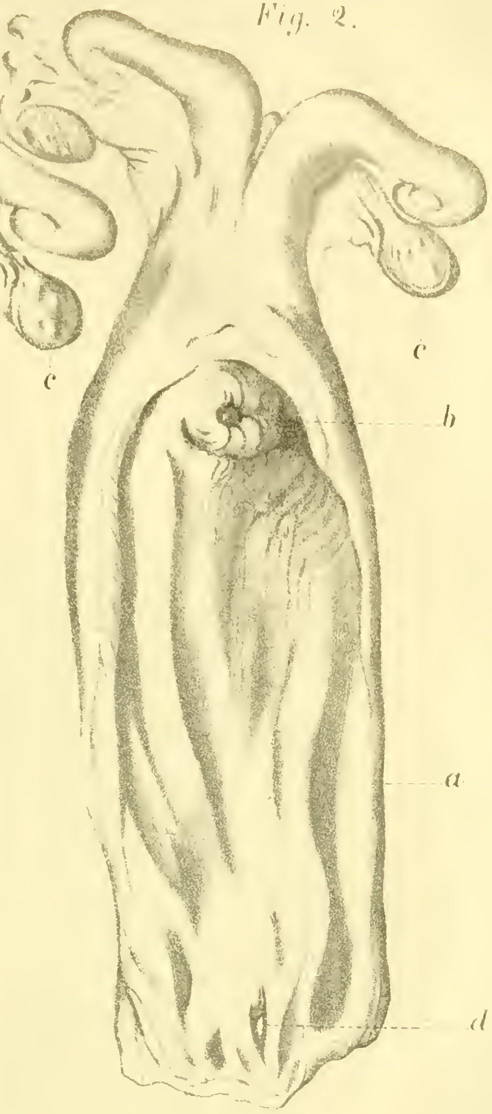


Fig. 2.



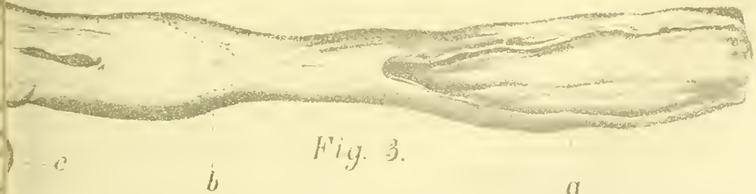


Fig. 3.

Sand,	861.26
Chalk,	10.00
Alumina,	15.00
Oxide of iron,	10.00
Carbonate magnesia,	5.00
Phosphate of lime,	15.00
Oxide manganese,	2.50
Anhydrous sulphate of lime,	1.25
Sulphate of potash,	0.34
Humate of potash,	3.41
Soda,	2.22
Humate of ammonia,	10.29
" lime,	3.07
" magnesia,	1.97
" alumina,	4.64
" iron,	3.32
Humine insoluble in water,	50.00

The plants in the sand were moistened by distilled water, besides being protected from external influences by being covered. Germination, growth, and sometimes flowering took place, but all were stinted and imperfect, and none produced seed. The plants in the mixed artificial soil grew luxuriantly and produced ripe fruit.

In order to determine the elements of the plants which grew in the sand, they were dried and burnt, and for comparison a quantity of seed equal in weight to that which had been planted was also burnt to ashes and its elements also determined by analysis. The results were that the elements of plants which grew in the sand weighed twice as much as those of the seeds sown—while the elements of the ashes of the plants which grew in the mixed soil were twice and a half times greater than those which grew in the sand ; and in the tobacco plant five times greater. To account for the additional matter found in the plant over and above that originally contained in the seed sown, the sand in which they grew was analysed after being well washed in boiling water. It contained

Silex, or flint,	97.900
Potash,	0.320
Lime,	0.484
Magnesia,	0.009
Alumina,	0.876
Oxide of iron,	0.315

The same sand was then exposed to water during a month, through which carbonic acid continually passed. The solution was then analysed, when it was found to contain silica, potash, lime and magnesia. To prove that the additional matter of the plants over and above that contained in the seeds sown, M. Wiegmann sowed seeds of cresses in fine platinum wire, in a platinum crucible, and watered them with distilled water. They grew well, but the ashes of the cresses contained only the same weight of inorganic matter as the seed which had produced them, a result which it will be seen, differed from that of plants growing in the sand, which contained at least twice as much inorganic matter as the seed from which they were grown. The sand used in this experiment was not pure silex or quartz, but a soil probably derived from granite, but from which not only all the vegetable matter had been removed by ignition, but all the free lime and alkalies by acid and full washing afterwards by water.

The results of these experiments go to prove,

1st. That inorganic matter is essential to the perfect plant, as no fruit was produced where it was totally wanting or even deficient in quantity.

2d. That plants by their roots possess the power of decomposing the compound of inorganic matter, as in the experiment with the sand from which all the free soluble matter had been removed as stated above.

3d. That the opinion which has been advanced by some physiologists that the elements may be formed in plants, is incorrect, as is shown by their absence in the cresses which grow in the platinum wire.

It is supposed, however, that all the inorganic matter is not necessary to the perfection of the plant, but that some elements may be substituted for others, as soda for potash, magnesia for lime, &c.

NEW BOOKS.

The Farmer's Manual, a practical treatise on the nature and value of manures, &c. By F. Falkner, Esq. To which is added, Productive Farming, by Joseph A. Smith. D. Appleton & Co. N. Y. G. S. Appleton, Philadelphia.

These two works in one volume contain much practical information for the farmer. The object of the first work, as stated in the preface, is "to explain the nature and constitution of manures generally, to point out the means of augmenting the quantity and preserving the fertilizing power of farm-yard manure, the various sources of mineral and other artificial manures, and the causes of their frequent failure."

The second part is a compilation from the various agricultural writers of the present day. We give below an extract from *the first* on the management of manures.

"We have already said that plants in a dry state, such as straw, hay, &c., consist of carbon, hydrogen, and oxygen, a very small portion of nitrogen, and of about six parts in 100 of alkaline and earthy salts; and that the former elements are placed, by the operation of the vital principle, under a different arrangement with regard to each other from that which their chemical affinities give them a tendency to assume.

The combustion or burning of vegetable substances is nothing more than a rapid and violent action of those affinities or attractions, in which oxygen plays the principal part. When they are heated to a certain degree, both the oxygen of the air and that already contained in the substance are brought into action, and the result will be easily understood from what has been previously stated of the nature of the elements concerned. The oxygen unites with the carbon to form carbonic acid gas, and with the hydrogen to form water, while a small portion of the hydrogen unites with nitrogen to form ammonia, or (though subject to some doubt) passes off uncombined. Carbonic acid gas is the most abundant of these products, water the next in quantity, and ammonia by far the least. These all escape as gases, and the ashes that remain consist of some or all of the oxides, or bases, before described, united with some or other of the mineral acids—as alkaline and earthy salts, which differ very much, both in kind and quantity, according to the plants from which they are derived. As these salts, or mineral substances constitute an essential part of all plants, they are themselves capable of acting powerfully as manure. The most valuable, and generally the most plentiful of them, are the salts of potash, and the phosphates of lime and magnesia; not that the other salts contained in ashes are less essential; as, for instance, muriate of soda (*common salt*) and sulphate of lime (*gypsum,*) but because the latter are more liberally supplied to the soil by the hand of nature.

If, instead of being burnt, plants are accumulated in heaps exposed to the weather—

as in a dung-yard—a similar action to burning, though of slower operation, takes place; which indeed may be called a tardy combustion, in which the elements of the water present take an active part. The greater portion of the carbon, hydrogen, and oxygen, with nitrogen, are thus dissipated; the sulphates and phosphates are decomposed, producing stinking gases; and if in the mean time water be allowed to soak through the mass and drain away, it carries with it the soluble salts, ultimately leaving a black mass, consisting chiefly of carbon, with a small quantity of hydrogen and oxygen, and some insoluble earthy salts. If, therefore, decay be allowed to proceed to its greatest extent, it produces a much worse effect than absolute fire; inasmuch as almost all the soluble salts are lost. Vegetable matter reduced to this state is *humus*, or that black vegetable matter contained in all rich soils, and those of old pasture land. The only difference is in the mode of their production, the one having been produced by the decay of plants on the surface, and the other from the decay of the roots and leaves of plants both above and beneath the soil. They operate in the same way in the nourishment they yield to plants, namely, by the salts they yet retain, by attracting moisture and ammonia from the atmosphere, and by slowly yielding carbonic acid gas to the roots of the growing crop.

If the quantity of water which mixes with the heap be limited, it is often evaporated by the heat produced by the fermentation; the chemical action in a great measure ceases; and the heap, when opened, exhibits that appearance which is commonly called "*fire-fanged*." When in that state, it will be found to have lost more than one-half of its value; but, if due care be taken to regularly mix the layers of dung, without too much intermixture of horse-litter, there will be no danger of the dung made by the cattle in the yards being overheated by fermentation, even in the warmest weather. Should that danger, however, be apprehended, an addition of road-scrapings, or earth of any kind, will prevent it; and, in the winter, the cleanings of the cow-house, as being of a cold nature, will answer the purpose.

When plants and their seeds are consumed by animals, nearly half their weight in a dry state is given out from the lungs and by perspiration from the skin in a gaseous form, chiefly as carbonic acid gas and water, with some ammonia; the remainder of their substance, together with the effete, or dead matter of the animal organs, are rejected, as dung and urine, except that portion retained as nourishment by growing and fatting animals. The *solid excrement* contains the woody fibre, the insoluble animal matter and salts, and the *urine*, the more soluble salts and substances rich in nitrogen. If no care be taken of the urine, and it be allowed to run about the yard, it soon putrefies—its nitrogen flies off in the shape of ammonia; its salts are carried away by every shower of rain; and, although a portion of it may be saved by its mixture with the dung of the cattle, yet the greater part of its valuable contents are evaporated by the action of the atmosphere. If it be allowed to drain into a tank or other receptacle, it there also rapidly undergoes putrefaction; and, if this be not checked, a considerable part of the ammonia produced will escape with the sulphur and phosphorus, resulting from the decomposition of the salts containing those substances: occasioning the intolerable stench observed in such cases. Now the ammonia, and the alkaline and earthy salts, are by much the most valuable part of farm-yard or stable dung, and the former is always more abundant when cattle are fed with corn, oil-cake, and other rich food. Without ammonia no seed could be produced; and without alkaline and earthy salts, neither seed nor plants could exist.

It is the deficiency of some of these substances, where moisture is not wanting, which is the cause of the land producing poor crops; and it is the almost total absence of some, or all of them, which is the cause of complete sterility. Instances may almost every where be found of land which, though abounding in humus—such as heathy and peaty soils—are, notwithstanding, incapable of bearing grain. If the valuable substances above mentioned be wasted in the manner described—which is too often the case, to an enormous extent—the crops will be very deficient; and if to this waste be added the carrying away of large portions of the produce—as when hay and straw are sold, and no manure returned—the land will soon cease to bear crops. To increase the quantity of manure raised on the land should, therefore, be the constant aim of every farmer: hay should never be sold, unless two tons of stable litter are returned for every load sent off the farm; and, unless the farm contains a large portion of rough pasture, the horse-teams should be kept in the stable, and soiled during the summer and autumn on green food; every portion of apparently refuse vegetable and animal matter should also be carefully collected and added to the dung-heap; and, in this manner, it is inconceivable what additional quantities of excellent muck may be produced. The manure thus made, and not fermented, is generally applied, either in its fresh state, or only partially turned, to clay land fallows which are to be sown with wheat; as being of a colder nature than winter-made dung, it will not occasion the crop to be so hastily pushed forward as to occasion straw instead of corn.

If attempts be made to supply the place of farm-yard dung by *any one salt*, or, in other words, by two or three only of the elements of plants—nitrate of soda, or nitrate of potash, or sulphate of lime *(gypsum)* for instance—it will succeed only where all the others happen to be present on the soil, by the effect of previous manuring; and will inevitably fail where those other needful substances are either absent or very deficient. Now, it is extremely difficult to ascertain in what salt the soil is really deficient; care must, therefore, be taken in the application of artificial manures, that they contain all the elements included in the muck for which they are substituted. These are all usually found, more or less, in the dung-heap; how needful, therefore, is it that the farmer should take good care of that manure produced upon his own land, which certainly contains all the elements of plants, and upon which he knows he can safely rely!

It has been stated before, that the most efficient part of farm-yard dung is that small portion, invisible in the mass, which consists of earthy and alkaline salts and ammonia. The other ingredients which constitute the great bulk of manure, consisting of carbon and the elements of water, are abundantly supplied by the atmosphere to the growing plants, and therefore a loss of these by needless fermentation or neglect is of little importance, were it not that their loss is unavoidably accompanied with the waste of the more essential substances in the manner described. It should be the object of the farmer not only to prevent the waste of such precious substances by every means that knowledge and ingenuity can devise, but also to make every addition to them that nature or local circumstances have placed within his reach.

These desirable purposes he will be the better able to carry into effect when he fully understands the nature of the manure he has under his management, and by that means he can exercise a sound discretion in adding to its quantity and effect.

Let it not be alleged against any inquiry by the farmer into the constituent nature and chemical properties of his manure, that he has no ideas attached to the several terms used to designate the substances of which it is said to consist. He is obliged to learn the names and uses of the several implements he employs in the cultivation; and upon what principle, we may ask him, should he refuse to make himself acquainted with the names and general properties of the produce he raises? But little effort is required to obtain a precise knowledge of the several elements, or substances at least, by the employment of which he is enabled to raise and increase his crops, and is it not pleasant to learn, as well as most useful to understand, the reason of their value to him? Nor is this limited degree of chemical knowledge of difficult attainment. Every farmer has seen wood ashes, and also seen water poured upon them for the purpose of extracting a something; that substance is chiefly potash, which may be seen by evaporating the clear water, which leaves the alkali behind, and the dregs which remain at the bottom consist for the most part of earthy phosphates—a similar substance to the earth of bones. *Soda* is now so commonly used as to be known at sight to most persons; *lime* and *magnesia* are still more familiar; *ammonia* is the common pungent salt of smelling-bottles; *sulphuric, muriatic,* and *nitric acids.* are extensive articles of commerce, and, with *phosphoric acid,* may be found at any chemist's shop, and these acids, as well as their bases—potash, soda, lime, and magnesia—may be had for a trifle, either separately or combined as salts. When, therefore, the appearance and more obvious qualities of these several substances have become familiar, their efficacy as manure may be proved, by mixing them thoroughly with two or three hundred times their weight of mould, and applying the compost to garden plants. The farmer might in this easy way soon become acquainted with the name, character, and properties of the invaluable substance contained invisibly in the muck of his yards; and would be the better able, and more desirous, to prevent their stealing away from him."

Lectures on the Application of Chemistry and Geology to Agriculture: By Jas. F. W. Johnston, M. A. F. R. S. Published by Wiley & Putnam, New-York. Price 31¼ cents.

This is part the fourth of this series of Lectures, which we have hailed with great pleasure, as they have successively appeared. These are decidedly the greatest addition that has yet been made to the Farmers' Literature, written in a manner that makes them entirely comprehensible to any one who reads them. This part is "On the products of the soil, and their use in the feeding of animals." The following extract will give a good idea of the work, and will be interesting to those engaged in raising and fattening animals:

OF THE KIND AND QUANTITY OF ADDITIONAL FOOD REQUIRED BY THE FATTENING ANIMAL.

"In the animal which is increasing in size or in weight, the food has a double function to perform. It must *sustain* and it must *increase* the body. To increase the body, an additional quantity of food must be consumed, but the kind or nature of this additional food will depend upon the kind of increase which the animal is making or is intended to make.

One of the important objects of the stock farmer is to make his full grown animals lay on fat, so that they may as quickly as possible, and at the least cost, be made ready for the butcher. To effect this object, he adjusts the kind and quantity of the food he gives, to the practical object he wishes to attain.

We have already seen reason to believe, that the natural and immediate source of the fat of animals is in the oily matter which the food contains. If we wish only, or chiefly, to lay on fat, therefore, we ought to give some kind of food which contains a larger proportion of fatty matter than that upon which the animal has been accustomed to live. This is what the practical man has actually learned to do. To his sheep and oxen he gives oil-cake or linseed oil mixed with chopped straw, to his dogs cracklings,* to his geese and turkeys Indian corn, which contains much oil, and to his poultry beef or mutton suet.

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* Cracklings are the skinny parts of the suet from which the tallow has been for the most part squeezed out by the tallow chandlers. Might cattle not be fattened upon cracklings crushed and mixed with their other food? Might not some *cheap* varieties of oil also be mixed with their food for the purpose of fattening.

Many experiments are yet wanting to determine with accuracy the proportion of fat contained in all the different kinds of food usually consumed by animals. Nearly all we yet know upon this subject is exhibited in the tabular view of their composition to which I have already directed your attention on page 531.

One thing, however, of considerable practical value has been recently ascertained, —that the oily matter of seeds exists chiefly near their outer surface—in or immediately under the skin or husk. This fact is shown in the case of wheat, by the following results of the examination of two varieties of this grain, one grown near Durham, the other in France. The result as to the French grain is given by Dumas :

PER CENTAGE OF FATTY OIL.

	English.	*French.*
Fine flour	1.5	1.4
Pollard	2.4	4.8
Boxings	3.6	—-
Bran	3.3	5.2

This fact of the existence of more fat in the husk than in the inner part of the grain, explains what often seems inexplicable to the practical man—why bran, namely, which *appears* to contain little or no nourishing substance, should yet fatten pigs and other full grown animals, when given to them in sufficient quantity along with their other food. It also explains why *rice dust* should be found to fatten stock,* though the cleaned and prepared rice contains but little oil, and is believed, therefore, to be unfitted for laying on fat upon animals with any degree of rapidity. No doubt the dust from pearl-barley and from oats, as well as the husk of these grains, might be economically employed by the stock feeder where they can readily be obtained.

KIND AND QUANTITY OF ADDITIONAL FOOD REQUIRED BY A GROWING ANIMAL.

The young and growing animal requires also that its food should be adjusted to its peculiar wants. In infancy the muscles and bones increase rapidly in size when the food is of a proper kind. This food, therefore, should contain a large supply of the phosphates, from which bone is formed, and of gluten or fibrin, by which the muscles are enlarged. Some kinds of fodder contain a larger proportion of these phosphates. Such are corn seeds in general, and the red clover among grasses. Some again contain more of the materials of muscles. Such are beans and peas among our usually cultivated seeds, and tares and other leguminous plants among our green crops.

Hence the skilful feeder or rearer of stock can often select with judgment that kind of food which will specially supply that which the animal, on account of its age or rapid growth, specially requires—or which, with a view to some special object, he wishes his animal specially to lay on. Does he admire the fine bone of the Ayrshire breed ?—he will try to stint it while young of that kind of food in which the phosphates abound. Does he wish to strengthen his stock, and to enlarge their bones ?—he will supply the phosphates liberally while the animal is rapidly growing.

An interesting application of these principles is seen in the mode of feeding calves adopted in different districts. Where they are to be reared for fattening stock, to be sold to the butcher at two or three year old, they are well fed with good and abundant food from the first, that they may grow rapidly, attain a great size, and carry mnch flesh. If starved and stunted while young, they often fatten rapidly when put at last upon a generous diet, but they never attain to their full natural size and weight.

When they are reared for breeding stock or for milkers, similar care is taken of them in the best dairy countries from the first, though in some the allowance of milk is stinted, and substitutes for milk are early given to the young animals.

*Rice dust is very good food for fattening pigs, makes excellent pork, and is very profitable when given along with whey.

But it is in rearing calves for the butcher that the greatest skill in feeding is displayed, where long practice has made the farmers expert in this branch of husbandry. To the man who has a calf and a milk cow, the principal question is, how can I, in the locality in which I am placed, make the most money of my calf and my milk? Had I better give my calf a little of the milk, and sell the remainder in the form of new milk—or had I better make butter and give the skimmed milk to my calves—or will the veal, if I give my calf all the milk, pay me a better price in the end? The result of many trials has shown, that in some districts the high price obtained for well fed veal gives a greater profit than can be derived from the milk in any other way.

While the calf is very young—during the first two or three weeks—its bones and muscles chiefly grow. It requires the materials of these, therefore, more than fat, and hence half the milk it gets, at first, may be skimmed, and a little bean meal may be mixed with it to add more of the casein or curd out of which the muscles are to be formed. The costive effect of the bean meal must be guarded against by occasional medicine, if required.

In the next stage, more fat is necessary, and in the third week at latest, full milk, with all its cream, should be given, and more milk than the mother supplies, if the calf requires it. Or, instead of the cream, a less costly kind of fat may be used. Oil-cake, finely crushed, or linseed meal, may supply at a cheap rate the fat which, in the form of cream, sells for much money. And, instead of the additional milk, bean meal in larger quantity may be tried, and if cautiously and skilfully used, the best effects on the size of the calf and the firmness of the veal may be anticipated.

In the third or fattening stage, the custom is, with the same quantity of milk, to give double its natural quantity of cream—that is, to supply in this way the fat which the animal is wished chiefly to lay on. This cream may either be mixed directly with the mother's milk, or, what is better, the *afterings* of several cows may be given to the calf along with its food. For the expensive cream there might no doubt be substituted many cheaper kinds of fat which the young animal might be expected to appropriate as readily as it does the fat of the milk. Linseed meal is given with economy. Might not vegetable oils and even animal fats be made up into emulsions which the calf would readily swallow, and which would increase his weight at an equally low cost? A fat pease-soup has been found to keep a cow long in milk; might it not be made profitable also to a fattening calf?

The selection of articles of food which will specially increase the size of the bones in the growing animal, by supplying a large quantity of the phosphates, is at present limited in a considerable degree. The grain of wheat, barley, and oats is the source from which these phosphates are most certainly and most abundantly supplied to the animals that feed upon them. But in many cases corn is too expensive a food, and those kinds of corn which contain the largest proportion of the phosphates supply only a comparatively small quantity in a given time to the growing animal. Why should not bone-dust or *bone-meal* be introduced as an article of general food for growing animals? There is no reason to believe that animals would dislike it—none that they would be unable to digest it. With this kind of food at our command, we might hope to minister *directly* to the weak limbs of our growing stock, and at pleasure to provide the spare-boned animal with the materials out of which a limb of great strength might be built up.

Chemical analysis comes further to our aid in pointing out the kind of food we ought to give for the purpose of increasing this or that part of the animal body. Thus in regard to the same growth of bone, it appears that, while *linseed and other oil cakes* are mainly used with the view of adding to the fat, some varieties are more fitted at the same time to minister to the growth of bone than others are. Thus four varieties of oil-cake examined in my laboratory, contained respectively of earthy phosphates and of other inorganic matter in 100 lbs. the following quantities:

	PER CENTAGE OF *Earthy phosphates.*	*Other inorganic matter.*
British linseed cake	2.86	2.86
Dutch do.	2.70	2.54
Poppy cake	5.22	1.24
Dodder cake	6.67	3.37

The numbers in the first column, opposite to poppy and dodder cake, show that these varieties of oil-cake contained a much larger proportion of the phosphates than the others did, and consequently that an equal weight of them would yield to growing stock more of those substances which are specially required to build up their increasing bones.

FAMILIAR LETTERS ON CHEMISTRY, AND ITS RELATION TO COMMERCE, PHYSIOLOGY AND AGRICULTURE: By Justus Liebig, M. D. &c.; Edited by Joel Gardner, M. D.—James M. Campbell & Co. Philadelphia.

An interesting series of Letters, by Professor Liebig, on various subjects and sciences, in which is to be found much information. His peculiar opinions are of course very prominent. The Twelfth Letter will be found below.

MY DEAR SIR—Having now occupied several letters with the attempt to unravel, by means of chemistry, some of the most curious functions of the animal body, and, as I hope, made clear to you the distinctions between the two kinds of constituent elements in food, and the purposes they severally subserve in sustaining life, let me now direct your attention to a scarcely less interesting and equally important subject —the means of obtaining from a given surface of the earth the largest amount of produce adapted to the food of man and animals.

Agriculture is both a science and an art. The knowledge of all the conditions of the life of vegetables, the origin of their elements, and the sources of their nourishment, forms its scientific basis.

From this knowledge we derive certain rules for the exercise of the ART, the principles upon which the mechanical operations of farming depend, the usefulness or necessity of these for preparing the soil to support the growth of plants, and for removing every obnoxious influence. No experience, drawn from the exercise of the art, can be opposed to true scientific principles, because the latter should include all the results of practical operations, and are in some instances solely derived therefrom. Theory must correspond with experience, because it is nothing more than the reduction of a series of phenomena to their last cause.

A field in which we cultivate the same plant for several successive years becomes barren for that plant in a period varying with the nature of the soil: in one field it will be in three, in another in seven, in a third in twenty, in a fourth in a hundred years. One field bears wheat, and no peas; another beans and turnips, but no tobacco: a third gives a plentiful crop of turnips, but will not bear clover. What is the reason that a field loses its fertility for one plant, the same which at first flourished there? What is the reason one kind of plant succeeds in a field where another fails?

These questions belong to Science.

What means are necessary to preserve to a field its fertility for one and the same plant?—what to render one field fertile for two, for three, for all plants?

These last questions are put by Art, but they cannot be answered by Art.

If a farmer, without the guidance of just scientific principles, is trying experiments to render a field fertile for a plant which it otherwise will not bear, his prospect of success is very small. Thousands of farmers try such experiments in various directions, the result of which is a mass of practical experience forming a method of cultivation which accomplishes the desired end for certain places; but the same method frequently does not succeed—it indeed ceases to be applicable to a second or third place in the immediate neighborhood. How large a capital, and how much power, are wasted in these experiments! Very different, and far more secure, is the path indicated by SCIENCE; it exposes us to no danger of failing, but, on the contrary, it furnishes us with every guarantee of success. If the cause of failure—of barrenness in the soil for one or two plants—has been discovered, means to remedy it may be found.

The most exact observations prove that the method of cultivation must vary with the geognostical condition of the subsoil. In basalt, greywacke, porphyry, sandstone, limestone, &c., are certain elements indispensable to the growth of plants, and the presence of which renders them fertile. This fully explains the difference in the necessary methods of culture for different places; since it is obvious that the essential elements of the soil must vary with the varieties of composition of the rocks, from the disintegration of which they originated.

Wheat, clover, turnips, for example, each require certain elements from the soil; they will not flourish where the appropriate elements are absent. Science teaches us what elements are essential to every species of plants by an analysis of their ashes. If therefore a soil is found wanting in any of those elements, we discover at once the cause of its barrenness, and its removal may now be readily accomplished.

The empiric attributes all his success to the mechanical operations of agriculture: he experiences and recognises their value, without inquiring what are the causes of their utility, their mode of action: and yet this scientific knowledge is of the highest importance for regulating the application of power and the expenditure of capital—for insuring its economical expenditure and the prevention of waste. Can it be imagined that the mere passing of the ploughshare or the harrow through the soil—the mere contact of the iron—can impart fertility miraculously? Nobody, perhaps, seriously entertains such an opinion. Nevertheless, the *modus operandi* of these mechanical operations is by no means generally understood. The fact is quite certain that careful ploughing exerts the most favoaable influence; the surface is thus mechanically divided, changed, increased, and renovated; but the ploughing is only auxiliary to the end sought.

In the effects of time, in what in agriculture are technically called *fallows*—the repose of the fields—we recognise by science certain chemical actions, which are continually exercised by the elements of the atmosphere upon the whole surface of our globe. By the action of its oxygen and carbonic acid, aided by water, rain, changes of temperature, &c., certain elementary constituents of rocks, or of their ruins, which form the soil capable of cultivation, are rendered soluble in water, and consequently become separable from all their insoluble parts.

These chemical actions, poetically denominated "the tooth of time," destroy all the works of man, and gradually reduce the hardest rocks to the condition of dust. By their influence the necessary elements of the soil become fitted for assimilation by plants; and it is precisely the end which is obtained by the mechanical operations of farming. They accellerate the decomposition of the soil, in order to provide a new generation of plants with the necessary elements in a condition favorable to their assimilation. It is obvious that the rapidity of the decomposition of a solid body must increase with the extension of its surface; the more points of contact we offer in a given time to the external chemical agent, the more rapid will be its action.

The chemist, in order to prepare a mineral for analysis, to decompose it, or to increase the solubility of its elements, proceeds in the same way as the farmer deals with his fields—he spares no labor in order to reduce it to the finest powder; he separates the impalpable from the coarser parts by washing, and repeats his mechanical bruising and trituration, being assured his whole process will fail if he is inattentive to this essential and preliminary part of it.

The influence which the increase of surface exercises upon the disintegration of rocks, and upon the chemical action of air and moisture, is strikingly illustrated upon a large scale in the operations pursued in the gold mines of Yaquil, in Chili. These are described in a very interesting manner by Darwin. The rock containing the gold ore is pounded by mills into the finest powder; this is subjected to washing, which separates the lighter particles from the metallic; the gold sinks to the bottom, while a stream of water carries away the lighter earthy parts into ponds, where it subsides to the bottom as mud. When this deposit has gradually filled up the pond, this mud is taken out and piled in heaps, and left exposed to the action of the atmosphere and moisture. The washing completely removes all the soluble part of the disintegrated rock; the insoluble part, moreover, cannot undergo any further change while it is covered with water, and so excluded from the influence of the atmosphere at the bottom of the pond. But being exposed at once to the air and moisture, a powerful chemical action takes place in the whole mass, which becomes indicated by an efflorescence of salts covering the whole surface of the heaps in considerable quantity. After being exposed for two or three years, the mud is again subjected to the same process of washing, and a considerable quantity of gold is obtained, this having been separated by the chemical process of decomposition in the mass. The exposure and washing of the same mud is repeated six or seven times, and at every washing it furnishes a new quantity of gold, although its amount diminishes every time.

Precisely similar is the chemical action which takes place in the soil of our fields; and we accelerate and increase it by the mechanical operations of agriculture. By these we sever and extend the surface, and endeavor to make every atom of the soil accessible to the action of the carbonic acid and oxygen of the atmosphere. We thus produce a stock of soluble mineral substances, which serve as nourishment to a new generation of plants, and which are indispensable to their growth and prosperity.

The American Poulterer's Companion: By C. N. Bement. Published by Saxton & Miles. 12 mo. 319 pp.

The value of this book is very clearly indicated by the rapid sale of the first edition. We cannot but add our testimony also to its value, after a pretty careful examination of its contents. It is the book which not only every farmer should possess, but also the mechanic, or every one who has a spot of land large enough to accommodate a dozen or two of fowls. In the publication of this work Mr. Bement has certainly performed a very important service to the community, and the subject cannot be considered a small one, when it is known that the value of poultry in New-York alone, amounted, according to the last census, to $2,373,029, and that in the states and territories it amounted to the sum of $12,176,170.

Mrs. Rundell's celebrated Cook Book. A new system of domestic cookery. Philadelphia, Carey & Hart.

Professes to be founded on principles of economy, for the use of private families. It contains 250 pages of directions for cooking, &c., but is quite out of our line of experience, as we are better qualified to pronounce upon the articles after they have gone through the process. The ladies will find abundance in it to practice upon, and all for 25 cents.

The Economy of Waste Manures: By John Hannam, Esq. Philad. Carey & Hart. Price 25 cents.

This is a pamphlet of nearly one hundred pages, on "The Nature and use of Neglected Fertilizers"—written for the Yorkshire Agricultural Society, England, but useful every where.

The Berkshire Jubilee, celebrated at Pittsfield, Mass., Aug. 22, and 23, 1844: Publishers, Weare C. Little, Albany; E. P. Little, Pittsfield.

We do not know how it is, but there are some movements of the mind which bear the impress of inspiration, they are so much like the immediate communications from the Divine Intelligence that we would fain regard them as such; or they possess at least some of those characters which belong to communications which have been made, when men "speak as they were moved." They are, to change the thought a little, immediate perceptions of a beautiful idea, free and spontaneous in its inception, and happy in its end. Such appears to have been the idea of the Berkshire Jubilee.

The book before us relates the sayings and doings of this occasion. The more important of the former consist of a sermon by President Hopkins of Williams college. A poem by the Rev. Wm. Allen, D. D.; and an oration by Joshua A. Spencer. The minor parts of the book consist of speeches and odes, from which we get something of the spirit of the occasion, and not only the spirit of the occasion, but we see in them the strong traits or features which belong to the New-England character. Some may say the character is strongly egotistic, so be it; nevertheless, it is the egotism we like: we hope it will live. It is the egotism of a sentiment worthy to be cherished, and where it prevails we may be assured also of the existence of a principle coexisting without, which will rally together the same spirit when outward or inward dangers threaten the safety of our country or our institutions. We take the liberty of copying one of the poems by our friend William Pitt Palmer, entitled the "Response of the Home-Comers."

RESPONSE OF THE HOME-COMERS.

"Hail, Land of Green Mountains! whose valleys and streams
Are fair as the Muse ever pictured in dreams;
Where the stranger oft sighs with emotion sincere,—
Ah, would that my own native home had been here!

Hail, Land of the lovely, the equal, the brave,
Never trod by the foe, never tilled by the slave;
Where the lore of the world to the hamlet is brought,
And speech is as free as the pinions of thought.

But blest as thou art, in our youth we gave ear
To hope when she whispered of prospects more dear,
Where the hills and the vales teem with garlands untold.
And the rainbow ne'er flies with its jewels and gold.

Yet chide not too harshly thy truants grown grey
In the chase of bright phantoms that lured us astray;
For weary and lone has our pilgrimage been
From the haunts of our childhood, the graves of our kin.

Nor deem that with us, out of sight out of mind,
Were the homes and the hearts we left saddened behind;
As the hive to the bee, as her nest to the dove,
These, these have been ever our centre of love.

Yes, when far away from the Land of our birth,
We have mused mid the trophies and Tempes of earth,
Our thoughts, like thy spring-birds flown home o'er the sea,
In day-dreams and night-dreams have still been with thee."

ERRORS.

Page 5, seventeenth line from the bottom for "discussion," read "digression."
Page 3, sixth line from the bottom, for "phosphate of lime," read "phosphates"

TO THE SUBSCRIBERS OF THE JOURNAL.

We have the pleasure of saying that we have already several important articles for the April number. We intend that hereafter the work shall appear promptly at the time it is due. Unavoidable circumstances connected with the printing of the present number has delayed its appearance two weeks beyond the time we had intended.

In conducting this Journal we propose to pursue a method which we think will be of great importance to our patrons. Instead of furnishing them with single articles upon important subjects, we propose giving a series in successive numbers, in order that all which relates to any given subject may be put within their reach; for example, we propose furnishing something upon insects injurious to the vegetable kingdom ; instead of limiting the communication to a single essay, we propose following up the subject until it is exhausted, or until the separate communications form a tolerably complete work ; so of Agricultural Geology, the food of animals and plants, &c., one number of which we have already given. By pursuing this course we shall place within the reach of every agriculturist all the information he will require upon those subjects, and it is scarcely necessary to add, that if we are sustained in this effort we shall be able to make the Journal superior to most of the periodicals of the kind in this country. Our subscribers will remember that we labor under a disadvantage on account of postage, which the monthly periodicals do not; on this account we are desirous always to forward the work by some cheaper mode than the mail. If we are unable to forward it by the regular express, we hope our subscribers may point out to us some mode of conveyance which shall be satisfactory to them and which will diminish to the least possible amount, the expense of conveyance.

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FOOD OF ANIMALS.

BY THOMAS HUN, M. D.

We find in nature two classes of bodies. The one comprehends inorganic substances, which may be simple, or composed of two, or even three or four elements, united in such a way that by ordinary chemical processes they may be analyzed, and again reproduced by the combination of their elements.

There is another class of bodies called organic, which are only found in the vegetable or animal kingdom. They are never simple, but are always composed of at least three, and sometimes of four elements, and the elements are united in such a way, that though the chemist can analyze these substances, he cannot reproduce them by bringing together the elements of which they are formed. Organic matters, or *proximate principles*, as they are called, are formed only in the laboratory of the living plant, under conditions which the chemist cannot imitate.

The elements of which proximate principles are composed, are carbon, oxygen, hydrogen and nitrogen. The three first are present in all, the last in only some of them.

On this is founded a distinction of the highest importance in animal and vegetable physiology, namely, into non-nitrogenized and nitrogenized proximate principles.

Of the non-nitrogenized principles, there are some which are composed of carbon united with oxygen and hydrogen, the two latter elements existing precisely in the proportion for forming water. They may, therefore, be considered as compounds of carbon with the elements of water, and are called neutral principles. The most important of them are starch, gum, and the different kinds of sugar. These substances differ from each other only in the proportion of the elements of water contained in them. They have been considered by some chemists as hydrates of carbon, but this denomination is of questionable propriety, since it is by no means generally admitted that water actually exists in them.

There are other non-nitrogenized principles which are also compounds of carbon with oxygen and hydrogen, but these latter elements are not in the proportion to form water, the hydrogen or the oxygen being in excess. They are called non-neutral compounds. The principal of them are fat, wax, acids, &c.

The nitrogenized principles are albumen, fibrin and casein. They all contain a substance called protein, consisting of carbon, oxygen, hydrogen and nitrogen; and this protein is combined with minute proportions of sulphur and phosphorus. As regards their chemical composition, they differ from each other only in the proportion of sulphur and phosphorus combined with protein. They possess, however, different properties, not depending merely on their chemical composition.

There is a fourth nitrogenized principle called gelatine, found in the bones and cellular tissue, which does not seem to be a compound of protein. Its chemical constitution is still uncertain.

The following table exhibits the proximate principles, and their relation to each other:

Non-nitrogenized principles:	neutral,	starch = 12 carbon + 10 water, gum = 12 carbon + 11 water, sugar = 12 carbon + 11 water.
	non neutral,	fat, wax, acids.
Nitrogenized principles:	albumen = protein + S. + P. fibrin = protein + 2 S. + P. casein = protein + S. gelatine—chemical constitution doubtful.	

Besides these organic matters, there are certain inorganic constituents, saline and earthy, deposited in vegetable and animal tissues. They are called the inorganic constituents of vegetables and animals.

These proximate principles are, at the present time, produced exclusively by vegetables. Ordinary chemical processes cannot form them from their elements, and animals can, indeed, in some cases, transform one principle into another, but cannot create any of them from inorganic matters. I say at the *present* time, because geological observations demonstrate that there was a time when no organic matter existed on the earth. At a subsequent period, vegetables, and then animals appeared, produced under conditions and by the operation of causes which we cannot point out, and which certainly do not exist at this day, for there are now no instances of the formation of vegetables or of animals, except from pre-existing beings of a like nature.

In a former article I have undertaken to show how the water, carbonic acid, and ammonia, existing in the soil and in the atmosphere, undergo transformations in the living plant, by which they are converted into starch, gum, sugar, and other proximate principles. The materials out of which these principles are formed, now exist both in the soil and atmosphere, but they may all be ultimately traced to the latter source. The water of the soil originally existed in the atmosphere in the form of vapor, and has been deposited by rain, dew, &c. The carbonic acid and ammonia of the soil are generated by the decomposition of vegetable and animal substances, but these substances themselves were formed from the carbonic acid and ammonia of the atmosphere. Consequently, all the organic matters of plants may be traced to the atmosphere as their ultimate source. The vegetable kingdom is formed from the atmosphere.

The exception to this is found in the inorganic constituents of vegetables, which are derived from the soil by the disintegration and decomposition of the rocks, under the influence of various physical and chemical agencies.

An acquaintance with the composition and mode of nutrition of vegetables, is a necessary introduction to the study of nutrition in animals, because animals derive the matter of which they are formed from vegetables.

Animals cannot produce organic from inorganic substances. All the organic matter entering into their composition is derived primarily from vegetables, then converted into organized tissue, and finally decomposed and restored to the atmosphere in the form in which it entered the plant.

The vegetable kingdom is, then, the grand laboratory in which the food of animals is prepared.

Herbivorous animals live on organic matters as found in vegetables. Carnivorous animals live on the flesh of the former; so that ultimately, both classes draw their nourishment from vegetables.

Just as all the elements of the proximate principles of plants once existed in the atmosphere in the form of water, carbonic acid and ammonia; so all the organic tissues of animals once existed in vegetables. Thus we trace the matter of which animals are formed, to the vegetable kingdom, and this again to the atmosphere; so that ultimately we find that all the matter now making part of vegetables and animals, may be traced to the atmosphere, where it existed in the form of water, carbonic acid and ammonia.

If we would determine what was the composition of the atmosphere before plants and animals existed, we must restore to it all the carbon, oxygen, hydrogen and nitrogen now existing in living animals and vegetables, and in their remains, whether fossil or others. The result of such a calculation would not, however, be altogether true, for the reason that carbonic acid and ammonia are constantly passing into the atmosphere from volcanic and other sources, and it is impossible to estimate the activity of these agencies in past times.

The great problem of nutrition may be thus stated: To trace the water, carbonic acid and ammonia through the various processes in the vegetable kingdom, by which they are converted into organic matters; to trace these organic matters through the processes in the bodies of animals by which they are converted into organized tissues; and finally, to trace this same vegetable and animal matter in its decompositions until it is restored to the atmosphere in the form of water, carbonic acid and ammonia.

These preliminary observations were necessary to prepare for the explanation of the process of nutrition in animals.

All the organized tissues of animals contain the four elements, carbon, oxygen, hydrogen and nitrogen. With the exception of the gelatinous tissues, about which chemists are not agreed, they are all compounds of protein.

During life these tissues are continually undergoing a change of matter. An act of composition and decomposition goes on within them, so that, while their form remains the same, the matter of which they are composed is continually changing. This composition and decomposition of the tissues constitutes the act of nutrition.

The body of an animal thus changing its materials, while its form remains unchanged, has been compared to the waters of a lake into which streams are emptying and from which other streams are flowing, while its smooth surface reveals nothing of the changes going on within its depths.

Let us see now what is the composition of the streams flowing into the animal (its food,)—what are the changes they undergo in its interior, and what is the composition of the streams as they issue from it—(the excretions.)

Nutrition takes place by a reaction between the blood and the organized tissues. From the blood are derived the materials out of which the organs are formed, and the product of their decomposition enters into the mass of this fluid before it is thrown from the system by the excretions. The loss thus sustained is made up by the products of digestion absorbed from the surface of the stomach and intestines.

From the fact that all the organs are formed from the blood, this fluid has been called *liquid flesh*, and the flesh *liquid blood.*

Composition of the Blood.

The blood, which to the naked eye looks like a homogeneous fluid, is seen under the microscope to be composed of an immense number of circular, flattened disks of about $\frac{1}{3000}$ of an inch in diameter, floating in a transparent colorless liquid. In these disks is contained the coloring matter of the blood, and it is on them that the air acts in the process of respiration. They arrive at the pulmonary capillaries loaded with carbonic acid which they there give off, and then absorb oxygen, which they carry to the different organs.

The transparent fluid in which the disks float is called liquor sanguinis. It consists of two parts—serum and fibrin.

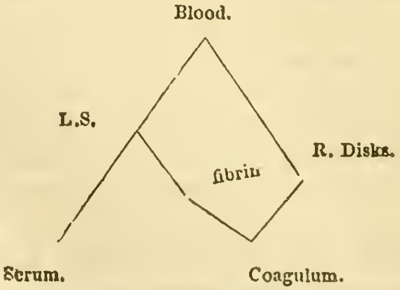
The fibrin is the constituent of the blood on which its property of coagulation depends. So long as the blood circulates in the living vessels, the fibrin remains dissolved in the serum; but when the blood is drawn, the fibrin coagulates and entangles in its meshes the red disks, so that the clot is composed of the fibrin and red disks. Coagulated fibrin, free from red disks, is a straw colored tough, stringy mass.

When, by the act of coagulation, the red disks and the fibrin have been abstracted from the blood, there remains a colorless, transparent fluid, in which the coagulum floats. This is the *serum.* It resembles in appearance the liquor sanguinis, but as it contains no fibrin, it does not coagulate at the temperature of the atmosphere. Serum consists of water, holding in solution the saline ingredients of the blood, and albumen. When serum is heated to 167° F. the albumen it contains coagulates, but not in a fibrous form like fibrin. The white of egg presents a familiar example of albumen. It is a protein compound, nearly identical in composition with fibrin, and like fibrin, it coagulates, but not in exactly the same circumstances. As we shall presently see, albumen has to pass through the form of fibrin before it can be converted into organized tissue.

The following table shows the ingredients of the blood :

$$\text{Blood, composed of,}\left\{\begin{array}{l}\text{red disks.}\\ \text{liquor sanguinis.}\left\{\begin{array}{l}\text{fibrin.}\\ \text{serum,}\left\{\begin{array}{l}\text{albumen,}\\ \text{salts,}\\ \text{water.}\end{array}\right.\end{array}\right.\end{array}\right.$$

Or the following diagram of Dr. Mandl, ingeniously shows the composition of the coagulum :



There are also in the blood some colorless globules, which I will speak of hereafter.

It now remains to point out the uses of the several ingredients of the blood.

To explain the use of the red disks, it is necessary to premise that the decomposition of the tissues, which constitutes one element of the nutritive act, requires the presence of oxygen. Now the office of these disks is to absorb oxygen from the atmosphere, during their passage through the pulmonary capillaries, and carry it to the other system of capillary vessels, which permeate all parts of the body. Here the oxygen combines with the living tissues, and the result of its combination with their elements is the production of carbonic acid and of the elements of the bile and urine. This carbonic acid thus formed, again combines with the red disks which have just parted with their oxygen, and is carried by them back to the pulmonary capillaries, where it is thrown off with the expired air.

The office of the red disks is thus twofold; 1st, to carry oxygen from the pulmonary capillaries to the general capillary system, where the oxygen combines with the tissues and promotes their decomposition; and 2d, to carry the carbonic acid here generated back to the pulmonary capillaries, where it is rejected from the body.

One word as to the mode in which the remaining products of the decomposition of the tissues are disposed of. The bile contains a large portion of carbon in combination with hydrogen, but as this is re-absorbed after serving its purpose in digestion, it is not properly an excretion. The carbon and hydrogen it contains are ultimately discharged by the lungs in the form of carbonic acid and water.

The elements of urine contain the nitrogenized products of the decomposition of the tissues, chiefly in the form of urea, which readily passes into carbonate of ammonia, by exposure to the air.

We have now explained that portion of the nutritive act, which consists in the decomposition of the tissues. Oxygen is brought by the red disks; this causes their decomposition; the results of this decomposition are: 1st, carbonic acid, which is carried back to the lungs by the red disks, and then thrown off; 2nd, urea and lithic acid, which are compounds of nitrogen and the other elements of the tissues, and which are rejected by the kidneys; and 3d, the elements of bile, which contains a large proportion of carbon united with hydrogen, and which after answering a particular purpose in digestion, is re-absorbed with the food, and finally rejected in the form of carbonic acid and water.

To complete this account of the excretions, it is only necessary to add, that the saline ingredients of the blood are also thrown off by the kidneys.

We now pass to the examination of those constituents of the blood which serve for the composition of the tissues.

The fibrin of the blood is the nutritive matter out of which the tissues are formed. This substance, which is in a state of solution while circulating in the vessels, becomes effused through the walls of the capillary vessels, and thus is brought in direct contact with the organized tissues. Here certain changes occur in it; first, it assumes a granular appearance. these granules aggregate together to form nuclei, and around these nuclei membranes form by which they are converted into cells. These cells, constitute the primitive condition of all organized tissues, and by various transformations are converted into the particular tissue in the midst of which they are formed. All the organs are then formed from the fibrin of the blood, and in proportion as a particle is removed by the act of decomposition to which I have alluded, it is replaced from the fibrin circulating through the capillary vessels. Whence is this fibrin of the blood derived? and how is the constant supply kept up?

The *albumen* dissolved in the serum is the ingredient out of which the fibrin is formed; it is the shape which nutritive matter assumes before it becomes fibrin. The similarity of composition between albumen and fibrin has been already pointed out, but there is a further difference of which their chemical constitution gives no explanation. Fibrin coagulates, has a tendency to become organized; it is albumen more highly elaborated and vitalized. The conversion of albumen into fibrin takes place in the blood by means of colorless cells, which differ from the red disks both in their structure and properties. I have already briefly alluded to them.

The saline ingredients of the blood enter into the composition of some parts, as the bones, and also seem to have other uses which are not yet well understood.

I have now given the uses of the different constituents of the blood. The red disks carry oxygen to the interior of the tissues and thus lead to their decomposition, and carry off a portion of the products of their decomposition, the carbonic acid ; the nitrogenized products being carried off by the kidneys in the shape of urea and lithic acid. The fibrin is the plastic matter out of which the tissues are formed. In proportion as it is consumed it is replaced by the albumen, which in the colorless cells, is converted into fibrin. The loss of the albumen is itself supplied by the food.

We are now prepared for examining into the nature of the food of animals.

One great object of food is to supply the blood with a portion of albumen, to replace that which disappears by its conversion into fibrin and finally into organized tissue. Since animals are incapable of forming proximate principles from their elements, the food must contain albumen ready formed.

The simplest form of nutrition is that presented by carnivorous animals, and I therefore begin with it as it takes place in them.

Living on the flesh of animals of the same composition as their own, they simply dissolve this flesh in their digestive canal and convert it into an albuminous solution. The earthy matters contained in bones, being insoluble in the gastric juice pass along the intestinal canal and are rejected as fœces, which in these animals consist almost exclusively of the earthy portion of bones with hairs and other insoluble matters.

The albuminous solution resulting from the digestion of the flesh is absorbed by the lacteal vessels, and enters the mass of the blood, to replace the albumen which has been converted into fibrin, and finally expended in the nutritive process.

A portion of the tissues is then decomposed and ultimately rejected from the system, in form of carbonic acid and urine ; a corresponding amount of matter is withdrawn from the blood to form new organized tissue, and a corresponding amount of nutritive matter is introduced into the blood to compensate for this loss.

We ought then, to find in the excretions of the animal, the same amount of matter and the same elements differently combined, as in the food ; not that the food is directly converted into these excretions, for it has first to pass through the state of organized tissue, but this organized tissue is itself exactly replaced by the food, so that the result is the same as though the food itself were at once converted into the excretions.

In the above exposition, I have taken the simplest form of animal nutrition, that of carnivorous animals, and in order to prevent complication, I have represented this as more simple than it is in reality, for I have omitted one essential ingredient of their food, the fat.

What becomes of the fat contained in the food of these animals? What is its use? It is not found as fat in the excretions; it does not make part of the body of the animal, for in general, carnivorous animals are remarkably destitute of fat.

Nor can it contribute to the formation of the organized tissues, for they all contain nitrogen, and fat is a compound of carbon, oxygen and hydrogen. We cannot suppose that it abstracts nitrogen from the albuminous principles of the food, for these principles contain nitrogen precisely in the necessary proportions for the formation of the tissues.

The fat is absorbed with the albuminous products of digestion, passes into the chyle and ultimately into the blood. A portion is in some cases deposited in the cellular tissue as fat, the rest disappears. What becomes of it? What form does it assume?

The oxygen, introduced by the red disks, is not all consumed by the decomposition of the tissues. A portion of it remains, which combines in the blood with the carbon and hydrogen of the fat and forms carbonic acid and water. The fat is thus burned in the blood by the oxygen, and is thrown off in the shape of the two compounds just named. It thus contributes to generate animal heat, for by this slow combination as much heat is generated as by their rapid combustion, attended with flame and light, when it takes place in the air or in oxygen. Heat is also generated by the union of oxygen with the carbon liberated in the decomposition of the tissues, but this decomposition is not in general sufficiently rapid to liberate carbon enough to generate all the heat required.

Fat, then, is not a supporter of nutrition. It does not contribute to the formation of organized tissues. It is a supporter of respiration; a means of generating heat.

The principles of the food are therefore divisible into two classes:

1. Supporters of nutrition, which are the albuminous matters or protein compounds.

2. Supporters of respiration—fat.

To resume. The food of carnivorous animals is composed of,

1. Water; which acts only as a solvent and not as an element of nutrition, and is rejected as water by the lungs and kidneys.

2. Saline and earthy matters: they contribute to the formation of the bones, and enter into other tissues and perform other uses not understood. They correspond to the *inorganic constituents* of plants. They are rejected by the urine and fœces, and render these matters so valuable as manures.

3. Albuminous matters: Protein compounds, supporters of nutrition. These are dissolved, converted into fibrin, and constitute the nutritive principle of the food. After becoming organized they combine with oxygen, and are rejected as urea and carbonic acid. The urea, by exposure to air, is speedily converted into carbonate of ammonia.*

4. Fat: supporter of respiration; generator of animal heat; combines with oxygen and is rejected as carbonic acid and water.

5. Oxygen: which is not usually called an article of food, but is introduced by the lungs rather as a means of waste than of repair, and is rejected in the combinations already mentioned.

I pass now to the nutrition and food of herbivorous animals.

The mode of nutrition in herbivorous animals differs less from that of carnivorous animals than was formerly supposed.

Recent chemical discoveries have established the fact that protein compounds, albumen, fibrin and casein, which are the supporters of nutrition in carnivorous animals, also exist in vegetables ready formed. Consequently herbivorous animals replace the albumen of their blood by the albuminous matters derived from vegetables, and so far their nutritive process does not differ from that of carnivorous animals.

The different forms of fat, oils, &c., are found in vegetable as well as in animal food, and herein herbivorous animals are nour-

* Gelatine is a nitrogenized principle but not a compound of protein, which is found in the bones and cellular tissues of animals. The mode in which it is disposed of, and its nutritive properties are involved in so much doubt, that I have thought it best to avoid the question in this paper.

ished like the carnivorous. The only difference is, that in the former a larger share of fat is stored up than in the latter.

In vegetable food, besides the albuminous and oleaginous principles, there is a third principle which is not found in animal food; this is the saccharine principle, comprehending starch, gum, sugar, and the whole of the non-nitrogenized neutral compounds of which I spoke in the beginning of this paper.

This principle, containing no nitrogen, cannot contribute to the formation of the organized tissues. Its uses are analogous to those of fat. Its carbon combines with the surplus oxygen, and is converted into carbonic acid, thus generating animal heat. For this reason the saccharine principle is, by Liebig, classed with fat, among the supporters of respiration.

The oleaginous and saccharine principles of the food are not, however, in all cases at once consumed by oxygen, introduced by respiration. When the animal takes but little exercise, and the respiration is consequently inactive, these principles find no surplus oxygen to combine with, and then the oleaginous principle is stored up as in the cellular tissue as fat, and the saccharine principle by a change in its elements, gives off a portion of its oxygen, and is converted into fat, which, as will be remembered, is a combination of the same elements in different proportions. This is the only instance in which one proximate principle is converted into another in the animal body. This conversion, first maintained by Liebig, was denied by Dumas, who undertook to show that in the food of herbivorous animals there was sufficient oil to account for all the fat of the animals, but I believe the point has subsequently been abandoned by Dumas himself. It seems indeed very improbable, that the grass eaten by a milch cow contains as much oil as is found in her milk.

It follows from this that in proportion as an animal takes more or less exercise, will the oleaginous and saccharine principles be consumed in the body or stored up as fat for future use.

Let us now turn to the difference between the food of carnivorous and herbivorous animals. Both contain the albuminous and oleaginous principles, and the latter contains, in addition to these, the saccharine principle. The food of carnivorous animals is made up of a large proportion of the albuminous principle, united with a small portion of fat; that is, of a large portion of the supporter of nutrition with a small portion of the supporter of respiration. The food of herbivorous animals is made up of a small portion of the albuminous principle or supporter of nutrition, and of a much larger portion of the oleaginous and saccharine principles which are supporters of respiration. There is a corresponding difference in the nutrition of the two classes. In carnivorous animals the change of the tissues take place with rapidity, and a large supply of albumen is required to take the place of that which disappears in the formation of the tissues. There is sufficient carbon thus liberated to saturate the oxygen introduced by respiration, and to maintain the animal temperature; the small portion of fat in the food saturates any surplus of oxygen. In herbivorous animals the change in the tissues is slower; less albumen is therefore required, and more of the non-nitrogenized principles or supporters of respiration are required to saturate the oxygen introduced by the lungs.

The supporters of nutrition in food are, the protein compounds albumen, fibrin and casein, as found in vegetables and animals. They are destined to repair the waste of the tissues, and by their decomposition give rise to carbonic acid, water and urea, which, by the addition of water, becomes carbonate of ammonia.

The supporters of respiration are the different kinds of animal and vegetable fat and oil, constituting the oleaginous principle and the neutral non-nitrogenized compounds, sugar, gum, starch, constituting the saccharine principle. These principles are either stored up as fat, or consumed by oxygen, and in both cases are ultimately thrown off in the form of carbonic acid and water.

The organic matters of the food are then ultimately thrown off in the form of water, carbonic acid and carbonate of ammonia. The saline matters pass off in the urine and fœces in the form in which they are introduced.

Thus the animal restores to the atmosphere by the lungs, and to the soil by the urine and fœces the compounds which serve as food for plants.

Vegetables convert inorganic compounds into proximate principles; animals convert these proximate principles into inorganic compounds.

There is but one substance produced in nature which contains all the elements of the food of animals so mixed as to be capable of serving permanently as an an article of food. That is milk.

An examination of the composition of milk will serve to confirm and to illustrate the preceding remarks.

When milk is allowed to stand it is found to separate into two parts, the cream which floats on the surface, and a clear fluid underneath. This cream consists of globules which may be easily seen by means of the microscope, and are composed of oil. They are mechanically suspended in the milk, and rise to the surface on account of their lesser specific gravity. When heated, or when beaten for a certain time, their envelope is broken and they form butter.

Milk is thus found to be composed of fat, existing in the state of globules and floating in a thin fluid. This recalls to a certain extent the composition of the blood.

If we add to the skimmed milk an acid, it separates into two parts, a coagulum and whey. Here again is an analogy with the liquor sanguinis.

The coagulum is composed of an albuminous matter called casein, the composition of which has already been explained. It is a compound of protein with sulphur.

The whey is composed of water, holding in solution a kind of sugar, called sugar of milk, and also phosphates and other saline ingredients.

In milk, we thus find, besides the saline ingredients and water, an oleaginous principle, an albuminous principle and a saccharine principle, that is, the three great staminal principles of the food. The albuminous principle serving as a supporter of nutrition, and the oleaginous and saccharine principles serving as supporters of respiration.

In butter we have the oleaginous principle separated from the others. In cheese we have the casein united with the butter, as in fat cheese, or separated in a great measure from it, as in skimmed milk cheese. In whey we have the sugar alone with the saline ingredients.

It was remarked by Prout, before the views of Liebig concerning the nature of the food were published, that milk contained the three great staminal principles of food, and that whatever might be the nature of the food it was necessary that at least two of these principles should be present in order to support life for any length of time. Thus, although the albuminous principle is all that is required to replace the fibrin of the blood consumed in the act of nutrition, yet animals fed on white of egg alone, perish after a certain time of starvation. For a still stronger reason, animals fed on pure sugar, or gum, or starch, or oil alone, die of starvation, for these substances contain no materials for repairing the waste of the tissues. In the simplest kind of food, as that of carnivorous animals, there is a mixture of the albuminous principle with fat. In the food of herbivorous animals there is a mixture of the albuminous with the saccharine, and with a smaller portion of the oleaginous principle.

"But," says Prout, "it is in the artificial food of man that we see this great principle of mixture most strongly exemplified. He, dissatisfied with the productions spontaneously furnished by nature, culls from every source, and by the power of his reason, or rather of his instinct, frames in every possible manner, and under every disguise, the same great alimentary compound. This, after all his cooking and art, however he may be inclined to disbelieve it, is the whole object of his labor, and the more nearly his results approach this, the more nearly they approach perfection. Thus, from the earliest times, instinct has taught him to add oil or butter to farinaceous substances, such as bread, which are naturally defective in this principle. The same instinct has taught him to fatten animals with the view of procuring the oleaginous in conjunction with the albuminous principle, which compound he finally consumes, for the most part, in conjunction with saccharine principles, in the form of bread and vegetables. Even in the utmost refinements of his luxury, and in his choicest delicacies, the same great principle is attended to; and his sugar and flour, his eggs and butter, in all their various forms and combinations, are nothing more nor less than disguised imitations of the great alimentary prototype—*milk*—as presented to him by nature."

From what precedes, it will be seen that there are three great aminal principles of food:

1st. The albuminous, which is destined to repair the loss of the tissues in the act of nutrition; that is, destined to be converted into organized tissues.

2. The oleaginous principle, containing a large proportion (60 per cent) of carbon united with hydrogen and oxygen, but not in

the proportions to form water, the hydrogen being in excess. This principle is destined to combine with the oxygen introduced by respiration into the blood, and by the combustion of its carbon and hydrogen to generate heat. When there is not enough of oxygen introduced to burn up all the fat of the food, this principle accumulates in the cellular tissue.

3. The saccharine principle, including sugar, gum, starch, and all those substances composed of carbon, combined with oxygen and hydrogen in the proportion to form water. The use of this principle is nearly the same as that of the oleaginous; it serves for generating animal heat, but in a less degree, for it contains less carbon, and the other two elements are in such proportions as to have satisfied their affinities, and no surplus hydrogen remains to be burned. The saccharine principle undergoes conversion into fat, when there is a deficiency of oxygen for its combustion.

Let us now apply these principles to determining the proportions in which these principles should be combined, in the food of man and of animals under different circumstances.

In proportion as the waste of the tissues is greater in nutrition will a larger supply of the albuminous principle be required in the food to replace the fibrin abstracted from the blood. Muscular exercise contributes to an increased activity of the nutritive act and thus renders a larger proportion of this principle necessary.

In proportion as the surrounding atmosphere is colder will the body be required to generate more heat in order to preserve its uniform temperature. This increased heat is generated by exercise and by proper diet. Exercise generates more heat in two ways: 1st by accelerating the circulation and respiration, it introduces more oxygen into the blood; 2d, by increasing the activity of the decomposition of the tissues in nutrition, it liberates more carbon which is burned by the oxygen. The diet of one taking active exercise in a cold air, should contain a large portion of the albuminous principle, to replace the waste of the tissues and of the oleaginous principle to be burned by the surplus oxygen. A man or animal laboring in a cold air requires food rich in these two principles and soon sinks under a diet composed of a large portion of the saccharine principle—such as rice, fruits, &c. A starving man freezes if exposed to cold, and the same thing happens to man well fed but kept at rest. The former freezes because, though he has oxygen enough in the blood it finds no fuel to burn ; the latter because, with plenty of fuel there is not enough oxygen introduced to consume it.

Alcohol is also ranked by Liebig among the supporters of respiration. Its composition very nearly resembles that of fat, being a compound of carbon with oxygen and nitrogen, the latter being in excess. Its action is two-fold ; it is a supporter of respiration and a special excitant of the nervous system. In the latter mode of action it is altogether different from any oleaginous compound. As a supporter of respiration its action is exceedingly prompt, from the rapidity with which it is absorbed and from the avidity with which it is burned by the oxygen. In this way it warms the body suddenly, but by exhausting the oxygen of the blood it leaves the system more exposed to the cold than before, unless by active exercise the introduction of oxygen is kept up in a degree proportionate to its consumption. The blood of drunkards is remarkably black, in consequence of being loaded with carbonic acid.

If we examine the diet adopted by inhabitants of cold and hot climates, we find it to correspond with the principles just laid down. In arctic regions where active exercise is necessary in order to resist the cold and to provide food, the diet consists mainly of animal flesh, with a large quantity of fat. Europeans read with astonishment the immense quantities of meat and fish oil consumed by the Esquimaux, and which are rendered necessary by their severe climate. Exposed to an atmosphere below zero, imperfectly protected by their miserable huts, they are compelled to burn the fuel by which their temperature is maintained, within their own bodies. Hence too, the avidity with which they seek after, and the impunity with which they bear large quantities of ardent spirits.

In tropical climates, nature provides abundantly for the wants of men, with little labor on their part. With this diminished necessity for muscular exertion, the temperature of the atmosphere is such as to require little animal heat to be generated, and consequently but little activity of the respiratory functions. Diminished muscular effort is attended with diminished waste in nutrition, and hence a small amount of albuminous matter in the food suffices. At the same time the moderate activity of the respiratory function renders the more active supporters of respiration, such as fat and ardent spirits, inappropriate. The diet of the inhabitants of these countries consist therefore mainly of the saccharine principle, united with small proportions of the other two. The rice and fresh fruits which constitute the repast of the Hindoo, offer as striking a contrast with the flesh and train oil of the Esquimaux, as the warm skies and lazy life of the former do to the snow huts and hunting excursions of the latter.

If we would produce a great muscular development with little fat, much exercise is necessary and a diet composed of albuminous matter, with little of the oleaginous or saccharine principle. This is the diet on which carnivorous animals subsist, and the hardness of their muscles and absence of fat are well known. This is also the diet on which men are put when *trained* in England for prize fighting. Jackson, a celebrated *trainer*, stated to John Bell that he usually began the system by an emetic and two or three purges. Beef and mutton, the lean of fat meat being preferred, constituted the principal food; veal, lamb and pork he found less digestible. Fish was said to be a "watery kind of diet," and is employed by jockeys who wish to reduce their weight by sweating. Stale bread was the only vegetable food allowed. The quantity of fluid permitted was 3½ pints, but fermented liquors were strictly forbidden. Two full meals with a light supper were usually taken. The quantity of exercise employed was very considerable, and such as few men of ordinary strength could endure. The effects of trainers' regimen are hardness and firmness of the muscles, clearness of skin, capability of bearing continued severe exercise, and a feeling of freedom and lightness (or "corkiness") in the limbs.

If instead of great muscular development we would favor the production of fat with tender muscular flesh, we must adopt a different regimen. First of all, we must secure rest, for exercise develops the muscles, and by giving activity to respiration it introduces more oxygen, which burns up the fat. With this we must have a somewhat elevated temperature without which rest is impossible. The diet should consist of a small proportion of the albuminous principle with a free use of the oleaginous and still more of the saccharine principle. With such a regimen the fat of the food finds no oxygen to burn it, and is stored up in the cellular tissue, while the saccharine principle, for the same reason, is converted into fat and is likewise stored up. Thus it is, that Turkish women, shut up in the harem, without exercise of mind or body, living on a farinaceous diet, acquire the embonpoinment so highly prized as an element of beauty in their country ; and indeed, it is to this cause that women in general owe the softness of muscle, their roundness of outline, which contrasts so strikingly with the muscular development and angular contour of men.

The application of these principles to the feeding of animals according to the object we have in view, is sufficiently obvious. If we would simply fatten an animal and prepare it for being eaten, we keep it at rest in a warm stable, and give it food containing an abundance of the supporters of respiration, so that its muscles may become tender and that the oleaginous and saccharine principles of the food may not be consumed in warming the animal but may be deposited as fat. If on the other hand we wish o procure hard and strong muscles, as in a race-horse, we keep iim in exercise and give him food containing more largely of the lbuminous principle. Contrary to a common opinion, food rich n albuminous matter does not contribute to the production of at. It is not very unusual for persons who wish to repress a disosition to obesity, to avoid animal food and restrict themselves o vegetables, and find to their surprise that the accumulation of at takes place more rapidly than before.

The use of alcoholic drinks dispose to obesity, unless they are bused to such a degree as to give rise to a derangement of digesion, which prevents the introduction of nutritive matter into the lood. Although the composition of alcohol is analogous to that f fat, it is not probable that it undergoes conversion into fat in the ody, but rather that, by combining rapidly with the oxygen of ie blood, it leaves a larger portion of the saccharine and oleagious matters of the food to be converted into and deposited as fat. ermented liquors contain a quantity of saccharine matter, and are r this reason particularly apt to cause obesity. Indeed, any cause hich consumes the oxygen of the blood, or prevents its introduction, as a tendency to produce an accumulation of fat. Want of exercise perates in keeping the respiration sluggish, and thus preventing e introduction of oxygen. Asthma, and diseases of the heart, y obstructing the circulation through the lungs, have a similar tndency.

When a person who has taken exercise freely in the open air, and has lived on a diet of animal food with alcoholic drinks, changes his habits of life and becomes sedentary, and continues the same diet, he falls into disease. The large proportion of albuminous matter of the food no longer finds its use in repairing the waste of the tissues in nutrition, and hence accumulates in the blood. This fluid becomes too rich in nitrogenized principles; there is an inflammatory state of the system produced; the formation of urea and still more of uric acid, becomes excessive, and hence arises a disposition to gravel, gout, or rheumatism, three diseases closely allied to each other. They all seem to be connected with an excess of nitrogenized principles in the blood, though this does not always arise from the same cause.

The lungs and liver have functions analogous in this respect, that they both separate carbon from the blood; in the former it is combined with oxygen; in the latter with hydrogen. There is a certain degree of antagonism between these glands, the inertness of the one being compensated by an increased activity of the other. In cold climates the lungs are most active, and are hence disposed to inflammatory affections. In hot climates, when the lungs separate the carbon imperfectly from the blood, the liver is thrown into increased activity, and hence its diseases are here most common. Europeans who pass to tropical climates, and continue their diet rich in fat, with free use of alcoholic drinks, inevitably bring on disease of the liver by overtasking this organ. The same thing happens to those who in temperate climates indulge in such a diet, while they lead a sedentary life in warm houses. Drunkards, almost always induce disease of the liver by surcharging the blood with carbon and hydrogen, and thus keeping the liver in a state of constant excitation. This explains also how persons leading an active life can resist the effects of alcoholic drinks, even when taken in excess, so much better than those who are sedentary. The former work off a part of the alcohol by their active respiration; in the latter the whole labor falls on the liver.

CLIMATE OF THE STATE OF NEW-YORK.

One of the most important problems to be solved in determining the agricultural capabilities of any country, is its climate. Common observation and experience is perhaps sufficiently exact to establish the truth of the proposition in a general way. A hasty examination, for example, of the natural productions of a valley and of the adjacent mountain, of a marshy or an arid district, of the shores of a sea, lake, or large river, of a warm and a cold region, and of an inland position, will show that they differ materially in their products; a difference which, without doubt, will be attributed to what is termed climate. The word is here ısed in its widest sense, and may be defined the character of a place, as determined by observations on latitude, height above the sea, vicinity to water, prevalent winds, position and slope of lands, ıature of the rocks and soil, and degree of cultivation. If climate, then, is determined by these conditions, it will be well to occupy a few moments on each of them, taken singly. 1st. Climate does not depend wholly upon latitude, for observation proves hat two places upon the same parallel neither agree in temperaure, nor in any two of the other conditions which determine its haracter. If they agree in the mean temperature for the year, hey may not agree in the temperature of their seasons. One, for ıstance, may enjoy cool summers, the other may be hot and comaratively dry. So, one may have a mild winter, while at the ther it is severe and rigid. Under these characters Paris and uebec have often been contrasted. Again, two places in the same ıtitude, but of different heights above the level of the sea, ill differ in climate. If, for example, one is five or six hundred et higher than the other, it will be from one to two degrees older than the other.

The other conditions which modify climate are not of equal conquence with the two preceding ones. Vicinity, however, to rge bodies of water, may be, perhaps, of equal consequence. 'he winds also exert a perceptible influence. In this country ıe northwest winds are cold, and where from the shape and contur of the surface they prevail, the temperature will from this cause alone, be slightly reduced. Then, again, a southern exposure is more favorable to vegetation than a northwest exposure. The color and composition of soils, too, cannot be overlooked in the list of causes which modify climate. These, however, are more local and less general, unless, indeed, the area is greatly extended.

Places which are known to enjoy an equal temperature are called *isothermal*, signifying merely an equal temperature. Imaginary lines connecting such places, are called *isothermal* lines. We have already said, in effect, that these cannot coincide with the lines of latitude drawn upon a map, or a terrestrial globe; they therefore intersect them at various angles, and form by themselves a peculiar system of lines approaching only to parallelism among themselves—for example, those which are drawn upon a map of Europe, do not coincide or run parallel to those of America, as the line of equal temperature in the two continents runs twelve degrees farther north in the former than in the latter.

Another result which has been obtained by careful observation is, that two places may receive an equal amount of heat, during a part of the year only; that is, it will enjoy an equal summer or an equal winter temperature. Lines or curves, representing these facts, are termed *isotheral* and *isocheimal* lines; the former referring to equal summer, the latter to equal winter temperature.

The temperature of the atmosphere is influenced by, and depends upon, the heating power of the earth, the rays of the sun passing through it without imparting their caloric directly to its particles. On being received, however, upon the surface of the earth, it becomes heated, and then imparts a portion of its temperature to the stratum of air in immediate contact with it. This, in consequence of its expansion, has its specific gravity diminished and hence rises and gives place to another stratum, which in its turn also ascends. By these changes of place then, the body of the atmosphere is heated and its temperature elevated. But this process only expends a part of the heat received from the sun. The remaining heat is conducted downwards from particle to particle, diminishing of course according to the distance from the surface, till finally we reach a depth which is unaffected by the sun's rays. The superficial temperature of the soil of any given place will vary as well as that of the air; the color of the soil, its na ture as it regards composition, height, slope, etc., all have their influences in a greater or less degree.

There are a few other general considerations in regard to climate, which it may be well to state in this place. We notice first, the globular figure of the earth. A body of this form receives the greatest number of rays from the sun on a given space, when they fall vertically upon it. In the second place, the space over which the sun approaches to verticality is increased by the obliquity of the earth's motion in regard to the plane of the equator. By this arrangement the sun apparently travels over a broad zone, equal to 47° in breadth. Then again, the diurnal revolutions of the earth produce the agreeable changes of day and night and an innumerable number of other important modifications of temperature.

It is perhaps impossible to conceive of all the results which must have followed had these several arrangements been differently disposed. If, for instance, the axis of the earth had been placed perpendicular to the plane of its orbit; in this case, the sun would have been always vertical to the same places and those places would have been, as a consequence, burnt, or parched with heat, but in consequence of the obliquity of the axis, the extent of the temperate zones has been produced far towards the poles, and has thereby rendered most of the earth's surface a fit abode for animals and plants.

The atmosphere also, from its great mobility, is an agent for distributing heat; it not only rises upwards, but is impelled forwards; moving over the surface of the earth with rapidity in some instances, and at the same time bearing along and distributing the caloric imparted to it from the earth.

The temperature too, of the current itself, is modified by the surface over which it passes. Traversing a low, sandy plain, it becomes hot and dry; over the sea, damp and chilly; and over high mountains, cold and pinching.

Such are some of the causes which operate generally in modifying climate.

Leaving these general views of climate, we pass to the consideration of the climate of New-York. In pursuing this subject, it is perhaps unnecessary to say, that it is also modified more or less by all the circumstances which have been enumerated. But in order that we may have a full understanding of the climate of the state, it is necessary that we should possess some knowledge of the face of the country under consideration, as the climactic features are inseparably connected with physical characters. Mountains, or high lands condense upon their sides the vapor of the atmosphere, which, if approaching the line of perpetual snow, will freeze, and become a source of cold by absorbing the caloric of the warmer regions, whether near or remote. They increase too, the supply of water in their vicinity, and tend greatly to preserve an equality in the streams which issue from them during the whole year. They modify the direction of winds, and shelter the products of their sides in some cases, while in others the exposures are increased by receiving the direct currents which move over them without mitigation. Dwarf and shrubby productions are always found on the exposed mountain sides—an effect which is not due to elevation alone.

The most important mountain chain of high lands in New-York is north of the Mohawk valley. These high lands may be considered as rising near Little-Falls, where, taking a north east course, they terminate partly upon Lake Champlain, and partly in the Canadian plains.

This belt of country is 70 miles wide, and is in fact table land, which, upon an average, is 1,000 feet above the level of the sea, or the tide water at Albany ; but a portion of it is from 1,500 to 1,800 feet above the same level. From this table-land a great number of peaks or ridges rise, which attain a height of from 1,200 to 3,400 feet. These are steep and precipitous, and worthless as lands for tillage. But they will supply eventually an immense quantity of lumber and wood. The valleys are high and narrow, with scarcely an interval of half a mile. From this high and broken country most of the rivers and creeks which supply the state with water, take their origin—as the Hudson, Mohawk, Black River, De Grasse, Racket, Salmon, Saranac and Ausable.

From these facts it appears that in the limits of New-York, and south of the latitude of 45 degrees, the land is sufficiently high to modify the climate very perceptibly. The highest points furnish an Alpine vegetation, and probably every night during the summer, water is congealed upon the exposed parts of their tops. The diminished temperature of this part of the state is seen in the husbandry; corn or maize is a precarious crop, and even wheat has been cut off by frost in August, at the base of the highest of the Adirondacks.

East of the Hudson there is another belt of high land, ranging nearly north and south, which is laid out in narrow ridges, which geologically consist of slate and limestone. These are prolonged into Canada. They probably present a medium height of 1,000 to 1,200 feet, but rising occasionally to 3,500 feet. The vegetation upon the top of these ridges, when they rise above 1,000 ft., shows merely the effects of the northwest wind, in the diminished height of the trees and their more shrubby growth; but they produce no where an Alpine vegetation. South of the Mohawk valley a hilly country prevails in all that region which is commonly called the Helderberg. South of this hilly range, and west of the Hudson, the Catskills form another important mountain chain, though less elevated by 1,800 feet than the Adirondacks. As a whole, then, New-York presents a surface greatly diversified—in some portions rising into very respectable mountains, in others it is depressed and traversed by long parallel valleys ; only a small portion of the surface is of that character which can be denominated level.

With these remarks, we proceed to speak of the temperature of New-York, and in this connection it is proper to remark that the results which are given in the following pages were obtained principally from the Regents' Reports, and from a paper prepared by Mr. James H. Coffin for the agricultural survey of the state, now in progress. These reports are made up from the returns of fifty-eight different localities, at which meteorological observations have been kept. These localities are scattered over a great variety of surface, and hence they indicate pretty fairly the climate of the state, or rather the meteorology of the state. The mean temperature of the fifty-eight places at which observations have been made for seventeen years, is forty-six degrees forty-nine minutes, but, as already remarked, the relative temperature of different sections of the state, while it depends chiefly on latitude and elevation, is modified by the circumstances already stated.

From numerous observations made within the limits of the state, it is very satisfactorily determined that the rate of decrease in temperature amounts to 1° for 350 feet of elevation ; from some observations the rate is greater, and in some less ; but as this is near the mean for all the observations which have been made, it appears sufficiently exact for all our purposes.

In order to obtain a correct expression of the leading characters of the climate of New-York, it is essential that its territory should be divided into districts, inasmuch as an expression for the whole state, taking the mean temperature, for instance, as that expression, will only approximate to the object sought. We propose, therefore, to divide the state into the six following districts: 1. Long-Island; 2. Valley of the Hudson; 3. Valley of the Mohawk; 4. District north of the Mohawk, extending from the east line of the state to Lake Ontario; 5. District southwest of the valley of the Mohawk, extending from the valley of the Hudson to the vicinity of the smaller lakes; 6. District west of the smaller lakes.

The climate of the state may be examined in reference to its mean temperature—the extremes of heat and cold—the length and forwardness of the seasons, and the progress of vegetation. By obtaining the results of each of the districts, and comparing them with one another, and with that of the state at large, we shall obtain all the important facts in regard to its climate. The length and the forwardness of the seasons, and the progress of vegetation, is determined by the appearance of robins, and other birds of passage: the blooming of trees and plants; the ripening of strawberries; the commencement of the hay and wheat harvest, and the first killing frost. The mean time of these for the whole state for fifteen years, ending with 1842, and also the mean temperature, and mean of the annual extremes, is shown in the following table, which may serve as a standard of reference in examining the same kind of facts in the different sections of the state:

	Mean Date.		No. of localities	Number of observations.
Robins first seen,	March	19	44	266
Shadbush in bloom,	May	1	48	168
•Peach in bloom,	"	2	57	175
Currants in bloom,	"	4	58	269
Plum in bloom,	"	6	52	264
Cherry in bloom,	"	7	52	250
Apple in bloom,	"	15	59	374
Lilac in bloom,	"	15	45	151
Strawberries ripe,	June	12	58	210
Hay harvest commenced,	July	8	34	127
Wheat harvest do.	"	25	45	186
First killing frost,	Sept.	23	57	471
First fall of snow,	Nov.	5		536
Mean temperature,	46° 49'		59	577
Mean annual maximum,	92° 00		59	550
Mean annual minimum,	12° 00		59	551
Mean annual range,	104° 00		59	550

1st District—Long-Island. Observations have been made at Oyster Bay, Easthampton, Jamaica and Flatbush. The feature which distinguishes the climate of this section is the uniformity of its temperature, occasioned by the equalizing influence of the ocean. The places at which observations have been made, are all at a low level, in the extreme south part of the state. The greatest heat of summer is 1½° less on an average, than in other parts of the state which are further north, and more elevated. On the contrary the extreme cold of winter is less by 10° to 18°, and has been so uniformly, every year for the past fifteen years. It is worthy of notice, that the temperature of Easthampton and Jamaica, is considerably less than is due to latitude and elevation. The former place, it is 2°.55, which is a greater difference than at any other place in the state. This fact is also indicated by the backwardness of the seasons. The trees bloom there later by a week than they do in the interior of the state, and two weeks later than at the west end of the island. The spring is but a little earlier than on the Black river, in Lewis and Jefferson counties. But notwithstanding the lateness of vegetation in the spring, agriculture does not appear to be so much retarded. Strawberries ripen, and the wheat harvest commences there earlier than the average of the state, though considerably later than at the west end of the

• The peach is considered the mean for the middle and south part of the state only.

island. Farther, the time lost by the lateness of the spring, appears to be made up in the fall. With scarcely an exception for the last fifteen years, the first killing frost in autumn has occurred much later at Easthampton, than at any other place in the state which has been reported. The average time has been a full month later than the average of the state, and nearly three weeks later than at Jamaica or Flatbush.

2d District—The valley of the Hudson. In this district, observations have been made at Mount-Pleasant, North-Salem, Goshen, Montgomery, Newburgh, Poughkeepsie, Kingston, Redhook, Hudson, Kinderhook, Albany, Lansingburgh, Cambridge, Salem and Granville. The mean temperature of Albany is found to be 1°.98 higher than the mean temperature of the state, as determined by observations for fifteen years. The extreme summer heat of this valley is greater by several degrees than in any other section of the state, and particularly has the thermometer risen higher at Montgomery, Poughkeepsie and Lansingburgh ; and the latter place is equally remarkable for the extremes of cold in the winter. Kinderhook is also remarkable for its extreme cold in winter. North-Salem is subject to early frosts, having occurred there ten days sooner than the average of the state, and more than fourteen earlier than in the valley of the Hudson generally. As we ascend the Hudson, the opening of spring becomes gradually later, the difference between New-York and Albany being about a week. The climate at Cambridge, Salem and Granville, becomes more rigid both from elevation and latitude. The extreme cold of winter is more intense by 10°, than at any other place on the Hudson south of Lansingburgh, and the spring opens several days later.

3d District—Valley of the Mohawk. Locations at which observations have been made, are Schenectady, Johnstown, Canajoharie, Fairfield, Utica, Whitesborough. At Utica the temperature due to latitude and elevation is 46°.20, and the mean temperature is one degree less than the mean of the state, and at Fairfield it is 2°.98 less.

The average mean temperature of this valley is lower by one degree than the average of the state. The winds of this valley have been shown by Mr. Coffin to be more northerly at Utica and Whitesborough than in other parts of the Mohawk valley. At

Schenectady and Canajoharie, vegetation advances more rapidly than the average of the state, and at Johnstown and Fairfield less so. The difference between Canajoharie and Fairfield, though only about 20 miles distant, is about a fortnight, which is owing to the elevation of the latter place. Utica may be considered a fair representative of the climate of the state. The vegetation at Utica agrees within a day with the average forwardness and its progress through the state.

4th District—North and northwest of the Valley of the Mohawk. Places where observations have been made, are Mexico, Belville, Lowville, Gouverneur, Ogdensburgh, Potsdam, Malone and Plattsburgh.

The mean temperature at Ogdensburgh is 44°.27. Gouverneur, the same; Plattsburgh 44°.65. These are temperatures due to latitude and elevation. In this whole district we have the characteristics of a more rigid climate; low mean temperature, extreme cold in winter, great range of the thermometer, backward seasons and early frosts. Gouverneur is colder by over one degree, and appears to be the coldest place but one in the state from which records are received. It stands unrivalled as it regards extreme cold in the winter. Ogdensburgh is less liable to extremes of heat and cold than the average of the state, from its vicinity to a large body of water.

5th District—Embracing a region south and southwest of the Valley of the Mohawk. Observations have been made at the following places: Pompey, Homer, Cazenovia, Hamilton, Bridgewater, Oxford, Hartwick, Cherry-Valley, Delhi. Mean temperature at Pompey, for 14 years, was 44°.9; Cherry-Valley, 44°.20; Delhi, 44°.92. These temperatures are due to elevation and latitude. Pompey is the coldest place reported in the state, being 3°.52 lower than the average of the state. It is situated on high ground, and yet the thermometer does not sink so low in winter, nor do the autumnal frosts occur so early as in the state generally. At all other places in this district the thermometer sinks lower than the average of the state by 4° to 11°, and the autumnal frosts occur earlier by four to thirteen days. Robins appear earlier in this part of the state, the vegetation is uniformly backward, though less so than at places in the northern parts of the state which have the same mean temperature.

6th District, or the Western part of the State, embracing Onondaga, Auburn, Aurora, Ithaca, Prattsburgh, Canandaigua, Palmyra, Rochester, Henrietta, Middlebury, Gaines, Millville, Lewiston, Buffalo, Springville, Fredonia, Mayville.

Mean temperature of Buffalo, 46°.23 ; Rochester, 45°.65 ; Auburn, 45°.97 ; Canandaigua, 46°.42, which are all due to latitude and elevation. The temperature of this section of the state does not differ greatly from the mean for the whole state. It is particularly characterized for its uniformity. The average annual range of the thermometer is 96°, while in the state generally it is 104°. The greatest cold in the winter at Rochester, Lewiston and Fredonia but little exceeds that of Long Island or New-York city. Vegetation in the spring is a few days earlier than the average of the state, and about the same as at Albany. The winds of this section are 11° more southerly than the mean for the state.

The facts developed by observation in this district, show a change in climate which is probably due to a variety of circumstances. East of this district, for example, 27 places out of 32 show a lower mean temperature than is due to elevation and latitude; while here, all but two show a higher.

There is a great uniformity in the extreme heat of summer throughout the state. But 5 places out of 55, show a difference of over three degrees from the mean of the state, which is 92°. The average time for the whole state, from the blooming of the apple trees to the first killing frost in autumn, is 174 days. On the west end of Long Island it is twelve and a half days more, and in St. Lawrence county twenty-two less ; the difference between the two latter, being consequently thirty-four and a half days.

The following table is annexed for the purpose of enabling the readers of this journal to make a more general comparison of the temperature of the different places spoken of in the article, with those at a distance. The allowance for elevation of the place above tide water is at the rate of one degree for 350 feet.

PLACE OF OBSERVATION.	Latitude.	Elevation.	Mean temperature as observed.	Mean temperature reduced to the standard of Albany and the level of the sea.	Calculated temperature.	Number of years observed.
Nain, Labrador,	57°08′	30ft.	26°42′	‡26°51′	25°46′	0
Quebec,	46 47	340	37 19	38 45	41 50	8
Plattsburgh, N. Y.,	44 42	105	43 97	44 73	44 95	2
Cambridge, N. Y.,	43 01	†600	45 39	47 22	47 67	14
Lansingburgh, N. Y.,	42 47	30	48 17	48 23	48 05	16
Albany, N. Y ,	42 39	103	48 27	48 64	48 26	17
Kinderhook, N. Y.,	42 22	125	46 91	47 73	48 71	13
Hudson, N. Y.,	42 15	150	48 29	48 75	48 90	10
Redhook, N Y.,	42 02	†50	48 36	48 95	49 27	12
Kingston, N. Y.,	41 55	180	49 46	50 97	49 44	14
Poughkeepsie, N. Y.,	41 41	†50	51 65	50 88	49 81	11
Newburgh, N. Y.	41 30	150	48 96	49 59	50 10	13
Mount-Pleasant, N. Y.,	41 09	125	49 33	50 44	50 66	11
Flatbush, N. Y.,	40 37	40	51 25	51 31	51 53	17
Williams College, Mass.,	42 43	800	45 59	‡47 88	48 16	23
Salem, Mass.,	43 31	50	48 08	‡48 82	48 47	33
Newport, R. Island,	41 30	30	50 55	‡50 64	50 10	10
Philadelphia, Pa.,	39 56	30	53 42	‡53 51	54 01	0
Cincinnati, Ohio,	39 06	510	53 78	‡35 24	53 92	8
Washington, D. C.,	38 53	30	56 57	56 66	54 26	0
Natchez, Miss.,	31 28	180	64 76	‡65 27	65 50	8
Havana, Cuba,	23 10	30	78 08	‡78 17	76 39	8
Cumania, S. A ,	10 27	30	81 86	‡81 95	83 87	8
Quito, S. A ,	0 13	9510	62 00	*‡83 75	85 48	0

* Reduced by Humboldt's observations.

† Height estimated. When a place is said to be at the level of tide water, the height of the instrument is assumed at 50 feet.

‡ Mean temperature as observed, reduced to the level of the sea.

Note. The observed temperature of Nain, Cincinnati, Philadelphia, Natchez and Havana, was taken from a table in the Bridgewater Treatises; that of Washington and Newport from the Meteorological Register of the U. S. A ; that of Quito from Rees' Encyclopædia, and that of places in New-York from the Regents Report.

BEDS OF OYSTER SHELLS ON THE HUDSON RIVER.

Having occasion to visit Rockland county not long since, I went ashore at Slaughter's Landing, near the great ice depôt. The shore at this place is quite steep, and closely skirted by the great range of greenstone columns, resting upon, and interlaminated with beds of the new red sandstone. This place is interesting on account of the effects which the greenstone has had upon the subjacent rocks, particularly for the remarkably distinct signs of powerful igneous action. But the facts which I propose to speak of, are the beds of oyster shells some sixty or seventy feet above the river. These beds are just below the surface of the soil in which the large trees of the forest still remain. On inquiring of some of the gentlemen who are residents of the place how the oyster shells came here, they remarked that the common opinion was that they were brought here by the aborigines. Although the remarkable state of preservation in which we find these shells seems to favor this opinion, still, other facts go to prove that it is erroneous.

1. The shells exhibit no proof of having been burnt—the margins are entire, except where they have disintegrated from the action of the weather ; both facts throw considerable doubt over the only inducement which would have led the Indians to have brought them to this place, viz. for food.

2. Among the oyster shells we find many smaller shells of different species, which are never consumed for food. But then, if we reject the common opinion of the inhabitants, what answer can be given to the question which will better explain their present position ?

As the Hudson river at this place is not sufficiently saline to perfect the oyster now, it appears highly probable that these beds have been elevated above the waters of this estuary in a comparatively modern period ; that the oysters lived and were associated in the same beds where we now find them, only they have been transferred from a lower to a higher level.

Oysters, it is true, still grow at this place, but they are so insipid that they are never used for food, but when taken up and conveyed to New York bay, or waters sufficiently saline, they become palatable food in the course of four years. There is no necessity for supposing that the oysters of this locality were always insipid. Let the coast be depressed sufficiently to immerse these beds, and the river from New-York up to this point would be converted into a bay whose waters would be as saline as those on the shores of Long-Island. In connection with other facts, these beds prove that within a very recent period great changes have taken place in the levels of the country skirting the sea, the coast of New-Jersey, and in fact along the whole northern and southern Atlantic board. It is not our purpose to go into a full proof of this position at this time. Facts from various quarters favor this view.

These shells, so far as they go, may be used with profit and advantage upon the land as a manure. If fully exposed to the atmosphere by spreading them upon the soil they will fall to an earthy state in a few years, and as their solution will take place slowly, they will furnish lime for a long time. In using them, however, it ought to be borne in mind, that if sufficient lime exists in the soil, no immediate effect will be observed from their use, especially from the outer portions of the bed where the shells have lost a large portion of their animal matter.

EXPERIMENTS.

Experiments in farming are generally made and conducted in a very blind way; so much so that they are not only worthless, but frequently injurious. Among our farmers in this country, and perhaps more or less every where, experiments are instituted from hearsay; for instance, it is reported that farmer B. has been very successful in the use of lime. But the reporter of these successful experiments, gives merely his results in connection with its use, and it appears surely that lime is a wonderful substance; and it no where appears but that lime may be used as well upon one piece of ground as another, and hence hundreds perhaps, are led to its use on the first opportunity. Out of this hundred, ten probably will receive benefit from it, while the ninety will perceive no difference in the crops upon which it is employed. What is the cause of this discrepancy in results? Probably no question is of greater importance to the farmer than the settlement of this, and other questions of a similar character; and to this point we ask the attention of the reader for one moment.

1. If lime already exists in the soil, no perceptible effect will be observed when an additional quantity is added.

2. In order that perceptible effects may follow from the application of lime, it is necessary that organic matter should either exist in the soil, or else it should be applied with it. These two positions we believe may be considered as established. Now the farmer who has been successful in his experiments with lime, attributes all the good effects which follow its application to this substance alone; he does not give the previous composition of the land

upon which it is employed, nor the circumstances under which he has conducted the experiments. He has barely stated a naked fact, and it is left probably with others to find out the reason why, under some circumstances, this substance is sometimes useful, and sometimes apparently useless.

Again, one of the farmers, and perhaps many of them, give their testimony against lime, for they have tried it, and it was with them entirely worthless. We recollect the President of the New-York State Agricultural Society gave his experience on the use of lime. He had employed it both upon a clay soil and upon a sandy soil, and in both instances there was a signal failure, and, in our opinion, this failure in both instances was due to the causes we have already stated. In the clay there is already a sufficiency of lime—in the sandy soil there is a want of organic matter.

We have made these remarks, not so much on account of the lime, as for the purpose of calling the attention of farmers to the great importance of conducting and reporting their experiments in a systematic way, or in other words, understandingly. Now this cannot be done unless they know something about the composition of the soil. This cannot be done in a way to benefit others unless they state also the controlling circumstances under which a particular experiment has been made. But there is one condition under which experiments have been made, which is most frequently omitted ; it is that of the weather, whether the season has been wet or dry, hot or cold. It is unnecessary to dwell a moment upon the importance of noticing these facts, for the most unlearned farmer has learned that the weather influences, above all other conditions, the cultivated crops, and that whatever may be done under unfavorable circumstances of temperature and moisture, a crop will fail, at least in part, let him cultivate it in the best possible manner.

Then, again, the nature of the surface, independent of the composition of soil, will influence very materially the result of a particular mode of culture. So, also, a particular manure is of excellent service to a particular product : but from this it does not follow that it will benefit all products.

In farming, as in medicine, there are no specifics or universal remdies. There is no manure which is adapted to every vegetable. Though it is true that carbon forms a large proportion of all vegetables, yet we may get the carbon in all cases and yet not get the crop we desire, for the sole reason that one or more special substances are wanting. From these views we advise all who are disposed to experiment, first of all to ascertain, approximately at least, the composition of the soil ; 2d, to keep a register of the weather, and 3rd, to state the nature of the surface of the land—what exposure it has, and whether it is level, a side hill, or a valley, or a position between two adjacent hills.

There are many other facts and circumstances which ought to be taken into the account, but what we have said is probably sufficient to answer the end of these remarks. But lest it may be thought that we are finding fault, or are disposed to be captious, we say, in conclusion ; make the experiments and give them to the public.

PHOSPHATE OF LIME AND OTHER FERTILIZERS IN THE OLDER ROCKS.

In the first number of this Journal, we gave a very brief account of the phosphate of lime, and a few other substances as they are found in the older rocks. The remarks referred to, were offered for the purpose of turning the attention of farmers to the existence of these substances simply as materials important in an economical point of view. We may however, view them in anoher light. They may be considered—in fact are considered—as special provisions made prospectively to meet the wants of organized beings. It is not in the province of these beings to create an element ; all we know of their functions, proves that they only modify and combine elements. Hence that their anterior creation had a reference to future use, is certainly not unphilosophical, and if we can discover in created things prospective adjustments, they are manifested as clearly in the composition and structure of the older rocks as any where else. Coal beds are often cited in proof of the doctrine we have just stated ; yet its demonstration is equally clear in the for mer, as in the latter instance. There is one fact not noticed by writers, which is perhaps as important as any other. It is the wide diffusion of these essential elements. If phosphate of lime was confined to veins and beds, and those only of the limited extent which we usually find them, this material would rarely exist in the soil. It might abound in some places, but it would be very deficient in others. What is especially required to meet the wants of every living being, is that those essential materials should exist every where, should be universally distributed. Such is eminently the case with those four gaseous bodies which enter, it may be said, into every living thing, viz: oxygen, hydrogen, nitrogen and carbon. Oxygen, is the controlling element, its peculiar properties rendering the three others subservient to organic wants; hydrogen entering into bodies in water, nitrogen in ammonia, and carbon in carbonic acid. The diffusion of carbonic acid is an important fact—important as a provision. The atmosphere always contains it. If it is disengaged from volcanoes, it is speedily and equally distributed through the body of the atmosphere by the law of the diffusion of gases, and by winds. In consequence of its ready solubility in vapor, it is brought to the earth where it may be appropriated to the uses of plants. That there should be no want of this substance, it is largely stored up in limestones, which are not of themselves insoluble, like silica or sand. From the air, and from both ancient and modern rocks, carbon is furnished in undiminished quantities, and such is the arrangement that the sources will remain and go on furnishing all the carbon required ad infinitum, though every part of the earth may be cultivated and be made to produce double the amount it now produces.

There is still another point worthy of attention, as well as admiration, it is the condition which fits it for organization. For example, by way of illustrating the thought, had carbonate of lime been employed as the material for constituting the bones of animals what would have been the result? From the tendency of this substance to crystallize, it is believed that this form of lime would not only have formed bones of little strength, but it would requently by this property, injure the softer structures as it cannot accommodate itself to the delicate animal fibres.

We have spoken of prospective arrangements; we now remark that of all the arrangements termed prospective, all yield in importance to that one which requires industry for securing the good, the absolute good, which they are capable of bringing. The tendency of the most important fertilizers is to escape and pass off into the atmosphere, or else they are insoluble or in a condition not fully adapted to the wants of vegetables. In the former case there is ammonia, which very soon passes off from the yard where animals are confined and gets beyond the reach of the owner, and we must, when this has taken place, consider it as abandoned property, or a lost material to which he has no better claim than his neighbor. To preserve it requires industry of two kinds. 1st, that of acquiring knowledge how he may best secure it; and 2d, manual industry, which consists in putting in execution the means he may have devised after he has acquired a full knowledge of the properties of the substance which he wishes to save. There is an industry which expends itself unprofitably, which consists in a continual doing but not intelligibly, and hence is wasted and consumed in mere motion. Effective industry knows beforehand what is wanted, and it proposes to itself an end, and devises means to secure those ends. The result usually turns upon the amount of knowledge which is made to bear upon those means and ends. While then, we find materials for the construction of organized beings abundant, sufficient in quantity, it is the part of the husbandman to work up these materials to the best advantage; and the fact that it requires ceaseless activity of mind and body, need not on this account be considered a faulty arrangement, inasmuch as it brings health and life in the highest degree by the fulfilment of the required conditions by which both may be possessed.

EDUCATION OF THE AMERICAN FARMER.

BY HENRY S. RANDALL, CORTLAND VILLAGE.

[We are happy to give a place in our Journal to the following article. The gentleman who thus favors us has been a county superintendent of common schools since the passage of the law creating that office; he is moreover a practical farmer, and therefore we consider his views and opinions in regard to education, as worthy of the highest consideration.]

In the January number of the Quarterly Journal of Agriculture, are submitted certain views, editorially, in relation to the topic indicated in the heading of this article, which, in the main, and especially so far as the enunciation of general principles is concerned, are, in my judgment, eminently just and seasonable. The present day is one of bold discovery and speculation. A blind veneration for antiquity no longer shields ancient dogmas and ancient institutions from investigation, and when necessary, from consequent rejection or abrogation. The true philosophy—the philosophy of progress, has become the motto of the age.

All this is well. But the progression principle should be tempered with a certain degree of conservatism. The advancing current, if kept within due bounds, will carry on its bosom a constantly meliorating civilization; if swelled to a furious torrent which spurns all control, it will, peradventure, overturn and sweep away that which exists.

In casting off old abuses, we should be careful not to consider age and error as necessarily synonymous. Our forefathers were wise in their day and generation as well as ourselves. We are not to condemn anything because it is ancient. I go a step further. I hold, as Blackstone does in relation to certain ancient laws, that anything which has stood the test of time, which has been sanctioned by generation after generation of the human family, is to be presumed good unless it can be clearly shown to the contrary. Stability is one and a strong proof of rightfulness. Otherwise no belief can attach to that most consolating and hopeful of all maxims, that "truth must prevail."

Let us not forget that were we to turn our backs with self-complacent arrogance on all the labors of the past, we, instead of ou cupying our present position, would roam the plains and the forests nomadic hunters—rude barbarians! In an æsthetic civilization, the ancients absolutely surpassed us; in much that constitutes modern civilization, in moral, intellectual, political and physical science, we stand in the same relation to them, that the grown up child does to the parent. The child aided by the parent to a certain point, ought, in obedience to the law of progress, to advance beyond that point. Each succeeding generation is bound to contribute its quota to civilization. But let not the last therefore spurn its predecessors, or lightly overthrow their works!

I have been led into these reflections by considering some of those propositions, ill-advised I cannot but consider them, for an improvement in our system of popular education—which also suggested the remarks of the Quarterly Journal.

It has been much the fashion, latterly, even in high places, to advocate a material education—an education having for its end the investigation of the law of physics, to the nearly utter neglect of those of psychology, ethics, and social polity.* This has been done in obedience to the maxims of a certain narrow utility; an utility which refers everything to the standard of pecuniary profit and loss; which regards man as an animal, whose prime object and chief good is to be well fed, well clothed, and well lodged; and which would therefore train him with nice care to so apply his energies and means to the attainment of these, that no jot or tittle of those means should be lost or mis-applied.

Our phase of this materializing tendency in reference to education, in the public mind, is exhibited in that assumption so popular among farmers, (since the impulse received from agricultural societies and journals has roused them into attempts to improve their knowledge of their art,) that our system of elementary education should be "practical,"—that is, that it should give them (and those in other avocations of industry?) that direct knowledge of the scientific principles upon which the processes of their art should be conducted, that they will derive tangible and "practical" pecuniary benefits from it in after life. I recently had the honor,

* I have said in "high places." In the State Normal School, where teachers are educating to mould the whole young mind of our state, neither of the last named subjects, are, so far as I am advised, taught. But singing, [illegible] are taught, carefully, and well taught!

officially, to receive a circular most respectably signed, and endorsed by a county agricultural society, urging an appeal to the legislature to establish a State Agricultural School for the education of agricultural teachers, male and female; a county school "for the education of town and district teachers," of the same kind, male and female; and lastly, "similar district schools for the education of the great mass of the people." The requisite sums to carry these several institutions into effect, to be borrowed from the common school fund. The circular urges that uniformity in teaching the various branches would thus be secured, and "the blessings of a thorough and '*practical*' education would be more generally and sooner disseminated." Other benefits and reasons are urged which there is not room here to transcribe.*

Now if "three-fourths of the effective laborers of our country are engaged in agricultural pursuits," as is alleged in the preamble ot the above propositions, and if "the blessings of a thorough and practical education would be more generally and sooner disseminated" by these schools, why *borrow* from the common school fund? Shall that vast fund, the property of all, be left to educate the few—one-fourth of the people—and thus render the schools *free* to that one-fourth, (as it assuredly would, if they alone received the avails of it,) while the other three-fourths shall *borrow* a pittance from it for *their education*—to be repaid with "interest"—the "farms and buildings (of the agricultural schools) mortgaged to secure the payment of said loan"—the state and county agricultural societies held responsible for the annual interest!" Why not appropriate the avails of the common school fund at once to the support of these agricultural schools, and let the *minority* borrow and give securities for repayment? Or rather, why not convert our State Normal School into a State Agricultural Normal School, our common schools into district agricultural schools, as could be done, by changing the course of studies! What equitable or valid objection could be urged against this metamorphose, if an agricultural education is really the proper and necessary elementary education of a vastly preponderating majority of our peo-

* Among them, one of perhaps questionable interest to at least a portion of the medical faculty! One of the benefits which it is claimed would result from the course of study proposed is that "it would give such a knowledge of chemistry, anatomy, physiology, and the laws which govern the animal economy, that quackery in the healing art would cease, and many valuable lives would thus be saved!

ple, male and female? It would be more democratic, and certainly more feasible! So long as we find it a matter of such extreme difficulty to provide suitable teachers, fixtures, &c., to effectually carry on one system, aided by the whole avails of the common school fund, it would scarcely seem expedient to create another system, designed to meet the wants of three-fourths of the people, which should live by *borrowing*—pledged to repay the uttermost farthing!

But, after all, is our present system of education, or the course of study pursued in our schools, unnecessary? Is that course defective, only in not embracing enough? Could one of the studies included in it, be omitted in acquiring the most rigidly "practical," or agricultural education? Is not reading, spelling, writing, geography, arithmetic and grammar, necessary to a farmer, or a "practical" man in any department of human labor? If so, our present system is good enough as far as it goes. Does any one wish it to go further? Then why not *add* to it, instead of *overthrowing* it, to substitute in its place something which must, after all, begin at the same starting point, and cover the same ground, before it can profitably advance further?

Most enlightened men are ready to concede, that the present system does *not* go far enough—that more should be taught in our elementary schools, to prepare our people adequately for their "practical" duties and responsibilities, as men and as citizens of a free government. Now practical utility, as well as practical good sense, would certainly require that all studies shall be taken up in the order of their importance, if equally adapted to the understanding of the pupil. So long as the pupil is liable at any time to be removed, by fortuitous circumstances, forever from the school, he should first secure that which will be of most use to him. In deciding then, what additions should be made to the present course of our popular instruction, we must decide what studies rank next in importance. Are those next studies chemistry, and the cognate physical sciences, which go to make up the science of agriculture?

Before answering this question, it may be well to pause, and ask what is the true theory of education—what its end and object? In selecting the word "education"* to express that training which prepares a man for the duties of life, our forefathers showed that

* "From *e* and *duco* to draw from, or draw forth. Why not write it "*eduction*?"

they considered it a *drawing forth* of the human faculties; and it extends to all the faculties, moral, intellectual and physical; in a word, all that goes to constitute, so far as this world is concerned, a perfect man. Practically, this order is often, I might say generally, reversed. The process of educating is made in-ductive instead of e-ductive—a filling in, instead of a drawing out. The mind of the child is treated as a piggin of certain dimensions which is to be filled with knowledge, and when so filled, the object is attained. Teachers forget that the mind, like the body, requires not only food but exercise. Should we, to further a physical development, constantly stuff the body with nutritious viands, not requiring any exercise, nay, keeping up a state of repletion that would incapacitate it for exercise, what would be the effect? A morbidly precocious development for a period, perhaps, but speedily ensuing debility and premature decay, beyond all question Now although analogies between mind and matter are at best bu fanciful, do we not oftentimes find the young mind suffered to remain inactive, and filled, through what we may consider its œsophagus, the memory—nay, crammed, as you cram a turkey with pellets of meal and treacle, until it exhibits similar phenomena! Doe not a stupid and dull obesity as certainly supervene, after such intellectual as after such physical treatment! The mind, instead o being a work-shop where materials are carefully and methodicall stored, with sharp, bright, and befitting tools well arranged t work them, is a garret filled with lumber promiscuously piled where that which is wanting can never be got at. We often se these men of knowledge instead of wisdom—these "book-worms" whose vast stores of erudition is as of little use to them as th pannier loaded with gold is to the ass which carries it; an which, in some instances, seems absolutely to incapacitate them fo any thing like an effective discharge of the duties of life. Lik the ass, they sink beneath their load, even though that load be gold Like the Roman Tarpeia, they are crushed beneath the ornament they have rashly sought! Scott well paints (though perhaps verging on caricature,) such a character in his Domine Sampson—whose "pro-di-gi-ous" good qualities of heart, however, somewhat conceal, as with a drapery, the ridiculousness of the rest o the figure. Cowper, with his usual felicity, contrasts in clean an well cut relief, the bare possession of knowledge, with that ful development of all the faculties, the exercise of which constitutes wisdom.

> "Knowledge and wisdom, far from being one,
> Have ofttimes no communion. Knowledge dwells
> In heads replete with thoughts of other men;
> Wisdom in minds attentive to their own.
> Knowledge a rude unprofitable mass,
> The mere materials with which wisdom builds,
> 'Till smooth'd, and squar'd, and fitted to its place,
> Does but *encumber* whom it seems to *enrich*."

We have not enough of education in this country to have many Dominie Sampsons; but we have much of the same education in kind, the *cramming* system, on a small scale. I was shown a little prodigy a few days since, who could, to the astonishment and delight of parents and teachers, repeat the contents of his geography from beginning to end. A specimen of this recitation was vouchsafed me. He stated of some country, "that its climate was salubrious and its soil fertile." I asked the lad the meaning of the word "climate." The reply was, "I don't know, sir!" "What does 'salubrious' mean?" "Don't know, sir!" What "fertile?" "Don't know!" Our schools are filled up with such prodigies, our country with such parents and teachers.

The great object of education is not to *fill* the mind with bare facts—abstract knowledge: it is to *train* the mind, to *discipline* it, *develop* all its energies and resources, as the body is trained and disciplined and developed in the gymnasium, until every sinew is firmly knit, every muscle hardened and strengthened to its utmost limit. Knowledge is a valuable *incident* in this course of mental training, but it is not the first object nor the main object. In selecting a study we should certainly, other things being equal, make choice of the one which would unite valuable knowledge with mental discipline. Arithmetic, English grammar, and many others belong to this class. But to sacrifice the great and primary object, for the purpose of obtaining what is miscalled a "practical" education, namely, a knowledge of the processes of the art which is to constitute the future occupation of the learner, is to consult a narrow utility. It is penny wisdom, and pound foolishness. This knowledge should be *superadded* to mental and moral culture. Its importance can scarcely be over-estimated in such connection. National and individual wealth and comfort much depend upon it, and it supplies the pecuniary means necessary to upbuild institutions even for mental culture. But which is of the most importance, in the economy even of this world, the *man* or the *workman*—the mind or the purse ? Do we live only to go unceasingly through one constantly recurring round of labor, like the miserable beast in the bark-mill, and are we to be trained only beast-like to perform that duty well, or do we live to enjoy those higher attributes of intellect which has allowed us to ascend to a position "but a little lower than the angels !"

Most fully do I concur with the editor of the Quarterly Journal, that the lawyer, the mechanic, and the farmer, all require a similar elementary training *in kind*—and to this I would be glad to add, *in degree*. The same preparatory discipline is requisite to give to the farmer or mechanic a vigorous and well balanced mind, that is to give it to the lawyer or clergyman. And is it less necessary ? Is any farmer prepared to subscribe to the humiliating doctrine that education, beyond that necessary to fit him to labor advantageously, and transact business decently, is of no avail to him—that it is his business to go through life uninstructed only in his handicraft, a sort of a food-producing machine for another class, who are to think for him—to legislate for him—in short, to use him as a voluntary helot—a sort of upper or privileged beast of burthen ? If there is such a farmer, he deserves to occupy the position which his downward aspirations so grovellingly claim !

Why shall not the farmer's habitation be the abode of taste and intelligence ? Why shall not Bacon and Shakspeare come and converse with him ? Why shall not history and poesy and science, shed the informing and refining influence over his domestic circle ? Are these Utopian dreams ? The farmer has but to *will* it so, to have it so ! He is the tax-payer—*he can be the legislator !*

But whether it is by legislation, or other means, that our schools are to be brought to a condition to confer such a culture on the farmer, the first step must be to add to instead of subtracting from his mental culture—to enlarge, instead of diminishing his course of disciplinary studies—to build up and extend and improve institutions having such culture and discipline for their object, instead of overthrowing them in quest of that pseudo utility which places dollars and cents before intellect—before the dignity of human nature.

Make our schools what they ought to be. Place them under the direction of competent instructors. Have the branches now taught in them taught philosophically—taught as they should be. Introduce into them other necessary studies—studies which will still further train and discipline the intellect. Add to these those which will cultivate the taste. Introduce moral culture, and, finally, teach young republicans political science—the science of government, political economy, and political ethics. All these are more important to the man and the citizen, particularly the citizen of a republic, than the knowledge of any or all arts or handicrafts. Thus I answer the question propounded in the preceding part of this article—"whether the *next* study to be engrafted on the present course of instruction in our schools, should be agriculture?

But when we have formed the *man*, it is assuredly well to form and instruct the *work-man*. After the farmer has attained the sound thorough education, e-ductive and in-ductive, above hinted at, it certainly behooves him to acquire the science of his own art. How shall this be done? Shall the study of agriculture be engrafted on the course of common school education? Not yet; perhaps never. It will take a long period to bring teachers and schools in a fit condition to teach, or to learn it, without sacrificing that which is more important. More erudition than is *now* contained in our common schools, would be necessary to understand even the *terms* of Liebig, Boussaingault, Paen, &c. Even the common, the necessary elementary branches now taught in them, are not generally well taught. They are taught by rote, as the parrot is made to repeat its phrases. If we would play the part of true reformers, and not of men run away with by a hobby, let us begin at the foundation. In spite of those swelling eulogiums which it is the fashion of Executives and Heads of Departments to lavish on this branch of our polity, he who has made himself familiar with the schools in any extended section of our country, in the "by places" as well as the "high places," cannot but feel the need, the deplorable need of reform. Scarcely a tithe of the scholars who receive their *only* education (so far as schools are concerned,) from our common schools, ultimately leave those institutions any thing like thorough proficients, even in the branches now commonly taught in them, viz: reading, spelling, writing, geography, arithmetic and grammar! In what condition then are such schools—such teachers and scholars—to take up a science, the study of which involves the study of many, if not all the natural sciences? In what condition are they, for example, to discuss and decide upon the rival theories of Saussure, Paen and Liebig? "Make them capable," is it said? This must be a work of time; I fear not a short time. Even when those indispensable elementary studies above enumerated, are thoroughly taught and acquired in our schools, there are still, if preceding positions are not false, other branches of instruction which would claim precedence of agriculture, as superadditions to the present course. Is it said that we should not wait for perfection either in the tuition or acquisition of present branches, before we introduce others which are concededly necessary? This is granted. But would it do to add *all* that are necessary at once? Does any one hesitate to decide that such a procedure, supposing it possible in the present state of public feeling among the proprietors of the schools, would lead to inextricable confusion—utter inefficiency? Then let us make our additions to the present course of study gradually, seasonably, and in the order of their importance. Let agriculture wait its "turn." We may be permitted to hope that turn will ultimately come, and peradventure, if the proper means are employed, not tardily. If we would accelerate the period, those means are obvious; our path is a plain one. We cannot do it by a zeal which embraces but one, out of all the benefits sought. We must unite in a vigorous and continuous effort to improve our common schools *in all respects*—to raise them to that pitch that they can take up the study of agriculture understandingly, and without the sacrifice or neglect of any thing more important.

The next point to be discussed is whether the study of agriculture can be profitably introduced into our higher schools—our colleges and academies—by the institution of professorships, as proposed by the editor of the Quarterly Journal? Of this there can be no doubt. These institutions are not elementary in their character. They have, or should have, the necessary chemical apparatus, geological specimens, &c. The scholars in them, it is to be presumed have finished their rudimentary education, or if not, that under the regulations of such institutions,* they will take up studies in their proper order.

The question now occurs, can these institutions, by the establishment of the proposed professorships, do all that can be properly *now* done—all that is feasible, in the premises ? Differing from the editor of the Quarterly Journal, I think not. I see no objection in theory or practice to the establishment of a State Agricultural School, with an experimental farm. There can be no more impropriety in legislating and appropriating the public funds, to instruct our people in an art from which three-fourths of them directly derive their subsistence, than to teach a few of them a profession.† The theory of legislation would be in both cases the same, to wit : the promotion of the general good. No one in his senses, surely, will deny that whatever tends to promote that branch of industry which gives food and raiment to man, which physically, at least, sustains and lies at the bottom of all the other avocations of industry, promotes directly and tangibly the general, the universal good.

With such a school—with the proposed professorships in our higher institutions—and with the agricultural press, I would at present leave the work. Knowledge is diffusive in its tendencies, especially in a republic. If the means proposed do not enough, we can gradually add to them. But let no rash hand attempt to overthrow our present system of elementary education, to build up in its stead a system having for its object specially the education of those of any art, or trade, or profession ! To adopt the sentiment of a gifted son of New England,‡ let our common schools remain the broad platform where the sons of the rich and the poor —those of all arts, trades and professions, shall start in the career of honor and usefulness together.

* Our academies do not prescribe courses of study. But there is an influence generally, and should be always, exerted by their teachers, which results in the same thing.

† Our medical colleges are directly endowed by the State.

‡ Henry Barnard, 2d, Esq. of Rhode Island.

NEW PUBLICATIONS.

Geological and Agricultural Report of New-Hampshire, by C. T. JACKSON, M. D.

THIS report, which is published by order of the Legislature, is in one quarto volume of 375 pp. It is very well printed on good paper, and is illustrated by maps and diagrams. Dr. Jackson has executed his work with ability, and the Report itself shows upon its pages that he is a thorough field-geologist, and can master all the intricate local questions in this department, as well as those general problems of geological dynamics, which are often so difficult and perplexing. We should not, however, do justice to the author of this work, if we failed to state, that we consider the Report as eminently practical; and is, especially on this account, of great value to the farmers of New England, or wherever it may circulate. We therefore propose to give a pretty full analysis of the work, that our readers who are not able to procure it, may be put in possession of some of the important results of this survey—especially the agricultural part of it—a part in which they will probably feel the most interest.

The rocks of New-Hampshire, as it appears from this report, belong almost entirely to the primary class; or to that class which is destitute of organized bodies. So far as Dr. Jackson's investigations go, petrifications are not found in any rock, except in the tertiary class, which occasionally appear on, or near the coast. The argillaceous slate, a rock of sedimentary origin, and resting upon gneiss and mica slate, is found in Hinsdale, Winchester, Chesterfield, and a few other towns. On the Vermont side, it furnishes roofing-slate, which, though not so smooth and fissile as those of Maine and New York, yet, are very strong and durable. Still higher in the series is a conglomerate, the new red sand-stone, of an era just posterior to the coal-formation; it however only borders the slate, without crossing the line. It is found in Northfield, Mass., near the south-western corner of the State. We have no more to say, at this time, of sedimentary rocks.

From these few facts, it will at once appear, that the great interest in the geology of New Hampshire, lies in the valuable minerals associated with primary rocks. Of those minerals, Dr

Jackson has selected the most common, and given their composition—for the purpose, in part, of showing the necessary composition of the soils—for it is from their decomposition that the soils of the state are entirely formed.

Thus, by knowing the composition of the mica, feldspar, quartz, and hornblende, we obtain a proximate knowledge of the soil which the rocks containing them will certainly form by decomposition. Thus, feldspar contains silex, alumine, iron, and potash, and sometimes soda and lithia—an alkali analogous to soda. Mica, also, contains one of the alkalies. Soils, then, derived from those bodies, will probably contain—at least in their original condition—those elements, nearly in the proportion in which they exist in the rocks, or in the minerals composing the rocks.

The most important metallic minerals of New-Hampshire are he oxides of iron, sulphate of zinc, copper, and arsenic; and oxide of tin. Iron has been profitably manufactured at Franconia, rom the magnetic ore. In Bartlett, very large veins of this ore ave been discovered. Zinc, though it has never been made in his country, Dr. Jackson has very satisfactorily proved may be, t a moderate profit, at least. The tin ores have been disovered in Jackson in sufficient quantities to repay the expense of xtraction. The tin ores are in veins, and are the first, and in act, the only ones which have been discovered in this country. t is a mineral which is very liable to be overlooked, from its want f that strong metallic lustre peculiar to most metals and ores. t always occurs in the primary rocks, and hence a very large proortion of New-York may be set down as entirely destitute of is valuable substance. In fact, there is very little probability f its occuring at all, even in our primary formations.

Among the earthy minerals which are profitably wrought, are ica, granular quartz, soap-stone, lime-stone, novaculite or honeate, granite and gneiss. The number of localities at which these inerals occur, produces an industry and enterprise quite comendable, and it is interesting to know, that in formations simir to those of New-Hampshire, that the sources of revenue are ite numerous. One great error, however, is in the disposition t overlook and undervalue all objects, except those which look as i they might contain gold or silver. The geological surveys, however, in all the states, as well as in New-Hampshire, have had a tendency to break up gold-hunting, and to turn the attention of landholders to those substances which, though far less showy, are more useful and profitable, if explored upon the right plan. If no other objects have been gained by geological surveys, the facts and information which have been freely communicated, are worth to community as much as they have cost.

In addition to the geological information, Dr. Jackson has measured most of the mountains of the state, with great care; and has, without doubt, obtained very accurate results. The following are the heights of some of the most important mountains o New-Hampshire:

		Feet.
Mount Washington,		6,226
Camel's Rump Mountain,		3,615
Gunstock	"	2,447
Carr	"	3,381
Chocarua	"	3,358
Piquaquet	"	3,358
Ossipee	"	2,361
Red Hill,		2,000
Connecticut Lake,		1,624

We subjoin the following list of minerals, which we believe wi be interesting to the lovers of this department of Natural Histor

Acworth. Beryl, rose quartz, albite, tourmaline.

Westmoreland. Sulphuret of molygdena, phosphate of lime, o: ide of molybdena in the small cavities of the mass.

Alstead, mica, tourmaline. *Charlestown.* Andalusite and sta rolite macle.

Unity. Sulphuret of copper and iron, in a vein in gneiss, ru ning N. 10° E., titanium, chlorophyllite, (N. S.,) octahedral iro green mica, actynolite, garnet.

Jackson. Oxide of iron, in veins running N. 80° W. and N 60° E.

Hanover. Almandine. *Wilmot.* Beryl.

Oxford. Clove brown tourmaline in large crystals, and in radi ted masses. *Piermont* micaceous specular iron ore in veins, ru ning N. 15° E., in which are masses of barytes, and green, whi and brown mica, and phosphate of lime.

Haverhill. Copper and iron pyrites, blende, native arsenic and arsenical pyrites, large crystals of garnet, and magnetic and white iron pyrites.

Franconia. Magnetic iron in veins running N. 30° E., 3½ to 4 feet wide, manganesian garnet, hornblende epidote, copper pyrites. *Eaton.* Vein of blend six feet wide, running N. 27° E., galena, containing silver in the proportion of one pound to one thousand pounds; copper pyrites. *Hillsborough.* Graphite.

Francestown. Soapstone. *Dunbarton.* Arsenic in a vein. *Randolph.* Andalusite macle.

Amherst. Pargasite, egeran and cinnamon stone, garnet in limestone, amethyst, magnetic iron. *Richmond.* Soapstone, quartz, feldspar, phosphate of lime, pinite, rutile, pyrites, garnet, hornblende, anthophylite, iolite.

Having stated some of the facts relating to the geology and mineralogy of New-Hampshire, we pass to that part which treats of agricultural geology and chemistry. We omit, purposely, a notice of the part which treats of metallurgy, at this time, intending to furnish our readers with some of the information upon this subject, in a future number. Agricultural geology and chemistry is divided into five heads. Under the first, Dr. J. treats of the mineral ingredients of soils, and of their distribution; under the second, of the nature and origin of the organic matter of soils and the saline ingredients accompanying them; under the third, of the substances found in plants; under the fourth, of those taken up from the soils by the crops; and fifthly, of the best method of restoring fertility to exhausted soils. Under the first head, it is maintained that soils originate from the rocks by disintegration and decay, and that the nature of the rock determines that of the soil; and as an illustration of this position, Dr. J. refers to the soil of mica slate, as differing from a granitic soil; the former being far more silicious, more highly charged with alkaline ingredients, and as being warmer and more retentive of moisture. The following is the composition of a fine mica slate, and granite soil:

	Mica Slate Soil.	Granitic Soil.
Water,	3.6	6.8
Vegetable matter,	5.4	1.8
Silica,	79.2	84.4

	Mica Slate Soil.	Granitic Soil.
Potash,	2.2	trace.
Peroxide iron and alumina,	5.6	6.8
Soda,	2.5	"
Lime,	3.2	0.3
Magnesia,	1.2	0.8
Loss,	0.1	0.0
	100.0	100.0

Hornblende and sienite make, also, a much better soil than granite, and trap rocks, than either, as it decomposes more rapidly, and furnishes the alkalies, potash, soda, lime and magnesia ; while, at the same time, it is warm and light.

Argillaceous rocks give origin to a tough blue or brownish colored soil, and is cold and heavy ; but is capable of being improved, by underdraining and admixture of sand. Limestone soils differ from the above, as much as the nature of the rock itself differs from it ; though the lime is often removed by filtration and solution, and by the action of plants, when it contains principally the silicates and alumina.

Under the second head, it is maintained that those plants which abound most in inorganic matter, were first formed, as lichens ferns and the grasses. These plants laid the foundation for organic matter in the soil, as they would consolidate a sufficiency of carbon to furnish the mould for other plants. Plants of the higher orders, when grown in pulverized quartz, with saline matter only do not produce seed, though the foliage grows well. When the plant dies, a mould or humus is formed, and the next crop perfec their seeds. Peat has a similar origin with mould ; that is, from the death of plants, as the mosses, growing in water togethe with the leaves, stems and roots of other vegetables. Peat preserves wood and even animal matter from decay when wholly submersed ; but when atmospheric air has access to those matters they decay. Peat contains nitrogen, phosphate of lime, and sometimes phosphate of magnesia. Sometimes peat spread upon soil exerts an injurious effect, from the presence of free acids. Som salts, as copperas, and sulphate of alumina, are present in excess these exert an injurious effect. These facts explain to us why i is, that some farmers are justly prejudiced against peat as a ma nure ; but we see, however, that the difficulty is easily remedied by the alkalies, as lime, soda and potash.

3. *Organic Matters of Soils.* Vegetables, by decay, undergo in the process a species of fermentation, and are ultimately converted into acids, which combine with the leaves and earths in the soil. This is a different result than that obtained when the decay takes place in bogs, as here there is rarely an alkaline or earthy base with which they may combine. In a pure silicious soil, those salts are not found ; and in those we see the necessity of adding ashes, lime, ammoniacal manures, &c. The turning in of green crops does not suffice in these cases. The following organic matters, according to Dr. J., are always present in soils, having obtained them from soils procured in every quarter of the world.

1. Crenic acid and crenates. 2. Apocrenic acid combined with bases. 3. Humic acid. 4. Humin, or undecomposed vegetable matter. 5. Extract of humus. 6. Another extract, not named ; and 7. Phosphoric acid combined with lime, alumina, or magnesia.

Origin of Saline Matter in Soils. These are traced distinctly to the mineral kingdom. The vegetable acids which form soluble salts in the earth, are formed from the constituents of the atmosphere and water—as carbon, oxygen, nitrogen and hydrogen.

The saline matter of plants having mineral bases, are always present, but vary their proportions in different parts of the same plant, as well as in different kinds of vegetables. These saline bodies are derived solely from the soil. The following analysis shows the relative quantities of those bodies in two very different plants :

	Red Raspberry Bush. Ashes.	Indian Corn. Ashes.
Silica,	0.25	38.45
Phos. of lime,	3.65	17.27
Carb. lime,	3.40	2.50
Potash,	5.24	13.82
Soda,	0.50	trace.
Oxide manganese,	1.00	——
Carbonic acid and loss,	2.16	——
Phos. of potassa,	——	2.25
Carb. magnesia,	——	2.16
Sulphate of lime and magnesia,	——	0.79
Silica, mechanically present,	0.0	1.70
Alumina and loss,	——	165.

The phosphates, which are always present in corn, are, however, distributed unequally in the kernel. The chits, for instance, contain a larger proportion than the other parts; thus the chits yield, on analysis—

Phosphate of lime,	2.4
" magnesia,	0.8
Phosphoric acid and a little silica, potash, and oxide of iron,	3.2
	6.4

By soaking a kernel in various chemical solutions, the different elements may be tested; thus the tincture of iodine colors the starch blue, sulphate of copper colors the phosphatic portions a pale green, forming with them a phosphate of copper. In this way Dr. Jackson has tested directly the presence of the most important bodies in Indian corn. A colored lithographic plate is given upon which this new and interesting mode of analysis is very satifactorily shown. The proximate elements differ in quantity in the different kinds of corn, or maize. Tuscarora corn contains the most starch, and rice corn the least. Rice corn contains the most oil, and Tuscarora corn none. The small Canada corn ranks next to the rice corn in this particular. The presence of oil confers the property of popping, as it is called. The oil serves to prevent fermentation in the grain—Tuscarora corn meal sours very soon—whereas, the meal of flint corn will keep sweet for years; the former forms a good light food for horses, but not for fattening hogs. Too much oil in corn makes a dry bread, and hence requires the presence of gluten to stick it together. The proportions of oil in corn vary from six to eleven per cent. From the presence of the above elements, it is seen why corn is such an excellent food.

1. It has abundance of starch for respiration and sustaining animal heat.

2. An oil for the fattening of animals.

3. Phosphate for the bones. We see too, from these facts, how horses may be overfed by the rich grains; the phosphates which they contain being supplied in greater quantities to the system, it is deposited as extraneous matter in the limbs of the animal.

On the Improvement of Soils.—To reclaim a soil from barrenness, or to improve one of moderate fertility, Dr. J. remarks, requires an insight into the nature of those agents most active, and universally present in fertile soils. The ingredients which occur in the most minute proportions, are those upon which its fertility depends. Silica, alumina, lime, magnesia, oxide of iron, and manganese, potash, soda, phosphoric acid, chlorine, and a certain proportion of disorganized and partially decomposed organic matter, appear to be the most common and universal constituents of soil. But the state in which these bodies are combined, and the condition of the organic matters, decide, not unfrequently, between barrenness and fertility. Light sandy loams need a heavy top-dressing of leached ashes, after which, they will produce abundant crops. When a soil is properly charged with a limed compost, gypsum is an excellent fertilizer, and should always be sown broadcast, with clover, which serves to retain the ammoniacal matters disengaged from nitrogenized manures by the action of lime.

Pulverized granite is a good amendment to clayey soils. When there is a deficiency of lime, it may be supplied in a compost with peat, either in the form of marl, or of slacked lime.

The alkalies are best introduced by means of ashes in a peat compost.

Magnesia is to be employed in combination with an acid, as the sulphate, or phosphate. Magnesian earth may be applied with profit to soils containing an excess of the sulphate of iron arising from the decomposition of pyrites.

A mixture of peat, urine, a little epsom salt, lime, and gypsum, will make an excellent fertilizer to almost all kinds of soil.

Salt acts as a powerful fertilizer, especially on soils remote from the sea. It causes an increased growth of foilage, and gives the plant more strength, so that a much larger crop of grass is obtained where it has been spread. It should not be used in larger quantities than from three to four hundred pounds to the acre, and it is best to mix it into compost while adding the recently slacked lime, for it will serve to retain the ammonia.

Phosphates of soda, potash, magnesia, ammonia, and lime, are all powerful manures, and enter largely into the composition of plants. Phosphate of lime is obtained from burnt bones.

In noticing this report, we have perhaps exceeded the proper limits; but as few copies only of the work are printed, we were anxious to extend the information it contains. We now take our leave of it for this time, intending, however, to take another opportunity for completing our analysis of its contents.

VESTIGES OF THE NATURAL HISTORY OF CREATION.

Republication, by WILEY & PUTNAM. 12mo. pp. 291.

"He has sometimes hinted that man might perhaps have been naturally a quadruped; and thinks it would be very proper that at the Foundling Hospital some children should be enclosed in an apartment, in which the nurses should be obliged to walk half upon four and half upon two, so that the younglings, being bred without the prejudice of example, might have no other guide than nature, and might at last come into the world as genius should direct, erect or prone, on two legs, or on four."
The Idler.

THAT curiosity which prompts us to search into the nature of those agencies which have been concerned in arranging the constituent materials of the earth, or the character of those laws which preside over the development of animate bodies, ought not to be styled frivolous or vain. That such inquiries often carry us beyond the pale of experiment and observation, is freely admitted; still, if we are within the province of reason, we may get from her those responses which can not be given by an experimental philosophy. She may, it is true, give us indistinct replies; or, her answers may not remove every doubt, yet we may be assured that they will be neither absurd, nor conflict with experiences well determined.

As a mind once awakened, though perhaps only partially enlightened, will rarely fall back into a state of apathy; so, one that is fully aroused can hardly be expected to tread the beaten track; yet, it seems to be true, that there is less occasion for running into absurd speculations now, than at any former period. In some minds, however, the imaginative powers are so largely developed, that they preponderate over those of sober observation; and hence, the equipoise between them being destroyed, they are prone to mistake speculation for demonstration; or else, are easily satisfied with a very few facts hastily snatched up by the way.

We do not deny, however, that we are often pleased in the perusal of speculative works, even though they belong to that class which may be styled unproductive; yet we prefer that they should be drawn up in the language of inquiry, and that they should be compatible with common sense. With these characters, we will not object to them, though they may land us upon what may be considered, by some, as heterodoxical ground. As with flint and steel the latent fire is stricken out, so, by the collision of minds, truth is elicited ; hence, we say, strike ! burn your tinder, that peradventure your blaze may illuminate those spaces where light has never before penetrated.

The "Vestiges of the Natural History of Creation," is the title of an English publication, which has recently been re-printed in this country, the perusal of which, in our case, has excited a variety of emotions, of which the pleasurable have, upon the whole, preponderated. The design of the author in this work, is to overthrow the commonly received doctrines of the origin of man, and the numerous species of living beings which people the earth, the air, and water ; or, perhaps, it is more agreeable to the general tenor of the work to say, that it calls in question the validity of the prevailing opinions upon this subject.

The main points which are attempted to be established, are, that a series of changes in animals and plants has taken place, by which they have advanced from lower to higher grades ; that these changes have been effected by the influence of physical agencies, and in which they were controlled in their upward progress by the conditions of the medium in which they were immersed. Man, for example, came first into existence as a monad or simple cell ; but has since advanced by ordinary generation from this humble rank to his present exalted station, having passed through a series of changes, the different stages of which are represented by the molusca, fish, reptile, and quadruped.

The proofs adduced in support of this hypothesis, are derived mainly from geology ; especially from those observations which seem to favor the doctrine that the beings entombed in the rocks, taken together, form a series of advancing types from the simplest to the most complex ; from the low to the high, when viewed as to time—the most advanced belonging to the period just anterior to the present,—the simplest and lowest, to the period most remote.

Having stated thus briefly the design of the work, and the foundation upon which it mainly rests, we proceed, more in detail, to consider some of the data upon which the doctrines are based, that we may estimate the value of the author's positions, and determine for ourselves how far they are entitled to belief.

The first 44 pages is a preliminary exposition of the arrangements of the universe of matter, in which he treats particularly of the bodies in space—of their formation—of the depth to which the earth has been penetrated—of its outer envelopes or coats, as the primary rocks denominated granite, gniess, mica slate, etc. Thus far, the doctrines of this work agree with those of the best informed observers of the day, and may be passed over without comment. The next section, however, entitled "Commencement of organic life—sea plants, corals," etc., demands a passing notice. The position assumed in this section, is, that carbon appeared upon the earth simultaneously with organic beings, as the following extracts show, page 45 : "Limestone is a carbonate of lime, a secondary compound of which one of the ingredients, carbonic acid gas, presents the element *carbon*, a perfect novelty in our progress.:" Again, page 46 : "It is not easy to suppose that at this period carbon was adopted directly in its gaseous form into rocks; for, if so, why should it not have been taken into the earlier bodies also?"

"Again, it is stated from Delabeche, that the quantity of carbonic acid gas locked up in a cubic yard of limestone, is equal to 16,000 cubic feet—and the quantity locked up in coal is also enormous—and it is supposed that if this enormous quantity was disengaged, or set free, it would prove destructive to animal life—but, says our author, a large proportion of it must have been, at one time, in the atmosphere. The results which we observe, are perfectly consistent with, and may be said to pre-suppose, an atmosphere highly charged with this gas, from about the close of the primary non-fossiliferous rocks, to the termination of the carboniferous series, for there we see vast deposits (coal) containing carbon as a large ingredient, while at the same time the leaves of the *Stone Book* present no record of the contemporaneous existence of land animals."

Two important affirmations are made in the above passages; 1st. That carbon and organic beings appeared simultaneously upon the earth. 2d. That the atmosphere, during the period included between the formation of the primary rocks, and the termination of the deposits of the coal rocks, was so loaded with carbon as to have been incompatible with the existence of land animals.

First, as it regards the contemporaneous appearance of carbon and organic bodies—on this point, we say, that there is no element so well entitled to the character of *primary*, as carbon. In New-England and New-York, it exists in combination with lime, forming with it limestone, which, if position is proof, is one of the oldest of our rocks. Immense beds of this material are every where associated with granite, hypersthene rock, and gniess, and under these conditions, which by no rational interpretation can be referred to the era of the sedimentary rocks containing fossils ; inasmuch, too, as these beds are often revealed by their destruction, where they appear locked in between beds, or masses, declared on all sides, as the primary rocks of the globe, and hence the limestone beds, their associates, have the same title to the appellation of primary, as any of the deeper rocks composing the earth's crust. What is there in limestone, which, as a rock, makes it incompatible with the primeval condition of the earth? Why should it not, like granite, form a constituent part of the primeval globe? We wish it to be understood, then, that what the author asserts in regard to the contemporaneous appearance of carbon and organic beings, has no foundation in facts. The geology of New York bears us out in an unqualified contradiction.

Having disposed of one of the points at issue, we proceed to the second, viz : that a far greater quantity of carbonic acid existed in the atmosphere in the interval between the primary schists, and the termination of the coal formation, than in the subsequent periods. On this point, we feel a greater difficulty in finding the direct proof which is calculated to silence a caviler, than the first ; for many persons seem ready, and even determined to believe any thing, provided, it is sufficiently marvellous.

As our author, however, has based his doctrines on statements which pass for truth in England, all we have to do, is to make known what has been discovered in this country ; which, when interpreted by his own rule, if it does not establish a position directly the opposite, will, at least, take away the whole force, point, and bearing of his argument.

It is assumed, for instance, that all the carbon now taken up in the coal beds, existed in a free state in the atmosphere during the whole period antecedent to their formation; and hence, the atmosphere was rendered irrespirable by land animals. The main fact, and probably the only one, which favors this doctrine is, the the supposed non-discovery of the remains of these animals in rocks of the coal series, or those which are nearly cotemporaneous with them. It will be admitted, no doubt, on all hands, that it is dangerous, in all cases, to found a position on a negative; especially, in the observational sciences, for we know not how soon some fortunate discovery, or it may, perhaps, be called unfortunate in one sense, will entirely upset the best constructed theory; certainly such is the case in regard to this part of the author's assumption. If the supposed absence of land animals in the rocks just referred to, is sufficient in itself to give weight to the view, that the atmosphere was irrespirable previous to the period of the coal deposits, certainly the discovery of facts proving their existence, ought at least, to nullify the assertion, or take away all weight and value to an argument formed upon such a premise. But, be that as it may, the existence of land animals is as clearly proved in the coal era as in that of the new red sandstone. We allude now to the discovery of foot-marks of birds and quadrupeds deep in the rocks of the carboniferous series, in Pennsylvania, by Dr. King. The observations seem to have been made with proper care, and to be as much entitled to our belief as those which have been made in the system of rocks above them, viz: the new red sandstone of the valley of Connecticut river. From this representation, then, we do not perceive that there is sufficient ground for what the author asserts in regard to the condition of the atmosphere, in the period referred to; and hence, so far as such a view may be considered as bearing favorably on the hypothesis of organic progress, as developed in the vestiges of creation, we cannot for ourselves, see that it has much if any weight. We dwell no longer upon the points specified above, inasmuch as it is sufficient for our purpose, to show that in this country carbon appeared as a constituent of the rocks, long anterior to organic beings; and that so far as the condition of the atmosphere is concerned, we have no occasion for basing an hypothesis on a negative position, in as much as we have that proof which warrants almost the assertion that the atmosphere was as respirable in the period of the coal deposit, as in the succeeding era, that of the new red sandstone.

It will be inconsistent with the plan of the Journal to notice in detail the views of the author, as they are successively developed in his sketch of the progress of animals and plants. It is sufficient to say, that, in all that portion of the work which treats of the organic developments in the eras of the old red sandstone, carboniferous, and new red systems, and also the oolite, cretaceous, and tertiary formations, we find nothing sufficiently erroneous to call for special remark, except in one or two facts, from which it appears that fish occur in older rocks here than in England. The bearing of this fact upon the author's hypothesis, is, to destroy that coincidence which he supposes may exist between the development of the fœtal brain and that of animal life as it has appeared upon the globe.

We now pass to the chapter which treats of the origin of the animal tribes, where we find that the author's view of one subject at least, calls for remark. It is the view which he presents of aboriginal or spontaneous production of living bodies, wherein he has assigned a production independent of generation. The first position assumed is, that the lowest types of organization, the intestinal and visceral worms, (entozoa,) for instance, are produced spontaneously, or at least independently of the ordinary process of generation, within those structures which they inhabit. The necessity of resorting theoretically to this mode, is the difficulty of gaining access to these structures by any thing from without; particularly by ova or eggs, from which insects invariably arise. It is supposed that any minute particle of organized matter, as a flake of lympth, may, under favorable circumstances organize itself; that is, not only maintain an independent vitality, but may create viscera and organs so far as to constitute an individuality. The proximate cause of life in the vestiges of creation is electricity; hence, without the impulsive electrical force, no atom can be vitalized so far as to become a specific being; from this it follows, that all similar structures must be vitalized by electrical forces also, for, in all animal bodies, are entozoa or worms. We are aware that the subject is one deeply obscure and profound; and we do not profess to know anything at all of matter, and yet we have a right to inquire, whether, since there are so many cases where it is proved that worms are conveyed into the system from without, and are generated in the ordinary way, ought we not still to adhere to the common notions; the bot, in the horse is a good example, whose production may illustrate in a general way what takes place in any given instance.

The second position assumed, is, that production and organization is the result of an electro-chemical force. To sustain this view of the origination of vitality and of an organized structure, he has recourse to the electrical experiments of Mr. Crosse, in England, under whose eye insects appeared in a saturated solution of silicate of potash, (flint dissolved in potash.) The remarks of the author are exceedingly curious, and we think he will say so himself when he comes to reflect upon them. We transcribe them from page 141: "In the apparatus, the silicate of potash became first turbid, then, of a milky appearance; round the negative wires of the battery dipped in the fluid, there gathered a quantity of GELATINOUS MATTER—A PART OF THE PROCESS OF CONSIDERABLE IMPORTANCE, CONSIDERING THAT GELATINE IS ONE OF THE PROXIMATE PRINCIPLES, OR FIRST COMPOUNDS OF WHICH ANIMAL BODIES ARE FORMED!!" Silicate of potash turned into gelatine or glue! This exceeds the expectations of the alchymists of old. The transmutation of the baser metals into gold, would not have been half so marvellous and wonderful. Whether the author intended to deceive, or lead astray for the purpose of giving plausibility to his doctrine, we cannot tell; certainly, so far as we have learned, none of the philosophers of England have ever gone so far as this, or have given such an interpretation of Mr. Crosse's experiments.

We have now reached that part of the work for which all that precedes it, seems to have been preparatory; and which was required to enable the author to give a plausible exposition of his peculiar views of organic progress on the globe.

This part is termed "Hypothesis of the development of the vegetable and animal kingdom." We have already anticipated some of the main points of this hypothesis; still, it is necessary to observe that it is based partly on physiology and partly on geology. Geology is supposed to furnish the following facts, viz: that the older rocks abound in fossils; they all belong to low types of organization, but they never contain the higher, in virtue of certain changes upon the earth favorable to their production. But let the Vestiges of Creation speak for itself, pages 153-4: "The whole train of animated beings, from the simplest and oldest up to the highest and most recent are, then, to be regarded as a series of advances of the principle of development, which have depended upon external physical circumstances, to which the resulting animals are appropriate." The nucleated vesicle* is the fundamental form of all organization. The first step in the creation of life upon this plant was a chemico-electric operation, by which simple germinal vesicles were produced. The first step being taken, an advance was made under favor of peculiar circumstances or conditions, from the simplest forms of being to the next more complicated, and this through the medium of the ordinary process of generation;" that is, if we understand the author, any individual of a species, may, or all simultaneously under peculiar conditions, generate a species a step higher in the scale than themselves, or in other words, create a being—for certainly it is a creation. At the first view, such an idea bears the aspect of impiety—but the author softens very materially this construction in preserving the agency of Deity by the instrumentality of law, through which, the creation proceeds—a law, emanating from the great Architect of worlds. The author, by this law, avoids the common notion of creation, which seem to suppose that in every creative act there has been an immediate instrumentality of Deity, like that of man, in his works. We do not charge impiety upon the author in this hypothesis. If, however, other readers know more of creative power, or of the modes by which species have been created, or of the reason why they have appeared successively upon the earth, by this hypothesis, they are more highly favored than ourselves.

Anatomical considerations militate against the law of development proposed by the author. In the calculating machine which changes its law after the 100,000,001, there is a special construction and adjustment of the machine by which the law is changed, at this stage of its action, and these special parts of the machine, whereby the law is changed, may be seen within it; it is a part of the original workmanship. But no provision can be discovered in the human machine for changing the law of production and generation.

If the calculating machine, by its own mechanism, can generate the special apparatus for changing its law, then we might infer

* A vescicle containing granules of matter, which are successively advanced in their turn to vessels also.

that the human frame, as a machine, might at any time generate within itself those parts which would raise it to a type specifically higher or lower than itself. But we know of no such provision. Whenever a species stands above or below another, though in the same group, it is supplied with additional parts, or else there is a modification of parts unknown to those near to which it stands.

In a machine which can change its law by the development of structures within itself, it would be impossible for any finite mind to know what it might produce — its law could be understood only by infinite intelligence; certainly, the human machine is not intended thus to work. The development of sex, does not come within this form of the law; the change of stamens into petals, by feeding, and other analagous changes, is a very different matter from that of change from species to species. The development of the queen bee, by an instinctive management of the workers, is but a part of the economy of the bee; the queen of the bee is produced, but they cannot produce a queen of any other species of bee: much less a wasp or hornet.

The work, from the 179th page, and onwards, to its conclusion, is devoted to an exposition of the Macleay system of animated nature, the early history of mankind, the purpose and general condition of the animated creation, and the mental constitution of animals. We can cheerfully recommend those subjects to the reader; they are well treated and worthy of a careful perusal.

We have, however, in conclusion, a few remarks which we have reserved for this place. We take upon ourselves the responsibility of saying, that geology lends only a feeble support, if any, to the peculiar views of the author so far as they relate to organic progress.

There are some analogies in the vegetable and animal kingdom, which may be brought in incidentally, which have a remote bearing upon the subject. Thus a barren soil first produces a green mould; next, mosses, and the larger plants of this class, and finally shrubs and trees. So, in the earlier periods, the seas produced (it may be) only the humbler animals, which vegetated, as it were, like the mould and the mosses of an unfertile spot of earth. But what does this amount to, if proved? Mosses and mould, as well as well polypi and monads, are the humble tenants of the soil and of the waters now; and the great and the humble com-mingle now in the same medium, both are products of the present. He who assumes that the early inhabitants of the seas were unfitted for the present, assumes what he can by no means prove. It is merely a bold assumption. We say again, what we have said on former occasions, that, because certain animals do not consume, apparently, as much of some of the elements as others, it does not follow that, if the atmosphere or water contained less, they could exist in one or the other; it is certainly an inquiry of great consequence. In the Vestiges of Creation we find no less than five important assumptions which are erroneous. 1. That carbon and organized beings appeared simultaneously. 2. That limestone was first laid down in the lower part of the Silurian system. 3. That the condition of the atmosphere, anterior to the coal era, was loaded with carbonic acid. 4 and 5. That land animals and dry land appeared only subsequently to the coal. Contrary to the above assumptions, we have found vestiges of land plants, at least as early as the Oriskany sandstone. And besides, though we have high authority against us, we believe that in no period in the earth's history has dry land been wanting. In fact, we are inclined to adopt the opinion that the seas of the earlier sedimentary matters were deeper than the present; for how, on other grounds, can we account for the great thickness of the slates and subordinate rocks of the Cambrian or Taconic system?

This book contains a few facts practically important to the farmer. They are such as prove that the perfection of all animals, is dependent upon proper conditions—upon a sufficiency of light, air, nourishment and temperature. The lower animals do not pass through their proper metamorphosis if deprived of light. The tadpole, for instance, does not become a frog, if submersed too deep in water: the absence of light and a lower temperature, both combine to prevent the natural development. The human family, in fact, when occupying unwholesome places and are poorly fed, produce a larger proportion of monsters, or of imperfectly developed offspring, than when surrounded by comforts, and living in a pure atmosphere. Domestic animals, in their turn, must suffer from similar causes. Fine horses become blind and are often lost by being kept in badly lighted stables. Economy and humanity, then, require the farmer to guard his animals against disease and imperfection by suitable provisions for their comfort, sustenance, and convenience. It is by following out the law of development that perfection in breeds is attained ; which consists mainly, in providing for such wants as the nature of the animal demands. Or to be more specific, in furnishing an abundance of food suitable to the age, and giving it at the same time, air and exercise ; exempting it from hardships which prey upon the physical powers, surrounding it with luxuries compatible with its organization, and finally, combining with all, a kind moral treatment.

INSECTS INJURIOUS TO VEGETATION—No. 1.

We commence with this number a series of articles upon the insects which are injurious to vegetation, with the hope and expectation that we shall be sustained in this new feature in an agricultural journal. We do not mean to say that insects have not been the subjects of investigation before, nor that they have not been written upon ; but we mean to say that suitable descriptions, with correct and colored figures, have never been given in any of our agricultural publications. For ourselves, we believe this is the only mode which can be eminently and extensively useful. We need say nothing of the importance of the subject, for we are sure that there can be only one opinion, viz : that it is one of the most practical, useful, and important subjects to the agriculturist, especially when it is known that the number of injurious insects increases, and that they extend their ravages wider and wider every year. To counteract their ravages, we must first know them ; then, their habits must be studied and well understood. We are then prepared either to destroy them, or evade their attacks upon our property.

Genus, Saperda, Lat. Plate III. fig. 1. Head vertical, as broad as the thorax, flattened, body cylindrical ; inferior lip straight without notch or remarkable fissure ; thorax cylindrical, without lateral spines ; antennæ filiform, and terminating in an elongated joint.

S. tripunctuta.—Color, deep black ; fore part of the breast, top of the thorax, rusty yellow, and two black elevated dots on the middle of the thorax, and a third dot on the hinder edge close to the scutel ; wing covers are coarsely punctured, in rows on the top, and irregularly on the sides and tips, each of which is slightly notched, and ends with two little points.*

Observations. This insect finishes its transformation towards the end of July, and lays its eggs early in August, one by one, on the stems of the blackberry or raspberry. The grubs burrow directly into the pith. The plant withers and dies the same summer.

S. bivittata.—Fig. 7. Upper side of the body marked with two white longitudinal stripes, between three of a light brown color ; face, antennæ, under side of the body, and legs, white.

Observations. This insect is the great pest of the apple tree, quince, mountain ash, hawthorn, and shadbush. The larva have been found in the trunks of all these trees, and the insect itself feeding upon their leaves.

That our readers may see the importance of watchfulness over their orchards, we subjoin a few extracts of a letter of the late Jesse Buel, upon this pest, of May, 1825.

Mr. Buel says that he was sent for a few days ago, by Mr. Heartt, of Troy, to witness the devastation made in a fine young orchard, by a grub hitherto unknown to farmers, and which correctly to know, and to be able to guard against, is a matter of great public interest.

It appears from this letter, that the orchard was injured much more seriously in that part which had a warm southern exposure and was situated upon a steep declivity. The whole damage which was done to this single orchard, was estimated by Mr. Heartt, the owner, at $2,000.

The larva, in this instance, entered the sap-wood just beneath the surface, and then cut its way upwards. The grub, after having undergone its transformation, which requires about three years, escaped through the bark by a perforation about thirteen inches above the surface. Sometimes they were so numerous in a single tree as to destroy the whole circle of sap-wood.

* A large proportion of the specific descriptions and observations are copied directly from Harris' Massachusetts Report. The editor has no merit, except in giving accurate figures of the insects.

The larva are fleshy, whitish grubs, nearly cylindrical, and tapering a little from the first ring to the end of the body ; head small, horny, and brown. It comes forth from the trunks of the trees a perfect insect, like No. 7, early in June, making its escape in the night. In the day time it is at rest among the leaves of the tree which it devours.

Dr. Harris considers the constant re-appearance of this borer in our orchards and nurseries is owing in a great measure to the carelessness and inattention of individual owners. Old trees are suffered to remain, which are full of the insect in its larva state ; or, they suffer the suckers to choke the base of the tree, and furnish a harbor so long as they remain unpruned.

Two or three methods have been resorted to for destroying this insect. 1st. By a wire thrust up into its hole. 2d. Cutting it out with a gouge. 3d. Plugging the hole with a piece of soft wood, to which Dr. Harris advises the use of a few grains of camphor. The first method is the safest. The gouging, if resorted to, ought to be performed with great care. In all cases, however, the suckers ought to be cut, removed from the field, or burned. The worst of cases we have seen of the ravages of this pest, have been those where the tree has been shaded and choked by suckers. The dampness, together with the exclusion of light, seem peculiarly favorable for the increase and propagation of this insect.

S. calcarata.—Body covered with a close short nap ; color, fine blue-gray punctured with brown, and with four ochre-yellow lines on the head, and three on top of the thorax ; wing covers tipped with sharp points.

Observations. This is the largest of our Saperdas. The grubs infest our native, as well as the Lombardy poplar, which last it has nearly destroyed. They are of a yellowish white color, except the upper part of the first segment, which is of a dark buff. When fully grown, they are two inches long ; body thick, and larger before than behind, and consists of twelve segments separated from each other by deep transverse furrows.

The beetles may be found on the trunks and branches of the various kinds of poplar, in August and September ; they fly by night. (Harris.)

Gen. clytus.—Body elongated ; antennæ shorter than the body. Thorax globose, unarmed ; hind legs clavate.

C. speciosus.—(The beautiful clytus.) Head yellow; thorax black, with two yellow transverse spots on each side, or rather parts of bands; wing covers $\frac{2}{3}$ black, the rest yellow; the black curiously banded with yellow, in the form of W, and the inner parts of the same letter; besides these, a yellow spot on each shoulder, and complete yellow band convex downwards; the yellow part banded black, convex upwards, with two dots, one on each side.

Observations. This is the largest known species of the genus clytus. Its larva destroys the sugar maple, by perforating its trunk. The eggs are laid upon the trunk of the maples in July and August; the grubs, as soon as hatched, penetrate the bark; the next year, they penetrate deeply into the wood, forming many sinuous passages.

In order to destroy the grub, Harris says they must be sought for in the spring, when they may be detected by the saw-dust from their borings, before they have penetrated deeply into the wood, when they may be destroyed by thrusting a wire into their holes; or by the judicious use of the knife. When young maples are seen to languish and loose their thrift, let them be examined for this insect.

C. pictus.—Body, black, ornamented with transverse yellow bands, three on the head, four on the thorax, and six on the wing covers; tips also edged with yellow; the third band is a W; the others may be described as zig-zag—or all looking more or less like a W; legs, rusty red.

Observations. In September they gather upon the locust-trees, when they pair; after which, the female deposits her snow-white eggs in crevices in the bark. The eggs are soon hatched, and the grubs immediately burrow into the bark, the inner side of which they soon devour; there they remain torpid during the winter; when the spring opens, they penetrate the wood, in irregular winding passages. Their works may be known by the saw-dust cast from their holes, and the oozing of sap. The effect of the wounds caused by these grubs, is to produce swellings in the trunk and limbs, and such a weakness of the woody texture, that it is unable to maintain a resistance to the winds. The grubs attain their full size by the 20th of July, when they soon become pupæ, and then beetles, and finally they are ready to leave the tree in September.

The principal means for destroying this insect, seem to be that of gathering it in September, when they congregate upon the locust tree, to pair. Mr. Harris expresses the opinion, that an hour devoted to this business for a few days, would be sufficient to rid us of it; and if followed up for a few years, would be the means of saving this excellent tree from ruin. Heading down the tree, in some instances, may be necessary.

C. caprea, fig. 5. P. III. Fuscous; thorax, with the anterior edge, yellow; elytra with four bands and tip, yellow. (Say).

Observations. The elytra at base are marked O. O. The two remaining bands arched upwards, and all at equal distances from each other; two yellow dots at their tips.

Say remarks, that the bands are sometimes white. The larva, like the preceding species, are supposed to live in wood.

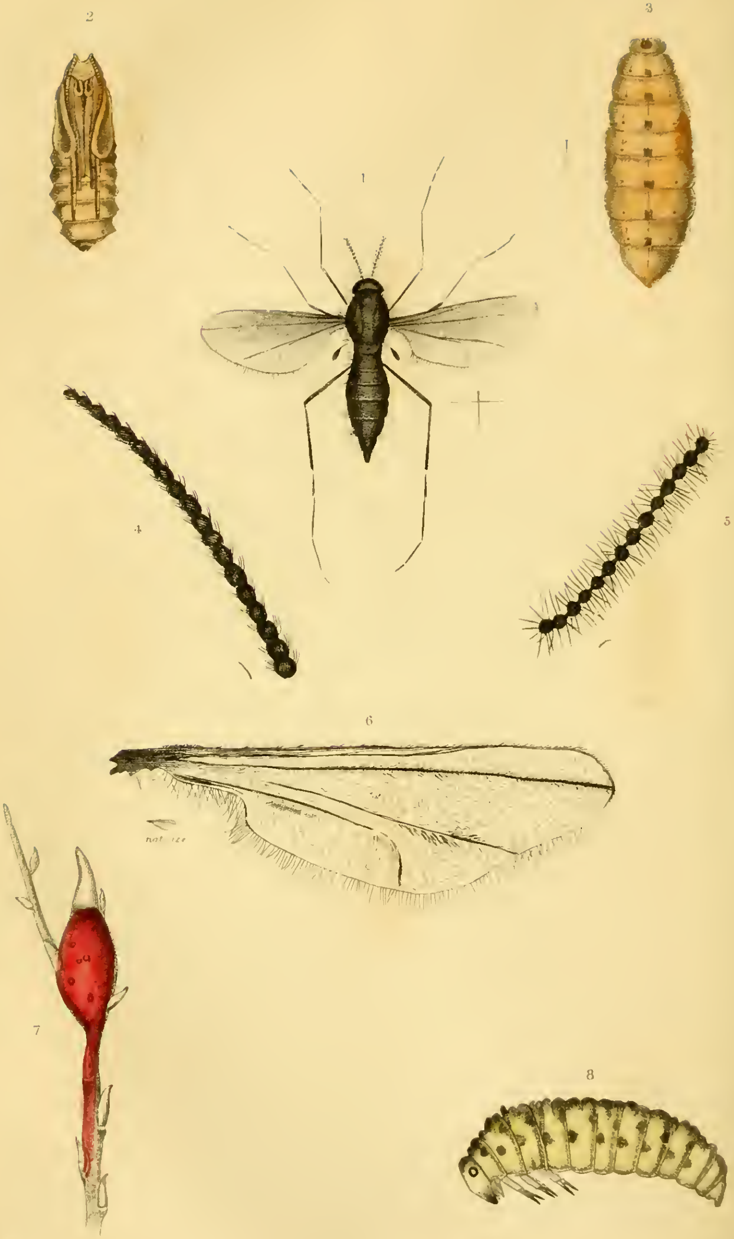
Desmocerus, P. III. fig. 6. Cerambyx of Forster: Stenocorus of Fab. Eyes lunated, surrounding the base of the antennæ; head sloped before; palpi terminated by a large joint, in the form of a reversed, elongated, compressed cone; labrum very apparent; maxillary larger than the labial palpi; thorax almost square, or cylindrical—generally spinous or tubercular on the sides; antennæ long and setaceous. (Stark.)

D. palliatus.—Color, deep violet, or Prussian blue; nearly one half of the wing covers orange-yellow; antennæ have a knotted appearance.

Observations. The larva live in the lower part of the stem of the elder, and devour the pith. This insect is rather useful than injurious, by destroying this troublesome shrub.

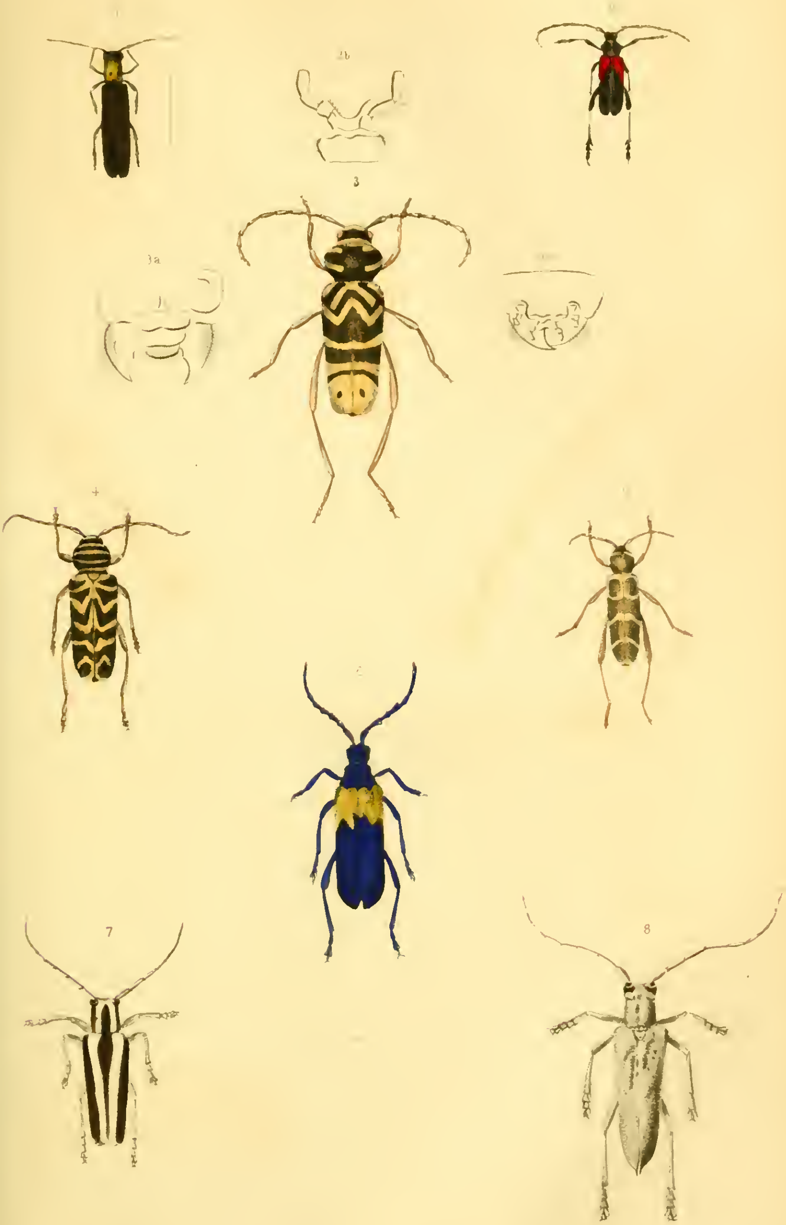
Fig. 2. Pl. III. Purpuricenus: Dejean. We are unable to give a satisfactory account of this insect; it will therefore be noticed in some subsequent number.

Note.—The valuable plates accompanying this number of the Journal, were engraved by our friend J. E. Gavit, Bank Note Engraver of this city, which—considering that it is the first attempt in this line of business—does him much credit as an artist.



A. Fitch Del.　　　　J. E. Gavit Sc.

1 *Cecidomyia salicis*
2 *Pupa*
3 *Larva*
4 *Male Antenna*
5 *Female Antenna*
6 *Wing*
7 *Gall of C. salicis*
8 *Destroyer of C. salicis*



Del. J.E Gavit Sc

1 *Saperda tripunctata*

2

3 [illegible] *speciosus*

4 " *pictus*

5 [illegible] *aprea*

6 *Desmocerus palliatus*

7 *Saperda bivittata*

8 " *calcarata*

3a 3b 3c details of *C speciosus*

INSECTS INJURIOUS TO VEGETATION.—No. 2.

INSECTS OF THE GENUS CECIDOMYIA, INCLUDING THE HESSIAN AND WHEAT-FLY.

BY ASA FITCH, M. D.

It is the design of the articles, of which the present forms the commencement, to lay before the reader as full and accurate an account as the writer's investigations and means of information will enable him to do, of a genus of insects, which, in consequence of the ravages which some of its species annually commit, justly ranks first in importance in the consideration of the tillers of our soil. This design consequently embraces a precise statement of the different marks which characterize each species in the several stages of its existence; its habits and instincts; the depredations which it commits upon the particular kind of vegetable which it inhabits; the most approved measures for lessening or preventing its depredations, together with a description of the natural enemies of each species, which aid in keeping it from becoming excessively multiplied. In the course of these communications, it is hoped, that some contributions may be made of interest and value, both to the cause of agriculture and of science.

INSECTS ALLIED TO THE CECIDOMYIÆ.

Preliminary to entering upon a consideration of the particular species of this genus, it is important that we ascertain with precision what characters belong to the group of insects with which this is classed, and what are the marks by which an insect pertaining to this genus may be clearly distinguished from its closely allied associates. Though nothing original will be embraced under this head, it is presumed that what it contains will still be valuable to those persons residing in rural districts, and therefore most favorably situated for making observations, but who at the same time have access to no large public library, containing those works on natural history from which full information respecting the natural alliances of these insects may be obtained. Any one not well acquainted with, or overlooking these generic and family marks, will be very liable to consider a number of insects to be cecidomyiæ, which in reality belong to some of its kindred genera.

The genus cecidomyia belongs to the order DIPTERA, of systematic works. This order includes all those insects which have but two wings, and which are known in our common language by the names "flies" and "musketoes." Gnats, midges, and some other names, are given locally to some of these insects, but are not in general use in our country, and consequently convey no definite ideas to the great mass of our citizens.

All the insects of this order undergo what is termed a perfect metamorphosis—their eggs hatching to footless *larvæ*, commonly called maggots or grubs, and these having attained their full growth change to *pupæ*, in which state many of them resemble a seed or an egg, and some surround themselves with a kind of silk-like cocoon. From these pupæ the perfectly formed and fully grown flies eventually come out.

A large number of the insects of this order are obnoxious to man in a variety of ways. Some suck his blood, their poisoned wounds producing pain, succeeded by an itching and swelling of the part. Some teaze and torment him, by pertinaciously alighting upon the uncovered parts of his body, or swarming upon the viands spread upon his table. Others deposit their eggs upon his domestic animals, that their larvæ may live upon or within their bodies; as, the horse-fly, bot-fly, sheep-fly, ox-fly. Others still, produce larvæ which injure vegetation to a greater or less extent; as, the radish-fly, onion-fly, cabbage-fly, pear-flies, fruit-flies. But, as if to counterbalance for these pests, this order also furnishes many species which render us special services, by feeding upon and destroying noxious species—by devouring putrid animal and vegetable substances, which might otherwise poison the air we breathe, &c. How forcibly do such facts portray the importance of our becoming acquainted with this class of beings, that we may know which are our friends and which are our foes—which to cherish and which to destroy.

Of the several family groups comprised in this order, the genus under consideration pertains to that named TIPULIDÆ, being composed of those insects originally embraced by Linnæus in his genus Tipula, a name in use among the ancients to designate some kind of water-spider, and not inappropriately bestowed upon these insects, their long legs being analogous to those of the spider, and their light airy structure enabling many of them to alight and walk upon the surface of water, without sinking into it.

This family, in many respects, closely resembles that of *Culicidæ*, to which the insects which we call musketoes belong. Both these families are distinguished from all other two-winged insects by their antennæ or horns, which are somewhat long and thread-like, that is, of much the same diameter throughout their entire length, and composed of at least six, and generally, as many as fourteen or sixteen joints — the other two-winged insects, which would all be designated as flies, in common parlance, have on the other hand but two or three short, thick joints to their antennæ, with a small but conspicuous bristle usually proceeding from the side or tip of the last joint. The long and slender body, small, round head, and legs remarkably long and slim, are other marks by which the Culicidæ and Tipulidæ are readily known. They fly, moreover, both by night and day, but when by day, mostly in shady and moist situations. When flying, their legs are generally extended for the purpose of balancing the body, though this renders their progression slow, compared with that of most other insects when on the wing. Many of the smaller species are accustomed to collect together in swarms in the air, and flit about in a kind of dance.

The Culicidæ are furnished with a long, projecting, thread-like proboscis, or sheath, containing a sucker composed of about five minute needles, enabling them to pierce the skin and suck the blood of the larger animals. This is the prominent distinguishing character between them and the Tipulidæ; the latter having no proboscis, or but a short and feeble one, bent downwards towards the breast, and incapable of being advanced forwards and serving the purpose to which it is applied by the musketoe.

The Tipulidæ then, possess at most only a muzzle or short proboscis, containing but a pair of needle-like threads, so weak that this organ seems only adapted for sucking up the exposed, or but slightly covered fluids of particular vegetable tissues. The perfect insect, in reality, exhibits but a slight inclination for food of any kind. The family appears to be well marked, and natural; its several members presenting an aspect strikingly analogous to each other, and resembling that of the well known musketoe. Of its subdivisions, proposed by different authors, those of Latreille appear to be the most natural, and are the ones most referred to at the present day. He divides the Tipulidæ into five subordinate groups, each differing somewhat from the others in the form of the perfect insects, and still more in the habits of the larvæ. These groups are briefly characterized, as follows :

1. Aquatic Tipulides. Antennæ entirely covered with hair. Larvæ live in the water.

2. Terrestrial Tipulides. Head elongated into a muzzle. Larvæ inhabit the earth, mostly living on the roots of plants.

3. Fungivorous Tipulides. Two or three ocelli ; trochanters elongated ; tibiæ strongly spurred. Larvæ feed on mushrooms.

4. Tipulides of gall-nuts. No ocelli ; trochanters of ordinary length ; head not prolonged to a muzzle ; antennæ moniliform, clothed with short and scattered hairs. Larvæ generally feed in galls formed on vegetables.

5. Floral Tipulides. Antennæ short, perfoliated, of from only eight to twelve joints ; legs of ordinary length. Larvæ in dung-hills ; perfect insects on flowers, said to eat their buds.

GENERIC CHARACTERS.

It is to the fourth of the above groups that the insects under consideration pertain. All the insects comprised in this group are distributed in the following genera, the most prominent distinctive characters of each being appended.

CERATOPOGON. Antennæ with a tuft or bundle of hairs at their base.

PSYCHODA. Wings furnished with numerous nervures.

CECIDOMYIA. Wings with but three nervures.

LESTREMIA. Like Cecidomyia, but antennæ only fifteen-jointed, and the first tarsal joint elongated.

The wings and antennæ, then, it will be perceived, furnish the characters by which the genus cecidomyia is distinguished from all the other Tipulidæ. The *antennæ* are always longer than the head, and frequently as long as the body ; they are slender and thread-like, and composed of sixteen joints or more, each joint being of a rounded and often globular form, and, at least in the females, verticillated with short hairs ; that is, having a number of hairs placed in a row around the joint, like the spokes of a wheel in its hub. In the males, the number of joints is commonly twenty-four, and these are clothed with minute hairs, but not always verticillated.

The *wings*, when the insect is at rest or walking, are not inclined in the form of a roof, as they are in the genus Psychoda. but repose upon the back in a horizontal direction, like those of the common house flies, the inner edge of one wing lapping over that of the other. Another yet more distinctive mark is found in the nerves or ribs of the wings. These are but three in number, running lengthwise of the wing, diverging from each other as they proceed backwards, and giving off no smaller or subordinate branches or veins. In most of the species, these nerves terminate before they reach the edge of the wing. This neuration of the wings appears to distinguish the Cecidomyiæ and Lestremiæ from all other insects, a genus of the Terrestrial Tipulides, named Lasioptera, being the only one allied to them in this character, that possessing but two similar nervures.

Other characters may be mentioned as more or less common to the Cecidomyiæ. The head is hemispherical in its form ; the palpi or feelers are short and inconspicuous ; the eyes are crescent-shaped ; the two first joints of the antennæ are often perceptibly shorter than the others ; the wings are generally transparent, shining and glass-like, reflecting the tints of the rainbow ; the legs are long and slender ; the tarsi, or feet, consist of five joints, of which the first is quite short, and the second long.

Habits.—The females of most of the species, have the body terminated by a sharp point ; in several, it is prolonged into a tube or ovipositor, the joints of which shut into each other, like those of a telescope. By this instrument, it is enabled to pierce the young leaf or flower buds of trees or plants, and place one or more eggs therein. Each species is led by instinct to a particular part of a certain kind of plant, which alone it selects as a home for its young. The egg hatches into a footless larva or maggot, which subsists upon the juices, or upon the substance of the bud, and the irritation which it produces, causes an increased flow of the fluids of the plant to this part, which thus grows to an extraordinary size, and forms a kind of excresence, called a gall. They agree in this part of their habits, with the Cynips, a family of four-winged flies, one of which produces the well known nutgalls of commerce. In the interior of this excresence the maggot dwells, and having acquired its growth, it becomes a pupa, and like most other insects in this stage of their existence, takes no nourishment, but lays dormant in its cell for a definite period of time, at the end of which, it changes to a fly, and makes its passage out of the gall. Some of the species, probably, leave the galls, and enter the ground, ere they assume the pupa form. The larvæ of a few, which infest grains and grasses, do not produce galls, but lie concealed between the natural clefts of certain parts of those plants.

It is a singular and interesting fact, that these minute creatures all so nearly alike in their colors and appearance that the naked eye can scarcely detect any difference between them, will go forth and each select for itself a particular part of a particular plant, in which to deposit its eggs; one choosing a leaf-bud, another a flower-bud, another the tender bark of the young twigs, and another it may be, the bark of the roots, or the petiole, or the nerves of the expanded leaf. Equally singular is it, that the eggs all minute as grains of sand, and often precisely alike in form color, and substance, will from one species, produce an excrescence always of a globular form, like a grape or bullet; another ovate, or shaped like a bird's egg; a third oval; a fourth knobbed and warty; here with a smooth surface, there prickly; now soft and succulent, again hard and stony; being thus so exactly marked in every instance, as to enable the naturalist to tell with certainty the particular species that will proceed from any particular gall that presents itself to him. *O Jehovah, quam ampla et mi randa, sunt tua opera!*

FOREIGN SPECIES.

Twenty-six different species of cecidomyia are enumerated by Mr. Stephens as occurring in Great Britain. Most of these, and others in addition to them, are found upon the continent. A short account of the habits of some of these cannot but be interesting to the general reader, and will be particularly valuable to the agriculturist, as giving him a more enlarged acquaintance with a group some of which yearly inflict upon him such severe disasters, and all of which rank among those insects which are injurious to vegetation.

One of these species (*C. Juniperina*,) infests the common juniper of Europe, forming its galls at the tips of the twigs. These galls are composed of six leaves, the three outer ones being larger and enveloping the three inner ones. Baron De Geer has studied out and described the mode in which the galls come to be thus constructed. He observes that the natural leaves of the juniper are always placed in rows around the stem, each row being composed

›f three leaves, and that the tips of the young shoots always end n three leaves, these last often inclosing three others which are maller, and which envelop the bud which is destined to produce new shoot. Within this bud the cecidomyia deposits its egg. The larva that comes therefrom subsists upon and destroys the bud, ut spares the leaves by which it is enveloped, which leaves, by eceiving a portion of the juice destined for the bud, become deveoped to an extraordinary size. The galls thus formed, boiled in ilk, are a popular remedy for the whooping-cough among the easantry of Sweden, who hence name them *kik-bar*, i. e. cougherries. Though these galls are found at all seasons of the year, is only during the cold months, from September till May, that ey contain the larva. This is a footless worm, about the twelfth f an inch long, of a bright orange color, rather broader posteriorly, d composed of twelve rings. It changes to a pupa in May, hich retains the same color, but is shorter and broader, being of oval form, and its head is furnished with two small conical eminces like horns. The perfect insect crawls out of the gall, at a nall opening formed at the tips of its inner leaves. It is of an h-gray color, with white wings, the margins of which are fringed ith hairs.

De Geer also discovered the pupæ of two other species, which ere enveloped in cocoons attached to the leaves of the pine. One these cocoons was composed entirely of a yellowish-white silk, d suspended by threads of the same kind ; the other had, in addion to the silky envelope, an exterior coating of a resinous and hite substance. The larva by which this is formed, differs from ost of the larva of this genus, in having two rows of pointed nipes resembling feet, to the number of fourteen. To escape from e cocoon, the pupa detaches from one of its ends a small portion ke a lid.

The lotus, the vetch and the willow, are others of the European ants which often exhibit those singular monstrosities, the galls the cecidomyiæ. The flower-buds of the lotus swell and expand tl they resemble bladders with a pointed apex, yet their petals ver appear. The young branches of some willows have irregular crescences formed upon them, sometimes rounded, sometimes ongated ; in short, varying considerably in their external appearace, and of a ligneous or woody texture within. Their surface exhibits the shrivelled vestiges of some of the buds which have failed to expand their leaves, and have withered in consequence of all the juices destined for their growth having been absorbed by the gall. These remains of buds form small holes, which communicate with the interior of the gall. The pupæ pass the winter season enveloped in cocoons within these galls, and when about to change to their perfect or fly state, glide by little and little along the channels produced by the perforations of the buds, to their mouths, whence they emerge upon the wing. The extremities of other twigs of the willow, stung by another species of cecidomyia, shoot forth a dense tuft of leaves, resembling a double rose in their appearance, though retaining their green color, or like the fruit of the hop. These singular appendages were very perplexing to the earlier botanists, some of whom regarded the trees on which they grew as distinct species from those on which they do not happen to occur. Gerarde thus characterizes one of the English willows as bearing something like roses, which make "a gallant show—being set up in houses for the decking of the same, and yielding a most cooling aire in the heat of summer."

AMERICAN SPECIES.

Hitherto but two species appear to have been noticed in this country, to wit: the Hessian fly, scientifically named and described by our accomplished and indefatigable naturalist, the late Thomas Say—under which name, however, the recent investigations of Miss Morris seem to render it not improbable that two distinct but closely related species may have been heretofore confounded—and the wheat fly, probably identical with the *C. tritici* of Europe, but which has not as yet been so accurately traced out and described in this country, as its importance demands. But that there exist within our boundaries a number of other species, no one acquainted with our Entomology, and consequently aware of the little attention that has been as yet bestowed upon our Dipterous insects, will doubt. Their minute size, the short period of their existence after attaining their perfect state, the obscurity of their retreats, and their seldom being much upon the wing during the day time, are circumstances that have enabled them to elude the researches of those few individuals who have devoted their attention to collecting and describing our American insects.

At the commencement of the past summer, an early species of grass, called "June grass," in this vicinity, was in several situations prematurely destroyed, soon after flowering, the stalks from some one of the joints upwards, withering and turning to a straw color, and to such an extent that one person informs me, on casually approaching his meadow one morning, it presented so white an appearance, that his first thought was that it was covered with hoar-frost. The connection of the stem immediately above the joint, seemed to be entirely destroyed, so that the slightest force withdrew it from its sheath, by which alone it continued to be sustained in an upright position. From the analogy of this affection, to that produced by the Hessian fly in wheat, I infer it to have been probably caused by a kindred species of cecidomyia.

Though my attention has not been directed to the detection of additional species till since the commencement of the present year, three species have already occurred to my notice. The larva of one of these inhabits the buds of our common alder; another occurs upon the sides and the third upon the tips of willow twigs, each of them producing those excrescences denominated galls. I have not as yet succeeded in forcing forward into its perfect state, and am therefore prepared to give an adequate account of but one of these.

CECIDOMYIA SALICIS. (PL. II. FIG. I.)

Black; hirsute; wings lurid, inner margins ciliate; beneath, abdomen white-pubescent, legs lurid.

Length 0.18. Wings expand 0.35.

Description. HEAD oval, transverse, scarcely half the width of the thorax, with a ruffle of fine velvet-like hairs surrounding its base. *Antennæ* shorter than the thorax, moniliform, slightly and gradually diminished in diameter towards their tips; joints twenty in number in the males, each with a few very minute hairs directed forwards, in females sixteen, each verticillated with longer and coarser hairs. *Neck* in recent specimens chesnut-yellow, distinct and slightly elevating the head as though on a pedicel. *Thorax* broad-ovate, the length and breadth equal and the anterior part slightly narrower; two impressed longitudinal lines on the back, slightly converging posteriorly, and densely set with minute hairs; intermediate space glabrous; sides with longer hairs most conspicuous and thickly set forward of the wings; posterior edge depressed into a deep impressed transverse line intervening between it and the scutel. ABDOMEN long-ovate, its broadest part nearly equalling the thorax, posterior edge of each segment marked by a lighter tinge; beneath chesnut-brown, thickly covered with short white hairs of a silky lustre; abdomen of females somewhat broader and shorter, terminated by a slightly exserted two-jointed ovipositor of a cinnamon-yellow color. LEGS glabrous, long and slender, hinder ones extending twenty-seven hundredths of an inch, of which the tarsi measure 0.13; blackish above, beneath light lurid brown; *femurs* slightly longer and conspicuously broader than the tibiæ, cylindric, somewhat contracted at their bases; *tibiæ* cylindric-clavate; *tarsi* black, first joint very short, third longest and most slender, fourth and fifth broadest. WINGS smoky-brown, translucent, broadest across the middle; nervures, except the anal, rectilinear; *mediastinal* confluent with the costal at the middle of the exterior margin; *postcostal* strongest, running direct to the tips of the wings; *medial* scarcely confluent with the inner margin at three-fourths the distance from base to tip, towards its base becoming a mere plait-like trace upon the wing, and at a first glance seeming to be a branch of the anal nervure; *anal* most developed towards its base, suddenly curved inwards and joining the inner margin near its middle, giving to the anal area a rhomboidal contour.

Larva. Pl. II. fig. 3. This is a small worm of a bright orange color, with the anterior extremity often red. It measures about twenty hundredths of an inch in length, and 0.08 in diameter, being of a cylindrical form, very slightly tapering towards, and obtusely rounded at both ends, more so at the posterior than the anterior extremity. A slightly projecting point is perceptible at the apex of the anterior end, and two similar projections at the opposite extremity. The larva is composed of but nine segments, each well marked by a contraction intervening at the joints. The anterior or head segment is the longest, and near the tip on its under side are two small, black lines, slightly diverging from each other as they proceed forwards; when closely examined under a magnifier, a dorsal row of deep pink-colored spots are seen of a square or trapezoidal form, one on each segment, reaching from its anterior edge about a third of the distance across the segment. The stigmata or breathing pores, are also perceptible, and often a very slender pink-red line is seen reaching backwards from each pore across the segment, and a similar line running backwards from each of the dorsal spots. Traces of other lines of the same color are often visible upon the surface, sometimes branching and anastomosing with these, like blood vessels.

Pupa. Pl. II. fig. 2. The dimensions of the pupa do not perceptibly differ from those of the larva. The abdominal segments retain the same orange color which they possessed in the larva state, but the future head, thorax, and wings are sanguineous, red, and lustrous, as though wet with blood. The embryo legs reach far down upon the front, or under side of the abdomen, but are free, or not connected with it, as shown in the wriggling motions made by the pupa when removed from its cell. In short, the whole of the parts acquired by the change seem to be like a cap or helmet drawn over the head of the larva.

Galls. Pl. II. fig. 7. These are formed at the tips of the twigs of several willows that grow to the size of shrubs and small trees. They are of an oval or long-ovate form, from three-fourths of an inch to an inch and a half long, and nearly three-eighths of an inch in diameter at their broadest part. Externally, they are of a red, yellow, or greenish-brown color, being the same as that of the particular species of twig on which they grow. Some of the natural buds of the shrub often occur upon the surface of the gall, as bright and vigorous as those on the unaffected branches, and frequently one, two, or three twigs grow from its sides, appearing so well nourished and thrifty through the winter season, that we should scarcely deem they were destined to perish the coming summer, did not an inspection of the old galls, some of which may frequently be observed on the same shrubs, show their similar shoots almost invariably withered and decaying. About three-eighths of an inch of the upper end of the gall, is in all cases dry, brown, and brittle, curving to a point, and appearing like a kernel of ergot or spurred rye protruding from the gall, a well marked line of separation occurring at the junction of this dead with the lower living portion. Within, the substance of the gall is of a greenish white color, and a soft woody texture. A cylindrical canal, the tenth of an inch in diameter, runs from the base of the gall, to the apex of the brittle horn at its summit, within which canal the larva lies. A beautiful provision of nature is here observable. The extreme tip of the horn at the top of the gall is so slender and brittle, that it is easily broken off by the slightest touch of the wing of a bird, or a contiguous twig agitated by the wind. It is therefore rare that it is found entire. But in breaking off, the edge of the part below, which thenceforth forms the apex of the horn, generally splits into several short, slender, elastic teeth or valves, the points of which converge so as to leave but a slight orifice into the canal below. The inclosed maggot, when ready to leave its cell, easily crowds these valves apart, and makes its exit—whilst any enemy attempting to insinuate itself into this orifice, only draws them more closely together. But that this curious structure sometimes fails of accomplishing the purpose for which it seems so admirably designed, will be rendered probable, when we come to speak of the enemies of this insect.

But little account is made in our country at the present day, of any of our several species of willow. That which in an economical point of view is probably the most valuable, is the species originally described by Muhlenberg, under the name of *rigida*. The very long, wand-like character possessed by the younger shoots, combined with the toughness and flexibility which is peculiar to them, have caused this to be esteemed more than any of our other native species, for the manufacture of baskets and other articles of willow-work. This, and its allied species *salix lucida*, (Muhl.,) seem to be the ones most preferred by the insect under consideration, though it also infests two or three others to a less extent. But upon our tall tree-willows it is never found—it may be, because their much more slender twigs would not afford sufficient nourishment for the insect, and the very slight articulations of these twigs would be incapable of sustaining the additional weight of these galls, without snapping off and falling to the ground with the first gust of wind. Of course those twigs of the *rigida* or American basket-willow, on which the galls are formed, become worthless for the use above alluded to. Their onward growth is arrested ere any of them attain that length which renders them valuable, and in the course of the following summer, most of them die entirely down to their origin.

Should it ever become an object to diminish the numbers of this species, beyond what is accomplished by its natural enemies and destroyers, this might readily be effected, by selecting out the galls in the winter season, when they show conspicuously upon the leafless twigs, gathering them, and consigning them to the flames.

Habits.—From an inspection of the galls formed by the C. Salicis, it would seem that their growth is caused in the following mode. The parent deposits an egg at the tip of a twig of the willow, when it is growing vigorously, and is of a succulent texture. Probably this is in the month of June. The larva, on hatching, gradually eats its way downwards in the pith of the shoot, entirely consuming this as it advances, and thus forming the canal which runs longitudinally through the centre of the gall. This consumption of the pith causes the extreme and tenderest part of the twig where the young worm begins, to wither and die, forming the horn-like summit of the gall. The juices of the plant now flow to this part more copiously, either in consequence of the irritation produced by the worm, or (if we may consider this to have any analogy to what takes place in the animal economy under similar circumstances) an inflammation excited to produce a separation between the gangrened and living textures, or both these causes combined. The part hence receiving an unusual quantity of the nutritive fluids of the plant, becomes preternaturally developed into the fully formed gall, with its woody texture, forming a secure residence for the worm during the winter season which ensues. And often, one, two or three of the buds upon the sides of the gall are also stimulated into activity, and shoot forth, forming small branches implanted upon its walls.

At or near the bottom of the canal within the gall, the larva lies during the winter season, with its head upwards. The perfect insects are readily obtained at this time, by placing a few of these galls in a tumbler covered with paper and kept in a warm room. Thus situated, their metamorphoses are completed in eighteen or twenty days—scarcely one of them failing to produce a fly.

A thin, white, membraneous-like partition, is placed across the upper part of the canal within the gall, with its edges reflected downwards, and lining the inside of the cavity for a short distance; when ready to undergo its final change, the pupa, by a wriggling motion, crawls upwards, and rupturing this partition, ascends through the horn-like summit of the gall, and almost entirely out of the cleft orifice at its apex. Thus exposed to the air, its superabundant fluids rapidly evaporate ; the parts within the outer film which envelops its body, contract and become more firm, and the fly gradually withdraws itself from the pupa skin, like a hand drawn from a tight glove, and floats forth upon the wing, leaving the blanched relicts of its pupa state adhering to the jagged teeth at the apex of the gall.

Enemies and Destroyers. Pl. II. fig. 8. Upon this topic, my investigations are as yet too limited to give but a few facts, leaving a more complete elucidation of it to a future occasion.

A larva quite different from C. Salicis, is occasionally found within the canal of these galls. It is of a dull pale greenish brown color, rather larger than the Cecidomyia maggot ; its body broadest anteriorly, moderately tapering towards the tail, and composed of thirteen segments ; the head is darker and polished ; the mandibles blackish, tinged with chestnut brown ; each of the three segments following, bears a pair of legs terminated by black feet. Viewed from above, it has a rugose or warty appearance, caused by a row of slightly elevated and darker colored spots on each side of the back, one being based upon the posterior edge of each segment. Lower down, on each side, is another similar row, the spots being upon the anterior edge of each segment. This worm is sometimes found in the upper part of the canal of the gall, with the larva of C. Salicis occupying its usual place in the lower part. But much oftener, at least in the latter part of winter, it is found in the lower part of the canal, the larva of the C. Salicis having disappeared. The presumption is hence strong, that this worm is carnivorous, devouring for its final meal, as it would seem, before it changes to its pupa state, the defenceless larva of the C. Salicis. What are its previous habits—on what it subsists to attain its present size, and how it obtains an entrance into the cell of the C. Salicis? are interesting inquiries, requiring a more extended series of observations than I have as yet been enabled to bestow. About one-tenth of the galls contain these larva.

But the Cecidomyia appears not always to die unavenged. I thrice observed the tenant of the willow gall to be a minute, glassy-white, footless grub, 0.08 long, and about a third as broad ; oval, minutely pubescent, composed of thirteen segments. These, I conjectured, were infantile larva of the C. Salicis, until a fourth occurred apparently feeding upon a dead and considerably shrivelled larva of the kind just described. Hence the inference arises, that it may be some species of the Ichneumonidæ, that kills and subsists upon the Cecidomyia's destroyer.

A day since, on opening a withered and but half-grown gall, like some passed by before without examination, I discovered within its cavity, what appeared to be a dead and distorted larva of the C. Salicis, and as such, laid it beside other fragments to be cast into the fire. But happening to pass a magnifier over this, afterwards, it was shown to be a cluster of minute, oval, orange-colored pupa, some six or eight in number, each one seemingly formed within a separate segment of the larva's body. A tiny Ichneumon will probably prove to be the insect which thus lives parasitically within and eventually kills the larva of the C. Salicis.

Remarks.—The writer is not certain but the species of Cecidomyia now described, may prove to be identical with the *C. Salicina*, which infests the willows of France. Being able to refer to but a meagre description of that species, he is unable to determine this point decisively. That, however, is said to form its galls from the *buds* of the willow, and if this statement be correct, the species is, doubtless, distinct from the one above described.

Salem, N. Y., March 4, 1845.

All attempts to confine the blessings of religion, science, and liberty, have been visited by judgments. Every aristocracy has been broken down, and all attempts to enslave, have resulted in the ruin of the author. The only safe course which a community can follow is, to extend far and wide every privilege, and disseminate every where the elements of knowledge.

FARMERS' MISCELLANY.

ON THE PROPER TREATMENT AND MANAGEMENT OF MEADOW LAND.*

BY JESSE RYDER.

What I mean by meadow land, is that which, from the nature of the soil, is more natural to grass than grain, so much so, as to make it desirable to keep it all the time in grass. It also includes the light moist soil which is good for either grain or grass. As permanent meadow land, the same treatment applies to it all. And be it understood, I have reference to upland merely. To such land as, when poor, or the grass becomes thin upon it, is covered with a red moss, and frequently mouse-ear, being reduced to the production of bull's-eye, or white daisy, all of which are the effect, and not the cause of the absence of grass.

Those temporary meadows on dry land, which come of a rotation of crops, where the grass is renewed after tillage, and remains in but a short time, do not come within the purview of this article. The very dryness of the soil, which compels frequent ploughing, increases the profits of the farmer ; his land is enriched by the easy and simple means of seed and plaster, in conjunction with the manure of the farm, and, as a general thing, such is the most profitable of all land.

But a far different system should be adopted with land which is too heavy and wet for grain, without manure.

From the nature of things, it requires manuring highly to insure a crop of grain, and the fertility of the soil cannot be maintained in tillage husbandry, by the cultivation of clover, as is that of dry land.

Where the soil of a farm is all of that nature, there should be no more ploughed than can be manured sufficiently to give good

* *Note by the Editors.*—The writer of the article above, in a private note accompanying it, says : "Had I possessed the information herein contained ten years ago, I should have been more than one thousand dollars better off than I now am."

assurance of every grain crop sought to be obtained therefrom. Consequently, that portion of the farm under tillage should be small in comparison with that of the same number of acres of dry land. But with the treatment which such land usually receives, the amount of manure made from the produce of the farm is too insignificant to maintain, much more to increase, its fertility. The common practice is to plough it up when the grass runs down, and take from it several meagre crops of grain, before it is again laid down to grass; then succeed two or three middling crops of grass, before it degenerates to the old standard, again inviting or compelling the owner to renew his impotent efforts to increase its fertility.

But such management is all wrong. The attempt to manage heavy land, the same as though it was dry, in order to renew the crop of grass upon it, necessarily involves frequent ploughing, with the application of little or no manure to the greater part of it, from the insufficiency of the supply; consequently, the land grows poorer and heavier by the operation. For soils which are naturally too stiff, but have been lightened by vegetable matter, speedily degenerate under tillage, and become less porous as the vegetable matter works out; leaving it compact, and heavy, and unfitting it for the growth of plants; so that it requires a very successful new seeding with grass, to again lighten it up and restore it to its former good estate. Such a system, then, should be adopted with such land, as will not diminish the amount of vegetable matter upon the surface of the soil. If it is desirable to plough the land, let it be up but one season as a summer fallow, and sown early with winter grain, and seeded with timothy in the fall, and clover in the spring; that enables the young grass to feed up the old, so that by the time the old roots are decomposed and appropriated to the use of the new crop, a more luxuriant growth is obtained, and the amount of vegetable matter in the soil increased; or, in other words, its fertility, or power of production is increased, which must be attributed to the large share of nourishment which plants derive from the atmosphere (being, according to Liebig, nine-tenths of the whole,) that makes the old roots a basis for nine times their weight of vegetable matter to be grown upon, or in the soil. This new estate can be maintained without manuring, as I shall show hereafter. Such, in my opinion, is the extent to which land not fitted for a succession of grain crops may be ploughed.

But a far better way than ploughing exists, in my opinion, to renew the grass upon old meadow land. There are two ways in which it may be done without ploughing ; one through the agency of red clover, the other by top-dressing with manure, of which the one most important to be understood, because the easiest, and cheapest, is that which is effected by clover.

Strange as it may appear to some, clover is to stiff clayey soils when kept constantly in grass, and rightly managed, the same source of fertility that it is to dry land in a judicious rotation of crops.

Although it generally succeeds but poorly on such land in a new seeding, after tillage, owing to the roots being drawn out by frost, it by no means follows that such soils are incapable of producing it. On an old meadow matted with other grass, there is but little freezing and thawing of the surface to draw out the roots of clover, and the multiplicity of other grass roots tend to bind them to the soil.

But it requires peculiar management of meadow land to preserve in it a succession of clover so as to maintain the fertility of the soil, and renew other grass upon it, so as to increase its burthen, like to a new seeding.

By observation, I have been enabled to discover the circumstances which govern the production of clover on old meadows, which might be called an inductive theory of its operation. To secure its benefits, one general principle is to be observed, which is, to always let the rowen clover go to seed, before cattle are turned on to pasture the after crop.

The operation is simply : this suppose an old meadow that is running down to blue grass. Timothy and other grasses are dwindling to a light crop, and there are plants of clover scattered over the land, which are permitted to spring up after mowing, and go to seed. The seed sheds abroad over the surface in the fall and winter ; in the spring it comes up very early, and is protected from frosts by the old stubble and moss which is upon the land. The crop of other grass being light gives the young clover a chance to grow, which consequently brings the land round to clover, the old grass preserves the roots during the winter, the next year it is up betimes, and takes possession of the ground by getting the start of other grass, provided the seeding was thick enough. If not, it seeds thicker the next fall, clover being on the increase, and thus it gets possession of the ground partially smothering other grass, and killing the moss. The land becomes completely renovated, but what becomes of the clover ? The year it gets possession, there is naturally a great deal of seed grown in the fall, which scatters over the ground in great profusion ; it comes up the next spring, but circumstances are now very different, there being a full growth of other grass, the young clover is nearly all smothered in turn. The old clover dies and the soil is further ameliorated by its roots, and timothy, red-top, and white clover take possession, in a rejuvenescent state, young clover is more or less killed until the timothy and red top dwindles again ; and thus by proper management is clover made the agent of the farmer in fertilizing the soil, and increasing his crops, without the aid of manuring, or ploughing, vegetable matter accumulates on the surface, the soil becomes more open and friable and pervious to air, heat, and moisture, and this is all done for a soil that is naturally wet and heavy without manure. But these changes of grass are not periodical.

The shortest that can be made are once in three years a crop of clover, but they are generally irregular, owing to the vicissitudes of seasons, affecting the young clover for good or ill.

There are many who suppose it necessary to leave the second growth of grass undisturbed, to rot on the ground, in order to preserve the fertility and maintain the productiveness of old meadows in grass, where top-dressing with manure is not resorted to. But such management is not only unnecessary, but oftentimes extremely hurtful, and the injury is proportioned to the amount left untrodden and unfed. If the amount left standing, or laying loose upon the surface be considerable, it, in the first place, makes a harbor for mice, which will, under cover of the old grass, intersect the surface of the land with paths innumerable, from which they cut all the grass that comes in their way, more especially the crowns of the clover plants of which they seem especially fond.

In the second place, the loose covering of old grass seems to operate to shade and smother the young grass in the spring, that the young mice may have left, more especially the young timothy, and the result is that a meagre crop of what is here called spear grass, or June grass, shoots up through the old grass as through a brush heap, in lieu of the good burthen of the year before.

I will here subjoin some general directions for the management of meadow land so as to secure a succession of clover, and consequently maintain the fertility of the soil.

1st. Always let the rowen clover go to seed.

2d. Always mow early, so that, if the season be dry, the clover may have a chance to get to seed. The hay will also weigh more and be of better quality.

3d. If the season be favorable and the second growth large turn in upon it as soon as the clover seed begins to shed, in order that it may be sufficiently fed off and trampled down before winter otherwise mow it the second time after sufficient seed has shed upon the ground.

4th. If the after-growth be light, so as if left upon the land, it will not endanger the next crop by shade and mice, do not pasture it at all.

Such treatment of meadow land is generous and good, and that generosity will be returned. It does not admit of turning cattle upon meadows as soon as they are mowed, to bite the grass down to the roots, killing some kinds and injuring others. Timothy grass, for instance, generally requires the balance of the season after mowing, in which to recruit, so as to put forth its best effort the spring following.

The more kinds of grass there are growing on the same ground the greater the weight produced, and the thicker the growth Each kind is supposed to require some specific food, not appropriated by the others, therefore they can feed together without robbing each other, and therefore it is that old meadows can be made to produce much more weight of grass than those newly seeded.

White clover is an important grass on flourishing old meadows It grows very thick at the bottom of the other grass, although in a good season it will grow to the height of from twelve to sixteen inches. It should be cut early or it will diminish fast, and in a dry season entirely disappear.

Red clover on old meadow will grow well when the ground is so wet as to hold water on its surface for two or three months in the spring. I have seen it in low spots completely covered for weeks together. Therefore land which produces abundant crops of grass would require extensive draining for grain, and seeing that ploughing such land destroys its life it is far better to keep it in grass continually.

I now come to treat of top-dressing meadow land with manure, to promote the growth of grass.

Where hay is much of an object of culture, and manure can be had, it possesses the following advantages over the clover culture, in renewing the crop:

1st. The crop can be kept more uniform in amount by manuring whilst it is still fair, and before it runs out to blue grass, which generally precedes the change to clover—for, in the clover culture, one or two middling crops must be expected in a round of from three to six years.

2d. If the hay is destined for market, clover is not as saleable as other grass, and it can be kept in a minority by pasturing the meadows close after mowing, and top-dressing with manure.

3d. Heavier crops can be obtained by top-dressing than by any other system of management, the clover system seldom giving over two tons of hay to the acre, at one cutting—new seeding with timothy, three tons—when top-dressing gives three tons and upwards. Three and a half tons to the acre, obtained by top-dressing, will stand up as well as two tons of timothy newly seeded, being so much thicker at the bottom, and growing so many more kinds of grass. I have obtained three and a half tons to the acre in a good season, by spreading ten two-horse wagon loads of fresh livery stable manure to the acre, in February, on a stubble principally timothy the year before, when a portion of the meadow not dressed gave but two tons. I have spread fifteen loads of manure to the acre on poor, wet, heavy, meadow land, in the fall, where about half a ton of white daisy grew to the acre. The next year the crop was about one and a half tons of daisy and other grass, particularly red clover; the year following timothy began to get possession—crop about the same in weight. In the fall I put on about ten loads more to the acre, of swamp manure, that had laid one year in the hog pen; the result was full three and a half tons of hay to the acre of timothy, and some white daisy of equal height, and very tall. The next year there was a very heavy growth of timothy without daisy, which was now mastered and killed. Two things I have ascertained by top-dressing, which may be useful for some farmers to know. One is, that it is the only way to exterminate from meadows daisies and weeds, and be paid for doing it, instead of paying for having it done.

Bull's-eye or white daisy, does not grow on my meadows, after the yield comes to exceed a ton and a half to the acre, except the year following the application of the manure—the growth being promoted for one year as much as that of other grass.

Another thing useful to know, is, that it pays better to manure good land than poor, when in grass; the limit being where the effect is neutralized by the grass lodging early, and rotting at the bottom—at least, such is my experience.

As concerning the time in the year when manure should or ought to be applied to grass ground, it is, or must be varied by circumstances. But this much I will say, that it may be done as soon after mowing as is convenient, and not later than the first of March in this latitude.

If the land be naturally wet, so that in the spring months it is saturated with water, the manure should be applied as soon as possible after it is mowed. By so doing, the rain which falls in the dry part of the season soaks into the ground, and carries with it the strength of the manure, which is thus secured for the benefit of the land. If on such land it be put on in the winter, the spring rains float off a great part of its substance, and the effect is comparatively trifling.

I have seen as good effects from manuring in the summer, spots so wet that nothing but wild grass grew, as I have from manuring land that is esteemed dry enough; it causes red-top to grow in such places most luxuriantly.

Another case where the manure should be applied early, is where the land is so poor that the grass is weak and thin. In such cases it should be applied immediately after mowing, so that the grass may have time to thicken up in the fall, for the year following. The greatest effect from the manure will then be observed in the first crop of grass. If it be put on late, the greatest effect will not be observed until the second crop is obtained. Early spreading is generally the best on any meadow land. I prefer unfermented stable manure, with the litter undecomposed, to the same manure in a rotten state; and hot, dry weather, in summer, forms no objections in me to applying it immediately. In the dryest weather, the grass will soon spring up through the manure, when it will not grow at all on the parts adjacent.

The manure should be spread very evenly over the ground; if it be long manure, it should be shaken fine off the fork. There are but few hired men who are willing to perform the work aright.

I have used earth from the road-side, swamp manure, swamp manure with leached ashes spread on it after it was applied to the land, and leached ashes alone for top-dressing, of which the swamp manure and ashes together produced the greatest effect, being fully equal to stable manure, and will no doubt be much more lasting. The rich earth from the road-side, on the second year, more than four times paid for its application. Ashes alone show a decided good effect. The swamp manure alone has been on for two years without having effected much change—I suppose, because of its insoluble state, and the grass roots not having got hold of it—but I do not despair of its ultimate good effects. I think that, as a manure, it should always be applied to the surface, that it may be dissolved by the gases that float in the atmosphere, aided by the roots of the grass when they have taken possession of it. I know that it is extremely favorable to the growth of timothy when it is once appropriated to its use, and that the crop is maintained for a long time. Rich earth, from the sides of the fences, where it has been washed or ploughed in, would be excellent for top-dressing; never mind if the bushes are killed by it. In top-dressing with stable manure, I make it a point to sow plaster upon it as soon as I can after it is applied, and the more manure I put on the more plaster I sow, more being required to arrest the ammonia in its escape.

As I do not think that mowing without manuring necessarily impoverishes the land, and as I think that my meadows are rich enough, I shall hereafter depend on clover, and top-dressing with any substance that will lighten the surface soil, to kill the moss and renew the grass.

As an instance of the effect of clover, I will mention that I know a meadow which twenty years ago was a barren waste—the soil heavy, and the water, in the spring months, escaped from it by flowing over its surface—no grass grew upon it. It was summer fallowed and sowed with rye, timothy, and clover seed ; a little manure was put on a part of it. It has never been manured since, except by plaster ; the hay from it has always been sold, and averages about two tons to the acre ; it is in clover about one quarter of the time, and is managed as I have directed in this article ; the soil is now very light, and the water soaks away freely.

When will farmers stop murdering their meadows, and keep more stock ? which they may do under a better system. Better soil the cattle with green corn, sown for that purpose, or clover, than to pasture so close.

EFFECTS OF MENTAL IMPRESSIONS DURING PREGNANCY.

I propose to enquire whether strong mental impressions made upon the mother, at particular times, will produce any effect upon her offspring.

This is not, as might appear at first sight, a question of curiosity alone, but is of practical value to every breeder of stock. If strong impressions made upon the female during heat, at the time of conception, or during pregnancy, are communicated to her young, it is highly important that those who wish to raise a pure breed, should at such seasons, prevent unfavorable impressions being made.

It is a fact well established in regard to the human female, that violent passions, or other strong mental impressions, may and often do cause the death and premature birth of the child. It is further argued and asserted by some, yet generally denied, that such impressions may also be communicated to the offspring during pregnancy, in such a manner, as to modify and even direct its organization. This opinion is founded upon a few, but well authenticated cases, in which there was an obvious recognized object, making a powerful impression of a disagreeable kind, complained of at the time, and followed by an effect in perfect correspondence with the previous cause. These facts are not denied, but are explained as coincidences; but in some of the in stances referred to and one of which is known to me personally, there is between the cause and effect, a similarity so perfect, that it is not easy to suppose it could have been accidental. Such are the views of men who have examined the subject as a matter of science, but among the uneducated, the belief is almost universal, that the imagination of the mother during pregnancy, has a strong controlling influence over her offspring. Indeed, the origin of this opinion is coeval with our earliest records, and although this alone should not be taken as proof, yet when we find a belief prevalent, not only in a single neighborhood, or even a single nation, but wide spread as the family of man, and this belief still further substantiated by occasional instances, occurring under our own observation, it requires a strong degree of skepticism to deny utterly its truth.

This influence is also claimed to operate upon the brute orders of creation, and although we cannot for a moment suppose animals to possess that same degree of sensitiveness as we claim for our own race, we cannot deny to them tender affections and sympathies, through which the causes here spoken of must operate.

No one circumstance connected with the history of the influence we are here discussing, has so effectually contributed to its permanency as a popular opinion, as the successful stratagem of Jacob to secure to himself the "ring streaked" cattle from the flocks of Laban. It is urged, however, that the effect here produced, was an indirect interposition of God in favor of Jacob, and against the crafty Laban. It would appear, however, from a careful consideration of the narrative, that Jacob only availed himself of knowledge, he had previously acquired as an experienced herdsman; yet, it is freely admitted that the *extent* of his success, was far greater than could have been anticipated from the influence of his motley rods alone. It is thus related. "And Jacob took him rods of green poplar, and of the hazel and chesnut tree; and pilled white streaks in them, and made the white appear which was in the rods. And he set the rods which he had pilled before the flocks in the gutters, in the watering troughs when the flocks came to drink, that they should conceive when they came to drink. And the flocks conceived before the rods, and brought forth cattle ring-streaked, speckled and spotted."* Other instances of a similar description, are recorded by modern writers, clearly proving that the feelings of the mother *may* influence at least the color of her progeny. A striking case of the kind is given by Sir Everard Home.† An English mare, which had never been bred from before, was covered by a quagga,—a species of wild ass from Africa, which is marked somewhat like the Zebra. This happened in the year 1815, in the park of Earl Morton, in Scotland. The mare was only covered once, and the produce was a hybrid, marked like the father. The hybrid remained with the dam four months, when it was weaned and removed from her sight. She probably saw it again in the early part of 1816, but never afterwards. During the four years following, she had three foals by a black Arabian horse, (having missed once.) They were all marked more or less, like the quagga, and in two of them the resemblance in color, and in the hair of their manes, was very strong. They were distinguished by the dark line along the ridge of the back, the dark stripes across the forehead, and the dark bars across the back part of the legs. Mr. Mayo,‡ mentions that a similar instance was observed by Mr. Giles in a litter of pigs, which resembled in color, a former litter by a wild boar.

Similar facts are frequently observed, and many such are alluded to by modern writers. Mr. Milne,§ tells of a pregnant cat belonging to him, the end of whose tail was trodden on with so much violence, as to cause intense pain. She had five young ones perfect in every respect except the tail, which was in each of them distorted near the end, and enlarged into a cartilaginous knob. Haller || remarks, that the young foal of a horse, from a mare which, previously, had a mule by an ass, has something asinine in the form of its mouth and lips. Beecher¶ says, that when a mare has had a mule by an ass, and afterwards a foal by a horse the foal bears evident marks of the mother having retained some ideas of her former paramour, the ass.

* Genesis. chap. xxx. verses 37-8-9.
† Philosoph. Transac. 1821. p. 21. and Lect. on Comp. Anat. vol. iii., p. 307.
‡ Outlines of Physiology, p. 376.
§ Transac. of Linnæn Soc., of London.
|| Element. Physiol. viii., 104.
¶ Physic. Subterran. Lips., 1073.

The above cases related by Home, Haller, Beecher, and similar ones by others, are attempted to be explained on the principle, that the connexion with the male produces a physical impression, not merely upon the ova which are ripe for impregnation, but upon others which are at the time immature. This explanation will not apply, however, to the case of the cat, related by Milner, nor to the following. Mr. Boswell* says, " one of the most intelligent breeders I ever met with, in Scotland, Mr. Mustard, of Angus, told me that one of his cows chanced to come in season, while pasturing on a field which was bounded by that of one of his neighbors out of which an ox jumped, and went with the cow until she was brought home to the bull. The ox was white with black spots, and horned. Mr. Mustard had not a horned beast in his possession, nor one with any white on it. Nevertheless, the produce of the following spring was a black and white calf, with horns."

Now, if this be true, as above stated, and I am not aware that it has been denied, it shows that a strong impression made upon the imagination even of so dull a beast as a cow during heat, can produce an evident effect upon her calf. If careful observations were made it is highly probable similar results would be obtained frequently.

Mr. Blaine, as quoted by Walker,† relates two cases occurring in the dog tribe. He says, " I had a pug bitch, whose constant companion was a small and almost white spaniel dog, of Lord Rivers' breed, of which she was very fond. When it became necessary to separate her, on account of her oestrum, (*heat*,) from this dog, and to confine her with one of her own kind, she pined excessively ; and notwithstanding her situation, it was some time before she would admit the attentions of the pug dog placed with her. At length, however, she did so ; impregnation followed ; and, at the usual period, she brought forth five pug puppies, one of which was elegantly white, and more slender than the others. The spaniel was soon afterwards given away, but the impression remained ; for at two subsequent litters, (which were all she afterwards had,) she presented me with a white young one, which the fanciers know to be a very rare occurrence."

* Quarterly Journal of Agriculture, vol i., p. 28.

† Walker on intermarriage, p. 246–7.

"The late Dr. Hugh Smith used to relate a similar instance, which occurred to a favorite female setter that often followed his carriage. On one occasion, when travelling in the country, she became suddenly so enamoured of a mongrel that followed her, that, to separate them, he was forced, or rather, his anger irritated him, to shoot the mongrel, and he then proceeded on his journey. The image of this sudden favorite, however, still haunted the bitch, and for some weeks after, she pined excessively, and obstinately refused intimacy with any other dog. At length she accepted a well-bred setter; but when she whelped, the doctor was mortified with the sight of a litter which, he perceived, bore evident marks, particularly in color, of the favored cur, and they were accordingly destroyed. The same also, occurred in all her future puppings; invariably the breed was tainted by the lasting impression made by the mongrel."

Such, then, are a few of the facts, in relation to this matter, and they would seem to warrant the inference, that the maternal imagination may strongly mark her offspring. The time during which this effect may be produced is not so well established. It would appear, however, to take place during heat, or any early period of pregnancy. To apply this principle to a useful end, is well worthy of careful experiment. This could be done by any farmer, of sufficient knowledge, and possessed of moderate resources, without expense and with very little trouble. The nature of such experiments and the manner in which they should be conducted, will be suggested at once, to any intelligent, thinking mind.

Newburgh, March 1, 1845.

YELLOWS IN PEACH TREES.

BY A. SAUL.

The fatal malady termed "yellows" in peach trees, has of late aroused horticulturists to institute more than ordinary inquiry into the cause that produces it. In most of our Agricultural and Horticultural Journals, the subject has been discussed by men of experience and observation, and so puzzling is the subject, that scarcely two persons appear to come to the same conclusions, nor has any one individual, so far as I am aware of, satisfied himself that he has ascertained the cause of this disease. In the February number of the Cultivator is an article from Mr. Darling, of New Haven, Conn., placing before the readers of that journal what he calls, and what in my opinion is, a clear, unmistakable description of this fatal disease, with a view of awakening universal research, in the hope of finding some clue to the cause of this epidemic. And, although his positions, on the whole, so far as I am able to judge, are correct, I have never seen, in my comparatively limited opportunities of observation, sufficient to warrant me in agreeing with him in the conjecture he has hazarded, (to use his own words) that it is derived from some unknown insect. Nor do I think, as is generally supposed, we have evidence sufficient to justify the conclusion that the disease is contagious, and is communicated from tree to tree, while they are in blossom. The fact, that when the disease commences in a plantation containing a number of peach trees, it does not attack the whole at once, but breaks out in patches or parts of one or more trees, which are progressively enlarged in the next and ensuing years, till eventually all the trees become victims to the malady, is not of itself enough to settle this point; there must be something more detected in connection with these circumstances, to establish the theory that the disease is contagious.

Without attempting to prove that the debilitated state of trees having the yellows is caused by exhaustion, from excessively luxuriant and vigorous growth, and the consequently superabundant crops that follow, there are many circumstances that I have noticed, that inclines my opinion in that direction. In England, where the peach tree is subjected to artificial management, rendered necessary by the humidity and deficiency of solar heat in that climate, to bring the fruit to perfection, either on walls or under glass, the "yellows" are not known. It is true, there are many insects, parasites, fungi, and other epidemics peculiar to this country, not known in Europe, and vice versa, that are very destructive to the cultivation of fruits and fruit trees. Consequently, this circumstance of itself is no proof. But the fact that in England, where peach trees are subjected to a regular routine of treatment, (of which I shall have a word or two to say in conclusion) the "yellows" are unknown, caused me in the first instance to look in that direction; and, although the instances afforded me for observation, and experiment, are but few, yet so far they bear out the theory which I have ventured to advance, that much of what is called yellows, is caused by exhaustion, and the entire neglect of a systematic routine of pruning, trimming the superabundant fruit crops, &c.

In 1839, there were among other fruit trees at this place (the establishment of A. J. Downing, & Co.) some old peach trees in bearing, part of which had the "yellows," and nearly all of which, (only two or three being left) have since disappeared, in the usual manner that trees do having the "yellows," or getting the disease from whatever cause. In the spring of that year, there were some young trees planted out, as standard trees, that have been pruned regularly every spring since; they have borne fine fruit for the last two years, the vigor of the trees at the same time being unimpaired, and show no symptoms of the yellows as yet. In the spring of 1840 and 1841, some trees were planted out for training in the manner of wall-trees, some of which were sorts known to be diseased, and consequently have since died; the others, that were of thrifty stock, have grown well, and have been pruned and trained in the usual manner as practised on wall-trees in Great Britain, &c. Some of them bore magnificent fruit last season, and are in a most luxuriant and healthy state. Again, peach trees with *entire* leaves, which are sorts not subject to mildew, are generally the greatest bearers, and generally most affected by the "yellows;" while, on the contrary, peach trees with serrated leaves are generally the more moderate bearers, and are the sorts mostly affected with mildew, and seldom with the yellows. There may be a few exceptions, but this is generally the rule. The inference to be drawn from this is, in the case of serrated leaved, mildewed varieties, the shoots affected with mildew perish as far down as diseased, and answer, to a certain extent, the purpose of pruning, and generally these sorts have very dark green foliage, and seldom have the "yellows;" whereas, on the contrary, the entire leaved varieties, not being subject to mildew, ripen their shoots to the very extremities, and bear fruit to the same extent when not pruned; the consequence is, the complete exhaustion of the vital powers of the tree in the production and maturing of such immense crops of fruit, so frequently seen on young and vigorous trees for the first year or two after they commence bearing.

It is well known that peach trees raised from healthy stock, grow very thrifty for the first four or five years, or, until they first bear fruit, and seldom or ever show symptoms of the yellows until they have borne fruit, unless taken from diseased stock. Consequently, the first and second crops are generally of fair quality and immense quantity, and it has never been matter of surprise to me, to see trees allowed to grow and produce in this manner, show signs, if not of the "yellows," of a state of exhaustion equally bad; for in nineteen cases out of twenty, trees are treated, or rather allowed to maltreat themselves as above described. Now, I ask, is it not as reasonable to look to the cause of the debility manifested in peach trees that have what is termed the "yellows," in the exhausted state of trees above mentioned, as to the disease being communicated from tree to tree while in blossom, as supposed by many? The fact of healthy trees seldom or ever showing any symptoms of the malady before they blossom, has given rise to the idea of its being communicated while in blossom; but it will be borne in mind that trees *rarely* bear fruit before they blossom, and seldom show signs of the disease until the fruit is half grown, or more, and the symptoms become more evident as they approach maturity, and at no time previous is it so visible as at that stage when the tree is ripening its fruit, when the whole resources of the tree are called into action to perform the important offices required at that eventful period.

Mr. Darling cites an instance of buds being taken from a tree in fruit, (I suppose before the fruit was ripe) which grew and made vigorous trees, while the old tree, after ripening its fruit, showed the yellows. This would appear to bear out the opinion that the disease is caused at the time of ripening its fruit more than at the period of the tree being in blossom, for it is well known that buds taken from trees having the yellows, if inserted in stocks ever so healthy, the disease will manifest itself in the tree produced by the bud, for in the vegetable as well as the animal kingdom there is a limit set, beyond which disease, when neglected, becomes incurable, and when such stock is propagated from, no matter whether from seed, buds, or any other way, the parent will entail on its offspring its constitutional infirmities.

I promised to say a word on the subject of pruning, in conclusion. The length of this communication already, will necessarily compel me to be more brief than the subject demands. On trees which bear on the last year's wood, *like the peach*, there is a necessity for annually shortening the branches, in order to provide a supply of new shoots for bearing the next season. The proper time for this operation depends a great deal upon the season, but as a general rule, about the middle or end of March is soon enough, and in late seasons, the beginning of April, or any time before the blossom expands, and trees of very vigorous growth may even be pruned in full blossom, as to cut the wood late in the spring is one of the remedies for excessive luxuriance. Weak trees should be cut as soon as the buds show the first symptoms of swelling in the spring.

In pruning the peach tree, the first thing to be attended to, is to cut out all weak and superfluous branches, such as are inclined to cross each other, and those that are wiry and sapless, and in old trees, thinning out decayed branches, and worn out bearers, and retain all the best shoots, selecting those that are *short-jointed* and *most fertile*, rejecting alike the over luxuriant, with the weak and sapless. Those retained, should stand at such distances as to allow the foliage and young shoots plenty of room to grow without crowding each other, then shorten those branches from half to a fourth, according to their strength, always bearing in mind to prune the luxuriant branches or trees least, and the weaker ones most. Were the strong tree much cut, it would produce shoots so disproportionately large, as are alike bad for wood and fruit, while the weak tree, unless relieved by pruning short, would not long continue to bear at all. A great deal may be done during the summer in the way of pruning, disbudding ill-placed and superfluous branches, wood buds, &c. Indeed were this part properly attended to, there would be little left for spring pruning, except shortening the branches. But when there is so little attention paid to spring pruning, it is hardly to be expected that summer management will be attended to.

Trimming the fruit is another operation that claims more attention than is paid to it. When the trees have set their fruit very thick, they should be partially thinned, as soon as they are fairly set, reserving the final thinning until the fruit is done stoning; that is, till the shell is quite hard, and the kernel formed—for most trees drop some of their fruit in the time of stoning, especially those anywise unhealthy, so that the thinning had better be performed at two or three different times, always observing to retain the fullest, brownest, and best formed fruit. With respect to the quantity or number of fruit proper to be left on the tree, much must depend on the size of the fruit, and vigor of the tree, large varieties requiring to be thinned more than small varieties of fruits; full grown healthy trees, too, being allowed to bear more than young and feeble trees, &c. The mistaken idea, than which nothing can be more absurd, entertained by many, of losing so much of their fruit, in carrying out the above directions, I know is the great obstacle to their adoption. Any person having peach trees about bearing the coming season, may convince himself by comparison. If they have two trees of a kind, both healthy, and as near as possible alike in size, and all other respects, let the one be treated according to the above directions, and let the other produce as it has been wont to do. It will be found that the tree treated in the above manner will produce an equal, and if the system be moderately carried out, a greater weight of fruit, and these much finer and of higher flavor, consequently worth a great deal more; while, at the same time, the tree is preserved in a healthy and vigorous state, and I think, prevent much of what is called the "yellows."

HIGHLAND HORTICULTURAL NURSERIES, *Newburgh, March 10th,* 1845.

IMPROVEMENT OF STOCK.

It is highly important that more attention should be given by the agricultural community generally, to the improvement of stock. Now and then, among our native cattle, an animal may be found of more than ordinary good qualities. But as a general thing, we are poorly off in this respect. It is a fact that astonished us not a little, when we first made the discovery, that the farmers, in some of the best parts of this country for dairying, sell off their cows every fall to avoid the expense of wintering them, and buy a new stock in the spring. Now if their cattle, were such as they ought to be, they would not do this.

We do not profess to understand thoroughly the principles of breeding. But we are inclined to believe that almost every farmer knows enough of them, to improve his breed of cattle very much. The best and most improved breeds of the present day, have all been produced from the common native cattle, by judicious management. And if farmers would supply themselves with good stock, they would not be willing to put them away every fall.

We think the agricultural societies are at some fault in this matter. Their attention has been too much directed to imported breeds, and thus our native breed has been neglected. Out of a large number of premiums offered at the last fair of the New-York State Agricultural Society, a very small number only, were offered for native cattle. Under such circumstances, there is no inducement to do any thing, except what the individual enterprise of any man may prompt him to. And such enterprise is not very abundant in this country. We cover such an extent of surface, and embrace such varieties of climate, that we cannot expect the breeders of Britain to supply us with animals suited to all parts. We must do something ourselves.

But since so much dependence is placed upon imported cattle, it becomes a matter of some importance to determine the best for particular climate or soils in this country. We do not comprehend the differences existing between the different breeds, and have no preferences founded on fancy or prejudice, and of course can say nothing by way of recommendation. But whenever we hit upon any thing, which appears to us worthy of notice, on this subject, we shall lay it before our readers, that they may be aided in forming a judgment. It is with this in view, that we make the following extracts, from English papers. The first is from a speech of a celebrated breeder, W. Fisher Hobbs, Esq., before the East Essex Agricultural Society.

"When he first became a farmer, he was determined to have a good breed of cattle. He first tried Short-Horns, because he thought they were the *best* ; and at a sale in Suffolk, he purchased several, better than which could not be obtained. He also purchased some Herefords, and kept them together for twelve months, and the result was most decidedly in favor of the Herefords. He was therefore compelled, *contrary to his own wishes*, to give up the Short-Horns and take to Herefords; and he had from that time continued to do so, being satisfied that with his soil and climate, they paid the best. (*Hear, hear.*) He trusted the farmers whom he was addressing, would do as he had done, and judge for themselves what description of stock was best suited to their farms; and when they were satisfied that they had a breed which would prove *most profitable* to them, he would advise them to *keep to them* ; and if they came here to exhibit them and were occasionally unsuccessful, he would advise them to go home, with a determination of meeting with more success on a future occasion."

The following is from the "Hereford Times."

"IMPORTANT TO DAIRYMEN—HEREFORDS AND SHORT-HORNS."

"A gentleman in Leicestershire, who keeps a large dairy of Short-Horn cows, wishing to make a comparison between them and the Herefords, bought a Hereford cow at the Rev'd J. R. Smythie's sale in 1839. He soon found that the Hereford gave less milk than many of his Short-Horns, but, as she was a fine looking cow, and a good breeder, he continued to use her in his dairy. In the spring of 1843, he determined upon making a more exact comparison as to the quantity and quality of the milk given by the respective breeds. For this purpose a short-horned cow was selected of the same age, and which calved within two days of the same time as the Hereford. The milk of each, was carefully measured ; the Short-Horn was found to give *nine* and the Hereford *six* quarts at a *meal*. The milk was set up and churned separately ; that from the Hereford produced *nine* pounds, and the Short-Horn not quite *five* pounds of butter per week. They stood in the same stall—were fed on the same description of food, and had been kept alike previous to calving. It has also been proved that two quarts of milk from a Hereford, will produce as much *curd* as three from a Short-Horn cow. The gentleman is now crossing his Short-Horn cows with a Hereford bull, with a view of improving the quality of his milk."

POTATOES.—EXPERIMENTS.

During the coming season judicious experiments ought to be made with the potatoe, to ascertain, if possible, more of the disease which has made such ravages in it for the last two years, and also the best mode of curing or preventing it. And to do this, let every farmer bestow particular attention upon all the circumstances connected with planting and cultivating them, such as the following :—whether they are most affected in old tilled land, or that which has been lying still in fallow or in grass for some years—whether in manured land or that which has not been manured—whether one kind of manure seems to be better for them than another—the effect of saline substances as nitrate of soda, saltpetre lime, plaster, ashes—whether they succeed best in shaded land or that which is exposed to the sun—in dry or moist land—and the peculiarity of the soils in which they are most and least diseased

We can conceive that great practical good may result from such observations, if generally and carefully made. The date upon which the disease is first observed should be noticed—the temperature of the air for a few days about that time, and the temperature of the earth, both on the surface, and about four inches beneath it. Such observations are attended, it is true, with some extra trouble, but if they are followed up systematically, the trouble will not be thrown away. Let every thing be noted down on paper at the time it is observed, and forwarded to us when the crop is lifted, and we will make up the result. It would be well for young farmers to form the habit of making such observations.

We would also suggest the making of some careful experiments on the general cultivation of this crop. It is not by any means a settled point whether they should be planted whole, in pieces, or whether the eyes or buds are not as good as either. As far as our experience goes—and we have made a number of careful experiments—we think there is no difference. But we think tubers of a good size are better than small ones. We may state one fact.

In the spring of 1844, we received from a friend one potatoe, just brought from Antwerp. It contained eight buds. The tuber was carefully divided, so as to include one bud in each piece, and each one planted in a separate hill. In the summer, before earthing them up, a shovel full of stable manure was thrown on each hill, and covered. The produce of the eight hills was 110 potatoes of good size—or nearly half a bushel. At the same time, we had a crop from whole potatoes, and another from mere eyes, and we could see no difference in the quantity or size of the produce. If it be a fact, that there is no difference, in a winter of scarcity, the seed end of the tuber may be cut off and preserved for planting, and the rest eaten.

The history of this useful plant is somewhat curious. It is doubtless a native of this continent. Its original locality seems to have been, as far as can be ascertained, in the mountainous regions of South America, near Quito. From that country they were introduced into Spain, early in the sixteenth century. From Spain it appears to have spread slowly through the southern parts of Europe, and in the latter part of that century reached Germany. About this time it was brought into Britain.

Sir Walter Raleigh first planted it on his estate near Cork, in Ireland, whence it was soon carried over into England. They were considered rather as a delicacy than an article of common food—and as to potatoe eaters, it is certainly amusing to read such accounts as are given by Parkinson, that "the tubers were sometimes roasted and steeped in *sack and sugar*, or baked with marrow and spices, and even preserved and candied by the comfit-makers."

It was a century and a half however, before they became generally known and cultivated in that island, since which time they have become a general article of food.

The numerous varieties of the potatoe which we have at the present day, have been produced from seed. The method of doing this, is as follows: The balls or apples, are gathered when the vines begin to die in the fall. They must be broken and the seed washed out, or pressed out through a sieve, and separated from the pulp and dried. In the spring, they may be planted in drills, and carefully cultivated through the summer. In the fall, each vine will be found to have a few small tubers attached to it. These may be separated, those belonging to each vine being kept by themselves, to be planted the next spring. At the end of the second season some will have attained sufficient size, to try their quality. But out of the whole quantity there may not be one of good character enough to preserve. If there should be any, they can be selected, and the others thrown away.

SELECTION OF SEED.

If much depends, in order to secure a good crop, upon the ploughing and manuring and after tillage, much likewise depends upon the kind of seed. Every one is not probably aware that new varieties in the vegetable kingdom are produced by *crossing*, just as they are among animals. If two kinds of plants of the same general family, be grown near each other till they produce seed, their seed will probably be "mixed" as it is called, and neither will produce the same kind of plant again. This is often seen in Indian corn, or in peas raised in the same garden—in cultivated fruit, and various plants. When, therefore, a good variety is grown, great care should be taken that no poor kind is grown near it, lest it should degenerate. The most of garden vegetables have become mixed in this way, so that it is difficult to find pure seed now. We think that farmers would do well to devote a portion of land every year, separate from his main crops, to the raising of seed for the next year. The extra cultivation he might bestow upon it, would do much to improve the seed. In saving seed, that which is the most prolific, and which ripens earliest, should be chosen. By this means much may be gained.

Mr. Loudon states that in the spring of 1823, he selected a wheat plant, from near the centre of a field, which produced sixty-three ears, and yielded two thousand seven hundred and forty-three grains. These he planted, and the fourth harvest brought him three hundred and twenty bushels of sound grain. Any farmer, n this way, from one seed of a good kind, could in a few years aise enough to sow his whole farm. The same author in this con-ıection, makes the following statement, showing the advantage of hoosing the most prolific seed :

" The number of fertile joints in the spike of the wheat gener-llly cultivated, varies from eighteen to twenty, and the inhabitants f Great Britain and Ireland amount to about the same number of aillions ; therefore, as the wheat produced in those islands has een of late years sufficient, or nearly sufficient, to supply the in-abitants thereof with bread, it is evident that a variety with two dditional fertile joints, and equal in other respects to the varieties t present in cultivation, would, when it became an object of gene-al culture, afford a supply of bread to feed two millions of souls vithout even another acre being brought under cultivation, or an dditional drop of sweat from the brow of the husbandman." *En-yclopedia of Agriculture, Art.* 4861.

DEGENERACY FROM BAD TILLAGE.

The evils of bad cultivation do not consist in bad crops alone. here are other and still greater evils to be avoided, and which ıould be a great inducement to every farmer, to use any effort to erfect himself in his art. And not the least of them is degene-ıcy in the character of the plant cultivated. In this respect, if ı no other, there is a sort of analogy between the animal and the egetable. An animal of any of the best and most improved eeds, if badly cared for when young—if scantily or insufficiently pplied with food, and exposed to all kinds of weather, and left to its own chances of support, will grow up a scurvy, ill-shaped, unsightly thing ; and one or two generations will bring it back to even a worse creature than its most distant sire.

Just so it is with the plant. High cultivation has produced all our valuable plants. Some of them, at least, have sprung from an apparently worthless vegetable, but by proper care and culture, they have been made the necessary dependence of man. But let them be left to the starving, slovenly methods of poor farmers, and it is impossible to tell how soon they may be utterly lost. They must be fed—they must be kept free from thieving weeds that rob them of their food—they must have all circumstances made the most favorable, in order to retain their present state. The constant tending is to degenerate. We have some drawings of plants which show this tendency in a remarkable degree. We hope at some future time, to lay them before our readers.

The effort of the farmer should be not only to raise the greatest quantity to the acre, but to make that quantity at the same time the most valuable for the purposes for which it is intended.

GARDENING.

A good garden is an essential part of the comfort of a family and is generally too much neglected by the farmer. He would find himself largely repaid if he would pay more attention to this branch of his business, and set apart a small portion of land for the cultivation of those vegetables which require more attention than the ordinary farm crops. And in villages, every one who can obtain it, has a high estimate of his garden spot. The relaxation it affords, for a few moments in the day, to the professional man—the exercise before breakfast, and after the business of the day is over—the luxury of vegetables, fresh from the ground, and the fruit of his own labor, are all considerations of no little consequence. The cultivation of the soil, even in a small way, is an improvement to the body and the mind, and a man whose heart is seared over by the constant toil and the *pecuniary* affairs of life, feels it grow green and young again, when he turns back to this employment. As the season approaches to commence gardening, we venture a few hints in relation to it.

Do not be sparing in the application of manures. You may have as handsome and good a spot for your garden as you can select, but unless it is well manured you will have nothing handsome or good in it, nor profitable. Unless vegetables are well supplied with food they will amount to nothing. The manure should be well rotted, so as to break up fine and incorporate easily with the soil. Poudrette or guano, if judiciously used, will be found peculiarly fitted for the garden. But if stable manure is used, it should be spread evenly over the surface, and then the ground spaded deep and well pulverised. No matter what you intend to plant, this is a point of great importance. It serves to give a free circulation of air about the roots of plants, and also, if the season should be dry, in a considerable degree prevents the effects of drought, by allowing the moisture to ascend from below. The roots of the plants, too, can extend easier and farther in a loose soil, than in a heavy one, and the more room they have, the better will be the growth of the plant. If the soil is not naturally deep, it should be dug from twelve to eighteen inches deep and be made very rich with manure, which process will soon produce a soil of sufficient depth. We advise the use of the spade in all cases, even where ploughing might be done. It goes deeper, divides the earth more perfectly, and mixes the manure more uniformly with it, and the extra expense will be more than repaid in increased products. Where the soil is principally clay, it will be materially benefited by applying a few loads of sand. This, put on before the ground is dug, will make it much more loose and easier to cultivate. If sand predominates, clay may be added. Heavy soils will also be improved by having the manure mixed with twice its bulk of peat or swamp muck, and lie in a pile two or three weeks before it is used. The quantity of manure would be increased by that, and the soil made light and warm.

Throughout the season the garden should be kept free from weeds. Not one should be suffered to live. They rob the plants of much nourishment. The soil should be frequently stirred about the roots of plants, but never immediately after rain. Do not throw weeds away, but dig a small pit in the corner and there deposit them, with the scrapings of the walks and the soapsuds and waste liquids from the house. In this way a considerable quantity of valuable manure may be saved for the next year.

All these remarks apply no less to the flower garden—a most delightful addition to the comforts and taste of any—even the humblest residence. There is no difference in the preparation of the soil—and when this is ready we should be glad to see more of our ladies engaged in the active labor of taking care of its future success. The exercise might serve to transfer some of the bloom of the flowers to cheeks that have been blanched and paled by too much housing. Neither plants nor ladies thrive well shut up in a close room, away from the free air and the light of the blessed sun. If we were young—as we used to be—we would discourse more at large on this latter topic, but we have reached that age when it "don't do" for us to say much about "love among the roses."

AGRICULTURAL STUDY.

Before agriculture in this country, reaches the degree of perfection which it has already attained in other countries, our farmers must devote themselves more to the study of their art. This, we believe, they have begun, very extensively, to feel. The disposition has heretofore been, to demand from writers on the subject nothing but what was purely practical—not in the true sense of the word—but in a false sense—that is, they must have the very processes described to them which others have used, and then with the whole actual result before their eyes, they could venture upon a trial of them themselves. Had this been the case with all who are engaged in the business—had there been none more willing than others to take the first step, agriculture would have been at an amazing low ebb. But some who have been bold enough to think for themselves, have taken the lead, and to this we owe the present condition of farming. But these means are, in our view and we believe, in the view of all thinking men, utterly inadequate to the present demand. A more general information is necessary Farmers must read and study and think for themselves. There is no practice in the whole range of agriculture whose fuundation is not laid in reason. Farming is not, in its foundation, practical as that term is generally understood, but it is, in the first place, a science which the mind must comprehend, before the hand can execute it.

FRUIT TREES.

Instead of continuing the old practice of having alternate bearing and barren years, for fruit trees, those who cultivate them would do well to note this fact: When young trees come into bearing for the first time, about the time the fruit is setting, if the most of it is taken off, and this continued for a few years in succession leaving every year about the same quantity on the trees, they will, by the time they have become of sufficient size to be profitable, acquire the habit of bearing every year.

A FRAGMENT.

We may estimate the worth and truth of any system of philoso-hy by the value which that system places upon life; or we may stimate it by another standard, and may ask what are its tenden-ies; if its tendency is to exalt God, the maker and ruler of the niverse, then *a priori*, we should say of that philosophy, that it s true. Again, if the tendency of a system is also such that it romotes the happiness of man, its truth may also be considered s at least probable. If the life of man, if the interests of man, if he interests and happiness of man is valued in it, and promoted y it, we can scarcely be justified in charging upon such a philoso-hy a foundation in error. Inquire then, within yourself, what ffect a system of philosophy or creed has upon your views of od, of the happiness of man, whether it has lessened or whether tends to lessen him in your estimation and make you reckless of fe and happiness? then we believe, by this test, you may render n answer both as to it's value and its truth.

PRACTICAL DIRECTIONS FOR THE FLOWER GARDEN.

PART I.

BY M. SUTTER.

I HAVE never been ashamed to confess that I love flowers. They are the Poetry of Agriculture, and I thank God that He made them, and implanted in my heart the love for them.

I have been accustomed, all my life—even when I was a man of study, as well as since—to devote a portion of my time, in the season, to the culture of flowers. I have found it a delightful occupation, and of great use to my heart, if not to my purse. And I always feel a sort of pity, when I see flowers made a traffic of, unless I buy them myself, and turn them out in the open garden, for every body to admire. For it seems to me that they are, and should be, nobody's property. I never kept them to sell, but always to give to my friends and to little children, in abundance.

I am gratified to see a growing taste throughout the community, for this branch of agriculture. Almost every lady has her beautiful exotics in her window, and the poorest cottager has her geranium or her monthly rose; yet, through the winter, there are always to be seen some who seem to be waiting with great patience for better times. The cultivators of them are ignorant of the care they ought to have, and how to manage them. For such persons, the following pages may be of use.

The farmer neglects this branch of his art too much. There is no earthly reason why his garden should not be ornamented with flowers; but the fact is, he is too utilitarian in his notions. We hope his daughters will read these articles and profit by them; I did not write them because I was ambitious of being an author, and especially in this department. They are the fruits of my own experience and reading, and were written down in this form at the earnest request of a respected friend and his lady, for their use. But being entirely practical, I thought they might be of use, if printed, to others.

I.—OF THE SOIL.

All soil is formed of decayed rocks, and its fertility, of course largely depends upon the particular rock from which it has its origin. But one great source of fertility is the vegetable and animal substances which are constantly accumulating and undergoing decomposition, upon or beneath the surface. These form a part of all soils, and none will be productive which contains less than two parts in a hundred of these matters; and on the other hand, a soil cannot be in a proper condition, to produce healthy plants, which contains too much of them. Those soils which contain from three to ten per cent of them, are the best. To those which are deficient, they may be added, in the form of the various manures which are used.

The soil for a flower garden is in no respect different from that of the kitchen garden, and should be prepared in the same manner. If the soil is too stiff and clayey, a few loads of sand may be added, according to the size of the garden; and if, on the contrary, it contains too much sand already, a proper quantity of clay or good stiff loam mixed with it, will soon bring it to a proper consistency.

After these preliminaries have been properly attended to, the ground should be spaded deep, and well pulverized; this will serve to make the earth open and light, so that the roots will meet with no obstruction, and it will also allow the free circulation of the air through it, which is very necessary for the health of plants. The deeper it is worked, the deeper will the roots strike, and, of course, the better will be the growth of the plant. This will also serve to prevent, in a considerable degree, the effects of drought, by giving a free chance for the water to rise from beneath.

The texture of the soil is not a matter of small importance. It should be such as will retain a proper quantity of water, and at the same time will drain off that which is superfluous. It should not contain so much clay as to bake in the sun and to crack open, nor so much sand as to become parched and dry. The power of retaining moisture depends upon the proportion of clay the soil contains, as the water cannot, even by great heat, be entirely expelled from this substance. But if there is too much, it will become hard and crack, and the roots cannot penetrate it freely.

Artificial soils are made for plants growing in pots, by a mixture of different substances, in order to imitate, as nearly as possible, the natural soil in which they grow. This is the plan generally pursued by gardeners and florists; but it is doubtful, in most cases, if any necessity requires it. If a loose soil from the garden, with a little addition of sand be used, and well mixed with fine manure, it will be found the most convenient, and probably as good for plants. A little wood ashes may also be used. The artificial soils are made by mixing loam, peat, decayed leaves—forming what is called leaf mould—sand, and manure.

Loam is the mixture of clay and sand, constituting the soil of a garden, or old pastures, and should be taken from the surface, or just beneath the sod.

Peat is formed in low ground, by the decay of leaves, roots and stems of plants which have grown upon the spot for centuries.

Leaf mould is taken from the surface of the ground or rocks in forests, and should form an important part in the soil.

Sand should be taken from some place where it has had long a free exposure to the air.

Manure should be two or three years old, and well rotted, so as to be easily reduced to fine particles.

These substances, mixed in proper proportions, will form a soil suitable for any plants. Some naturally grow in a soil more sandy than others—some in a soil principally or wholly of loam, and others of mould; and in these we have the means of suiting the native habits of each. They should be well pulverized, and intimately mixed, and always ready for use.

It is often convenient to combine the flower garden with the kitchen garden. In such a case, the best arrangement that can be made, is to lay out a broad walk through the most convenient part, and on each side of it a border about three feet wide for flowers. This may be slightly raised by shovelling the earth which is taken from the walks into these borders. Others may, if necessary, be made around the sides or in the middle, by devoting a sufficient space for the purpose, which can be laid out according to the fancy or taste of any one. By having the two combined, a neatness and grace is added to the utility of the kitchen garden, and both can be taken care of together. No particular directions can be given as to the form and plan of such a garden. Much will depend upon the size of it, and more upon the taste of the one who takes care of it.

II.—OF MANURES.

Let the soil of the garden be what it may, and let it possess all other natural advantages, without the free application of manures, the labor bestowed will meet with a very small return. If these are necessary in the kitchen garden to insure a good growth of vegetables raised there, they are no less important in the flower-garden. It is from them that plants derive their food, and they live by food as well as animals. Many seem to have an idea that if plants are freely supplied with water, they have all that is necessary to promote their growth ; but this is a great mistake. Water is essential to the life of plants, but at the same time there are very few which will not die soon if they had no other food. Indeed, this can scarcely be considered as food, being principally necessary to dissolve those substances which are their proper nutriment. It is only in this form that they can imbibe nourishment, and too free a supply of water becomes injurious to the life of vegetables. Hence the necessity of draining land which does not admit an easy passage off for the water.

The dung of animals must always be the chief dependence in the article of manures. This consists of both animal and vegetable matter, and contains all the elements of plants. To prepare it for use in the flower garden, it should be well rotted by lying in heaps for two or three years, so as to be reduced to fine particles. In this way it will incorporate readily with the soil, and many of its parts will dissolve in water easily, and afford a rapid supply of food. Good manure from the stable-yard, well rotted, is as good as any that can be used.

Poudrette is a manufactured manure, possessing very powerful qualities, and would probably be found very valuable in the flower garden. It is prepared for this purpose, and put up in boxes so as to be easily transported. It may be applied to the whole surface of the soil, and then incorporated with the rake, or, which is probably the preferable mode, it may be applied to the roots of the individual plants. A small quantity placed upon the seeds when they are sown, is said to cause them to germinate with great vigor. *Guano*, imported from tropical islands, is a most powerful manure, and requires much care in using. A very small quantity is sufficient for a whole flower garden. It may be conveniently used by dissolving it in water, and applying it around the roots of plants twice a year.

Much valuable manure may be saved by collecting all the weeds, leaves, twigs, and dead plants, &c., which are taken away from the garden, and forming a small compost heap with them. To do this, whenever a quantity of these materials is added to the heap, they should be covered with a layer of earth, or stable manure, which is better, and so by adding to the quantity continually, in the course of the season a large pile will be formed. A vast deal is wasted by not being economical in what appear to be small things.

Too much cannot be said in favor of liquid manures. In all countries where gardening is carried to any perfection, this practice is found to be of great service. The manure is thus applied directly to the roots, and in a state to be immediately taken up by the roots. It throws a surprising degree of vigor into them. The Chinese, who are celebrated for their skill in horticulture, apply their manures principally in this form. It is only necessary to pour wate upon any of the common manures in a convenient vessel, and afte it has stood for a day or two, dip it off, and water the plants wit it, taking care to apply it only to the roots. Soap-suds will b found a very powerful and useful manure of this sort, and may b used freely.

Charcoal, wood ashes, and soot, have very valuable qualities a manures, and should not be neglected. The first should be reduce to a fine powder before it is used, and the last should only be ap plied in small quantities. The ashes may be used freely upon al soils with great advantage.

Plants will thrive well and vigorously in finely powdered cha coal, and it has been thought to add beauty and depth of colo both to the foliage and flowers. Cuttings of plants will rot soone in pure charcoal, or when it is largely mixed with earth, than i earth alone ; but it must constantly be kept wet. It will be foun a useful application to soils in all cases ; applied about the roo of diseased plants, the most beneficial results have been obtaine

The manure in a flower garden, should not be spaded in ver deep. After the ground has been well dug and pulverized, let th manure be applied, and worked in to a moderate depth with spade, and well mixed with the soil. Or a portion may be turne in deep, and the rest well mixed with the surface.

In speaking of manures, those salts should not be omitted whic have of late excited no little attention. Many of them act a powerful stimulants to the growth of plants, and others are usef as actually affording nutriment. Among these, the most importa are saltpetre and the nitrate of soda. They may be sown broa cast upon the surface, to be dissolved and washed down with t rain, or they may be dissolved in water at the rate of one ounce t a gallon of water, and then applied as other liquid manures. Great caution is however necessary in the use of these substances, as too much of them will destroy the life of plants. They should not be applied more than once or twice during the season. The principal benefit from their use, is found in their producing a rapid growth, and giving a fine rich color to the foliage.

The free use of manures cannot be too strongly urged. All success in the cultivation of flowers, as well as all kinds of plants and vegetables, will depend upon this. Neither animal nor vegetable life can be sustained without food. And the flowers which ornament the garden, are no less dependent on it for the exhibition of their beauty, than those plants which are grown for use, for their perfection.

III.—OF THE CARE OF THE FLOWER GARDEN.

No little care is necessary in order to keep the flower garden neat and clean. The walks should be kept free from weeds and grass, and covered with gravel not very coarse, and if possible should be made solid with a heavy roller. A handful of coarse salt applied to any tufts of grass which may be seen springing up, will soon destroy them. If the walks are through a grass-plat, the edges should be kept cut evenly with a sharp spade, as also the edges of the flower borders.

Not a weed should be suffered to appear among the flowers, and as soon as one appears, it should be immediately exterminated by the roots. In this way, by a little watchfulness and attention, in a short time they will cease to appear. But if one is suffered to go to seed, it will scatter its offspring through the whole garden in a little while.

The earths in the borders and about the roots of the plants should be frequently stirred with a hoe or a gardener's trowel, that the roots may have every chance to extend. The looser the soil is kept, the better they will grow, and the beauty and perfection of the flowers depend upon the strength and healthiness of the plant. By this process also, the soil is drained of superfluous moisture, and a free circulation of air is produced about the roots. It should be done very often, and especially in dry weather, and not after a shower or rain.

All dead branches should be cut off carefully from the plants with a sharp knife, and not rudely torn off, as is the practice with some careless persons. When any annual plant has done flowering, unless it is wanted for seed, it should be removed and another put in its place. For this purpose, a reserve bed may be kept in some part of the garden, where plants can be raised to be transplanted to supply vacancies in the regular borders.

Decayed flowers should be taken off, as they are unsightly objects in a neat border, and the stems of bulbous plants and other: should be cut down when the flowers have gone. Plants whicl grow tall and slender, should be carefully tied up to neat stakes t(support them, and the shrubbery neatly pruned.

A spade, shovel, large and small hoe and trowel are alway: necessary in the flower garden, and should be always ready fo use. Pine sticks, cut smooth, and pointed at one end, should b always in readiness for marking the names of plants, and also nea rods for tying up plants. Bass matting makes the best strings.

IV.—PROPAGATION.

The natural way of propagating all plants is by seed. Unde favorable circumstances, these are always produced by all plant: but a change of climate and soil often prevents it, when we mus resort to artificial methods.

In selecting seeds, great care should be taken to choose thos which have not lost the power of germination, by being kept to long, or by being exposed to unfavorable circumstances. Som retain this power for an indefinite period. Wheat, which wa taken from the covering of an Egyptian mummy, and which ha lain for thousands of years, was found to have retained this powe and germinated and ripened its seed when planted. Others lose i after a few years, and some even in a few weeks. As a genera rule, the seeds of the last season only can be relied on with safety

Seeds should not be gathered till they are perfectly ripe; ver few seeds will germinate unless they are mature.

With regard to the depth at which seeds should be planted, n particular directions can be given. This will depend in a grea degree upon the size of the seed and its ability to force its wa through the ground. Small ones require but a small covering o earth, and should be planted thick, whilst large ones may be burie deeper and more scattered. As a general rule, no seed should be planted deeper than one half inch below the surface.

Seeds should not be sown in the open ground till it has become warm and the weather settled. As almost all annual plants may be expected to bloom in from eight to ten weeks after they are sown, there is no reason for inordinate haste in getting them into the ground. From the first to the middle of May in this climate, will be soon enough. They may be sown in drills or patches, so that when they come up they can easily be distinguished from the weeds. When large enough they can be thinned out, and those that will bear it can be transplanted. Those which will not bear it, must, of course, be left in the spot where they grew. As a general thing, except in cases of severe drought, no artificial watering should be given to seeds, but they should be left to the natural moisture of the ground. Many, however, may be soaked with advantage in warm water before they are sown.

The process of transplanting should be performed with care, as the plant depends upon its roots for its supply of nourishment, and especially the tender fibres which form their extremities, and are their proper mouths. If any of these are injured or broken off, it will take some time to recover from it, or the plant may die. It is, of course, a bad plan to pull up the plant by force. It should be carefully raised up by a trowel or sharpened stick and taken with as much earth as possible attached to the roots, and removed to the place where it is to be deposited, and there placed in as natural a manner as possible, and the earth pressed gently around it. A little water may be given to settle the earth about the roots. Transplanting should be done in cloudy weather and the plants protected for a few days from the direct rays of the sun.

As some plants do not ripen seed, and others do not reproduce their own kind, artificial methods have been devised for propagating them. This may be done in several ways.

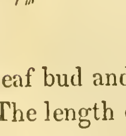
1. By gums, bulbs or offsets. Some plants, such as the lily tribe, the capen and bignonia, produce in the axil of the leaf, a small conical bulb or gum, which, if planted, will take root and grow. Bulbous roots throw out offsets from their sides : these, whether growing from the stem or root, should be planted as soon

as they are separated from the main plant, about their own depth in a good soil.

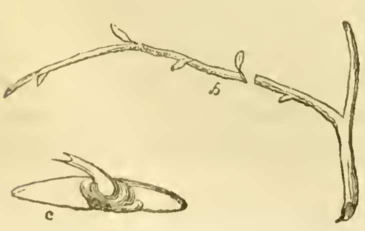
2. By dividing the plant. It is taken out of the ground, all the earth shaken from the roots, and then separated in such a way that a portion of root may be left to each part. Some may be divided without removing from the ground, with a sharp spade or the trowel.

3. By runners. These are slender shoots that spring out from the roots of some plants, and wherever a joint comes in contact with the earth a root is produced. All that is necessary is to let the joint become well rooted before it is removed. Similar to these are the suckers which start out just above the roots of some plants, and send down roots into the soil.

4. By cuttings or slips. These are only small portions of the branch, which are removed and planted separately, and inasmuch as the propagation of a great many of our most ornamental plants depends upon this mode, it may be well to give more minute directions with regard to it. Many annuals which do not ripen their seed, are thus continued from year to year, and form some of the chief ornaments of our flower gardens. Such are the beautiful varieties of the verbena and pelunia, salvia splendens, and many others, which enliven our borders through the whole season. In this way also, varieties of flowering plants are perpetuated, the seed of which will not reproduce the same kinds, monthly roses and most plants which are grown in pots.



Slips should be taken from wood of the latest growth which has become hardened, and where it is possible, with a collar of the old wood, (fig. *a*.) If not, they should be cut off with a sharp knife, making a smooth surface immediately below a leaf bud and as close as possible to the foot of the leaf, (fig. *b*.) The length of the cutting is of little consequence, but it may consist of three or four joints or buds, and the leaves near the upper end may be left on. But great care should be taken to make a smooth cut, as, if the bark is torn or jagged, it will most certainly fail. Some plants



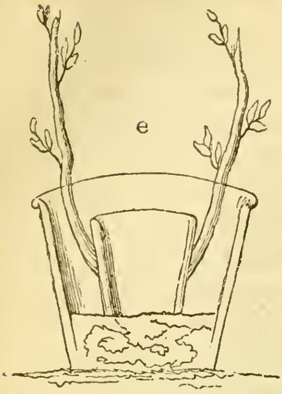
may be produced from cuttings, taken off without reference to the bud. But this is the surest way. Sometimes a mere bud taken off with a portion of bark attached to it, will take root, (fig. *c.*)

Cuttings of some plants will root freely if merely placed at a proper depth in any good soil, but on the other hand, the greater number require more or less care, and some are made to root with great difficulty. Such can only be grown to advantage in a green-house. Many require the artificial heat of a hot-bed, in which the pots must be sunk; and indeed all will root sooner in this way. But they should be removed as soon as they are well established in their growth, to the open air.

The best soil for cuttings is a tolerably rich one, with a free mixture of white sand, to prevent its becoming packed and hard, and to assist in draining it. A large proportion of powdered charcoal will be found of great service. Indeed, it will be found that in pure charcoal kept constantly wet, cuttings will grow more sure than in any other way, sometimes becoming rooted in a few days. Cuttings of some plants root better in pure sand. Fill a pot within an inch and a half of the top with earth, and on this place an inch of sand. Through this sink the cutting, till the end just touches the earth.

The pots in which cuttings are planted should be well drained, so as to carry off all superfluous moisture. For this purpose, a piece of broken pot should be placed over the hole in the bottom and a layer of the same upon it. On the top of this the earth should be put, to within a half inch of the top. In this the slips are to be planted, either in the centre, or which is better, at the sides, so that they will touch the inner surface of the pot throughout the whole length. This being porous will retain moisture, and part with it slowly, so that there is little danger of drowning them.

The following is an excellent plan: in the bottom of a large pot place a layer of broken tiles, so deep that a small pot set upon them in the middle, will be level at the top with the large one. The bottom hole of the inner one is to be stopped tight with a cork. Having placed them thus, fill the space around with good soil in which the slips are to be planted, with their ends cut slant-

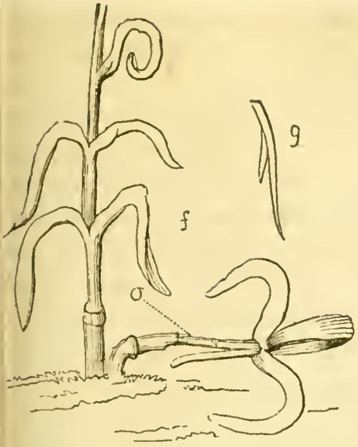


ing so as to fit against the side of the small pot, (fig. *e.*) This is to be kept full of water which will pass through its pores in sufficient quantities, so that none need be given to the earth itself. The pots themselves, must of course, be unglazed.

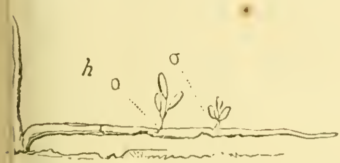
To preserve a uniform moisture, and to prevent excessive evaporation, a large tumbler or bell-glass, is of use, placed over the cuttings and pressed gently into the ground around them. This should be occasionally taken off, to allow a supply of fresh air to enter. They should be kept free from the direct light and heat of the sun, but where they can have a good supply of light. Sinking the pots in the ground will be useful in order to secure a uniform moisture of the earth in them.

No cutting should be planted deep, though large ones may be deeper than small ones. If they are sunk down to the second bud it will generally be deep enough. About midsummer is the best time for planting cuttings, as the wood is then usually ripe. As soon as they have rooted well, they should be transplanted singly into pots, or the places where they are to remain.

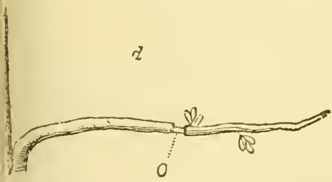
5. By layers. This consists simply in turning down a branch fastening it with a hooked stick, and covering it with earth. The advantage in this method is that the layer has the benefit of a connection with a parent plant till it has become rooted. Some plants will send out roots if a joint happens to be upon or near the surface of the moist ground. There are several modes of layering plants, of which the following are the most convenient :



With a sharp knife make an incision half way through the branch to be layered, at or just below the bud or joint. Then, turning the edge of the knife upwards, towards the top, split it through the bud a short distance, say half an inch or more. At this point then, it is to be buried under the ground, the end being placed as nearly as possible upright, so as to keep the split open. They must be fastened down with hooked stick, to prevent their being disturbed before they have ken root. After this has taken place, they should be care-lly separated from the old plant, and in a few days removed their places.



Another mode is to take out a notch just below a bud, as deep as the centre of the branch, which is then to be treated as above. Where a hole branch is layered, if the notch is made at each bud, a num-mber of plants may be obtained.



Ringing, or taking off a small ring of the bark, quite around it, and down to the wood, is another method. This must be done also just below a bud or joint. The Chinese grow a great many dwarf fruit tes in this way. They select the fruit bearing branches, and riging them, bind on the ring a ball of rich earth, which is kept cnstantly wet by water dropping from a vessel placed above. Tey become rooted in a few weeks, when they are removed to ps. The orange and lemon may be propagated in this way with sccess; or the branch may be thrust through a hole in the bottom of a pot, which can be filled with earth, and kept wet in the same way; or, instead of ringing, a few holes pierced through the branch with an awl, will answer as well.

6. In arching—another method of propagating some kinds of flowering plants, consists in uniting two branches whilst attached to the parent stem. But as this cannot be practised generally, except under the most favorable circumstances, it will be passed by.

7. Budding is a process which can be performed by any one, and thus much beauty may be added to the flower garden. This is done by making an incision about one quarter of an inch in length, across the branch and through the bark. Perpendicular to this, another incision is made downwards, an inch or more in length, also through the bark. The bud is prepared by taking it from the last year's growth of wood, which has become hard, with about an inch, or even less, of the bark below, and a half an inch above it, cutting it off smooth down to the wood, or even with a small piece of wood attached to it, which may afterwards be carefully removed, or left at pleasure. Now, with a flat piece of ivory, like a narrow paper-folder, loosen the bark on both sides of the incision that was made, and carefully insert the bud, pressing it down till the bark attached to it is nearly all in, and then cut off the upper end of this bark even with the transverse incision. Tie the bark down moderately tight with a soft woolen yarn, both above and below the bud, passing it several times around. The bass matting used by florists is still better than yarn. But this is mentioned as being easily procured. In three or four weeks the bud will have taken, when the string must be removed.

Budding may be performed from July to September, and in the following spring the stem should be cut off close above the bud.

8. New varieties of flowers are produced by impregnating the flower of one plant with the pollen or dust of another of the same family. All that is necessary, is to to cut off, with a sharp pointed scissors the stamens of the plant to be operated on, and with a fine camel's hair pencil take the dust from the one with which it is to be impregnated, and deposit it on the pistil of the former. This is to be done in general, shortly after the flower opens. After the seed ripens, it is to be sown as usual. In this way the endless varieties of flowers which adorn our gardens, are produced.

MANURE.—NO. II.

MANAGEMENT AND APPLICATION.

It has appeared to us better, before examining the causes in-luencing the action of manures, to make our remarks assume a nore practical form, and direct the attention of our readers to the nanagement and application of those substances which are com-nonly used for supplying the food of plants. These are points vhich—let objectors say what they may—are capable of being, o a great degree, settled. Experiment, if correctly pursued, will e found to confirm whatever theory suggests. And in advocating conomical farming, it is necessary to have a good understanding f the way in which manures may be made to exert their utmost ffect and suffer the least loss. But we do not theorise only—we epend upon what is already known from experience in some mea-ure, and shall attempt, in as brief a manner as possible, to lay the iatter in a clear light before the reader. If in doing this, we say iuch that some already know, we are certain they will excuse us, vhen they reflect that we write for the ignorant, that they also iay know.

The first consideration then, claiming our notice, is the *saving f manure.* We read in ancient mythology, of the Ægean stables, nd their purification ; but we realize something of it, when we ee the mountains of manure which the Wolga bears away every pring, on its ice—the accumulations of the neighboring farm-yards -or when, "on the borders of the Roman Campagna, we see hole hills of dung—the long accumulating refuse from the stables f the post-house." Such an exhibition might excite surprise in e most slovenly and wasteful of our farmers; and yet, among e best of our practical agriculturists, instances are not rare, of disregard of saving, which, if not exactly parallel to these, are, say the least, equally deplorable. We have ourselves travelled rough a large portion of our new states, and witnessed much of is evil. Vast piles of manure are suffered to go to waste, or even rted out in the spring and thrown into some pond-hole—the en-re straw of numerous harvests left to rot on the spot where it as threshed, or turned on the same spot, are some of the evidences of ignorance and sloth, which have often met our eyes. In those new settlements, men do not seem to look forward beyond the present fertility of the soil—to its slow, indeed, but certain, deterioration ; and we can regard such practices there, with some pardon. But when we find the same disposition manifested —though not so palpably, perhaps—in the old, and already worn-out sections of the country—the little care that is taken to increase the quantity and improve the quality of manures—in suffering the whole drainage of the farm-yard to run off into some stream or pond, and such like waste, we cannot suppress the expression of our surprise. It would often seem, indeed, as if the-dung hill were placed intentionally where every thing should be most favorable to secure for it the most thorough washing, from the rains falling upon it, and all atmospheric aid in becoming completely dissipated. Let us employ, then, a short space in investigating the resources of the farm for its own maintenance.

1. The farm-yard ought to be the mine of wealth to every one who appreciates the value of manure. Here are collected the excrements of all the domestic animals—the litter of the stalls—the straw and refuse of the farm, and all those substances which have once constituted a plant, and are, of course, the very materials necessary to supply food to others. We will consider, hereafter, the means of preserving these manures, and bringing them to that condition in which they will most efficaciously promote vegetation. We wish, now, to impress upon the minds of every tiller of the soil, the great importance of collecting in one spot every thing which will in the least degree promote the growth of a plant, or the maturity of a seed. Its construction should be such, that no particle shall ever escape from it, and capacity so great as to hold all that can be accumulated in it. And the main source of waste is generally found in the passage that is allowed for the liquids to flow off. This should be prevented by the construction of tanks which will receive it ; and from these it should often be pumped out and distributed on the solid contents of the yard. There, also, should be collected the liquid excrements of animals—a species of manure which is ordinarily little regarded or entirely wasted, but which is, in fact, far more powerful in its action than the solid. It is in the attention which the farmer bestows upon this subject, that his enterprise and intelligence appears, and

a good opinion may commonly be formed of the man, by the condition of his farm-yard. Those countries which have excelled in agriculture, have always been those which have used the greatest diligence in the collection of every thing which could act as a manure.

2. Aside from the farm-yard may be found much that, rightly managed, will add greatly to the fertility of the soil ; but all ought to be gathered in there. The contents of the piggery—of the poultry-house—night soil—the waste of the house, and all the weeds of the farm, if added to the general stock, would swell the amount considerably. Thoroughly scientific farming, may suggest he application of particular manures to certain crops ; but the amount of knowledge we now have on this subject, and the nethod of farming in this country, preclude this for the present. We must be content to supply food to different plants, from the ommon stock of manure, till we understand more of the particuar wants of each.

We may mention, in this connection, the vast bodies of marl nd of peat, which exist in every neighborhood, and on almost very farm. In these is to be found a source of fertility almost nexhaustible ; and yet it is wonderful how few are aware of their alue. We stated, in a previous article, the composition of plants, nd from that it will be evident, that whatever has once helped to onstitute the body of a plant when living, is capable, after death, f being resolved again into that form in which it may be again aken up by a new plant, in the shape of food. All animal bodies re derived from the same source, and are capable of the same hange. Whatever, therefore, on the farm, has ever been once a omponent part of a plant or an animal, should be carefully preerved and prepared, to be applied to the soil, to increase its ferlity. The annual waste of these substances, in every neighborood, is enormous, and indeed, upon every farm that is not conucted upon principles of economy. We are led, then, directly to e consideration of the preparation and management of the maure on the farm.

The idea has been advanced in years past by writers, in speakg of the distinction between plants and animals, that one point difference is to be found in the form in which they receive eir food. Animals require food of a highly organized form, which by the powers of the alimentary canal, is converted into nutriment for their bodies. On the other hand, plants require their food in quite an opposite condition—that is, in order to fit it for their use, it must be decomposed and reduced almost to its elementary state. In our former article, we partially dissented from this opinion, and expressed the idea that they as well as animals, have the power of converting organic matter into nutriment, after they have absorbed it. One thing is, however, beyond dispute—that all their nutriment which they receive by their roots, must be in a fluid form, and all substances must be reduced to a soluble state, before they are fit for absorption by them. It will be the object of the farmer then to convert all his manures into this state. But at the same time, let it be remembered, that during the changes which take place in animal and vegetable matter, while passing into this condition, it is liable tc experience a great waste, which is to be carefully guarded against What this waste consists in, will readily appear upon referrin to the constitution of plants. During the process of fermenta tion which takes place in most manure, those elements called or ganic, enter into various combinations, which being very volatile are borne into the air and mingle with it, to be distributed fa and wide over the earth. Those parts which are fixed and nc volatile, if in a soluble state, are liable to be washed out by th rain falling upon them, and in these two ways alone, a manur heap may speedily be converted into an almost useless mas Again—if the fermentation goes on too rapidly, and without pro per precaution, it will soon have gone through a process equiva lent to, and in fact the same as combustion, and little else wi remain except a heap of ash.

We do not hesitate boldly to dissent from the theory, that ma nures may be too much decomposed for beneficial application t the soil. But let it be remembered that the decomposition mu be carefully conducted, and under such circumstances as to secu against waste of any of the useful matter. We have long ente tained this opinion, and are confirmed in it by experience. Th experiments of Mr. Campbell of Scotland, of soaking seeds i solutions of salts, adds great weight to our position. The fu growth and vigor of a plant is very much affected by the vig of germination, and the plentiful supply of nutriment, at an earl period of its life. It is thus enabled to send out numerous roots into the soil, and to expand its leaves rapidly to the light and air, and prepare itself to thrive at a period when food is less abundant. Precisely such will be the effect of thoroughly decomposed manures. But when applied in their raw state—that is, without fermentation—depending upon adventitious causes to promote those changes which they must undergo—at one time furnishing an abundant supply, and at another scarcely any—and exercising their least influence at the period of germination, and directly afterwards, when the young plant requires all possible nourishment and aid to establish its vital powers—they cannot be supposed to produce as strong an effect as in the other case. It is indeed a generally admitted fact, that manures do not have so much effect the first year, as the year following that in which they are applied. If we were to reason by analogy, from the animal race, the position will be farther substantiated. We cannot deny, that where the common imprudent attention to, and reckless disregard of the principles upon which manures act, is followed out in the utter neglect of all care to secure them against injury or waste, the unfermented state is the best. For when once in the ground, they are safe from so much loss. The mere practical farmer would therefore do well to apply his manures in their fresh state, and plough them in—the rational farmer will prepare them beforehand, so as to secure their greatest effect. And we shall conclude this paper with a few practical directions for the care and management of farm-yard manure.

We have stated already that all kinds should be collected in the yard. By this means a mixture is obtained, promising in a degree the qualities of all, and proper to be applied to any crop. The yard should be made sloping from the sides to the centre, so as to prevent any liquid from escaping, and the bottom should be covered with a thick layer of peat, or swamp muck, or vegetable matter—or, in the want of any of these, a quantity of earth may be used. In the lowest part a tank should be sunk, capable of containing many hogsheads of water, and into which all the drainings of the yard should be conducted. During the season in which cattle and horses are stabled, all the manure and litter must be removed from the stables and spread over the surface of the yard, to be trodden down and mixed with the substances already placed there. Thus a compost is formed, which by the addition daily of new materials, is partially excluded from the air, and by the treading of cattle is so condensed, that the decomposition which ensues is slow and gradual, and equal through the whole mass. The gases which would otherwise escape, are arrested by the peat, or earth, which was added, and the salts are taken up by the water which passes through, and carried with all other soluble substances to the tank. From this the liquid should be frequently pumped out, and distributed over the contents of the yard. To this same tank the liquids from the stables should be led, to be used in the same way. Under such treatment, the whole mass will be speedily reduced to a fine and powerful manure, and the smell of ammonia, so often discovered about the dung-heap will be entirely wanting, and the presence of that substance will not be indicated in the adjacent atmosphere by the most powerful tests. The use of charcoal, gypsum, and other salts, has been often recommended for the purpose of arresting the ammonia generated in manure heaps. If conducted as recommended above, they may be dispensed with for this purpose, although they would be valuable additions to the manure. In fact, all substances which are capable of furnishing food for vegetables should be gathered into this place as the storehouse of the farmer's hopes.

The formation of compost heaps, we regard as still better than the above. In this case the management for the foundation of the heaps should be the same as that recommended for the yard and also for the preservation of the liquids, both from the manure and from the stables. Every fresh addition to the heap should be spread on evenly, and not thrown upon it carelessly, for the object is to promote an equal and uniform decomposition. To secure this also, and to prevent a rise of temperature, and consequently too rapid fermentation, the heaps should be made quite solid This may be effected by the feet of the workmen who construct it by rolling, or by driving the teams over it as the fresh portions of manure are added. As the heap increases in height, which should never be more than three or four feet, every few inches a layer of peat or earth may be made, which will be found highly useful in absorbing the gases which may be found, and thus these substances will be converted into manure as good as the rest. The liquid from the tank should be frequently distributed over the heap to keep it from becoming too dry. All the substances which would be added to the mass of the manure in the farm-yard may be in the same way added to the compost heap to increase the quantity as well as improve the value of it.

We had proposed to defer the consideration of the application of manures to the soil, to a future article. We will, however, venture one or two remarks on that subject here. Are not manures too generally buried too deep for obtaining their full influence upon growing plants? There are two sources of loss to be avoided—one is the tendency of the gases to escape into the air, and the other the tendency of the soluble portions to be washed downwards into the earth; and these in practice stand directly opposite to each other. But, we believe, the downward tendency is the most to be avoided. A very slight covering of earth, from its porous nature, is capable of confining all the gases. But the rain falling upon the earth and passing directly through the soil, must inevitably, in its passage, carry down too low for the roots of plants, all the soluble portions of manure. Allowance must be made for difference in soils; we refer to the general principle, which will be examined more at large hereafter.

NEW BOOKS.

Lectures on Agricultural Chemistry and Geology. "The profit of the earth is fo all; the King himself is served by the yield."—Eccles, v. 9. By James F. W. Johnston, M. A., F. R. S. S., L. & E., etc. With an Appendix. Republished b Wiley & Putnam. 619 pp., besides the Appendix of 89 p. Price, 12s.

The American publishers of this work have performed an exceedingly important service to the American farmer, by givin these lectures of Prof. Johnston in a compact and cheap form—for cheap they are, considering the amount of matter which the contain, and the great interest of the subjects which are discusse in them.

There is only occasionally a work so opportune as this; on which the times required, and without which, a blank would hav been very obvious to every intelligent agriculturist. We hav in fact, very rarely studied a work which came up to so high standard of excellence as this, and which of itself forms what ma be truly styled "*the Farmer's Text Book.*" The lectures a plain and simple, yet full, and though the subjects themselv would excuse the use of many technical terms, yet there are nor of which the farmer can complain.

The author has divided them into four parts, taking up ar treating the subjects in the order of their simplicity. He com mences with the elementary principles which belong to the su jects, and proceeds to those which are more complex, and farth removed from the common attainments of gentlemen who ha not made chemistry and its kindred sciences special subjects cultivation. By this disposition of the matters treated of, tho obscurities are really avoided which may seem to exist, when tl more advanced part of the course is reached, and are taken without reference to what has preceded, or what has been alread explained. The reader will see from the following brief synops of the subjects treated of, the whole range and scope of the lectures as they were delivered.

"The first part is devoted to the *organic elements* and parts of plants, the nature and sources of those elements, and to an explanation of the mode in which they become converted into the substance of plants; the second to the *inorganic elements* of plants, comprehending the study of the soils from which these elements are derived, and the general relations of geology to agriculture; the third to the various methods, mechanical and chemical, by which the soil may be improved, and especially to the *nature of manures* by which soils are made more productive; and the fourth to the *results of vegetation*, to the kind and value of the food produced under different circumstances, and its relation to the growth and feeding of cattle, and to the amount and quality of dairy produce."

It will be perceived that this synopsis of subjects covers a wide range of matter; in fact, the whole field of domestic economy. That the reader may have some idea how the distinguished lecturer handles his subjects, we give one extract at random.

"Why Lime must be kept near the surface.—Nor will you fail to see the important reasons why lime ought to be kept near the surface of the soil—since

1st. The action of lime on organic matter is almost nothing in the absence of air and moisture. If the lime sink, therefore, beyond the constant reach of fresh air, its efficacy is in a great degree lost.

2d. But the agency of the light and heat of the sun, though I have not hitherto specially insisted upon their action, are scarcely less necessary to the full experience of the benefits which lime is capable of conferring. The light of the sun accelerates nearly all the chemical decompositions that take place in the soil—while some it appears especially to promote. The warmth of the sun's rays may penetrate to some depth, but the light can only act upon the immediate surface of the soil. Hence the skillful agriculturist will endeavor, if possible, to keep some of his lime at least upon the very surface of his arable land. Perhaps this influence of light might be even adduced as an argument in favor of the frequent application of lime in small doses, as a means of keeping a portion of it always within reach of the sun's rays; and this more especially on grass lands, to which no mechanical means can be applied for the purpose of bringing again to the surface the lime that has sunk.

There are, at the same time, as you will recollect, good reasons, also, why a portion of the lime should be diffused through the soil, both for the purpose of combining with organic acids already existing there, and with a view of acting upon certain inorganic or mineral substances, which are either decidedly injurious, or by the action of lime may be rendered more wholesome to vegetation.

In order that this diffusion may be effected, and especially that lime may not be unnecessarily wasted where pains are taken by mechanical means to keep it near the surface, an efficient system of underdrainage should be carefully kept up. Where rains that fall are allowed to flow off the surface of the land, they wash more lime away the more carefully it is kept among the upper soil—but where a free outlet is afforded to the waters beneath, they carry the lime with them as they sink towards the subsoil, and have been robbed again of the greater part of it before they escape into the drains. Thus, on drained land, the rains that fall aid lime in producing its beneficial effects, while in undrained land they in a greater or less degree counteract it."

Chemistry as Exemplifying the Wisdom and Beneficence of God: By George Fownes, P. H. D. New-York, Wiley & Putnam. Philadelphia, J. W. Moore. 1844, pp. 158, 12mo. Price 50 cents.

This work is a Prize Essay, prepared by the author in fulfilment of an appointment by the President, Managers and Members of the Royal Institution of Great Britain, a committee, charged with the execution of a bequest of £1000, the interest of which is to be devoted septennially as a prize for the best essay, illustrative of the wisdom and benificence of the Almighty.* The subject selected for the first essay is announced in the title page as above.

The range and foundation of the argument demonstrating the goodness and benevolence of God, as illustrated in the chemistry of organic and inorganic substances, may be seen in the special subjects of the essay. The order in which they stand is as follows:

1. The Chemical History of the Earth and the atmosphere.
2. The peculiarities which characterize organic substances generally.
3. The composition and sustenance of Plants.
4. The relations existing between plants and animals.

The critical notices of this work have been uniformly kind and flattering to its author, both as to value of its matter and the clearness of the argument and the simplicity of its style.

For an illustration of its character, we give the following quotation from the 106–7 pp., almost at random, on the cause and source of animal heat:

"Carbon and hydrogen are burned in the blood, and this to an extent which will strike with surprise, and at first, incredulity, those unaccustomed to such considerations. Many ounces of carbon are, in every individual, daily rejected from the lungs as carbonic acid. It is impossible that combustible matter can thus be disposed of without the evolution of a vast amount of heat; as much heat, in fact, as if it had been burnt in a fire grate.

This heat is manifest in the elevation of temperature which the animal frame always possesses above that of the surrounding medium; an elevation of temperature always in the direct proportion to the amount of nervous and muscular energy of the animal, and the vigor of respiration, but never in any single case altogether absent.

The internal capillary combustion is the source of animal heat.

Thus much for the body. Every part where blood-vessels are to be found; every part, where nervous influence is perceptible; every organ, every tissue; muscle, and brain, and nerve, and membrane, waste away like a burning taper, consume to air and ashes, and pass from the system, rejected and useless; and where no means are at hand for repairing these daily and hourly losses, the individual perishes—dies more slowly but not less surely, than by a blazing pile. He is, to the very letter, burned to death at a low temperature; the various constituents of the body give way in succession; first, the fat disappears;

* This fund owes is existence to the liberality of the late Samuel Acton, Esq., of Euston Square, Eng.

this is the most combustible; it is to be sacrificed ; then the muscles shrink, and soften and decay. At last the substance of the brain becomes attacked, madness and death close the scene. This is starvation."

RURAL ECONOMY, in its relations with Chemistry, Physics and Meteorology, or CHEMISTRY APPLIED TO AGRICULTURE, by J. B. Boussaingault, Member of the Institute of France, &c. Translated, with an introduction and notes, by George Law, Agriculturist. New-York, D. Appleton, & Co. Philadelphia, George S. Appleton, 1845.

THIS work needs no commendation from us. The author's name is enough to insure it a careful perusal by all who look to science as the handmaid of agriculture. It contains a full system of farming in a summary way, the first part treating, in the words of the author's preface, "of the physical and chemical phenomena of vegetation—of the composition of vegetables and their immediate principles—of fermentation—and of soils. The second comprises a summary of all that has yet been done on the subject of manures, organic and mineral—a discussion of the subject of rotations—general views of the maintenance and economy of live stock—finally, some considerations on meteorology and climate, and on the relations between organized beings and the atmosphere."

We hesitate not to commend this work to all who seek the aid of science in the noblest and best of all pursuits, and we do it the more cheerfully, because we are heartily rejoiced whenever we see a work for the farmer, from a man who has devoted himself as has M. Boussaingault to their interests. He is a practical farmer, as well as an experienced and careful chemist, and it is not by following the opinions of any one man that the farmers are to succeed. They might read and think, and compare and reason in matters relating to their business, and in this way only can they become the class of men they ought to be in this country, and which we believe they are ere long destined to be.

The gentlemen Appletons have got this work up in excellent style.

UNITED STATES EXPLORING EXPEDITION.

WE received from Lee & Blanchard, Philadelphia, but too late for our January number, specimen sheets of this truly great work, by Charles Wilkes, U. S. N., Commander of the Expedition, &c.

The letter-press and engravings are in superior style. The work consists of "five magnificient large imperial octavo volumes—containing sixty-eight large steel engravings—forty-six steel vignettes—three hundred wood cuts—thirteen maps and charts, and twenty-five hundred pages letter-press. Price $25,00 to subscribers, done up in beautiful extra cloth binding.

The Farmer's Mine, or Source of Wealth, being a compilation, with the addition of new and important information on the subject of manure, together with the most approved methods for the manufacture of vegetable manure, by which the farmer can obtain, in the shortest possible time, as much manure of the richest quality as he pleases—to which is added Productive Farming, by Joseph A. Smith. By Henry Heermance. Revised and corrected by A. B. Allen, Editor of the American Agriculturist. New-York, published by Henry Heermance, and for sale by Saxton & Miles, office of the American Agriculturist, 205 Broadway. 1845.

This book, with this tremendous long title, contains a great deal of practical information for the farmer on the subject of manures and is a compilation of the views of various authors on that subject.

The Chemistry of Vegetable and Animal Physiology, by Dr. G. T. Mulder, Professo of Chemistry in the University of Utrecht. Translated from the Dutch, by P. F. H Fromberg, First Assistant in the Laboratory of the Scotch Agricultural Chemistry Association, of Scotland. With an introduction by Professor J. F. W. Johnston, F. R. S S., L. & E.

First authorized American edition, with notes and corrections by B. Silliman, Jr. Vol. I Part I. No. 1. New-York, Wiley & Putnam. 1845. Price, 20 cents.

We have read the first number of this work with attention, and have come to the conclusion that, thus far, it is the most philosophical treatise upon vegetable and animal physiology which has yet appeared. It is not a repetition of the views of Liebig o Boussaingault, or of any preceding writer. It is a work which stand by itself, and is made up of the matter and thought of Mülde with all the aid which cotemporary laborers can give in this prolific field of research. The names upon the title page are th strongest testimony to the value of the publication which can be given. We like especially the size and typographical execution of the work. The paper is white, and the printing uniform and beautiful.

CATALOGUES.—We call the attention of our friends to a series of Catalogues, by Wiley & Putnam, Publishers and Importers of Foreign Books, 161 Broadway, New-York.

They are published in four divisions, viz :

I. Science, Natural History, Useful and Fine Arts.

II. History, Biography, and General Literature ; Greek and Latin Classics, Philology, &c.

III. Theological Literature.

IV. Medical Literature, with copious appendices.

The subjects are classified, and each book has its price affixed. A list of all the Periodicals is subjoined, with their prices per annum. These catalogues are of great value as well as convenience to the reading community ; they may be had *gratis* on application to the publishers.

STABLE ECONOMY, a treatise on the management of Horses in relation to Stabl ng, Grooming, Feeding, Watering and Working. By John Stewart, Veterinary Surgeon, author of "advice to purchasers of horses," and lately Professor of Veterinary medicine in the Andersonian University, Glasgow. New-York, D. Appleton, & Co. Philadelphia, G. S. Appleton.

THIS work was received too late for us to give it a perusal, but the name of A. B. Allen, editor of the American Agriculturist, who has prefaced it and adapted it to the wants of this country, will be sufficient recommendation of it to all who are interested in the use of that noble animal, the horse. In preparing it, Mr. Allen states that he has taken the liberty to correct many errors of the author, and in some instances to suppress "whole pages, all of which were either quite erroneous in matters of fact, or totally inapplicable to this country." We like this. Too much of imported knowledge is often unhesitatingly adopted in this country, and thus great mistakes committed.

EXTRACTS

FROM

DOMESTIC AND FOREIGN JOURNALS.

ON THE DISTRIBUTION OF MINERAL SUBSTANCES, IN INDIVIDUAL ORGANS OF PLANTS.

BY DR. A. VOGEL, JUN.*

It has been ascertained by direct experiment, that the quantity of inorganic matter assimilated by plants differs materiallyin the different organs to which it has been distributed. Hertwig, at the suggestion of Prof. Liebig, demonstrated that the earthy matter of the tubers of the potatoe plant, differed from those of the stalks, or the herbaceous parts. Vogel, Jun., in order to set at rest the question generally, undertook the examination of several species of plants, the results of which have established the fact, that the inorganic matters of the root, differ from those of the trunk, both in kind and quantity. The following may be stated as an example of the results which have been obtained by an analysis of the ashes of the different parts of a vegetable; the one employed was a species of pear. (Pyrus spectabilis.)

1. From the trunk, Vogel obtained from the ashes 82 per cent of carbonate of lime. And 8 per cent of the insoluble phosphates of lime and magnesia, with a slight admixture of magnesia.

2. The ashes of the leaves contain about 7 per cent of soluble alkaline carbonates, with traces of sulphate of potash, chloride of sodium, (common salt,) and phosphate of potash. The carbonate of lime, is 10 per cent less in the leaves than in the trunk. While the phosphate of lime and magnesia amount to 10. The quantity of magnesia is nearly twofold; 4.9 per cent, it is now 9.76 per cent.

3. The ashes of fruits contain of soluble parts 33.1 per cent. The quantity of carbonate of lime has diminished from 82 per cent, to 37 per cent, whereas the phosphate of lime and magnesia, has augmented to 18 per cent; the phosphoric combinations taken together, amount in the fruits to over one third, or to 36.38 per

* Annalen der. Chemie and Pharmacie, July, 1844.

cent. The quantity of iron too, diminishes from the trunk to the fruit.

GENERAL SUMMARY.

	Trunk.	Leaves.	Fruit.
Alkaline carbonates, ...	4.6	6.80	1.90
Carbonate of lime, ...	82.2	72.90	37.00
Alkaline phosphates, ...	....	traces	14.10
Carbonate of magnesia, ...	4.9	9.76	5.52
Phosphate of lime & magnesia,	8.8	10.50	18.60
Silica, ...	....	.....	3.70
	100.5	99.96	97.92

[From Chambers' Edingburgh Journal.]

NUTRIMENT.

Comparative quantity of nutriment in the various articles used for food among all nations; derived from a report of Messrs. Perey and Vanquelin, and presented to the French Minister of the Interior.

The result of the experiments of Messrs. Perey and Vanquelin is as follows:—In bread, every 100 lbs. are found to contain 80 lbs. of nutritious matter; butchers' meat, averaging the various sorts, 31 lbs.; French beans, 80 lbs.; pease, 23 lbs.; lentiles, 94 lbs.; greens and turnips, 8 lbs.; carrots, 14 lbs; potatoes, 25 lbs.

According to this estimate, 1 lb. of good bread is equal to 2 1-2 or 3 lbs. of the best potatoes; and 75 lbs. bread and 30 lbs. butchers' meat, are equal to 300 lbs. of potatoes; or again, 1 lb. of rice or of broad beans, is equal to 3 lbs of potatoes, while 1 lb. potatoes is equal to 4 lbs. of cabbage, and to 3 lbs. turnips. This calculation is considered perfectly correct, and may be useful to families, where the best mode of supporting nature should be adopted at the least expense.

One remark seems to be called for in connection with the above extract, viz: That it is rarely, if ever, proper to bring the condition of food into a concentrated state, so as to occupy the least possible bulk—or, in other words, to separate the nutritious from that which is not of this character. Some bulk is absolutely essential to health, and even to satisfy the cravings of the appetite; still, this comparative view of the different nutriments, is highly important, and not only worthy the attention of those who are charged with the duty of supplying food for families, but to those who feed stock; and we have no doubt, but the real value of the different kinds of butchers' meat, depends greatly upon the food upon which the animals were fattened; and that there is at least one third difference between the value of meat fattened upon Indian corn, and the best of the roots which are generally substituted for it.—Eds.

SULPHUR IN PLANTS.

We do not speak of the existence of sulphur in plants as a new discovery, still it is a highly interesting fact, and deserving of careful investigation. Dr. Vogel, Senior, of Munich, has very recently called the attention of chemists to this subject. It appears that the cruciferœ as mustard, scurvy grass, &c., contains sulphur as a constituent principle, particularly the pepper-grass (Lepidium sativum.) It had been supposed that this substance was admitted into the plant from the soil, but from the experiments of Dr. Vogel, it appears that even when all substances containing sulphur are excluded from an artificial soil in which pepper-grass has grown, and when watered with distilled water, that it still contains sulphur. This apparently puzzling fact, seems however, to be explained on the ground that plants obtain it from the atmosphere. If this conjecture is true, it leads to the establishment of the fact, that one or more of the compounds of sulphur exist constantly in the atmosphere. This compound is supposed to be sulphuretted hydrogen, which exists in all mineral water, termed hepatic, and also in all animals and vegetable products in a state of decay.

MEMOIR ON THE DISTRIBUTION OR APPROPRIATION OF LANDS.*

BY PROFESSOR LIEBIG.

The most attentive investigations concerning the animal bodies have shown that the blood, the bones, the hair, &c., as well as all the organs, contain a certain number of mineral substances. If these were not present in the food, their formation could not take place.

The blood contains potassa and soda, as well as compounds of these bases with phosphoric acid. The bile is rich in alkalies; the substance of the muscles contains a certain quantity of sulphur; the red coloring matter of the blood contains iron; the most important principle of the bones is phosphate of lime; the nervous and celebral substance contains phosphoric acid and alkaline phosphates; the gastric juice, free hydrochloric acid.

We know that the free hydrochloric acid of the gastric juice, and a portion of the soda in the blood, arise from chloride of sodium; and that, by the simple privation of this salt, we put an end to digestion and life.

If we give for nourishment, to a young pigeon (*Chossat*, *Comptes Rendus de L'Academi des Sciences*, June, 1843), grains of wheat, in which the most important principle of its bones, phosphate of lime, is wanting, and if it be prevented from procuring elsewhere, the lime which is necessary for it, we perceive that its bones become more and more thin and fragile, and that the continued deprivation of this substance produces death. If we suppress the carbonate of lime in the nourishment of birds, they lay eggs deprived of the hard protective shell.

If we feed a cow with an excess of tubercles and roots, such as potatoes and beet-root, which contain phosphate of magnesia, but only *traces* of lime, the animal experiences the same fate as the young pigeon.

If we remove daily from the cow in its milk, a certain quantity of the phosphate of lime, without repairing this loss in its nourishment, this phosphate must be taken from its bones, which gradually lose their strength and solidity, and finally become incapable of supporting the weight of its body.

If we add to the nourishment of the pigeon, grains of barley or

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* *Annalen der Chemie und Pharmacie.*

peas, or to that of the cow, barley straw or clover, which are rich in salts of lime, the health of the animal is sustained.*

Men and animals receive their blood and the principles of their bodies from the vegetable kingdom, and an inscrutable wisdom has ordained that the life and the vegetation of the plant should be connected by the closest links with the absorption of the same mineral substances that are indispensable to the animal organism. Without those inorganic matters which we know to be principles of their ashes, it is impossible to form an idea concerning the formation of the germ, of the leaf, of the flower, and of the fruit.

The quantity of the principles serving for the nourishment of animals is extremely unequal in the cultivated plants.

There is a much greater relation between tubercles and roots, with respect to their chemical principles, than with the seeds. The latter have always a similar composition.

Potatoes, for example, contain from 75 to 77 per cent of water, and from 23 to 25 per cent of solid substance. By means of a mechanical operation, we can decompose the latter into 18 or 19 parts of starch, and three or four parts of dry, amylaceous fibre. It is easy to see that the two combined, weigh almost as much as the dry potatoes themselves. The two hundredths which are wanting are formed of salts, and of the sulphuro-nitrogenous substance known under the name of albumen.

Beet roots contain from 88 to 90 per cent of water, 25 parts of beet roots contain very nearly the same elements as 25 parts of dried potatoes. We found from 18 to 19 parts of sugar, and 3 or 4 parts of cellular tissue; half of the two hundredths which are wanting is formed of salts; the rest is albumen.

Turnips contain from 90 to 92 parts of water. From 23 to 25 parts of dry turnips contain from 18 to 19 parts of pectine, with very little sugar, three or four parts of cellular tissue, and two parts of salts and albumen. Sugar, starch, and pectine contain no nitrogen; they are met with in plants in the free state, never in that of combination with salts or alkaline bases. These are combinations formed by the carbon of the carbonic acid, and the principles of water, whose elements take the form of starch in the potatoe, that of sugar in the beet-root, and that of pectine in the turnip.

We have as a sulphuro-nitrogenous principle, in the seeds of cereals, *vegetable fibrin;* in peas, beans, and lentils, *casein;* in the

* The workmen, in the mines of South America, whose daily work (perhaps the hardest in the world,) consists in raising on their shoulders, from a depth of 146m. 178, a charge from the mine of the weight of from 90 to 100 kil., live only on bread and beans; they would prefer bread alone for their nourishment; but their masters, who have found that they cannot work so hard with bread alone, treat them like horses, and force them to eat beans, [Darwin, *Journal of Researches*, p. 324.] But beans contain proportionally, much more of the earthy substance of the bones than bread.

seeds of oleaginous plants, *albumen*, and a substance greatly resembling casein.

The vegetable fibrin of the seeds of cereals is accompanied by starch. This same body is a principle of the pods of leguminous plants. In the oleaginous seeds the starch is replaced by another nitrogenous principle, analogous to oil, butter, or wax.

It is evident that, according to the object of culture, and according to the principles which we wish to obtain, we should present to plants the conditions necessary for their production. Sugar and starch require the addition of other substances than the sulphuro-nitrogenous principles.

To furnish to the potatoe and the beet-root the necessary principles of their leaves, that is to say, organs destined for the absorption and assimilation of carbonic acid, is to fulfil the conditions of the formation of starch and sugar.

The juice of all vegetables rich in sugar and starch, and most of the ligneous plants, is rich in potassa, soda, or the alkaline earths. These alkalies and alkaline earths cannot be considered as accidental principles; we must suppose that they answer certain objects in the organism of the plant, and that they are absolutely necessary for the formation of certain combinations. I have said that they are combined in plants with organic acids which characterize some kinds of vegetables, so that they are never wanting. The organic acids themselves should be the intermedia of certain vital functions in the organism of the plant. Now, if it be borne in mind, that fruits, before arriving at maturity, grapes for example, are not eatable on account of their great quantity of acid, that these fruits act absolutely like leaves in the solar light, endowed, as they are, with the power of absorbing carbonic acid, and of eliminating oxygen (De Saussure); that the augmentation of the sugar coincides with the diminution of the acid, we can scarcely help thinking that the carbon of the organic acid in the fruit, before its maturity, becomes a principle of sugar in the ripe fruit, that it is thus, by an elimination of oxygen, with an assimilation of the elements of water, that the acid is converted into sugar.

The tartaric acid in grapes, the citric acid in cherries and gooseberries, and the malic acid in summer apples which ripen on the trees, are, therefore, the intermedia of the conversion of carbonic acid into sugar; deprived of the proper temperature, and of the action of the solar light, they would not undergo the changes of this metamorphosis.

Now, we see in the sorb apple of bird-catchers (*sorbier des oiseaurs*,) the tartaric acid replaced by malic acid, the more oxygenous acid by the acid containing less oxygen; we see the malic acid gradually, almost completely disappear from these fruits, and we find in its place gum and mucilage, which did not previously exist in them, and, consequently, we have reason to admit the conversion of the carbon of the tartaric acid into that principle of malic acid which succeeds to it, a transformation not easily involved in doubt, as much as we have to attribute it to the metamorphosis of those acids into sugar.

The opinion that a plant assimilates carbonic acid, that this carbonic acid takes in its organism the forms of tartaric, racemic, and citric acids, only to be finally converted into carbonic acid; this opinion, I say, cannot be reasonably sustained.

If this mode of view relative to the part which organic acids take in the formation of sugar be confirmed, it should have the same value relative to the formation of all the other non-nitrogenous substances of similar composition; the formation of starch, pectine, and gum, is not, therefore, immediately produced, without transition, by the carbon of the carbonic acid, and the elements oi water; but a gradual transformation is operated in consequence oi the production of combinations which become, by degrees, more poor in oxygen, and richer in hydrogen. The formation of oil o: turpentine cannot be represented without the production of analogous intermediate bodies.

But if the organic combinations, rich in oxygen, *the acids*, ar the intermedia of the production of those which contain less oxy gen, sugar, starch, &c., it is clear, that in cultivating plants, i which the acids are rarely in the free state, but in which they ordi narily exist under the form of salts, the alkalies and the alkalin bases should be regarded as the conditions of the production of th non-nitrogenous principles. Without the presence of these base: an organic acid may, perhaps, be formed; but, without the aci neither sugar, starch, gum, nor pectine, can be formed in the orga nism of these plants. In the fruits and seeds, in which the orga nic acids are free, that is to say, not in the state of salts, such a citric acid in lemons, oxalic acid in chick-peas, sugar is not form ed. Sugar, gum, and starch, are produced only in the plants i which the acids are found combined with bases, which are met wit in plants.

Whatever may be the value which may be accorded to th opinion concerning the part performed by alkaline bases in tl vital act of vegetables, the positive fact that, in young shoots, th leaves and buds which are developed, consequently in the parts (the plants in which the faculty of assimilation is observed in i greatest force, the proportion of alkaline bases is most considerab that the vegetables most rich in starch, are not less distinguish by their richness in alkaline bases, and in organic acids; this obse vation, I say, cannot, on account of this view, lose its value i rural economy.

If we find sugar and starch accompanied by salts, formed l organic acids, and if experience demonstrates that, without alka line bases, all the development of the plant, the formation of suga of starch, and of ligneous fibre, are found restrained; that their presence gives activity to, and augments, its vegetation, it is clear that if in culture a maximum of product should be attained, it is not by an excess of carbonic acid and humus that it can be effected, if we do not present to the plants, in great quantity, and in a state appropriate to absorption, the alkalies which are the principal conditions of the conversion of carbonic acid into sugar and starch, whatever may be the manner in which they may contribute to this result.

The oxalic, tartaric, citric, and malic acids, &c., are produced in the organism of the plant: their carbon arises from carbonic acid.

We find, in vegetables, these acids combined with potassa, lime and magnesia, in the state of salts, the smallest parcels of which, abandoned to themselves, follow their own attractions, as is seen in their tendency to crystallize.

It cannot be doubted that these combinations do not possess the character of organic life, precisely because the force which appears to be in activity in them is not the vital force, but the force of cohesion. It must be quite the same with sugar, which is, likewise, crystallizable.

We should suppose that the smallest parcels of the products, whose formation is due to carbonic acid, are subordinate to the activity which, in the living plant, reacts on them, like the smallest parcels of carbonic acid itself; that, thus, the carbon of the oxalic and tartaric acids, &c., should possess the faculty of becoming the principle of an organ endowed with vital force.

It is easy to pursue this metamorphosis in the organic acids. If we represent 12 equivalents of our carbonic acid as losing (in presence of a base, and under the influence of light, in consequence of the action of the vital force of its elements), the fourth of its oxygen, we have oxalic acid. This acid may be imagined in the anhydrous state, by supposing that the carbonic acid has not given rise to it in any other manner:—

$$C^{12}O^{24}—O^{6}=C^{12}O^{18}=6 \text{ eq. of anhydrous oxalic acid.}$$

The oxalic acid does not exist in the anhydrous state. In the state of hydrated oxalic acid, it contains 1 eq. of water; the salts of potassa, lime, and magnesia, likewise contain water. Hydrated oxalic acid is formed of:—

$$C^{12}O^{18}+6 \text{ eq.}=C^{12}H^{6}O^{24}=6 \text{ eq. of hydrated oxalic acid.}$$

It is easy to observe that carbonic acid and hydrated oxalic acid contain an equal quantity of oxygen. We may, therefore, here represent hydrated oxalic acid as carbonic acid, into the composition of which a certain quantity of hydrogen enters.

If the continuation of the influence of the activities eliminates from oxalic acid fresh portions of oxygen, we have tartaric or malic acid. Tartaric acid is formed by the elimination of 9 equivalents of oxygen : the separation of 12 equivalents of the same element gives rise to malic acid.

Hydrated oxalic acid $C^{12}H^{6}O^{24}—O^{9}=3$ eq. of tartaric acid.
" " " $C^{12}H^{6}O^{24}—O^{12}=3$ eq. of malic acid.

It is by a simple separation of water from the elements of malic acid that citric acid is formed ; we know, that by the sole influence of heat, we can produce, with citric acid, *aconitic acid*, and with malic acid *lichenic* and *maleic acids*.

Malic acid $C^{12}H^{6}O^{12}—$ Aq$=C^{12}H^{5}O^{11}=3$ eq. of citric acid.
" $C^{12}H^{6}O^{12}—3$ Aq$=C^{12}H^{3}O^{9}=3$ eq. of lichenic acid

We may now consider the tartaric and malic acids as combinations of oxalic acid with sugar, gum, ligneous fibre, or their elements.

Tartaric acid.		Oxalic acid.		Dry grape sugar.
$2\,(C^{12}H^{6}O^{15})$	=	$C^{12}O^{18}$	+	$C^{12}H^{12}O^{12}$

So that, consequently, by the addition of new quantities of hydrogen, all these acids may contribute to the formation of sugar, starch and gum. In this metamorphosis, the alkalies, which were combined with the acids, should, as is self-evident, be set at liberty; they should recover the faculty of again performing the same part. It may, therefore, be believed that one equivalent of alkali may serve for converting 10, 20, and even 100 equivalents of carbon into a principle of the plant. It is by time alone that the quantity of the base present produces any difference.

If a living evergreen plant assimilates, throughout the year, with the assistance of a given quantity of potassa, a certain quantity of carbon under any form whatever, a summer plant requires nearly four times as much potassa to assimilate the same quantity in one fourth the time.

Gay-Lussac first observed that oxalic, tartaric, and citric acids and sugar, ligneous fibres, &c., are brought to the state of carbonic acid by the contact of an alkali, at a high temperature.

This course of decomposition is precisely the inverse of that which occurs in plants. In the latter, the elements of water are added to the combination of carbon to the carbonic acid, oxalic and tartaric acids, &c., are formed, *owing to a separation of oxygen*.

In the chemical operation indicated, the elements of water present are added to those of the oxalic and tartaric acids, &c. they are brought to the state of carbonic acid *by a separation of hydrogen.*

Without disengagement of any gas, from the fact of the presence of an alkali, the tartaric and citric acids are already divided, at

:emperature of 392° F., into oxalic and acetic acids. But the ınhydrous acetic acid contains carbon and the elements of water, precisely in the same relative proportion as ligneous fibre (Peligot) which, in perfectly similar conditions, also gives acetic acid.

This mode of decomposition has led a distinguished French chemist to admit the existence of oxalic acid ready formed in tartaric ıcid. At all events, its elements are formed in it by the side of a second body, which, like sugar, gum, and ligneous fibre, may be egarded as a combination of carbon with water.

Every part, every principle, of the animal body is derived from plants. It is by the organism of plants that the combinations which serve to sanguification are formed; it cannot be doubted hat the parts of the plants serving as food contain, not only one r two, but all the principles of the blood.

We cannot believe in the possibility of the formation of blood n the body of an animal, or of milk in that of a cow, if there be wanting in their food one of the principles which should be rearded as conditions of equal necessity for the sustenance of all ıe vital functions.

The sulphuro-nitrogenous substances, as well as the alkalies and ıe phosphates, are principles of the blood; we cannot conceive ıe passage of the former into this fluid without the presence and oncurrence of the latter.

The faculty possessed by a portion of the plant of sustaining ıe life of an animal, and of increasing the mass of its blood and esh, is, then, in direct ratio with its richness in the organic prinples of the blood and with the quantity of alkalies, phosphates ıd metallic chlorides (chlorides of sodium or potassium) necessay to their passage into the blood.

It certainly is a highly remarkable fact, and of great value to griculture, that the sulphuro-nitrogenous vegetable substances, hich we have designated as organic principles of the blood, are, all the parts of plants in which they are found, always accomanied by alkalies and phosphates.

In the juice of potatoes and of beet-roots the vegetable albumen accompanied by alkaline salts and soluble phosphate of magnea; we have in the seeds of peas, lentils and beans, and in those cereals, alkaline phosphates and earthy salts.

The seeds and fruits in which the organic principles of the ood are found in greater abundance, contain also a predominating ıantity of the inorganic principles, the alkalies and phosphates; ıd in the other substances, such as potatoes and roots, which are oportionally so poor in the former, the latter exist also in a uch smaller quantity.

The simultaneous presence of the two classes of combinations so constant, that an intimate connexion cannot be doubted. It extremely probable that the production and formation of the organic principles of the blood in the organism of the plant, are connected by the strongest ties with the presence of the alkalies and phosphates.

We should suppose that even with the introduction of the greatest quantity of carbonic acid, of ammonia and of the sulphates, which furnish the sulphur, the organic principles of plants would not be produced in the form appropriate to their conversion into blood, if the alkalies and phosphates by which we always find them accompanied were wanting.

But even admitting that they might also be produced in the organism of the plant, without the concurrence of these substances, they could not be converted in the body of the animal into either blood or flesh, if the mineral principles of the blood were wanting in the part of the plant given as food.

Apart from all theoretical considerations, the judicious agriculturist should then, with relation to the objects he has in view, proceed precisely as if the production of the organic principles depended on the presence of the inorganic principles of the blood (the phosphates and alkalies) ; he should give his plants all the principles necessary to the formation of the leaves, stems, and seeds ; and if he wish to attain on his fields a maximum of blood and flesh, he should add in greater quantity those of their principles which the air cannot furnish.

Starch, sugar, and gum contains carbon and the elements of water : they are never found associated with the alkalies ; they do not contain phosphates. It may be believed that in two varieties of the same plant, by the addition of an equal quantity of the mineral elements, very unequal quantities of starch or sugar are formed, that from two equal surfaces of land prepared in precisely the same manner, and sowed with two varieties of barley, we might collect on one, one and a half, or even twice, the weight of seeds on the other ; but this excess of product can have relation only to their non-nitrogenous, and not to their sulphuro-nitrogenous principles : for an equal quantity of the inorganic principles of the blood added to the soil and passed into the plant, there should be formed in the seeds a quantity of inorganic principles which corresponds to them ; in short, it cannot be found more in one than in the other.

It will be only the introduction of a less quantity of nitrogen into a plant during the lapse of time given, which will produce a difference : it will be owing to the want of ammonia that a corresponding quantity of the inorganic principles of the blood will not find employment.

Of two kinds of different plants which we cultivate on a field of the same nature, that one will remove from the soil the greatest quantity of the inorganic principles of the blood (phosphates) in the organization of which will be produced the greatest quan tity of the organic principles of that fluid (sulphuro-nitrogenous compounds).

One of the plants will exhaust the ground of these principles, whilst with the same conditions of culture for the other, which has removed from it a smaller quantity of phosphates, it will still remain fertile for a third kind of plant.

This is, therefore, the reason why with the development of certain parts of plants which, such as the seeds, much exceed all the others in their richness in the organic principles of the blood, the soil loses much more of the phosphates, and is exhausted much more than by the culture of herbaceous plants, or of tubercles and roots which contain very little of them in proportion.

Besides, it is clear that if two plants which require in equal times the same quantity of the same principles, grow side by side on the same ground, they will partake the principles of the latter. That which one of them introduces into its organism, the other cannot appropriate.

If the soil on a limited space (surface and depth) contain not more of these inorganic aliments than ten plants require for their complete development, twenty of the same plants cultivated on the same surface will attain only half their development: the number of their leaves, the strength of their stems, and the number of seeds should present a difference.

Two plants of the same nature should be reciprocally injured, if grown within a certain distance they find in the ground or in the atmosphere which surrounds them a less quantity of the aliments which are necessary for them, than they require for their complete development. There is no plant more injurious in this manner to a plant of wheat than a second plant of wheat, or to a potatoe plant than another potatoe plant. We find, indeed, that cultivated plants greatly excel at the border of the fields, in strength and in number of seeds and tubercles, those which grow in the middle.

But the same case should be reproduced, in a perfectly similar manner, if we cultivate the same plant no longer by the side of the other, but one after the other during several years on the same soil. Let us admit that the soil contains a quantity of silicates and phosphates sufficient for 1,000 crops of wheat, it will be sterile for the same kinds of plants after 1,000 years. Let us represent the surface of this field as exhausted to the bottom which nourishes the roots of the plants of the first crops; let us replace the bottom by the surface, and the surface by the bottom, and we then have a new surface, which, being much less exhausted, again ensures us a series of crops: but this state of fertility also has limits.

The less rich the soil is in these mineral aliments, so indispensable to plants, the sooner will the period of exhaustion arrive: but it is clear that we restore it to its primitive state of fertility by reëstablishing its original composition, and consequently, by returning to it the principles which we had reaped and removed in the plants.

Two plants may be cultivated side by side, or one after the other, if they require unequal quantities of the same principles in unequal times; they will not be injured, and their vegetation will be beautiful, notwithstanding their proximity, if they require for their development different principles of the soil.

The investigations of M. de Saussure and many other naturalists, have shown that the seeds of the *Vicia faba* of the *Phaseolus vulgaris*, of peas and garden cress (*lepidium sativum*,) germinate and are developed to a certain degree in wet sand, and in horsehair kept in a state of humidity; but when the mineral substances contained in the seed are no longer sufficient for the further development of these plants, they begin to droop; they sometimes flower, but they never produce seeds.

Wiegmann and Polstorff made plants of different kinds vegetate in white sand boiled with aqua regiâ and freed from acid by careful washing;* barley and oats sown in this sand, and sufficiently moistened with water free from ammonia, reached the height of 0m487; they flowered, but produced no seeds, and perished after flowering. The *Vicia sativa* attained the height of 0m27, flowered, and produced husks; but they contained no seed.

Tobacco sowed in this land presented a perfectly normal development; but from June to October, the little plants attained only the height of 0m14: they had only four leaves without stalks.

The examination of the ash of these plants, as well as the analysis of the seeds, showed that this land, sterile as it was by itself, and poor as it was in potassa and soluble principles, nevertheless yielded to them a certain quantity of these substances which had served for the development of the stalks and leaves. But these plants could not bear seed, because evidently there was a complete absence of the substances necessary for the formation of the principles of the seeds.

In the ash of most of the plants grown in this sand, might the presence of phosphoric acid be demonstrated; but it corresponded only to the quantity of that acid introduced into the soil by the seed. In the ash of tobacco, whose seeds are, as is known, so small that the phosphoric acid which they contain eludes analysis, it was impossible to detect any trace of it.

* This sand contained in 1,000 parts:

Silica	979.00
Potassa	3.20
Alumina	8.76
Peroxide of iron	3.15
Lime	4.84
Magnesia	0.09

Wiegmann and Polstorf demonstrated the accuracy of the theoretical opinions relative to the cause of the sterility of this sand. They took the same sand, and prepared with it, by the addition of salts obtained in a purely artificial manner in a laboratory, a soil likewise artificial; they sowed in it the same plants, and found them to thrive in it very well. The tobacco shot forth a stem more than a metre in height, and many leaves; it flowered on the 25th June, produced seeds about the 10th August, and on the 8th September ripe capsules were collected with perfectly developed seeds.

Barley, oats, buck-wheat, and clover were developed in a perfectly similar manner: they all came up well; they flowered and produced ripe and perfect seeds.

It is quite certain that the fine vegetation of these plants in this sand, previously quite barren, depended on the salts added. This artificial soil owed its equal fertility for all these plants to the addition of certain substances whose presence might be demonstrated in the perfectly developed plant, in the stem, leaves and seeds, and whose existence in the soil and in the vegetables, puts beyond doubt their necessity for the life of the plant.

We can, therefore, give the most barren soil the greatest fertility for every kind of plants, by furnishing to it the principles which are necessary for their development. In fact, to endeavor to render fertile, according to these principles, a completely barren sand, requires neither trouble nor expense; but by applying them to our ordinary lands of culture, which already contain in themselves a great number of these substances, it is sufficient to furnish those which are wanting, to increase those which are found in them in too small quantity, and to give to the soil, by the art of agriculture, the physical properties which render it permeable to the humidity of the air, and permit plants to appropriate these principles of the soil.

Different kinds of plants require for their vegetation and complete development, the same inorganic aliments, but in unequal quantity or unequal times; or else they require different mineral substances. It is to the difference of the aliments necessary to their development, which the soil presents, that it must be attributed, if certain kinds of plants, growing side by side, are mutually arrested in their development; and if others, on the contrary, in the same condition, present a rich vegetation.

If, indeed, we compare the principles of the ash of the same plant which is developed, in different soils, we find only very slight differences in its composition. We have, as an invariable principle, in the straw of the graminacæ, silicic acid and potassa, and in their seed phosphates of potassa and magnesia; in the straw of peas, and in clover, an abundant quantity of lime is found. We know, besides, that in certain kinds of plants, potassa may be replaced by soda, and lime by magnesia.

It results, moreover, from the investigations of M. Boussaingault (*Annales de Chimie et de Physique*, 3[d] Série, t. i. p. 242), that on an equal surface (4 acres [?]) of the same field manured once, there will be removed from the soil, by five successive crops:—

			Principles of the soil.
1st year, by a crop	of	potatoes (tubercles without stalks or leaves) ..	246.8 lb.
2d "	"	wheat (straw and grain)	371.0 "
3d "	"	clover	620.0 "
4th }	"	wheat*	488.0 "
}	"	peeled turnips	108.8 "
5th "	"	of oats (straw and grain)	215.0 "
By a crop of		beet-roots† (roots without leaves)	399.5 "
	"	peas (seeds and straw)	618.0 "
	"	rye	284.6 "
	"	artichokes (hel. tuberosus)	660.0 "

Of these numbers which express the quantities of inorganic substances extracted from the same soil by different plants, and extracted or removed consequently in the crop, it results that different plants introduce into their organism unequal weights of these principles of the soil.

The attentive examination of the principles of their ashes shows, moreover, that they differ essentially with respect to their quality. 1000 parts of beet roots, potatoes, or turnips, leave, by cultivation in the dry state, 90 parts of easily fusible ash, containing a great quantity of carbonate of potassa and salts, with alkaline bases. Of these 90 parts, 75 dissolve in cold water.

2000 parts of dried fern likewise give 90 parts of ash; but of these 90 parts, nothing dissolves in water, or only a trace is dissolved. (Berthier.)

It is the same with the ash of wheat straw, and those of barley, peas, beans, tobacco, &c. With equal weights to their ash, very unequal quantities of its principles dissolve in water. Some ashes are completely soluble in water; some are only half soluble in it; and again others contain only traces of principles soluble in water.

If we pour an acid—hydrochloric acid, for example—on the portions of ashes insoluble in water, we find that with a great number of plants, the residue left by the water is completely soluble in the acids (beet roots, potatoes, turnips, &c.); that with others, only half of these residues are dissolved in the acid, whilst

* In a second and third *assolement*.

† In the quinquennial crop above referred to, wheat is mentioned twice. In the second year, by a crop of wheat, 371 lbs., and in the fourth year, 488 lbs. of inorganic principles were removed from the soil. This difference is owing to the unequal quantity of straw and grain which were collected in these two years. In the one, the combined weight of the straw and grain was 8,790 lbs.; and in the other, on the contrary, 10,858. The relative proportion of these ashes was absolutely the same as these numbers.

the other half finally resists; that with others, only one-third, or less, is dissolved.

The principles of the ashes of plants which are soluble in cold water, are formed, without exception, of *salts with alkaline bases* (*potassa* and *soda*); those soluble in the acids, are *salts of lime and magnesia.* The residue insoluble in the acids is *silica.*

The unequal portion of these principles, which are so different in their mode of acting with water and the acid, enables us to divide plants in culture into *plants containing potassa*, which contain more than half their weight of soluble alkaline salts; into *plants containing lime*, in which the calcareous salts predominate; and into *plants containing silica*, in which there is a predominance of silica. These are precisely the principles which are necessary to them in very great quantity for their development, and which essentially distinguish them from each other.

[Continued from number 1, page 137.]

EXPERIMENTS AND OBSERVATIONS ON THE PRODUCTION OF BUTTER.

BY PROFESSOR TRAILL.

Series 1.

The comparative value of the first and last portions of the milk.

For this purpose a cow was selected which had calved five weeks before, and the experiments were begun on Monday, 26th May, 1806.

No. 1 was the first pint milked.

No. 2 was a pint of the whole milking, after the separation of No. 1 and No. 3.

No. 3 was the last pint of the milking, or *afterings*.

As in previous experiments, *scalding* the milk was found to favor the more perfect separation of the butter, after the three portions were allowed to remain twenty-four hours in the milkhouse. They were at the same time placed in earthenware basins, in a pan of water heated to 180° Fahr. They were removed within an hour from the water, when the milk had acquired a temperature of 130°. They were replaced for ten hours in the milkhouse, and then examined. No. 1 then showed scarcely any indication of cream. It formed a very thin pellicle only; and the quantity, being too small to be churned, was estimated from other comparative trials, to be no more than equivalent to five grains of butter. No. 2, was evidently richer to the eye, but the cream was pale-colored, and, when churned, yielded 181 grains of firm butter. No. 3, the cream, before churning, had a rich yellow tint; the butter produced was well flavored, and weighed 551 grains. The difference between the richness of the first milk and the afterings, in a cow yielding about fifteen pints of milk at each milking, is thus as 1 : 110.

When a cow has calved less recently, the difference between the first milk and afterings, however, appears not so great. On the 9th of August, the milk of the same cow, which then yielded fourteen and a half pints at a milking, was subjected to experiment in a similar manner.

The three portions were placed in similar basins in the milk-house for forty hours, and were then scalded till the temperature of the milk rose to 145°. The milk was drawn off next day from below the cream by means of a siphon, and the three portions were churned, in glass vessels, at the same time, for thirty minutes. The butter was soft and very white, although it was allowed to remain for twenty-four hours after churning in cold water. This probably arose from the heat of the weather; the thermometer in the shade then standing as high as 73°. When the butter was washed, and worked to free it from water,

No. 1	yielded	31	grains.
No. 2	"	252	"
No. 3	"	416	"

Here the proportion between the first and last milking is as 1 : 13.42 nearly, or 1 : 13½.

On this occasion, we took the opportunity of repeating an experiment formerly made on the proportion of caseine or curd in each of those portions of milk, by coagulating small but equal parts of each by means of rennet, and also by sulphuric acid, which we had found to afford a larger and more firm curd than rennet. Two ounces of each portion of the milk, after the cream was removed, were measured out, (that is, one-eighth of an English pint;) a teaspoonful of filtered rennet was added to each; to equal quantities of the same milk forty drops of sulphuric acid were added; and the six cups were placed in boiling water for some minutes. They were all firmly coagulated. The curd was separated from each; and, when equally dried, in a heat about that of boiling water, each was accurately weighed.

	With Rennet.		With Sulphuric Acid.
No. 1	gave of dry curd 14 grains.	...	18 grains.
No. 2	" " 13 "	...	18 "
No. 3	" " 14 "	...	19 "

This shews that, though the quantity of oily matter differs materially in the first milk and the afterings, the proportion of caseine or curd differs but little.

The experiments shew the caseine obtained from each pint to be equal to—

	With Rennet.		With Sulphuric Acid.
No. 1 ..	112 grains of curd.	...	144 grains.
No. 2 ..	104 " "	...	144 "
No. 3 ..	112 " "	...	171 "

SERIES 2.

Comparative quantity of butter yielded by

No. 1. Sweet cream churned alone.
No. 2. Sweet milk and its cream churned together.
No. 3. Sour cream churned alone.
No. 4. Sour milk and its cream churned together.
No. 5. Scalded cream, or Devonshire cream, churned alone.

On the 24*th May*, 1807, the milk of four cows was drawn in the same vessel, passed through a strainer, and then divided into five portions of six English pints each, which were placed in similar basins of earthenware, in a milkhouse, the temperature of which ranged from 55° to 60° Fahr.

Monday, 25*th*.—The temperature of the air was very hot, 76°; but that of the milkhouse, by constant evaporation of water, was kept about 60°.

Tuesday, 26*th*.—Thirty-nine hours after the milk had been drawn from the cows, it was removed from below the cream of No. 1 and No. 3, by a siphon; and we immediately began to churn the cream of No. 1, and the milk and cream of No. 2, in glass vessels.

No. 1. *Sweet cream churned alone.*—Having previously found that the addition of a small quantity of cold water to thick cream facilitated the separation of the butter, half-a-pint of water was added to the cream, and it was found that the temperature of the mixture, at the commencement of the churning was 62°. In fifteen minutes, butter appeared in grains; the churning was continued for twelve minutes longer, *i. e.* twenty-seven minutes in all, when the temperature of the whole had risen to 70°. The butter was now collected into one mass; but, from the warmth of the weather, was very soft. It was, therefore, put into cold water, and placed in the milkhouse until the morrow, when it was worked and washed in the usual way, and weighed 1386 grains. It was of a good color, and perfectly well flavored.

No. 2. *Sweet milk and its cream churned together.*—The mixture of sweet milk and cream was churned at the same time; but, though cold water was here added, after one and a half hour's churning, no butter was to be seen. The churning was continued for as long, (in all for three hours,) but without our obtaining a particle of butter.

No. 3. *Sour cream churned alone.*—On *Thursday*, 28*th May*, the cream of No. 3, which had been separated on Tuesday, and placed in a milkhouse, was now slightly acid, and was churned, after half a pint of cold water had been added to it. In twelve minutes butter appeared; and in eight minutes more, it had united into one mass. During the churning, the temperature of the cream had risen from 54° to 63°. The buttermilk was very poor, fit only for pigs. The butter, when well washed, and worked to separate the watery part, weighed 1756.5 grains. The color and taste were very good.*

No. 4. *Sour milk and its cream churned together.*—On the same day, 28*th May*, the milk and cream which had become acid were churned together, and half a pint of cold water was added. It was fully fifty-seven minutes before any butter appeared; and before the churning seemed to be completed, one hour and fifty minutes had elapsed. This shews that much more time is required to churn milk and cream together than to obtain the butter from cream alone. The butter was, in this instance, diffused in small grains, and, when washed and worked as long as any color was communicated to the water, it weighed 1968 grains. Its color was rather paler than the last, but its flavor was good.†

No. 5. *Clouted cream churned alone.*—On *Tuesday* 26*th*, the milk and cream of No. 5 were placed in a vessel of warm water until the temperature of the milk rose to 156°. In these experiments on scalded cream we had the assistance of a Devonshire dairymaid, to superintend this part of the process. She generally placed the vessel containing the milk among the embers of a low fire; but we preferred water as the heating medium. She judged of the due degree of heat merely by dipping her finger in the milk, and the wrinkling of its surface; and we found that the heat considered by her sufficient generally ranged from 135° to 156°, and was occasionally as high as 160° or 162° Fahr. The milk was drawn from below the cream by a siphon; and the latter was placed in the milkhouse, until the following day, before it was churned. It was churned on Wednesday, the 27th. The milk of this portion was very poor, had a scalded taste, and would have been unsaleable.

I may here state that, by churning the milk of No. 1 and of No. 3., we could obtain a few more grains of butter, on some oc

* The buttermilk from cream alone was poor and thin, in this and in all our experiments, whether water had been added to the churn or not.

† The buttermilk from No. 4—that is, from churning milk and cream together when slightly acid, is a bland, agreeable fluid, containing much albumen or caseine. It finds a ready market in towns, and is much used in Lancashire as an article of diet. It is, therefore, a valuable product which ought to be considered in an economical point of view.

casions; but we never could obtain the smallest quantity of butter from the milk of No. 5—so completely does the scalding process separate the butyraceous matter from the milk. The butter of No. 5, when well worked and washed, weighed 1998 grains. It had a rich yellow color, tasted agreeably, and was quite free from the peculiar scalded flavor of the milk.

Series 3.

This series, a repetition of the preceding experiments, on the milk of four other cows, was commenced on *Thursday the 25th of June*, 1807, or a month after the last series. As before, the whole milk was mixed, strained, and divided into five equal portions, of six pints each, which were treated as the last.

No. 1. *Sweet cream churned alone.—On the 26th*, or in twenty-four hours after the milking, the milk of No. 1 was drawn off by the siphon. The temperature of this portion, at the commencement, was 62°; and when the churning was finished, had only attained to 65°. The churning required forty-five minutes. Water had been added as before, and the butter was obtained in grains like peas. When well worked and washed, it weighed 1147 grains. Its color was good and its flavor excellent.

No. 2 *Sweet milk and its cream churned together.*—The sweet milk and cream churned together afforded no butter.

No. 3. *Sour cream churned alone.—On the 29th of June*, the cream, which had become sour, was separated by the siphon and churned. The temperature at the commencement, was 58°—at the end, it was 65°, The butter was fully formed in forty minutes, and united into one mass. Well worked and washed, it weighed 1247 grains. Its taste was good as was its color.

No. 4. *Sour milk and its cream churned together.*—At the same time, the sour milk and cream were churned, with the same precautions as before. The churning occupied two hours; when the temperature had risen from 58° to 68°, or nearly 69°. When worked and washed, the butter weighed 1447 grains. The qualities equalled that of No. 3.

No. 5. *Clouted cream churned alone.*—The cream of this portion was scalded on *Friday, the 26th June*, by being heated to 160°, which temperature it attained in one hour, the usual time required for this operation. On *Saturday, the 27th*, it was churned in forty-five minutes; during which process the temperature of the cream rose from 58° to 64°. When well washed and worked, it weighed 1591 grains. The butter in the mouth had a granular feel, which we attributed to the heat rising, by accident, too high; by which an unusual portion of caseine appeared to be separated with the cream. The butter had, however, no peculiar flavor from the process; although the milk would have been unsaleable, from a strong taste of *scalding*.

The general result of these experiments, confirmed by many similar trials is, that the largest quantity of buttter is produced from the scalded or Devonshire cream ; the next in quantity from the method of churning the milk and cream together, when they have become slightly acid ; the third in quantity is afforded by cream kept till it is slightly sour ; the smallest quantity is obtained from the sweet cream. We were unable to obtain butter from churning sweet milk and cream together ; and in several other series attempted it no more.

In one series of experiments we used as much as 11½ English pints of milk in each experiment ; but we then had to churn in vessels of tinned iron ; and we did not find the results so uniform as when operating on smaller quantities in glass vessels.

Series 4.

This series was intended to decide on the qualities of the butter obtained by the four processes above detailed, as to keeping fresh. These experiments were made, as those of the next series, on the butter obtained in most of our experiments. No. 1 always remained, when exposed freely to the air, longer without any rancid taste than any of the other kinds of butter. No. 3 and No. 4 were nearly on an equality in this respect : if there was any difference it was in favor of No. 3. No. 5 became rancid more quickly thar No. 3 or No. 4.

Series 5.

Equal quantities of butter obtained by the four processes wer salted with equal quantities of salt, then spread thinly on glas plates, and exposed to the air in a dry room. They were inspec ted from time to time, and it was ascertained that the taint of ran cidity always appeared in the following order, commencing wit that which shewed it first :—

In No. 5, or butter from scalded cream.
" No. 4, " " a mixture of sour milk and its cream
" No. 3, " " sour cream.
" No. 1, " " sweet cream.

The cause of this difference in their power of resisting deca was believed to depend on the varying proportions of caseine, c curdy matter, in each. To determine this point another series c experiments was undertaken.

Series 6.

Two hundred grains of each kind of butter were kept liquifie by a moderate heat, in glass capsules ; the oily matter was take up by bibulous paper successively applied, as long as any oil stain was perceptible ; the watery liquid which remained belo the oily matter was evaporated, and the solid residue, after bein well washed, squeezed between folds of blotting paper, and dried, was carefully weighed. Unfortunately I have been unable to recover the details of this series of experiments; but the following ire the general results, which decidedly shew that the presence of he greater quantity of caseine in butter coincides with its greater endency to become rancid. The four kinds of butter afforded aseine in the following order, commencing with that which yielded the most:—

No. 5, butter from scalded cream.
No. 4, " from acid milk and its cream.
No. 3, " from acid cream.
No. 1, " from sweet cream.

Experiments had been made in *October*, 1806, which proved hat *overchurning*—that is, continuing the process after the full eparation of the butter—was very injurious to the quality of the utter, although it increased its weight; and these, though made efore the experiments detailed above, shall now be indicated, as

SERIES 7.

The cream of six English pints of milk was separated by a sihon, and churned in a glass vessel. The butter was formed in bout half an hour; but the churning was continued for half an our longer, when the butter had lost its fine, yellowish, waxy apearance, and had become pale and soft, while very little liquid emained in the churn. This butter was so soft that it could not e washed and worked, until it had remained some hours in cold ater. It was pale, still rather soft, and, when weighed, = 2566 grains. That this was beyond the due quantity of good utter, from such a quantity of cream, was apparent, when the mparative experiments on the same quantities of the same milk, ut only churned till the butter was well formed, gave the following results:—

No. 1, The sweet cream, overchurned, yielded	= 2566	grains.
No. 3, The acid cream duly churned, "	= 2187.5	"
No. 3, The acid milk and its cream, do. "	= 2397.5	"
No. 5, The scalded cream, do. "	= 2671.	"

The butter of No. 1 tasted insipid, never became firm, and soon rned rancid. It was found to yield a very unusual quantity of th caseine and of watery fluid, which could only be separated by elting the butter.

Similar experiments were repeatedly made, the results of which ewed that overchurning is very injurious to the quality of the tter; but it adds considerably to the weight of the article; and appears to be frequently practised in Lancashire, especially in nufacturing *fresh* butter for *immediate sale.*

It is a common opinion in Lancashire that considerably more butter is obtained by adding *hot water* to the churn than by using cold water. We had invariably found that the addition of a small quantity of cold water, especially in summer, greatly facilitated the separation of the butter, and rendered it more easily washed. But a dairyman informed us that the same quantity of cream, which will yield 14 lbs. of butter with *cold water*, will afford 15 lbs., or even 15½ lbs., with an equal addition of hot water. This formed the subject of

Series 8.

On the 15*th of November*, 1807, we took, from the mixed milk of four cows, two portions of six English pints each, and set them aside in a milkhouse, the temperature of which ranged from 59° to 52°. *On the* 17*th November*, the cream was removed from each by the siphon, and churned at the same, in circumstances as nearly equal as possible, except in the addition of water. The temperature of the cream, at the commencement of the churning was 55°.

No. 1. To this portion an ounce and a half of water, at temperature 45°, was added. After churning for eighteen minutes the butter began to appear; two ounces more of water, at 45°, were added, and the churning was carried on for five minutes more. The butter was then worked and washed.

No. 2. To this portion of cream one ounce and a half of water at 105°, was added; butter began to appear after churning for thirteen minutes, when two ounces more of water, at 105°, were added, and the churning was continued for five minutes more, or eighteen minutes in all. The temperature of the contents of the churn was 71°. This butter was very soft, and, therefore, cold water was added, in which it was worked and washed.

Unfortunately, the note of the weight of the butter in this series has been lost; but I find it stated that the butter of No. 2 was rather more bulky, and weighed a little more than that of No. 1; that it neither was so firm nor of so rich a colour as the butter of No. 1; and that, on pressing it next day, some watery fluid escaped from it. From this we inferred that the quality of the butter was deteriorated by the addition of hot water; and that the quantity obtained by this practice, of marketable butter is not so great as is commonly alleged in Lancashire, although the time of churning is thus somewhat abridged.

[From the Albany Daily Advertiser.]

OTICES OF THE WINTERS AT NEW YORK FOR THE LAST FORTY-TWO YEARS, AND OF THE DATES AT WHICH THE HUDSON WAS FROZEN OR WAS OBSTRUCTED OR CLOSED BY ICE AT ALBANY.

789—1790. A very mild winter. The mildest January since 1781. River open till 3d February, though occasionally obstructed by ice before.

'90—1791. Very severe weather in December, but more moderate in January and February. River closed on the 8th December. Lowest degree of thermometer, this winter, 5° above zero.

91—1792. A very severe winter. River closed on 9th December; uninterrupted and severe frost for four weeks; lowest degree of thermometer, 1° above zero.

92—1793. A very mild winter; river open all winter to Poughkeepsie; though it closed at Albany on the 12th December.

193—1794. A mild winter with but little snow; river closed on 26th December.

194—1795. A very mild autumn and December; river closed on the 12th January; no ice till 3d January, and but little cold weather and snow this winter.

195—1796. Another very mild autumn and December; no ice till 21st December; river open till 23d January.

196—1797. Early winter and severe till 12th January; river closed on 28th November, intensely cold on 23d and 24th December; mercury at zero in the morning.

197—1798. Very early and severe winter; river closed on 20th November; lowest degree, 3° above zero.

198—1799. Very early, long and severe winter; though the weather was moderate for about three weeks in January; river closed on 23d November; lowest degree, 2° above zero.

179—1800. A mild winter; river closed on 6th January, but obstructed by ice before.

180—1801. A mild winter, with but little snow; a very mild December, river closed on 3d January.

181—1802. A remarkably mild winter; river open till 3d February, though obstructed by ice occasionally before. In January the mercury generally ranged between forty and fifty degrees, and no snow of any consequence fell till 22d February.

1802—1803. A mild and variable winter with but little snow; river closed on 16th December.

1803—1804. A very mild December; some severe weather and deep snows in January and the latter part of February; river open till 12th January; lowest degree, 42° above zero.

1804—1805. A remarkably cold and variable winter, deep snows and heavy rains with high winds; lowest degree 2° above zero; river closed on 13th December—much distress among the poor.

1805—1806. Generally cold in January, though very mild in December and February; river closed 9th January and opened on 23d February.

1806—1807. A severe winter; river closed on 11th December lowest degree, 4° above zero.

1807—1808. A mild winter; December very mild; river close on 4th January.

1808—1809. A long and severe winter, with much snow river closed on 9th December; lowest degree 6° above zero.

1809—1810. Remarkably mild till 19th January, when the rive closed, and the weather was intensely cold f several days; very little snow this winter; low est degree, 1° above zero.

1810—1811. Much snow in February, though not much seve cold this winter. This season was remarkab for a severe snow storm on the 2d November river closed on the 14th December.

1811—1812. A severe winter; river closed on 20th Decembe lowest degree, 2° above zero

1812—1813. A severe winter; river closed on 21st Decembe lowest degree, 4° above zero.

1813—1814. A severe winter; river closed on 22d Decembe lowest degree, 8° above zero.

1814—1815. A very severe though variable winter; river clos on 10th December; lowest degree, 1° above ze

1815—1816. A variable though not severe winter; river clos on the 2d December.

1816—1817. A very severe winter, though it did not set in t the middle of January; river closed on 16th D cember, thermometer on 15th February w 6° below zero, and the first time since 1788 th it has fallen below zero in this city. As cold in January, 1765, when the mercury sunk the same degree; which the papers state to ha been the coldest weather experienced in this c in fifty years.

1817—1818. Generally moderate in December and January, though severe in February; river closed on 7th December, opened on 14th, and closed again on 21st December; mercury fell to zero this winter.

818—1819. Severe weather for two weeks in December; river closed on the 14th; generally very mild in January and February.

819—1820. A severe winter; several deep snows; river closed on 13th December, though obstructed by ice before; lowest degree, 3° above zero.

820—1821. Intensely severe weather during the greater part of January, though mild in February; river closed on the 13th November, opened on 20th and closed again on 1st December; the mercury fell on 25th January, to 7° below zero, one degree lower than in February, 1817; as cold weather, probably, as was ever experienced here. The Hudson was crossed on the ice between this city and Powles' Hook, for several days. During the last hundred years, the river has been passable on the ice, in the same way, only four times, viz: in 1740–41, 1764–65, 1779–80, 1820-21.

21—1822. A severe winter with but little snow; river closed on 13th December; mercury as low as one degree below zero.

22—1823. No very severe weather till February and March; river closed on 24th December; lowest degree, 3° above zero.

23—1824. Very mild winter; river closed on 16th December; open in January for a short time.

24—1825. Mild winter with but little snow; river closed on 3d January.

25—1826. Weather generally very mild, though there were two or three excessively cold days this winter. December 14th was a remarkably cold day; thermometer, at 8 A. M., 3°, and 10 P. M. indicated 2°, 7° and 9°; river closed on 13th December.

26—1827. A severe winter; river closed on 24th December; lowest degree, 3° above zero.

27—1828. A very cold and blustering November, followed by the mildest winter since 1801–2; river closed only about three weeks at different times through the winter. The mildest February since 1778–9, when vegetation commenced, and flowers were gathered in the woods, and in Pennsylvania, peach trees blossomed in this month.

1828—1829. A long, severe winter; river closed on 1st January and opened on 29th March; lowest degree, 6½ below zero. Much suffering among the poor i February.

1829—1830. Weather generally mild, till 23d January, when th river closed; weather then very severe for sev ral weeks. As much ice in our harbor as i 1826–7; lowest degree, 3° above zero.

1830—1831. A very severe winter, with several deep snows ground covered with snow from 6th January the 28th February, a longer period than in ar winter since 1808–9. Severe and uninterrupt frost for upwards of five weeks; during whi time, there was but three days in which the me cury rose as high as the freezing point; lowe degree, 5° above zero. Much distress amo the poor. River closed on 23d December, ope ed again by heavy rains, and closed again 16th January.

1831. December 10th: thus far the coldest December sin 1786; lowest degree, 14° above zero; riv closed on 3d December.

[From the Baltimore Sun.]

COLD WINTERS AND DEEP SNOWS.

The recent heavy snow storms experienced both east and w of the mountains, have had the effect to bring out, in seve newspapers, some cold weather reminiscences. The United Sta Gazette has accounts from 1681 to 1840, of cold weather at a in the neighborhood of Philadelphia. We take a few of the stances given. In December, 1704, snow fell to the depth of th feet. In 1725, it fell in one night to the depth of two feet. T winter of 1737, was intensely cold; many persons were frozen death. The winter of 1751, was so cold that many cattle a deer were frozen to death; bread stuff and provision were so sca and dear, that many persons in the country had to subsist on deer found dead. As late as the 19th of April, the snow lay u the ground to the depth of three feet. On the 9th of Janua 1773, the mercury was 9° below 0. 1780 was a memorable c winter; the ice in the Delaware was three feet thick; squirr and partridges were found in the woods and fields frozen to dea

In the spring of 1789, fires were necessary until the first June. The winter of 1790 was so mild and warm, that on

2d of January, the boys went into the Delaware to bathe. The winter of 1797 was intensely cold. The mercury frequently sunk from 10° to 13° below 0. A gill of brandy was put into a saucer, and placed in an open lot north of the city, on the 9th of January, and a ring of ice formed round the edge an inch broad. A gill of water, placed near, froze solid in ten minutes. The winter of 1815 was very cold, and fuel scarce. Oak wood sold at from twelve to fourteen dollars a cord. The winter of 1821 was excessively cold. The mercury, several times, fell to 10° below zero. On the 24th of January, three cows froze to death near the city. The Cincinnati Republican, after alluding to the snow storm experienced there on the 4th, 5th and 6th of this month, as the most severe that had visited the south part of Ohio for several years, gives, from old files of papers and documents in the possession of the editor, some account of the great New-England snow storms of the last century. Among these, the tempest of 1717, known in history and tradition, as *The Great Snow*, is mentioned. The weather was mild until the beginning of February; but on the 18th of that month, the storm commenced, and continued, with short intervals, for nearly a week. The northeast wind, in fierce gusts, drove the descending snow into drifts that obliterated the roads, covered the fences, and in some places, even the buildings.

In Boston, the snow lay in the street six feet deep. Multitudes of animals perished in the drifts. A letter from John Winthrop, of New-London, to Cotton Mather, says: "We lost at the island and farms, about 1100 sheep, besides some cattle and horses interred in the snow; and it was very strange, that eight days after the storm, the tenants at Fisher's Island, pulled out of the ruins, 100 sheep, out of one snow bank in a valley, where the snow had drifted on them sixteen feet, and found three of them alive in the drift, which had lain on them all that time, and kept themselves alive by eating the wool off the others, that lay dead by them. As soon as they were taken out of the drift, they shed their own fleeces, and are now alive and fat." The winter of 1741 was intensely cold. Deer were found dead in the woods, and some even ventured to the farmers' houses and fed on hay with the cattle. In January, 1780, wood sold in the village of Worcester, Massachusetts, at sixty dollars a cord. The roads were so blocked up with snow, that no fuel could be brought from the forest. The snow was four feet and a half deep in the woods on a level. Fences and low buildings were buried beneath the drifts; and the inhabitants of contiguous houses, reached each other through arches hollowed under the snow banks. The sufferings of the people of New-England, especially in the small villages, were very great.

AMERICAN AGRICULTURAL ASSOCIATION, NEW-YORK.

A few weeks ago we alluded to the importance of establishing an agricultural association in this city independent of every other organization and specially devoted to the improvement of agricultural science. Such a society has just been organized, with the following officers :

President.—Hon. Luther Bradish.

Vice Presidents.—Hon. Theodore Freylinghuysen, James Lennox, Esq., James Boorman, Esq., A. H. Stevens, M. D., Thomas A. Emmet, Esq., Hugh Maxwell, Esq., Stephen Whitney, Esq., Stephen Knapp, Esq., Vice-Chancellor McCoun, Cyrus Mason, D. D., W. A. Seeley, Esq., J. S. Livingston, Esq.

Honorary Consulting Officers.—Major Le Conte, U. S. A., F. L. S., *Entomology and Zoology.* Professor Renwick, LL. D., *Mechanical Philosophy.* W. G. Redfield, Esq., *Geology.* Professor Torrey, M. D., *Physiology.* John Johnson, Esq., *Rural Architecture.* Professor Loomis, *Meteorology.* D. P. Gardner, M. D., *Chemistry.* D. J. Browne, Esq., *Arboriculture.*

There was a large and spirited meeting of this association—the fourth that has been held since its formation for the despatch of business—in the Library of the Historical Society. Seven o'clock was the hour named for commencing the proceedings ; but as at that hour the greater number of those who attended had not arrived, a delay of more than half an hour took place. At length

The Hon. Luther Bradish called the meeting to order, and after inviting all those gentlemen who had accepted their nominations to offices to be seated at the table, said :—

Gentlemen : On entering upon the discharge of the duties you have been pleased to assign me, I cannot refrain from offering you and the friends of agriculture generally, my cordial congratulations, as well upon the numbers, as the character of those who compose this meeting. This indicates a concern of the right kind which exists for the great interest of our country—that of agriculture. As the cultivation of the earth was the original, so it was, and is still, the most general, the most important, and the noblest occupation of man. To improve this great interest—to introduce into its practical operation all the discoveries and improvements in science—thereby improving and beautifying this earth of ours, and increasing all the necessaries, the comforts, the embellishments of life ; these are objects worthy of the attention and efforts of every friend of his country and his kind ; these are the objects of the American Agricultural Association; these are objects this society propose to pursue, with reference to the present state of scientific knowledge and actual condition of the world. Among the remarkable characteristics of the age in which we live, there are two prominent ones; first, the great developments in natural science—and, secondly, the application of these new discoveries to the practical business of life, and the great interests of society. Scientific knowledge is not now what it once was. It is no longer confined within the magic and mystic circle within which it was deemed forbidden for all but the initiated to enter. It no longer dwells within the college or the schools, but it has come forth among the people, mingles in the affairs of the world, and directs its practical operations. Principles are no longer valued merely because they are ingenious, or adapted to lend brilliancy to some theory, but they are valued as of practical utility, and as they subserve the great interests of mankind. Ours is eminently a utilitarian age. Now, what the American Agricultural Society proposes, is, to follow this manifest spirit of the age, and introduce into agriculture, as far as is practicable and may be useful, the discoveries and improvements of modern science. Indeed, we hold the opinion that no system of agriculture can be considered as enlightened but in proportion as it may prove useful. What, for example, would you think of a physician—I do not now speak of those geniuses who accomplish wonders by the force of instinct, who are not only equal with, but in advance of science—but I speak of those learned gentlemen who really cure disease. What would you think of the learned doctor who would prescribe for a disease without any knowledge of its character, its symptoms—or, without any acquaintance with the *materia medica*, from which he professes to derive his remedy? So it is with agriculture; without a knowledge of the elements of active agents in production—the qualities of the soil—and whether that soil contained all the properties necessary for that production; if not, what manures and composts are suitable for invigorating it, or restoring the different agents—without this knowledge, no system of agriculture can be enlightened or perfectly successful. In illustration, let me suppose a case:—A practical farmer wishes to produce a certain crop from a particular field under cultivation. Now, if he knows what agents are necessary for the production of such a crop, and also that his field is deficient in any of those agents, he ought to supply them, and thus render the power of his soil complete. But without this knowledge, the usual error is to manure generally, by which, if the farmer has supplied the deficient agency, he may have added others in which the soil abounded. In this case he will obtain his crop, but it generally happens that those necessary agents are not supplied—in which case, he will not only have failed in his crop, but be subjected to additional expense. Now the great object of the improved system of agriculture, is not merely to enable the farmer to produce more, for that he may learn from the fancy cultivator, with his expenses, appliances, and carelessness of economy—but to enable him to produce, and by that production to make money. That system of agriculture, therefore, is best, which enables the farmer, on a given amount of capital, to produce the greatest amount of profit. Profit, then, in agriculture, is the grand test of perfection ; and these objects the American Agricultural Society propose, not only most fully, but only to obtain by the union of scientific knowledge with good productive husbandry. To ensure this union, and its legitimate results, is the great object of this association. But I may here be asked, perhaps, where is the necessity of a new agricultural Association ? Have we not already sufficient number of institutions for the promotion of this object? Have we not, even in our midst, the American Institute with its agricultural department? In answer to this I would remark here, in the first place, that, as regards the American Institute, I never can, here or elsewhere, speak of that noble and patriotic institution but in terms of the warmest respect and regard ; and as a citizen of the United States, I am happy to avail myself of this occasion to express my acknowledgments for the great good they have already accomplished, and, I trust, the greater good they are yet destined to achieve. But with objects so numerous and extended, the American Institute cannot give agriculture that attention it demands. Mr. Bradish concluded in a few words, illustrative of the wide field there was for the co-operation of their new association to promote the end proposed.

Mr. Meigs returned thanks for the complimentary allusion of the President, to the American Institute, and expressed himself delighted to see the formation of the new Association in a cause dear to him and all true friends of the country ; after which,

The Secretary read the minutes of the last meeting, held on January 22d, which were adopted.

A report from the Visiting Committee having been read, another of a more important character, from the Executive Committee, was introduced by the Secretary. Accompanying the report, was a draft of the constitution and by-laws of the Association, which the Executive Committee submitted for the approval of the meeting. They were unanimously adopted, after a few alterations suggested by Professor Mason and Dr. Stevens, one of which made the President and Secretaries ex-officio members of the Executive Committee, to which the constitution assigned the power of disposing of the unappropriated funds of the Society.

W. A. Seeley, Esq. read an admirable and elaborate paper to the Society upon Organic and Agricultural Chemistry, in which the importance of science to agriculture was shown in a masterly manner—it elicited warm marks of approval.

The meeting was then addressed by Dr. Stevens, Dr. Underhill, and Professor Mason, when the thanks of the Association were voted to the Historical Society for the gratuitous use of their rooms; and the meeting adjourned till the first Monday of next month.

PERUVIAN AND AFRICAN GUANO.

"*Resolved*, That the Association cause an analysis to be made of the cargoes of guano from Ichaboe and Peru, now in the market, for the use of members and all persons in the neighborhood; and that a report be drawn up with the analysis, containing suggestions for the application of the manure; the whole to be published as early as practicable in the agricultural papers of this city and vicinity."

PERUVIAN GUANO.

Uric acid	10.5
Ammonia	19.0
Phosphoric acid	14.0
Lime and magnesia	16.0
Salts of soda and potash	6.0
Oxalic acid, with carbonic and muriatic acids	13.0
Water	13.0
Sand	2.0
Volatile and organic matters	6.5
	100.00

ICHABOE GUANO.

Ammonia	13.5
Humic acid	4.0
Phosphates	25.0
Oxalic, &c., acids	20.0
Salts of Soda, &c.	7.0
Water and volatile matter	27.5
Sand	3.0
	100.00

Prices and Relative Value of the Peruvian and African Guano.—These specimens are both very fair, and represent the peculiarities of the two kinds of guano. The absence of uric acid in the African variety, is the cause of its inferiority; for that body decaying gradually in the soil, continues to yield carbonate of ammonia for a long time, so that the stimulating effects of the guano are seen the next year, whilst the African is more fleeting. The prices of the two are, for Peruvian $45, and for African $35 per ton, for quantities amounting to five tons; and this may be considered, all things being taken into account, a fair representation of their value in agriculture.

The African being soluble to the extent of 40 per cent, is better adapted for watering plants, and where very rapid growth is wanted. The Peruvian, on the other hand, acts for a longer time, and is better calculated for crops which continue to grow vigorously during many weeks. The two will probably produce very similar effects for one crop; but the Peruvian is much more active on the second crop.

Crops to which it is Applied.—It is hardly necessary to state, that the application may be made to every crop, for experiments are already multiplied with nearly every common plant or tree: to enumerate a few is sufficient. Wheat, corn, grass, the cerealia, sugar-cane, tobacco, apple, pear, and other fruit trees, flowers, cabbages, turnips, and other cruciferous plants; the experiments are fewest on leguminous plants. But the effect of guano will not be equal on all; for those plants requiring most stable manure, such as tobacco, turnips, and corn, are more benefited than grass, oats, or such as require less—the chief effect of the manure being due to the quantity of the ammonia it contains. The reason guano is serviceable to all plants, arises from its containing every saline and organic matter they require as food.

Kinds of Soil to which it may be Applied.—It has been used beneficially on all soils; for as it contains every element necessary to plants, it is independent of the quality of the soil—*one great point* being attended to, that the land be in *good tilth;* for, otherwise, the tender roots of the vegetable find an obstruction to free growth, and are crippled. Poor, well-tilled soils exhibit most increase by guano, for in them, some essential to the growth of plants is more likely to be absent.

Amount to be Applied.—On wheat, 250 lbs. per acre will be an average for a fair soil; 300 lbs. per acre for one that is poor, and 200 for a good soil. Corn, potatoes, turnips, cabbages, and garden vegetables, will require 300 lbs. in fair lands; but the amount may be dimished by 50 lbs., if two applications are made instead of one. For grass, rye, and oats, 200 lbs. will be enough.

Time and Mode of Application.—Seeds may be prepared by soaking in a solution of two lbs. of guano to the gallon of water, and this will answer for a first manuring, if they are left sufficiently long to exhibit signs of germination. Wheat and other small grains should be steeped in this solution about sixty hours, corn about one hundred hours. Thus steeped, the seeds of smut will also be destroyed. Half the quantity per acre to be applied when the plant has fairly started, and is in second leaf. By this timely addition, the effects of many insects are avoided, and the seedling at once takes on a robust habit. The remaining half should be applied to the small grain crops when they are throwing out new stems, or tillering; to corn, as the tassel appears, or at the second hoeing, and so with other hoed crops. This application should be made, therefore, at the latest period of working, and as nearly before flowering as practicable. The guano should be sowed with a mixture of fine soil, gypsum or charcoal, to give it bulk, and divide the particles. No lumps should be thrown amongst the plants, for they burn them; and where an extensive application is to be made, it is better to screen the manure and pound the lumps. In sowing, reach the soil, if possible, for it is unserviceable to sprinkle it on the plants, and frequently destroys them. Select a season when the land is wet or moist, or when rain may be expected; for in dry weather the guano does not answer well, or even does injury, by acting as a caustic on vegetation. But if the crop suits, always prefer manuring the plant or hill; do this whilst hoeing; less guano is thus used, and more certain effects result. One tablespoonful to the hill of corn, tobacco, potatoes, &c., is an abundance for each application. If a solution be preferred, mix one pound in ten gallons of water, and water sparingly with this on the soil, and not *on the plants*, at the times before mentioned, taking care to stir up the insoluble portion when applied. For this purpose, the African variety will be most suitable. Or, where rapid growth is wanted, irrespective of seed, the clear solution may be applied; the insoluble matter (phosphates, &c.) being reserved for wheat and corn. Guano may be composted with common soil, or anything but *lime* and *unleached ashes*; for these liberate the free ammonia, and thus diminish the effects of the manure.

Value, compared with other Manures.—So far as the experiments in England and Scotland may be adduced, one cwt. of guano is equal to about five tons of farm-yard manure on an average; but it is much higher for turnips than for grass, &c. It would be advisable that in the very different climate of the United States, comparative experiments be made on this point. Let twenty single cart loads of stable manure be used per acre on wheat, corn, &c., and contrasted with four cwt. of guano. It would also be of service to the agricultural world, that some experiments were made on the value of the organic and inorganic portions of guano. A plot of ground, eight square yards, may be divided into two parts, one half manured with the ordinary guano, and half with the ashes remaining after burning. In this way, the proportionate effect of the organic and saline parts would be estimated, and the conclusion be serviceable, insomuch as the saline matters can be mixed into a compost for a trifling sum, and thus the expense of guano avoided. D. P. Gardner, M. D.

Notice.—This publication is made by the American Agricultural Association, not that parties may be induced to purchase guano, but that attention may be called to the varieties for sale, and other particulars, for the diffusion of correct information. It is their intention to examine all available manures, and make them known publicly, as well as the results of careful experiments in agriculture, horticulture, and the management of stock, and to issue not only information from time to time, but a series of Transactions, embodying the particulars of their experiments, analyses, &c. All those wishing to advance the cause of improvement are respectfully solicited to become members, and forward suggestions for the advancement of agriculture. Letters or communications to be addressed, post-paid, to the Secretary of the Executive Committee, Dr. D. P. Gardner, 412 Fourth-street, New-York. By order of the Executive Committee.

R. L. Pell, *Chairman.*

March 12, 1845.

THE ALPACA.

We desire to direct the attention of our wealthy farmers to the following extract, from the British Cultivator. It will be seen, on its perusal, how much interest this animal is exciting in England and Scotland ; and, may we not hope that an equal amount of interest may be excited also in this country, especially in the state of New-York. Probably there is no climate, nor any range of country better fitted to the natural habits and wants of this animal, than the northern section of this state. Mountainous and broken, as much of it is, and yet producing a great abundance of the food which is adapted to the constitution of the Alpaca, and at the same time furnishing a most ample extent of country which is fitted only for grazing, it seems that a better combination of circumstances does not exist where such an enterprize as the introduction of this animal bids so fair for success.

" For most of our cultivated plants, and, indeed, for many of our domestic animals, we are indebted to other countries. With regard to the former, the history of their introduction is, in many cases, well established in detail ; but it is so long since the latest of them—the potatoe, the turnip, or the mangel-wurzel, or carrot, for instance—was first cultivated in our country, that farmers have fairly settled down into the belief that they must make the best of the subjects they have on hand, for that Nature has nothing further in her stores suited, in our climate, for the wants of man or beast. And with regard to the latter, the introduction of the very latest dates so far back, that we must estimate the prejudice as stronger still, which scouts at the idea of any further addition being made to our stock of domestic animals from the lists of other countries. Of course, in speaking of this universal prejudice, we allude simply to the generality of those who at present occupy and cultivate our soil, and who form their opinion, probably, without very well knowing the grounds upon which it rests.

There is every probability, notwithstanding the general notion to the contrary, that a useful addition will shortly be made to our stock of domestic animals. The alpaca, from the experience of it which has been compiled from various quarters in this country by Mr. Walton, really seems likely hereafter to play an important part in the stock-farming of the hilly districts of the kingdom. This animal is indigenous in the mountainous regions of Peru, where two domesticated species of it occur. The one receiving the name of llama, is used as a beast of burden ; the other, the alpaca, to which we at present allude, is a wool-bearing animal, and of it large flocks were formerly possessed by the Incas, sovereigns in former days of that country, and by other wealthy inhabitants of it. The climate of the districts in which this animal flourishes, is described by Mr. Walton as follows :

'The woolly natives possess a hardiness of constitution, and a peculiarity of structure, admirably well adapted to the nature of their birthplace. There, during half the year, snow and hail fall incessantly ; whilst in the higher regions, as before noticed, nearly every night the thermometer falls below the freezing point, and the peaks, consequently, are constantly covered with an accumulation of ice. The wet season succeeds,' &c.

On the applicability of the alpaca to our soil and circumstances, we quote the following remarks :

'The hardy nature and contented disposition of the alpaca cause it to adapt itself to almost any soil or situation, provided the heat is not oppressive, and the air is pure. The best proof of its hardiness is its power to endure cold, damp, hunger, and thirst—vicissitudes to which it is constantly exposed on its native mountains ; while its gentle and docile qualities are evinced in its general habits of affection towards its keeper. No animal in the creation is less affected by the changes of climate and food, nor is there any one to be found more easily domiciliated than this. It fares well while feeding below the snowy mantle which envelops the summits, and for several months in the year clothes the sides of the Andes. It ascends the rugged and rarely trodden mountain path, with perfect safety ; sometimes climbing the slippery crag in search of food, and at others instinctively seeking it on the heath, or in rocky dells shattered by the wintry storm ; at the same time that, when descending, it habituates itself to the wet and dreary ranges on the lowlands, so long as it is not exposed to the intense rays of the sun.

'Many of our northern hills would try the constitution of any sheep, and yet there the weather is never so inclement or so variable as on the Cordilleras of Peru. With so many advantages, why then, shall not the alpaca have an opportunity of competing with the black faced sheep, the only breed that can exist in those wild and inhospitable lands? Of the two, the stranger would fare best on scanty and scattered food; at the same time affording to the owner a far better remuneration.'

The alpaca wool is at present used largely in British manufactures. Mr. Walton estimates the quantity hitherto consumed, since its introduction in 1832, at 12,000,000 lbs. The price of it varies from 1*s.* 8*d.* to 2*s.* 6*d.* per pound, and the average weight of the fleece may be put at 10 pounds. Were the animal fairly naturalized on some of our bleakest hill districts, such land would soon increase in value from the increased worth of its annual produce in alpaca wool. And it appears from the experience of several gentlemen who have small flocks, that, when its habits shall be thorougly understood, little difficulty will be experienced in doing so. The following is a statement by Mr. Stirling, of Craigbarnet place, Lennoxtown, Glasgow, a gentleman better qualified to speak on the subject than any one we could name:

'I can have no doubt that, when the subject is better understood, the animal itself better known, and a more expeditious method contrived to bring them to Britain, we shall have thousands of them. When known, their docility, their temperate habits, their hardiness, and, I may add, their easy keep, will, ere long, bring them into general notice. I can answer without the fear of being contradicted, that they will thrive and breed in Scotland equal, if not superior to our native black faced sheep.'

To those who would laugh at the idea of bringing over here, and domesticating on our hills, a Peruvian camel or sheep, (for the alpaca has properties in common with both,) we would point to Australia, a country which not many years ago possessed no quadruped but the kangaroo; and yet notwithstanding its many peculiarities of climate, is now thickly peopled with our sheep and oxen. But the question must not be left to generalities of this kind. The experience of a few short years, on the larger scale whcih expected importations will enable, will determine it satisfactorily; and if, as in all probability will be the case, the alpaca should become one of our domestic animals, the best thanks of the country will be due to Mr. Walton for the persevering energy with which he has pressed the subject on public attention. His book is an exceedingly interesting and neatly got-up little volume, and will, we doubt not, prove a useful publication."

)N THE FORMATION OR SECRETION OF CARBON BY ANIMALS.*

BY MR. ROBERT RIGG.

The scientific world is at present much occupied with the appli-ation of chemistry to animal and vegetable physiology; and it aay be interesting to some of your readers to know, that by a few ery simple experiments they may satisfy themselves upon that ranch of the subject which relates to the formation of carbon by nimals.

Suppose an animal, which comprises in its whole system 50 arts by weight of carbon, to be kept for five days, during which consumes other 50 parts, it is evident that if during the five days t gives to the atmosphere 60 parts, and at the end of that time it s found to have increased its weight of carbon by 10 parts, there s a positive gain of carbon equivalent to 20 per cent.

The experiment may easily be made upon young small animals. 'ake two of these so nearly alike that there can be no material ifference in the weight of the carbon they comprise. Kill one of hese, and expose it to a temperature not exceeding 220°, for two r three days; it may then be powdered, and by subjecting an verage sample to analysis with oxide of copper, the weight f carbon comprised in the entire animal may be determined rith the greatest certainty. The other being supplied with food, he weight and chemical constitution of which is ascertained, should e kept in a limited atmosphere, which must be tested and changed very one, two, or three hours,† the increased proportion of car-onic acid of that atmosphere will show the quantity of carbon iven off by the animal in the course of the experiment; and the icrease or decrease of carbon in the animal itself may be ascer-ained in the manner above mentioned.

In this manner I have experimented upon many animals; and rithout taking account of the carbon which passes off otherwise ian by respiration, the result has invariably been a great increase f carbon—an increase which cannot be accounted for, unless we onclude that carbon is secreted by animals.

Amongst my best experiments, are those made with young mice. healthy young mouse, weighing 200 grains, comprises in its onstitution from 25 to 30 grains of carbon; when fed daily with 0 grains of bread moistened with water, containing about 16 rains of carbon, it increases in weight, and imparts to the atmos-here from 20 to 26 grains of carbon, the quantity varying gene-

* *Medical Gazette*, Aug. 23, 1844.

† The health of animals appears to be affected by an atmosphere containing more an 5 per cent. of its volume of carhonic acid.

rally with the quietness or the habits of the animal. A kitten, from six to ten weeks old, when supplied daily with four fluid ounces of skim-milk, containing 66 grains of carbon, will increase in weight, and impart to the atmosphere from 80 to 110 grains of carbon.

Either of these two animals may be kept without food until they give off by respiration a weight of carbon equal to 80 per cent, and retain from 60 to 70 per cent., of that which they comprised at the commencement, showing that a weight of carbon equal to 40 per cent, had been secreted. The experiment may also be made with birds supplied with little or no food. A tomtit was placed under experiment without food; the bird was violent and restless during its imprisonment. In sixteen hours it imparted to the atmosphere 65 per cent. of carbon, when it appeared to die of exhaustion, and retained 77 per cent of the weight of carbon it originally contained; showing a secretion of carbon in sixteen hours, when under violent exertion, equal to 42 per cent.

On making the carbon in the food, and that in the air respired by a full grown person, the basis of our calculation, we obtain results which favor the conclusion that carbon is likewise secreted by man. Physiologists estimate the weight of carbon in the air respired by an adult at from 5,000 to 6,000 grains per diem. I have subjected to analysis many articles of food, and found this weight of carbon far to exceed that in the food consumed by most laboring men, who may be supposed to impart to the atmosphere the greatest weight of carbon. A person eating each day after the following rate, will consume 6,000 grains of carbon:

Rump steaks	1 lb.	containing	1,050	gr. carbon.
Bread......	1½ do.	"	2,830	"
Potatoes....	½ do.	"	310	"
Porter.....	2 pts.	"	760	"
New milk..	2 fl. oz.	"	57	"
Butter.....	½ oz.	"	320	"
Cheese....	1 do.	"	150	"
Sugar.....	2 do.	"	350	"
Coffee.....	1 do.	"	96	"
Tea.......	1 do.	"	80	"
			6,003	

This weight of carbon is not more than is consumed by some persons who are actively employed, but it far exceeds that in the food of our laboring population; and on comparing it with that allowed for each adult in the different workhouses, &c., we have in the dietary of the—

	Per Cent. of this 6,000.
City of London Union........................	75
Brentford do.	50

		Per Cent. of this 6,000.
Uxbridge	do.	55
Aylesford	do.	56
Macclesfield	do.	44
Westminster New Prison		57
Milbank Penitentiary		80
House of Correction, Clerkenwell...		53
Hanwell Lunatic Asylum		75

nd if we make the carbon in the food of some of our agricul- l laborers the subject of comparison, we find the deficiency r ter than in any of the above mentioned dietaries.

could add to these many other experiments, which furnish, in opinion, irresistible evidence of the secretion of carbon by ani- s. If an animal be kept without change of circumstances, or f iet, except as to the quantity of food, it will be found that the ght of carbon in the air respired, does not vary in proportion iat consumed in the shape of food. On the contrary, the de- ncy of carbon supplied seems to be met by an extraordinary t of the animal system, as appears from the following results f ccurate observation :—

	In the food.		In the air respired.
f animal in the first 24 hours s a plentiful supply of food, ere is	80 grs. of carbon		100
n e next 24 hours a less quantity	70	"	94
" " a sparing do.	60	"	87
" " a small do.	50	"	78
" " a very small do	40	"	65

it if the animal, instead of having its quantity of food varied, bold be sometimes left in a quiescent state, and sometimes excit- d great activity, the weight of carbon given off will be found o ry in proportion, within certain limits, to the activity of the s of the animal, and the exertion called forth.

I the carbon in the food be represented by..........	100
hat given off by an animal of easy habits will be.....	110
hat given off by an animal of active habits, will be...	130
D. do. when under exertion.........................	140
D. when under great exertion........	150

I the animal be both stinted of food, and excited to great acti- ity the difference between the carbon comprised in the food and hat given off by the animal is as follows :

	In the food.	Given off.	Difference.
Crbon....	100	120	20
"	80	105	25
"	60	90	30
"	50	85	35

Hence food is a substitute for expenditure of animal strengt[h]. To this may be added, that when an animal is distressingly exe[r]cised, the weight of carbon in the carbonic acid given off by resp[i]ration is at first increased, afterwards gradually diminishes, a[nd] becomes much less when the animal is in a state of exhaustio[n]. Rest alone is not then sufficient, but rest and food soon restore t[he] strength of the animal ; and with its strength its power of secre[t]ing carbon—a power which I conceive to be essential to anim[al] life, and which will probably furnish a solution to some of t[he] most difficult problems of animal physiology, including that of t[he] generation of animal heat.

[From the Glasgow Argus.]

DINNER IN HONOR OF PROF. LIEBIG.

We doubt not that many of our readers will be pleased w[ith] the remarks of Prof. Gregory at the Glasgow dinner, in Octo[ber] last. They give a succinct view of the labors of this distinguis[hed] man, and the contributions he has made to science. For this r[ea]son, they are deserving of a place in our columns. It is true, t[hat] this speech contains a few words which may not be intelligibl[e to] all our readers ; still, by far the greater part is, and may be p[re]sented with profit and pleasure.

" Professor Gregory, on risng, was loudly applauded. My L[ord] and Gentlemen, he said, in proposing, as I have been requeste[d to] do, ' The Progress of Organic Chemistry,' I may perhaps [be] allowed briefly to direct your attention to its recent history, m[ore] especially in connection with the name of our honored gu[est]. (Cheers.) Before his time, the analysis of animal and veget[able] bodies was a most tedious and difficult operation. By his [im]provements, and especially by his admirable invention of the [pot]ash apparatus for determining the proportion of carbon, he r[en]dered organic analysis so easy and so sure, that the chemist can [now] undertake, and complete in a few weeks, researches which wo[uld] formerly have demanded years of labor. (Cheers.) A glanc[e at] the former and at the present state of organic chemistry wo[uld] give the best idea of the value of Liebig's improvements ; [and] it ought to be specially noticed, that, although his methods h[ave] been now and then objected to, they are at this day, univers[ally] employed by chemists. (Applause.) Armed with the powe[rful] weapon of a sure and easy method of research, Liebig, in 18[..] took the field in organic chemistry ; and the trophies of his prow[ess] are seen in an uninterrupted series of the most splendid orig[inal] researches in that department, from that date to the present time. Permit me briefly to allude to the more important of these, confining myself, however, chiefly to the subject of general organic chemistry. The services which Liebig has rendered to agricultural and physiological chemistry will, I doubt not, receive due attention from other speakers. The researches of Liebig, then, embrace, among numerous original discoveries of new compounds, those of hippuric, onauthic, and amygdalmic acids; of chloral and aldehyde; of melon, melane, and a host of allied compounds, including two artificial alkalies, melamine and ammeline; and in connection with his illustrious fellow-laborer, Wohler, that of the wonderful and interesting series of compounds derived from uric acid. In addition, however, to his actual discoveries of new compounds, Liebig has made vast contributions to our knowledge of those previously described. Thus, he has studied with the most brilliant success, all the important organic acids, as well as the interesting class of organic alkalies; he has developed the true nature of alcohol and of ether, and of the important process of acetification, or the making of vinegar; he has given us much new and valuable information on the different kinds of sugar; he has done more than any other chemist to extend our knowledge of the compounds of cyanogen; and has cleared up the theory of the very important manufacture of prussiate of potash, and placed this branch of industry on a much improved and secure foundation. Along with Wohler, he has, I might almost say, exhausted the extensive subject of uric acid; he has clearly developed the nature and relations of these three isomeric bodies—cyanic, fulminic, and cyanuric acids; and, by the demonstration of the existence and chemical relations of benzoyle, established the doctrine of compound radicals, the most valuable and fruitful additions yet made to the theory of organic chemistry. This may appear, to many of those whom I address, merely a catalogue of names, but the chemist will fully appreciate their value; he will remember that there is not one of the discoveries I have enumerated which has not exerted a beneficial influence on the progress of science, and that in them is often to be found the germ of those beautiful ideas, the successful application of which to practical purposes, in agriculture and physiology, has made us feel it a duty to assemble here this day, in order to express our admiration and our gratitude. But the labors of our valued guest have led to many other practical improvements; as, for example, in the preparation of drying oil for the painter; in the manufacture of vinegar, of prussiate of potash, of soap, of beer, and, what I am sure you will rejoice to hear, of wine; in the preparation of lactic malic, and formic acids, with many others; not to speak here of the immense benefit which agriculture and physiology are daily deriving from the application of his views. In organic chemistry, the name of Liebig is, moreover, associated with several of most important theoretical speculations, among which may mentioned the now prevalent views, originally started by the gacious genius of Humphrey Davy, of the true nature of ac and of salts; according to which, acids, instead of being, as voisier supposed, invariably compounds of oxygen, are rat compounds of hydrogen, the latter element being the true acidi ing principle; while salts are compounds in which the hydro of the acids has been replaced by metals. The doctrine of pc basic acids, that is, of acids requiring more than one equivalent alkali to neutralize them, and the neutralizing power of which measured by the proportion of replaceable hydrogen they conta owes its development entirely to Liebig; and the same may said of his profound and beautiful views on the process of mentation, putrefaction, and decay. Were I asked to point a good example of Liebig's researches, without particular re ence to agriculture, I would select, out of many equally valual his researches on aldehyde and on the origin of acetic acid. all know that no fermented alcoholic liquor can be produced cept from the vinous fermentation of sugar; and also that all mented liquors, under certain circumstances, are changed i vinegar, or, in common language, undergo the acetous fermer tion; in more exact terms, the alcohol they contain is conver into acetic acid. Now, if we compare the composition of ac acid with that of alcohol, we find that the former contains less drogen and more oxygen than the latter. It was therefore ne sary to study the action of oxygen on alcohol; and Liebig, pu ing some observations of Doebereiner, soon found that this act constituted two stages. In the first, oxygen removes part of hydrogen of the alcohol, forming with it water, and leaving al hyde, a pungent volatile neutral liquid; and in the second, an ditional quantity of oxygen combines with the aldehyde, convert it into acetic acid. This discovery at once cleared up the wh theory of the formation of vinegar from alcohol, put an enc the fancy of acetous fermentation, the process being one sim of oxidation; and, by detecting the source of loss in the proc followed abroad for obtaining vinegar from brandy, (which shown to be the escape of aldehyde unoxidised from a defici supply of oxygen,) enabled the manufacturer to improve economise his process. (Loud cheers) But if I were cal upon to select, out of the ideas suggested by Liebig in agric tural chemistry, those which do him the greatest honor, which have added, and will add, most to our knowledge, I kn not that I could do better than refer to his doctrine of uses of the phosphates and of the alkalies in plants and anim (Cheers. What is the use of the phosphates? of those s stances which are never absent in a fertile soil: and which, ac nulated in the form of dung, of bones, or of guano, we restore to it is manure? We find them in the ashes of plants, but the question is, what purpose do they serve? A few years ago the mineral elements of plants were supposed to be accidental; but, by exact analysis of the ashes of the different parts of plants, Liebig discovered that the phosphates are invariably found in the largest proportion in the seeds; and, pursuing the investigation, he showed that the phosphates are essential to the existence of those vegetable products which are capable of contributing to the nutrition and growth of animals—of albumen, fibrine, and caseine; which bodies, as is well known, are chiefly found in seeds, but are present also, in all nutritious roots and juices. Hence he drew the conclusion that the phosphates are indispensable to the life of vegetables; not merely, as he showed, as being essential to the formation of seeds, but also for a wise and beneficent purpose, namely, that animals should find in the vegetables they consume, (such as grass, hay, oats, and turnips) albumen, fibrine, and caseine, the materials of which their blood, that is, their bodies, are formed. In animals, again, it is not merely their bones, but every part of their structure, that requires the continued supply of phosphates, while the phosphates not required for nutrition are discharged in the dung and urine, and in that form restored to the soil, again to contribute to vegetable life, and from plants again to pass into the bodies of animals. It is impossible to imagine a more beautiful display of the divine wisdom and power than is thus laid open to our view. (Cheers.) Again, what is the use of the alkalies which are always found in the ashes of plants, generally in the form of carbonates, indicating that they have been, in the fresh plant, combined with vegetable acids? The idea of Liebig is, that the alkalies, being supplied by the soil to the young plants, not by fixing carbonic acid from the atmosphere, which, along with the elements of water, under the combined influence of the vital force of the plant and the chemical agency of the alkali, passes first into oxalic acid, then into malic, citric, and tartaric acids, and finally, into sugar, gum, starch, and woody fibre, which have all essentially the same composition. Having served this important purpose, the alkalies, in the shape of vegetable ashes, or of animal manure, are again restored to the soil, again to run the same unceasing course of usefulness, and to excite our wonder and admiration of that infinite wisdom which has devised such beautiful arrangements for our benefit and happiness. (Cheers.) I cannot here refrain from mentioning, in proof of the continued activity of Liebig, that he published in May last a paper on the urine, which, for the importance of the subject, the sagacity displayed in its investigation, and the beauty, as well as the practical value of the deductions arrived at, is, in my opinion, entitled to the very highest place among all the modern writing on physiological or medical chemistry. I earnestly recommend this invaluable paper, a translation of which has appeared in the *Lancet*, to the careful study of my medical brethren. The chemist will also be glad to learn that, still more recently, Liebig has published a most valuable memoir on mellon, confirming and extending his previous discoveries on that subject. It is not, however, only as the indefatigable investigator, the sagacious discoverer, or the profound philosopher, that Liebig has promoted the progress of organic chemistry. His sympathetic writings on the subject, especially his organic chemistry, written for the posthumous edition of *Greiger*'s *Manual*, have greatly contributed to produce the present flourishing state of this branch of science. (Hear, hear.) The lectures on organic chemistry, now appearing in the *Lancet*, are still more interesting, as embodying his most recent views. I need say nothing of his two works on Agricultural and Animal Chemistry. These works are at least as well known and as highly appreciated here as in Germany; in fact, it is as the author of these works that we have met to do him honor; and it is pleasing to reflect that they have been so well received in Scotland. (Cheers.) But perhaps it is as the teacher that Liebig has done most. Look at the scientific journals of the last fifteen years, and you will find that three-fourths of the researches on organic chemistry which they contain have issued from the school of Giessen. Indeed, so valuable and extensive are the additions made to science by his pupils, working under his eyes, profiting by his advice, and enjoying, as all who have been there will bear witness, the most kind, liberal, and utterly unselfish encouragement on his part, that, even if we owed to him none of his great works, and none of the fine original papers he has given us, we should still be compelled to recognise in him, as a teacher, the greatest benefactor to organic chemistry, through the many distinguished chemists he has formed; a large proportion of whom are now Professors in all parts of Europe. Among the distinguished pupils of Liebig, Glasgow can claim a full share. The late Robert Campbell was a native of Glasgow, and the names of Dr. Robert D. Thomson, and of Dr. John Stenhouse, are now known throughout the scientific world. (Applause.) My Lord and Gentlemen—I have detained you far longer than I could have wished to do; but, as a pupil of Liebig's—as one who has, from an early period, devoted much attention to organic chemistry—above all, as one who has experienced, in its full measure, the unwearied kindness and the true friendliness of his nature—I could not well say less than I have done. I am sure you will join me in drinking, with deep gratitude to Justice Liebig—"Success to Organic Chemistry." The toast was drunk amidst great applause.

NEW METHOD OF OBTAINING CREAM FROM MILK: BY G. CARTER, OF NOTTINGHAM, LODGE NEAR ELTHAM, KENT.

A PECULIAR process of extracting cream from milk, by which a superior richness is produced in the cream, has long been known and practised in Devonshire; this produce of the daries of that county being well known to every one by the name of "clotted," or "clouted" cream. As there is no peculiarity in the milk from which this fluid is extracted, it has been frequently a matter of surprise that the process has not been adopted in other parts of the kingdom. A four-sided vessel is formed of zinc plates, twelve inches long, eight inches wide, and six inches deep, with a false bottom at one-half the depth. The only communication with the lower apartment is by the lip, through which it may be filled or emptied. Having first placed at the bottom of the upper apartment a plate of perforated zinc, the area of which is equal to that of the false bottom, a gallon (or any given quantity) of milk is poured (immediately when drawn from the cow) into it, and must remain there at rest for twelve hours. An equal quantity of boiling water must then be poured into the lower apartment, through the lip. It is then permitted to stand twelve hours more, (*i. e.* twenty-four hours altogether;) when the cream will be found perfect, and of such consistence that the whole may be lifted off by the finger and thumb. It is, however, more effectually removed by gently raising the plate of perforated zinc from the bottom, by the ringed handles, without remixing any part of it with the milk below. With this apparatus, I have instituted a series of experiments, and, as a mean of twelve successive ones, I obtained the following result:

Four gallons of milk, treated as above, produced, in twenty-four hours, four and a half pints of clotted cream; which, after churning only fifteen minutes, gave forty ounces of butter. The increase in the cream, therefore, is twelve and a half per cent, and of butter upwards of eleven per cent.

The experimental farmer will instantly perceive the advantages accruing from its adoption, and probably his attention to the subject may produce greater results.

MISCELLANIES.

THE PRETTY BIRDS—COMPLIMENT RETURNED.

Our readers will remember that we recently published a good article headed "Spare the Birds," at the same time expressing a hope that it would be heeded by every man and boy in the land. It was an earnest plea in behalf of the feathered tribe, based upon their natural rights, their usefulness in the destruction of insects, the gratification to the eye afforded by their plumage and motion, and to the ear by their music. The claims of humanity were also urged.

This publication was made on Wednesday morning last; and in the course of the day it was scattered far and wide. The joy and gratitude which it diffused among the birds, may be estimated from the fact, that on the following morning they waited upon the writer's family in a body, at his residence in New-Haven,—the number present being, as nearly as could be calculated, from 2500 to 3000. The blue-birds sent the largest delegation; next, the robins; then the canker-birds, snow-birds, &c. As it was impossible for so large a number to be received in person, the greater portion of them very considerately took their positions on the different trees and fences about the yard, while a sub-committee of about 250, comprising, say, 100 blue-birds, 75 robins, 40 canker-birds, and 35 snow-birds, with perhaps small representations from other tribes, presented themselves near the window of the sitting-room, most of them gathering around, upon, or among the branches of a young cedar 25 feet distant; and such a chirping, fluttering, and cooing,—such pretty colors and motions, have rarely been heard and seen before. Not only the sub-committee, but the whole delegation, from every tree and shrub and picket, raised a grand chorus, such as was never heard before, nor anything in comparison to it, by any who witnessed the celebration. The only mortifying circumstance is, that the *writer was not present*, (otherwise we should probably have a speech to report,) having been engaged at his usual drudgery in New-York. The sub-committee were however entertained in the best manner which circumstances would permit; an ample repast being provided for them,—for the cedar was covered with berries,—which they partook of with an excellent relish, and appeared to enjoy the interview quite as much as did their honored guests. It continued for about two hours; when fearing that they should be burdensome, they withdrew, but repeated the visit on the following day, much in the same manner. The robins were uncommonly large and fat, and in fact the whole delegation, and especially the members of the sub-committee, were highly respectable in appearance, as we have no doubt they were in reality. They have our best wishes for their continued health and happiness.—*Jour. of Commerce.*

AMERICAN CHEESE.

At a meeting of the South Derbyshire Agricultural Society, on Saturday week, Mr. Colville, M. P., who filled the chair, drew the attention of the farmers to the import of American cheese, for the purpose of calming their fears. He showed that, although the import of American cheese had considerably increased, it had driven the Dutch cheese out of the market. He produced a table, which showed, that from 1831 to 1840, the importation from America had fluctuated, without any regularity, between nothing and fifty hundred weight; from Holland or Belgium the importation had increased, in the same period, from 133,397 hundred weight to 224,957 hundred weight; from other European countries the supply had remained insignificant and nearly stationary—1,049 in 1831, 1,464 in 1840: the aggregate importations advanced from 134,459 in 1831 to 226,462 in 1840. The last figures of the table we take as they stand: they show the imports of cheese, in hundred weights, from the places named for the last three years.

Year.	America.	Europe.	Total.
1841	15,154	254,995	270,149
1842	14,098	165,614	179,748
1843	42,312	136,998	179,389

The importation of cheese had decreased during the last ten years by nearly 32,000 hundred weight, while the population has increased by 2,300,000 mouths.

COW FEED.

M. Dumas made a report on some experiments made by M. Boussaingault, relative to the feeding of cows with beet-root and potatoes. M. Boussaingault states, that two cows which were fed exclusively on beet-root, fell off in flesh in seventeen days, nearly one-sixth, and their milk diminished from eight to ten litres per day to five litres. They were then turned into pasture, and soon resumed their former weight, and gave the former quantity of milk. They were next fed exclusively on potatoes, when they fell off still more in flesh than they had done with beet-root, and the milk was reduced to two litres each per day. On being placed on a mixed food of hay, chopped straw, beet-root and potatoes, they again recovered their flesh, and gave the former quantity of milk. The conclusions of this gentleman are, that beet-root and potatoes do not perform the part usually imputed to them, of fattening cattle, or increasing the quantity of the milk of cows. His experiments show that this is the case, when this food is given to the exclusion of all others.—*London Athenæum.*

SALE OF AMERICAN HAY.

On Wednesday last, a sale of American hay, per the Liverpool, from New-York, took place on the north quay of the Waterloo Dock. The attendance was not numerous, though the bidding was, on the whole, tolerably spirited. The hay was considered of rather inferior quality. The quantity offered was 210 bales, divided, for the convenience of purchasers, into 21 lots, of 10 bales each. The first lot went off at 7½d. per stone ; the next seventeen were knocked down at 7d., and the three remaining lots at 7¼d. Tare was allowed at the rate of 25 lbs. per bale ; and parties were to remove their purchases on the day of sale. It was stated that there had been a loss by the sale of from 30 to 40 per cent. It will be seen, by reference to our London market reports, that another sale of American hay took place on Friday last in the metropolis. There, as here, the hay was not permitted to enter a bonded warehouse, owing to its being a combustible matter, which, in case of fire, occurring from spontaneous ignition or otherwise, would vitiate the insurance policy.

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AMERICAN

QUARTERLY JOURNAL

OF

AGRICULTURE AND SCIENCE.

CONDUCTED BY

DRS. E. EMMONS AND A. J. PRIME.

VOLUME II.

ALBANY:
PRINTED BY CARROLL AND COOK.
1845.

TO OUR PATRONS.

We take this opportunity to inform our Patrons that our year is completed with this number. We hope the Journal has been conducted so as to satisfy the majority of our readers. We have received many flattering expressions of regard for it. We shall continue it another year on the same plan, and with increased efforts to make it what the farmer needs. We shall be gratified if most of our present subscribers make up their minds to patronize us the next year : if so, they may, if they please, forward their subscriptions as early as convenient, say by the middle of December. If they do not patronize the work, we shall esteem them just as well. Whenever we find it is not wanted by a sufficient number to support it, we shall stop it short at the close of the year; for we have something else to do than to beg for its life, and it shall not, while in our hands, be suffered to taper off to the little end of a pipe stem. We seriously contemplated reducing its price to two dollars, but found we could not, and furnish such illustrations as the work demands. For further information, we refer to the Prospectus. We would also call attention to a new arrangement commencing with the present number, namely, the introduction of a division termed "Spirit of the Monthlies;" under which we propose to make regular selections from the various agricultural periodicals, whereby our subscribers will be furnished with much that is useful and interesting, and which they could not obtain otherwise than by greatly extending their subscription lists. A. J. PRIME.

Albany, October 20, 1845.

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FARMER'S MISCELLANY.

TO OUR READERS.

Under the new Rates of Postage, this Journal will be charged, o those who receive it by mail, by the ounce, and by this means vill amount to no more than the postage on a weekly newspaper. Che Postmaster General has made provision for transmitting aoney to Editors, but we will not trouble the department with ur business. Subscribers will oblige us by transmitting their ubscriptions to us by mail and we will pay the postage.

We have been gratified with the expressions of unqualified ap- robation with which the Journal has been received thus far, and o effort will be wanting on the part of the Editors to sustain its haracter, and make it the first Agricultural Journal in this coun- y. And we would ask the efforts of our friends to add to our st of subscribers. We have not yet undertaken to praise our- elves, but we might cite a large amount of recommendations, oth from individuals and from the public press. Still it is our ish to stand upon the actual merits of the Journal, and of these ur readers will judge. We think it will recommend itself to every itelligent agriculturist. By that class of farmers who are already o wise to learn, we do not expect to be read.

We are requested to notice the following errors in our last num- er: Page 284, 18th line, and page 287, 9th line, for *trimming* ead *thinning*.

Page 302, 23d line, for *rot* read *root*.

Downing's "Fruits and Fruit Trees of America," was received o late for notice.

Some obscurity seems to exist in the explanation of the draw- gs on page 86. A millimeter is about $\frac{1}{25}$ of an inch. The visions of the attached scale represent hundredth parts of a mil- neter—each division, consequently, is equal to $\frac{1}{2500}$ of an inch. y applying this scale, therefore, to the drawings, the exact degree fineness may be seen.

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Vol. II. JULY, 1845. No. 1.

AGRICULTURAL GEOLOGY.

General observations on the soils derived from the decomposition of different rocks. Classification of rocks. Analysis of simple minerals: felspar and albite; labradorite; hornblende; hypersthene; serpentine; basalt and greenstone. Drifted soils.

§. Soils derived from the decomposition of different rocks.

In the pursuit of an important object, it is wise and proper to avail ourselves of all the aids within our reach to secure its attainment; and it is an imperious duty so to do, when the object to be obtained is surrounded with difficulties, and where every ray of light is wanted to illuminate dark and obscure points. Upon agriculture all the modern sciences send their lights, some more and some less; all, however, impart something, and lend their aid to its promotion. In this office geology is behind none other, unless it be chemistry, whose range is not only great, but minute, affecting every and all departments. A great many facts, strictly geological, have an important bearing upon the subject before us; such as the nature of the rock, its structure and position, its composition, its relations to moisture, and liability to solution. The position of the rocks of a district, as will be seen in the sequel, is always an important point, and in some cases all that is essentially requisite; for it often adds value to their possession, even when they cannot be turned to account directly in the culti- vation of the soil.

Under the influence of these considerations, and others of mi nor importance, which it is unnecessary to state, I propose to giv first of all a recapitulation of the geology of New-York, with view of applying all the facts which bear upon agriculture to it illustration. For the convenience of description, I shall pursu the plan adopted in the geological reports, namely, that of de scribing the rocks in the ascending order; and this will lead me t speak of them in the order of the districts which I have alread briefly described, and into which the state has been divided.*

The six districts coinciding nearly with six groups of rock each of these groups respectively imparts to the overlying sc some of its distinguishing characters, or in a good measure mak it what it is. Modifying influences, however, independent of t geological formation, have done something as diluvial or trai porting agents, by which soils originating and formed at a distar have been brought to and distributed over adjacent districts. St it will be found on examination that the underlying rocks ha given a stronger character to the soft materials than has usua been supposed, leaving out of view some areas in every distı where drift has lodged in deep beds.

In estimating the amount of soil furnished by groups of roc we are necessarily obliged to observe the nature of the mas: Many of the shales and slates, and they occur in almost ev group, disintegrate rapidly, the action being favored both by w: and frost: the first, penetrating between the laminæ, partially se rates them; and in some instances no other agent is require effect an entire destruction of a stratum, especially where wet and drying alternately occur. In other cases, the assistance f frost is required to effect a complete reduction of the strat: o soil.

Limestones are liable to a constant loss of material by sol it properties of rain water, which holds carbonic acid in soluti ; and this operation is favored by a rough or uneven surface, w e the water stands for a time. On a polished surface, the actio of water and other agents is very slow and inconsiderable even : er the lapse of several years, as is proved by the durability of le

* See article Temperature, No. 2, vol. I.

narbles used in the construction of monuments, and by that of other rocks when carefully smoothed; whereas upon the exposed surfaces of quarries, the sloping sides are often deeply grooved by he water which slowly trickles over their surfaces.

Granite and gneiss disintegrate and decompose from their pecuiar chemical composition, and the presence of alkalies in the felpar and mica exert a powerful influence in these changes. High granitic peaks in the region of frosts undergo a rapid decay, and n consequence furnish upon the slopes and in the valleys beneath, heir peculiar soils, which are well adapted to grass and grain. The alkalies in these rocks, if completely insulated, would pass ff rapidly through the soft materials, and be lost to vegetation. They are, however, so combined with silica, that they are comparatively unaffected by the common solvent, water, and hence re retained in the soil for the use of plants.

Other kinds of rocks liable to decay, are the siliceous limestones, ne of which is the calciferous sandstone. It appears from examiation that the lime is dissolved out, leaving upon the surface the ilex in grains, which falls off by its own weight, or else is rubbed ff by friction. The dissolved lime, however, does not all pass nto and remain in the soil, but is carried down, and forms very requently with other materials a *hardpan*, a puddingstone, or conretions, the lime acting as a cement; in other instances it percoates into and through the rock, and forms stalactites, veins or ther deposits. The same action or power which dissolves the arbonate of lime in solid rocks, dissolves also that which may be iffused through the soil. This takes place where the surface is requently stirred, as in cultivated fields. Thus this element is removed both by vegetation and by the ordinary action of rain water, and hence its deficiency in most of the soils of New-York nd New-England.

§ 2. Classification of rocks.

The classification of rocks has been a most perplexing study to geologists. They have not disagreed, however, so much as to he planes where lines of separation should be drawn, as in the esignation of the masses. The ancient names, *primitive*, *transi- on* and *secondary*, have all been objected to, and have been abandoned by many of the European writers. In consequence of this others have been proposed as substitutes, and have been adopte in part; but the proposed names are about as objectionable as th old ones, and hence much hesitancy has been manifested in thei adoption. Without attempting to decide which nomenclature i best, I shall use that which the public is most familiar with.

The word *primary* is a term whose meaning is well fixed in thi country, being applied to those masses which were consolidated be fore the creation of organic bodies. This term, then, will be used t designate a class whose existence was anterior to that of organi beings. It is true that some masses belonging to this class hav been in a liquid or fused state since the existence of organi bodies; still, so far as observation extends, the great mass or cru of the earth is made up of granite, gneiss, mica slate, hornblend serpentine and primary limestone; and doubtless these mass were consolidated anterior to the period spoken of.

The word *sedimentary* is another term, the meaning of whic cannot be misunderstood or misapplied. It will be used to desi nate those masses which are really consolidated sediments. will often be used as synonymous with the word *stratified*, ina much as all sediments are disposed to arrange themselves in laye or strata. The materials in this case lie in parallel beds, varyi greatly in thickness; all, however, separable from each oth through the planes of deposition, each of which may be disti guished by lines upon the faces of a ledge, by some diversity the materials, or difference in the colors of two adjacent be Other lines, however, appear both upon the ends or surfaces beds, which are not indicative of bedding planes. Thus, wh we find regular forms as rhomboids marked upon rocks, they a not to be taken at all as the result of deposition. No differen of materials or difference of color can be discerned along the lines. Such regular forms are therefore the effects of crystaliz tion. In some masses, however, both kinds of planes may found. If the beds are horizontal, the upper and lower plan are those of deposition; but they may lie in any other directio as the vertical, or oblique in various degrees. The other lin course along upon the planes of deposition, and produce rho boids or other mathematical forms. In other cases, again, *all* t planes are the effects of crystalization. Those which appear in granite, in trap, serpentine and primary limestone, are never planes of deposition. The forms which these rocks give us are more ob-use than those in slates and shales; they are frequently nearly quare blocks. All these planes serve an important purpose; and hough they are really produced by the operation of a constant aw in the inorganic world, yet they bear the impress of design: hey facilitate the dissolution of the mass, and by that means as-ist in preserving a due balance in matters above and below water; hey are highly important as a means of separating and raising he layers from their beds, and thus aid in quarrying. Without hem, it would be impossible to raise stones for flagging, and for a ariety of other useful purposes.

The first great division of rocks, then, is into *Primary* and *edimentary*. The former are divided into two kinds: those hich are *massive*, or destitute of planes analogous to planes of eposition, as granite; and those which are *stratified*, as gneiss, ica slate, etc.

It is proper, however, to observe in this place, that all rocks vide by different kinds of planes. Those which are not the anes of deposition, are termed *joints*; and hence a rock is said be jointed, when planes exist in a direction different from that the planes of deposition.

Sedimentary rocks are subdivided into several systems. By the term *system*, is meant a series of rocks formed and deposited in the course of a single period or era, during which nearly the same orders of organic beings existed; each system being marked, both at its coming in and going out, by some great change in the condition of things. The outgoing and the incoming of a system is indicated by changes in the sediments, in their position, and in the character of the organic beings of the time and place. It will be conceived, then, that the lines of demarcation between systems are the most important of all. The most instructive study is that of the diversity of these systems; as from it we learn the history of the earth, its revolutions and changes. We are not, however, to receive all the doctrines which are advanced in relation to changes and revolutions as fully proved. At the time when organic beings first existed, certain essentials in organization were necessary. A physical system was then established, and to this system organic beings were to be adapted. There were controlling agents. Of these, the atmosphere was one, and caloric another and these have continued and will continue to control the types o organization to the end of time Vary the present standard, i only in a narrow compass, and but few if any of the present race would continue to exist.

In view of this subject, I hazard the assertion that the compo sition of the atmosphere was never essentially different since th *Nereites* of the Taconic system were created ; and also that th temperature has never been greater than it is now, since that pe riod. This is going back as far as it is possible with organ beings ; none older are now known to exist. Because a lizard crocodile does not consume so much oxygen as an ox in a give period, it does not follow that in the era of the Lias, an era of li ards, the atmosphere contained less oxygen or more carbonic ac than it does now ; for with their respiratory apparatus, we have right to infer that if the proportion of oxygen was less than it at present, they would not be supplied with that material, a enough could not be obtained if less existed in the atmosphe When we speak, therefore, of the changes which usher in a n system, it is not intended to inculcate the doctrine that they w so great, or of such a character, as would be incompatible w the present ; or that organic beings would be unfitted organica for any other period or era in the world's history.

Systems are subdivided into groups ; the groups holding same relation to a system, as the system to the totality of the c solidated sediments. The beginning and end of a group is mar by some important change, such as the disappearance of affilia tribes and species. It is then by observations of this kind, t divisions and subdivisions of the sediments are obtained. Na which are supposed to be appropriate at the time, are confer upon the systems and groups. They may subsequently, howe be demonstrated to be inappropriate ; the progress of discov outgrowing and thereby rendering obsolete the nomenclat This is an evil ; and one who is disposed to cavil, might lay h of the fact to the prejudice of the science of geology, on ground that nothing is settled ; that it is a subject of opinions speculations, and not of facts and principles ; of endless de and fanciful hypotheses, which every man has a right to invent for his own or his neighbor's amusement. But such cavilers belong to a race too lazy to observe, too self-conceited to profit by facts, or too bigoted to look at truth when they fear it may conflict with their own notions. They are too obstinate to be reformed; and if they were reformed, they would be of little use to science in any of its departments.

The primary rocks, comprehending granite, hypersthene, primary limestone, serpentine, gneiss, mica and talcose slates, hornblende, sienite, trap and greenstone, require our attention first of ıll. They may be tabulated as follows:

PRIMARY.	IGNEOUS	Granite	Composed of quartz, felspar and mica.
		Hypersthene rock.	
		Primary limestone.	
		Serpentine.	
	PLUTONIC	Greenstone and trap.	
		Basalt.	
		Lavas	
	STRATIFIED	Gneiss	Composed of quartz, felspar and mica.
		Mica slate	Quartz and mica.
		Talcose slate	Quartz and talc.
		Hornblende	Simple.
		Sienite	Composed of hornblende and felspar.

Those portions of the state over which primary rocks prevail, re the northern and southern highlands. Most of the masses numerated above are found in both these districts. In the northrn, which is by far the largest and most important primary disrict, that peculiar variety of granite denominated *hypersthene rock* revails very extensively: it forms the highest parts of the county f Essex. Surrounding this mass as an irregular zone, are beds f granite, primary limestone, and a granitic gneiss. This imıense mass forms a large portion of the great triangle north of ıe Mohawk valley. It is here that our granitic soils are formed. he beds, however, of granite and other felspathic rocks which re disposed to decomposition are not very extensive. We have one of the sandy varieties of gneiss or mica slate, which become iable on exposure to the atmosphere, and crumble readily and ıpidly into soil. Neither have we much of that peculiar granite hich forms porcelain clay, or it is so limited that mere local fects are observed. Primary limestone, associated with granite, ıd even incorporated with it, exists also, but within such narrow mits that it is unnecessary to notice the peculiar soil which is us jointly formed. The rocks on the highest parts of the Adirondacks disintegrate very rapidly, and form deposits on the side of these mountains, which in the progress of time find their way to the valleys.

In estimating the extent of granitic soil, and taking into account all the causes which act in distributing it over the state, I am led to adopt the opinion that it exists only in the immediate district underlaid by the primary beds, in such quantity as to give the leading characters of a granitic soil. Diluvial action has undoubtedly swept over these districts, and carried to the south some o the soil which once rested upon the mountains and in their valleys, and it has intermingled with other soils more or less; stil the quantity bears but a small proportion to that derived from sedimentary rocks. It is true that the materials of these rocks wer in many instances of granitic origin, and it is easy often to discer undecomposed felspar in them. Notwithstanding all this, I a not ready to subscribe to the doctrine that all soils are essentiall derived from one origin, and that a granitic one; for most of th alkalies are lost in the course of the changes to which the fir particles are subjected. No one, who has observed the soils New-York, will hesitate to admit that the slate soils are qui different from those of the highland districts.

The same remarks might be made in regard to the Southe highlands. Granitic soil must be confined to the fields underla by primary rocks; those which contain felspar and mica, a which furnish by decomposition one or more of the alkalies alkaline earths. Besides felspar, there are other minerals whi are agriculturally important; thus, albite (another variety of t felspar family), mica and hornblende, are each important miner to be known, or to be sought for in the rock, if we would lea approximately the composition of the soil of a primary distri Thus in Gouverneur and the neighboring towns in St. Lawren county, a granite occurs, containing considerable albite. This su stance contains soda in the place of potash; and hence we mig expect this element in granitic soils, especially as this kind of gr nite is rather disposed to disintegrate.

§3. Composition of simple minerals.

The composition of *felspar* and *albite*, together with that of ome of the other more common rocks, it may be well to state in his place. The two first named consist respectively of

	Felspar.	Albite.
Silica, ...	65.21	69.09
Alumina,........................	18.13	19.22
Potash,........................	16.66	.....
Soda,........................	.....	11.69
	100.00	100.00

In attempting to distinguish these minerals from quartz, or flint s it is often called, we are to notice their hardness. Felspar and bite just scratch common window glass, but quartz does not. lbite is always white ; felspar is white or flesh-colored, and each ves a strong reflection of light from the planes of the crystal ; hile quartz has the lustre of glass, or more of a vitrified appear-ice in the mass.

Another kind of felspar is the *labradorite*, which abounds in the cks of the Adirondack mountains. The rock itself, as already ated, is termed *hypersthene rock*, from a small quantity of this ineral which it contains. The whole mass is mostly labradorite ; d by decomposing, it has formed in some places an imperfect rcelain clay. Its composition is as follows :

	Labradorite.
Silica, ...	55.75
Alumina, ...	26.50
Lime, ...	11.00
Iron,..............................	1.25
Soda,..............................	4.00
	98.50 Klaproth.

This species is usually smoke-grey, though the exposed surface c the rock is grey or greyish white : it appears to be bleached.

Mica, another mineral found in granite, gneiss and mica slate, ls a composition much like that of the felspars, or at least is alogous to them, as containing two alkalies, potash and magne-s ; thus,

	Potassic mica.	Magnesian mica.
Silica,....................	46.10	40.00
Alumina,..................	31.60	12.67
Protoxide of iron,..........	8.65	19.03
Potash,....................	8.39	.....
Magnesia,................	...	15.70

Together with a variable proportion of oxide of manganese an fluoric acid.

Hornblende, which often replaces mica in the granites, is usuall a dark green substance, and extremely tough in the mass. It i commonly crystaline, and more or less fibrous. It differs esser tially from the micas and felspar, in containing larger proportior of lime. It consists of

	HORNBLENDE.
Silica,	42.24
Alumina,	13.92
Lime,	12.24
Magnesia,	13.74
Protoxide of iron,	14.59
Oxide of manganese,	0.33
Fluoric acid,	1.50
	98.56

All these substances are termed *silicates* ; the silica uniting wi each of the principal elements as an acid, and forming therel silicates of alumina, potash, magnesia, and iron. In the northe as well as the southern highlands, *pyroxene* or *augite* enters large into the constitution of the primary rocks. Its composition dc not differ materially, so far as its effects upon a soil is concerne from that of hornblende ; thus,

	PYROXENE.	
	Light colored.	Dark colored.
Silica,	55.32	54.08
Lime,	27.01	23.47
Magnesia,	16.99	11.49
Protoxide of iron,	2.16	10.02
Alumina,	0.28	0.14
Manganese,	1.59	0.61
	103.35	99.81 ROSE.

To the same family belongs the *hypersthene*, which gives na to the rock forming the highest grounds of Essex, namely, *l persthene rock*. This substance contains less lime than hornbler or augite, and hence is less favorable as an element of soil ; in fa it is remarked, that where it exists in sufficient abundance to inf ence the nature of the soil, it is quite barren. It is composed of

	HYPERSTHENE.
Silica,	51.35
Lime,	1.84
Magnesia,	11.09
Protoxide of iron,	33.92
Water,	0.50
	98.70

At the north, however, this substance existing in but a small proportion in the hypersthene rock, has but little influence upon the quality of the soil ; besides, being mixed largely with labradorite, which contains both lime and alumina, the soil formed therefrom may be considered as good for grains and grass. Quartz or silex, too, is extremely scarce in this rock ; and hence there is no excess of sand in it, as there is usually in a pure granitic soil. Hypersthene, upon the whole, may be considered as rather a rare mineral in New-York. It is found in gneiss in Johnsburgh, but in such small quantities that it has no influence upon the soil.

Serpentine is another primary rock, disposed to crumble into soil. It is one in which magnesia is the characteristic element. It consists of

	Serpentine.	
Silica,	40.08	42.69
Magnesia,	41.40	40.00
Water,	15.67	16.45
Protoxide of iron,	2.70	1.00
	99.85 Shepard.	100.14 Vanuxem.

Serpentine may be known by its softness, and yellowish green color. It is easily cut by a knife, or easily impressed, and it is always found softer upon the outside than upon a fresh fracture ; the color, too, is much paler on the weathered surface.

In foreign treatises on agricultural geology, serpentine is set down with those rocks which make a poor soil. Thus, Johnson speaks of the soil at the Lizard in Cornwall, as being far from fertile, and so retentive of water as to form swamps and marshes ; and even when drained, it rarely produces good grass, or average crops of corn. It is the opinion of the same distinguished writer, that the barrenness is due to the small quantity of lime contained in the soil ; serpentine, as will be seen from the above analysis, being destitute of this element. In New-York, and part of New-England, it would appear that the serpentine exists under different conditions. Thus, in St. Lawrence, Jefferson, Essex and Warren counties, it is intermixed with lime, and the lime disintegrates more rapidly than the serpentine ; the soil, therefore, must contain a sufficient quantity of lime. However this may be, there is always a luxuriant growth of vegetables about these beds. The serpentine hills of New-England are not so productive as those of

New-York. I allude more particularly to the hills of Chester and Middlefield, along which the great Western Railway passes Still, I have seen good crops of rye growing there, though the soil may have derived a beneficial influence from the decomposition of the neighboring rocks composed of hornblende and sienite Here is also a peculiar vegetation: the *Ilex canadensis*, and some other herbaceous plants, are only found here, and this is the only place where any thing like a pine grove has been planted by nature. For localities where serpentine prevails, see the Report of the Second Geological District.

In this connection, it would be proper to state the compositio of *basalt* and *greenstone*, although in New-York they do not form very extensive beds.

	Basalt.	Greenstone.
Silica,	46.50	57.25
Alumina,	16.75	25.50
Lime,	9.50	2.75
Magnesia,	2.25	.....
Soda,	2.60	8.10
Iron and manganese,	20.12	3.50
Water,	2.00	3.00
	99.72	100.10

The composition, however, of these varieties of rock is e tremely variable, but all are known to contain the alkalies ar alkaline earths; and it is owing to this fact that the greensto soils are remarkably fertile, so much so that they may often employed to increase the fertility of less favored ones.

§ 4. Character of granitic soils.

Returning once more to the consideration of granitic soils, I r mark, that they are too siliceous and porous when derived pure from granite. Position, however, alters their character; for whe they lie upon sloping surfaces, sand predominates; but in the va leys, the fine alumine or clay of the felspar accumulates and forn an admixture of clay and sand, which is more favorable to t support of grass and grain. On reviewing the composition of t minerals which enter as elements in rocks, we find that the m abundant of them contain the proper proportions for a good sc Silex rarely forms less than one-half; the remainder is made f alumina (which is essential to the consistency of the soil,) me, potash, soda and iron, some containing more and some less f each respectively, the alkalies being the most essential, and ndering a soil rich, as it is termed, in proportion to their amount. 1 addition to the fact here stated, I may observe that the tendency decompose is also increased in proportion to the percentage of e alkalies contained in the mineral: a rock of pure quartz is ted upon very slowly, while one in which felspar and mica exist umbles rapidly.

In applying the preceding facts, it is easy to see how farms and tates should be selected in a primary district. The depth of il is an important fact, as is well known, but its derivation is other equally important. For its determination, the outcrop of cks upon hillsides may be examined, and their nature ascertained; hether their exposed or weathered surfaces are bleached, and softer an that of a recent fracture ; or whether they are crumbly, and sposed to disintegrate. If the rocks are hornblende or pyroxenic eenstone, or a coarse granite with large masses of felspar, we all expect the soil to contain the alkalies or alkaline earths ; and y cultivation they become exhausted, we may expect that by deep subsoil ploughing a fresh quantity can be brought to the surface the use of vegetables, and thus a constant reproduction of them tained from the decomposition of the coarser particles now inter-xed with the deeper soil. Greenstone and trap, from their more dy disposition to undergo change, may be ranked among the t materials for a foundation soil, and possess all the requi-es desired for the cultivation of grains and fruits. They are not porous as the granitic sands that are termed *leechy* ; nor so com-t as many of the argillaceous soils, many of which retain the ter in pools upon the surface.

§ 5. Drifted soil.

farther consideration of the causes which have distributed soil and spread the debris of rocks at a distance, is of some ortance while treating of the northern counties ; as it may ap-r to those who are familiar with the drift or diluvial theories, t little reliance can be placed upon our instructions for ermining the character of the soil by observing the rocks beneath. It is true that we find the debris of distant rocks in mos of our soils; yet we find that their essential character is, witl some exceptions, derived from the rock near by. On the norther and northwestern slope of the highlands in Franklin county, man boulders of Trenton limestone may be found, which, togethe with some of the finer matters, were brought from the Canad side, and probably this transported debris exerts some influence still there is a predominance of soil from the Potsdam sandston the underlying rock of a great part of the county, particularly th nôrthern part. In the neighborhood of Malone, immense dri beds have been accumulated, in which the boulders of this san stone always predominate. They have also been transported sout and lap on to the primary masses, and modify the soil of the gr nite and gneiss; but when we penetrate deeply into this great pr mary region, its distinguishing characters are derived from tl masses beneath. In some instances the drift current has left n thing but loose boulders, which, resisting decomposition, all t soil we now find is of modern or recent origin. Narrow form tions, whose strike is east and west, will usually be covered wi a more distant soil than those whose strike is north and south. this fact, we shall have occasion to speak hereafter.

Little need be said of the northern highlands in regard to str ture. The country being either mountainous or hilly, almost the whole surface is properly drained, or else is easily drair where, from local causes, water may be retained in the subs The valleys are narrow, the hills abrupt, and there is no necess of searching the peculiar structure of the rock to open a pass for stagnant water. The spontaneous growth of grass is the m interesting fact; the country being best adapted to pasturage, the keeping of stock for wool, butter and cheese.

This district is, however, broken by the steepest and high precipices in New-York, or indeed in all the Atlantic or Mid States. The Adirondack pass is a giant precipice. It is fee represented facing this chapter, for it is only a feeble rep sentation which the pencil can give. To be conceived, it m be seen. Many minor precipices break up the country at sources of the Hudson, and thus diminish its value as an agri tural district.

RELATIONS OF VEGETABLES AND ANIMALS.

The world in which we live may be considered as naturally including two great classes of bodies, viz: Animate and Inanimate. The latter class consists of the atmosphere around us, the various bodies of water, and the earth with its mineral contents. To the former class belong all those various forms of living beings which swarm upon the earth and teem in the air and water, including the plants, which form, in one respect at least, the connecting link between the animate and inanimate—the living and the dead. Whatever *life* may be—whether an abstract and undiscoverable principle or essence of the metaphysicians—whether it be the product of a number of forces acting in conjunction—or merely and simply chemical action—whatever it may be—one thing is certain, we know it and recognize it only in its effects. No one can say of the egg or acorn that it is alive, except by presumption, for it gives no sensible evidence of life. But let either be subjected to the action of certain circumstances, and they grow warm and active with life. The chick in due time breaks forth from its prison a living and breathing animal, and the oak in due time spreads the shade of its broad "hundred arms" far over the land, and we say *they live.* This is all we know as yet of life.

But of living beings we know more. We can trace the power of the vital principle by its effects upon matter in giving to it forms and functions, which unaided mere matter could never assume. These changes we can follow in the acorn or the egg, from the first moment that life begins to mould them, till the perfect plant and animal are produced. We cannot see how they are produced—we can only see that they are.

We cannot imitate the products of life. Very many of the combinations and changes which take place in inanimate nature we can copy, or by resources in our power we can produce the same results. We can separate the elements of water and ascertain its composition—and we can take the same elements and reunite them, so as to produce water again. We can analyze the most intricate of the products of life, but we cannot reunite even the simplest, so as to form the same compound. Here the art of the

chemist is baffled, and the wisdom of the wise is proved foolish
ness.

The chemical composition of plants and animals is precisely th same. This will be readily seen when we come to consider th fact that the animal is fed by the vegetable, not only by simpl eating it, but because the particular and individual parts of th animal are first prepared by the plant before they can becom available for the food of the former. While for a long tim oxygen, hydrogen, nitrogen and carbon were considered the so necessary constituents of animal matter, the so called inorgan parts being regarded as only accidental, the same substances we viewed as the constituents of vegetables, with the exception nitrogen, which was supposed to be present in but very few plant But the fact is well established now, that the component elemen of both are the same, and that nitrogen is always present in t vegetable as well as in the animal.

It has been attempted to establish some sort of analogy betwe plants and animals, which does not exist. The only point which they resemble each other, is in the possession of life, but tl is employed in the production of very dissimilar results, and t vital action is developed in essentially different ways.

Animals require food of a highly organized character to supp life. They are provided with a digestive apparatus of an intric construction, by means of which the food when once received, partially disorganized, and prepared for the building up of body. They are incapable of appropriating or assimilating elements which they require, in an unorganized form.

Plants, on the other hand, require food entirely disorganiz The construction of their organs of digestion, if they may called so, and especially their mouths, is such that they can rece no nutriment till it is so much decomposed as to be reduced t fluid form by solution. The spongioles of the roots are the pro mouths of plants. These are pierced by numberless small h or pores, which are the extremities of their circulating vess Into these pores nothing solid, although never so finely divid can enter. Fluids only are capable of entering, and in this f plants receive all their nourishment. Within these vessels, un the influence of light and heat, very powerful chemical affini are continually at work, by means of which, changes of an in ate character are produced. The most wonderful of the powers f animal life are small, compared with these.

Animal bodies are constantly undergoing change. From birth death, the animal is subject to a continual waste. Every mo-on, the most trifling as well as the most powerful, is accompanied y a loss of matter. Every breath we exhale carries away its are of our bodies. The lungs—the skin—the intestines—are all enues by which the particles which compose the animal struc-re are thrown off and separated. So that it is true that in e ordinary length of human life, the entire body is several times tirely changed. This will be easily understood, when we flect, that by means of the lungs alone, during the process of spiration, a full grown man will daily discharge several ounces carbon.

We have no evidence of any such waste in vegetables. From t moment of germination through the whole life of the plant, tere is a constant accumulation of matter. There is no time en it ceases to grow, till it ceases to live. As a general rule, tre is a limit to the growth of the animal, when it has reached wich, all the vital force is expended in maintaining the bulk it h attained. After a time, it is insufficient to support this, and t disposition to waste predominates, and for the remainder of li the body progressively diminishes, till death supervenes upon t worn-out forces. But there is no fixed limit to the growth of vetables. Supply them with the requisite food and they con-tie to grow and add yearly to their bulk. The natural period olife for some is but one or two years, and they have attained thr full size, and die. But as far as is known, perennial plants ar without limit to their life, and do not die of old age.* Trees ar at this day growing upon this earth which are many hundred ye's old, and yet seem to flourish with perpetual youth. How-ev this may be, as long as plants live, they constantly are add-in to their size.

ut different as animals and vegetables are in these and other re-spts, they are, to a great degree, mutually dependent upon each othr for life. If the animal kingdom is supplied with food by hother, by the constant waste which is going on in its organiza-

* he reader is referred in connection with this subject, to an extract on another ag of this No., on the "Duration of Varieties of Fruit Trees."—Eds.

tion, it restores this same food to the atmosphere or the earth, to be again absorbed by the plant and reconverted into food, thus going an eternal round. But we will examine this subject more at large, and shall thus be enabled to perceive more distinctly the intimate and mutual relation those two great kingdoms of nature sustain to each other.

A large part of the food of plants consists of carbonic acid, which they absorb largely by their leaves. Though they are no utterly dependent upon animals for this, yet from them they ar always receiving a large supply. It has been stated already tha a full grown man discharges from his lungs, daily, several ounce of carbon ; the larger animals, of course, a greater quantity. Bu this is not in the form of pure carbon. The process of respiratio consists in inhaling oxygen of the atmosphere into the lungs, whe it unites with the waste carbon of the body, and is exhaled as ca bonic acid. Should this process be continued for a long period— a very long one it is true would be required—and were there provision for the removal of this acid from the atmosphere, would ultimately become so abundant as to poison the whole ra of animals. But it is absorbed by the leaves and roots of gro ing plants, to sustain their life, and thus the atmosphere is pu fied.

By the continual consumption of oxygen by the respiration animals, the apprehension would be perfectly reasonable that process of time this gas, so essential to their existence, would come so much diminished, as to be inadequate to their wan This would in fact be true, were it not for the compensating pov of plants. The carbonic acid which they have absorbed, wh passing through their circulation is decomposed, the carbon fi in the vegetable system, and the oxygen, again liberated by leaves, is restored to the atmosphere. Thus is completed one l in the unending chain of organic life.

It is not the carbon exhaled alone which becomes the food the vegetable. All the solid and liquid excrements of animals applied to the same use. The body itself dies, and passes to cay. It mingles with the atmosphere and the earth, and beco the food of plants, to be by them converted into food for the mal. And here the remarkable difference, hinted at above, tween the two kingdoms, becomes evident. The changes in nimal are in a descending scale. The food eaten is in a highly rganized form. It enters into the structure, only to pass soon rough a change which entirely disorganizes it. In this state, it fit to become the food of plants, when in them the ascending ale commences. The unorganized materials are, by the plant, oduced in an organized form. That the living vegetable has the ower of decomposing certain compounds cannot be doubted. The rbonic acid, ammonia, and water are separated, each into their dividual elements, before they are incorporated in the structure. he metallic and earthy salts are readily decomposed by the vital rce, and again recombined in new forms. The vegetable and imal substances applied to the soil as manures, are not reduced their simplest forms before they are taken up by the plant. All at is necessary is that they should be soluble. Thus they are pable of supplying carbon in other forms than that of carbonic id. The fluid extracts of vegetable substances are capable of ing absorbed, and we know nothing which would contradict the t of their being decomposed in the system, and placed in the sues.

The food of animals is in all cases highly organized. The ani-l has not the power, like the vegetable, to assimilate unorga-ed matter. And upon this point modern science has thrown at light. The plant is the laboratory in which all the food of mals is first prepared. The fat—the material for the formation the muscles—the salts for the bones, &c., are formed in the nt, either in the same state as they exist in the animal or in h a form as to require but a slight change to bring them to such tate, so that the process of digestion would seem to be little re than reducing the materials consumed by an animal to a so-ion, in order that they may be taken up by the vessels and car-l to be deposited in their proper places, to build up the body compensate its waste.*

Thus again the two are dependent upon each other, the animal organizing the food it eats, for the nourishment of plants, which heir turn again organize it for the use of the animal. The nt is in reality the producer, and the animal the consumer.

A gentleman extensively engaged in the investigation of the medicinal properties of lants, has lately informed me that in the cold infusion of vegetables he has dis-co red globules corresponding in all but color to the molecules of the blood.

Were this the proper place, it would be interesting to carry out these views farther. But for a more extended view we must refer the reader to the late works on organic chemistry and physiology where they may be examined at large.

From these facts, some practical hints may be derived, of grea importance to the cultivator of the soil, and to the improving and growing of stock.

1. The amount of crops upon a given extent of soil must depend upon the amount of food they receive. The quality of th crop may, and probably does, depend upon the quality of the food The excrements of animals being composed of those substance which once formed the vegetable, and the bodies of animals bein the same, are of course capable of affording to plants the very foo they need to bring them to the greatest perfection. And this ha ever corresponded with practice, the greatest effects being show when the purest animal manures are used. Let it then be remembered, that every particle of animal matter that is wasted and no applied to the soil, is so much robbed from the productiveness of th earth. If all that is taken from the soil and used for animal foo were restored to it, the land would never become impoverishe and in proportion as more or less is restored, in such proportic will the land retain its vigor and capacity to produce more.

2. All plants do not furnish the same animal food, nor in th same quantity. It is desirable then to adapt the kind of food the effect intended to be produced. If fat is required, those kin of food which yield the most oil, and starch, &c.; and so in r ference to other parts. Enough is not at present known to esta lish any rules, and it is desirable that in this the practical farm would unite with the chemist in investigating the matter.

We have but just stepped upon the threshold of science. W believe the same of practice, especially in agriculture. Whi the whole range of arts beside has owed the proud stand they present occupy to the aid of their handmaid, science, farming h presumed to go alone, and if we may believe the evidence of hi tory and of our own senses, has rather degenerated than improve At any rate it has advanced none. Improvements which we suggested half a century ago, are neglected, and are now just b ginning to be employed. Till within a few years nothing w known of the relations of animals to plants, or of plants to the s they grow upon. And at the present day, how few compared with the great mass of practical farmers, know any thing of the principles of this noblest of human arts. Much remains to be known, but enough is already understood, if properly applied, to add immensely to the productiveness of the soil and the happiness of our race.

ODD SPELLS.

BY GILES B. KELLOGG.

I. The Farmer.

"The best part of the population of a country are the cultivators of the soil. Independent farmers are every where the basis of society, and the true friends of liberty."—*Andrew Jackson.*

I love to contemplate the quiet life and the honorable occupation of the farmer. What pursuit is more useful than his? Diligence in his business reaps the promised rewards of charity—a double blessing. He cannot be useful to himself in his calling without being useful to others. The faithful discharge of his duties has a reflex and self-improving action. The influence of his example is contagious and beneficial on others. On the products of his industry depend for subsistence the larger portion of the human family. With his prosperity is identified the prosperity of every other branch of labor; and the well being, the advancement, the power of the country, may be measured and pretty accurately determined by the position and the influence which he occupies and exerts. As a general fact, no nation ever became wealthy, powerful and great, whose cultivators of the soil, the men who owned and held the plough, were ignorant, degraded and servile; and an enlightened, industrious and prosperous farming community never conferred other than a high character on its nation.

And then again his occupation is one of moral dignity. His employments are among the creations of the great Architect of the frame-work of nature, and intimately associated with His wisdom, goodness, power and constantly superintending care. In the pursuit of his labors he becomes a co-worker with that great and good Being, of his dependence on whom he is constantly reminded, in the promotion of the happiness of his fellow men. In the vegetation of the seed he has committed, in confidence of a harvest, to the ground—in the blade of grass that springs up at his feet—in the flower that smilingly meets his eye along his pathway—in the birds of the field and forest that welcome him to his daily toil—in the cattle grazing upon his hills, he recognizes a wisdom and a care for which nothing is too high or too minute. "No occupation is nearer heaven. The social angel, when he descended to converse with men, broke bread with the husbandman beneath the tree."

And on the farmer the country relies for assistance and safet in times of public danger and calamity. He it is who furnishe the means of defence—who supplies the sinews of war—whos strong right arm guards the hearths and homes of the country, an whose reliable patriotism shines brightest when patriotism is pu to the severest test. The farmers of our Revolution were men no common honesty, of great intelligence, and of more than Ro man virtue; and in no small degree to them it is that we owe th achievement of our liberties. "Not a blade of grass springs Saratoga, but takes to itself a tongue to proclaim the successf valor of patriot husbandmen." And in every crisis of our n tion's existence it has been the farmers who have stood by the a of our safety and carried it triumphantly through the storm.

Jefferson was a close observer and discreet judge of men, a his opinion of this important and honorable class of our commu ty is entitled to great weight. "Those who labor in the eartl he early declared, "are the chosen people of God, if ever he ha chosen people, whose breasts he has made his peculiar deposito for substantial and genuine virtue. It is the focus in which keeps alive that sacred fire, which otherwise might escape fr the surface of the earth. Corruption of morals in the mass of c tivators, is a phenomenon in which no age nor nation has found example. It is the mark set on these, who not looking up heaven, but to their own soil and industry, as does the husbandm for their substance, depend on the casualties and caprice of c tomers. Dependence begets subservience and venality, suffoca the germ of virtue, and prepares fit tools for the designs of am tion. Thus the natural progress and consequence of the arts, sometimes, perhaps, been retarded by accidental circumstance out generally speaking, the proportion which the aggregate of the other citizens bear in any state to that of its husbandmen, is the proportion of its unsound to its healthy parts, and is a good enough barometer whereby to measure its degree of corruption."

II. The Temperance Reformation among Farmers.

> " So, when our children turn the page,
> To ask what triumphs marked our age,
> What we achieved to challenge praise,
> Through the long line of future days,
> This let them read, and hence instruction draw—
> Here were the many blessed,
> Here found the virtues rest,
> Faith linked with love, and liberty with law ;
> Here industry to comfort led,
> Her book of light her learning spread ;
> Here the warm heart of youth
> Was wooed to temperance and to truth ;
> Here hoary age was found,
> By wisdom and by reverence crowned."
>
> *Charles Sprague.*

No reform of our day has been more marked and beneficial than ie effect of the temperance movement among farmers. From the oint in the progress of this cause which we now occupy, we look ack with a shudder at the effects produced by intemperance—fects bounded by no particular territory and confined to no parcular class, but spread every where and affecting alike the high id the low, the rich and the poor, all ages and both sexes, every .nk, station and condition of life. We saw this monster of evil vade the splendid abodes of the wealthy and overcome its inates by his fascinations. We saw him creep into the hovels of e poor and make desolation still more desolate. We saw him eaken and paralyze the arm of labor—put out the light of learng—strike down the loftiest genius—change the immortal stiny of man, and degrade woman from her pure and exalted ation. We saw him mar the face of youth and beauty—aylay the path of usefulness—nip in the bud the unfolding omise of manhood, and drag down to the tomb in disgrace e white locks of matured old age. We saw him the worshipped vinity of every nation, and every community, the household god every abode from the palace to the poor-house, at whose shrine ere offered up the morning, mid-day, evening, and midnight sacrifce. We saw him robbing the generous sailor of his last farthing

—pilfering the hard earnings of the industrious mechanic—plundering the adventurous merchant by wholesale—stealing away the products of the labor of the husbandman, and bringing under the terrible power of his fascination the high in station, the learned, the accomplished and the venerable. In short, we saw the evils he entailed upon his immediate victims—to quote another—to be, "self-reproach, mental anguish, enfeebled intellect, brutalized passions, poverty, crime, infamy, disease, despair, madness and death; to their dependent families, shame and mortification, withered affections, blasted hopes, misery and want, reproaches and violence; in fine, disgust, loathing, and unspeakable wretchedness to the public bad example, neglected duties, violated laws, the streets filled with beggary, and the courts with offenders, crowded alms-houses and prisons, the industry of the country burthened and oppressed, the general morals vitiated, public virtue degraded and the very foundations of government weakened and endangered."

And who can wonder at this awful extent of vice and misery when he remembers how all-pervading and firmly established wa the use of intoxicating drink? This offspring and agent of perdition was the inmate of the drawing-room and the kitchen; h was domesticated into a nurse of children; he worked in th fields with the farmer—helped him harvest his crops, and alway went with him to market, or met him there; he was the princ pal personage at births, marriages and funerals; he was the getter up of most quarrels, and no quarrel could be settled without h friendly interference. At anniversaries, at civic celebrations, a military displays, at social entertainments, at religious observance at the farmers' bee, and the ladies' tea-party, he was always fir and foremost—the most busy and the most noisy. Freemen coul not properly remember the day of their country's birth, withou getting independently drunk, and acknowledging allegiance to power far more despotic, more heartless, more cruel and exacting than any of the race of Tudor, or Stuart, or Brunswick. H helped to elect the candidate to office, and then while he rejoice with his friends over his success, with an equal largeness of hear sympathized with his opponent at his defeat. He was present c all occasions, whether of joy or grief, sacred or secular, ready t furnish the inspiration suited to the occasion, and in the requisi quantity. He welcomed friends on their arrival, and dismissed them on their departure. Hospitality, without an introduction to him, was considered boorish, and he who declined an acquaintance with the master-spirit of the house, was sure to insult the host. He was the patent quack of the world—his nostrums a sovereign balm for all "the ills that flesh is heir to"—would restore to health when sick, and ward off disease—would keep in the heat in winter and keep it out in summer—would induce to sleep when necessary, and when necessary drive it away. He was the rewarder of every trifling service which had no pecuniary value—the solace of the idle and the companion of the laborious—helped prepare the discourses for the pulpit and then inspired a mighty eloquence in their delivery. While robbing the poor of their last cent and binding them out in eternal servitude, he made them believe they were richer than Crœsus. Soldiers, under his command, were "intoxicated into valor,"

> "And their hearts, though stout and brave,
> Still, like muffled drums, were beating
> Funeral marches to the grave."

"Age, with his white locks and tottering frame—manhood, in his fullest strength—youth, in his freshest bloom, and beauty in her sweetest charms," were all stricken down together, by this inhuman spoiler of the race and great ally of death.

But, thanks to an enlightened humanity, to labors of the benefactors of their race, to sterling common-sense, and, above all, to the blessings of an over-ruling Providence, the progress of this mighty evil has been stayed, and the farmers of our country deserve no little credit for their agency in the good work. The improvement among them is manifest. It has been found that the fruits of the earth can be better cultivated, turn out more abundantly, and, when ready for the garner, can be more securely gathered in, without the aid of this unnatural and noisy co-laborer—this exacting god, the sacrifices at whose shrine are, loss of sense, and damage to the farmer's estate. It is not, as it used to be, so much the custom to pour out libations of manufactured poisons at his shrine. And the result has been, increased prosperity, better health, clear heads, stronger and steadier arms, constitutions better fitted to encounter toil and endure fatigue, and hearts more susceptible of being inspired with gratitude to "that universal Providence which watches over the seed time and matures the harvest."

ON DRIFT AND THE CHANGES WHICH HAVE BEEN EFFECTED IN THE POSITION OF SOILS; Etc.

[Communicated to the American Association of Geologists and Naturalists, May 1844, by one of the Editors.]

Scarcely a more interesting or important fact has been brough to light by geological research than this, that in the northern re gions at least, there has been a general movement of all the loos materials covering the surface of the earth. This movement is highl interesting from the consideration of the nature of that force b which it was effected, as it is by no means one of those ordinar occurrences in the history of the earth, the precise and exact natur of which geologists have not as yet been able to determine ; be sides, so wide and general was the movement that it involves in i consideration a force whose operation extended in this countr from the base of the Rocky Mountains to the shores of the A lantic.

It is highly important, then, from the above considerations, th this movement which has influenced so widely the nature and fe tility of the soils, has mixed and mingled them in proportions ve different from what could have been effected by the slow and ord nary operations of nature, should be fully understood. In son instances those soils which were naturally barren have been carrie and spread over those of a more fertile character ; in other i stances the latter have been spread over or mingled with t barren, so that probably upon the whole the general effects ha been favorable to husbandry, and that upon a great scale, the has been an equalization of benefits, or like all the great operatio of nature, the universal good has been effected by the instrume tality of general operation. Having alluded to the fact of mov ments as indicated and proved by observations on every side, v may now state definitely one or two established points which great increase the importance and interest of the phenomenon here alluded to. The first and most important fact is, that soils have been carried from north to south, and that in no well authenticated instance in this country has this movement been from south to north. From this fact, then, follows an easy, though practical application of the fact, viz : that in searching for certain peculiarities of a given soil, we must go north ; for the rock itself which has furnished originally the material composing the soil will probably be found only in this direction. Take, for example, the distribution of the Onondaga limestone, which forms the surface rock from the Hudson to Lake Erie, and where do we find its fragments ? We certainly never find them a mile north of the outcropping edge of he rock ; but they are every where found south within a limited ange, and wherever they are found in numbers they do modify he soil ;—and wherever we travel, if we find the boulders or the ravel of a certain character, we may, without experiment or even arther observation, form some exact and definite conclusions in egard to the nature and properties of the soil. These considera-ons, then, show us one very important practical geological fact—ne which every agriculturist ought to know, and which we are ssured may be often applied in investigations upon the nature and omposition of soils in this country, and which will explain some acts in husbandry which otherwise would remain inexplicable.

Again, the course or direction in which the drift or soil has been ansported is determined by furrows upon the rock beneath. hese furrows correspond in direction with the course of the drift. hat they are made by gravel and sandstones passing along over e rocks, is proved by actual observation ; for example, a boulder often found at the extremity of the furrow which it has been strumental in forming ; it is precisely in the position in which e farmer leaves his plough in its furrow when he unyokes his am at the sound of the dinner horn, and its course for a limited stance may be traced with equal certainty. On this fact rests e statement which we have just made in regard to the agents hich have scored the strata.

We now proceed to give the language of the paper which we epared on the subject of drift for the Association of Geologists d Naturalists. The remarks we have already made do not form part of this communication, but were deemed necessary in this place in order to show the practical bearing of the subject; and inasmuch as those who till the soil are constantly meeting with phenomena illustrating this interesting and important subject, they ought especially to be well versed in all the facts which bear directly or indirectly upon the subject.

During the past year, (1843,) the field of my observations on drift, have been confined to the western part of Massachusetts, the eastern counties of New-York, and a belt of country extending from the Hudson to Buffalo, on the line of the Erie canal. O my observations as a whole, I will in the first place remark, tha they go to establish most of the great principles in relation to drif and diluvial action, which have been heretofore presented to th Association—those for instance which relate to the scoring c rocks, the course in which drift was transported, the materials c which it is composed, the period of its transport, the great powe and force expended in its transportation, and partly in regard to it organic remains.

As it regards the direction of grooves upon rocks, and the kin of materials of which any drift bed may be composed, the gener law is, that the first have a direction varying but little from nor and south, and the latter show that the materials also were deriv from the same direction. But occasionally an important exceptio to this law is found; for, where a powerful barrier lies in the dire tion in which drift was transported, it is always deflected from course; thus, both the grooves upon the rocks and the drift itse near the base of the Catskill mountains, show a deflection of t current of drift to the east, or, through the present valley of Cat kill creek which flows in an easterly direction, and the bould derived from the northern outcrop of the Helderbergh rocks, a transported across the Hudson at Catskill and lodged upon t eastern bank of the river, in Columbia county. These facts go show that the Catskill mountains, of sufficient height to form barrier, existed at the period of the drift, and operated as a b rier to those drift currents: and another fact, having the sa bearing, is, that no foreign boulders are lodged far up the sides upon the summits of the Catskill.

My observations, however, on this last point are limited. I the general law that drift had a northern origin, is finely illustrat in all the drift beds which lie in a belt of country from the C ecticut river at Springfield, Massachusetts, to Buffalo, on the line f the western railroad and Erie canal. Thus, on this belt I find ve distinct kinds of drift, differing according to the kind of rocks which exist in places to the northward of the points of observa-ion.

First. Towards Springfield on the east, the boulders and gravel eds are composed of gneiss and mica slate.

Second. In Berkshire, and eastern part of New-York, of the rocks f the taconic system ; and so well defined is the latter belt, that here is no intermingling of the rocks of the two adjacent ystems, except upon their very borders.

Third. In the valley of the Hudson river, the drift beds are com-osed of rocks of the Champlain group.

Fourth. In the valley of the Mohawk, thirty miles west of Albany, t Amsterdam, I find a great abundance of the northern primary ocks, and particularly the *hypersthene rock*—which is confined to small space of country directly north ; and finally, another belt owards Rochester and Buffalo, in which the harder layers of the Iedina sandstone, the harder parts of the Niagara limestone, to-ether with primary boulders—among which I think I can discern ie hypersthene rocks of Labrador—together with some foreign oulders whose origin I have been unable to determine.

Again, of the direction of the grooves, and of drift, when com-ared with the direction of *valleys*, I would remark, that although find frequently a *parallelism*, still there are some notable excep-ons, even when no apparent barrier existed to the course of the rift currents. Thus, the western face of Petersburg mountain is cored upon a slope of 30° or 35° upwards ; and again, in many ocalities I have found scorings upon the perpendicular faces of ocks parallel with the valleys in which they lie.

As it regards the organic remains of drift, I am forced to differ i part, from the views of Mr. Lyell, as given in a late No. of ie Journal of Science. Mr. L. maintains that the tertiary of hamplain, which I have described in my New-York Report, is rift. From this view I beg leave to dissent, for if any formation irnishes stronger evidence of having been deposited in quiet aters, I know not where it is to be found ; but towards the close f the period in which this formation was deposited, we have strong and undoubted evidence of disturbance and of transport of the materials of which it is composed. And it is in the transported beds of sand and coarse gravel, that we sometimes find the broken shells of the mya and saxacava. The boulders which are found at Beauport, in Canada East, in the midst of shells, were unquestionably dropped from icebergs, for it would be contrary to reason and fact, to suppose for a moment, that the delicate terebratula psittacea could have been moved with the drift or disturbed by currents, and maintain their perfect integrity.

I will state farther, in this connexion, that I am forced to differ from Mr. Lyell and some other geologists, as it regards an essential change of temperature at the period of the tertiary or drift. But I do not propose to state my objections, in this place. I have but one subject more which I wish to bring before this Association, viz: the immediate agent which was instrumental in the transportation of drift. On this subject, I would speak with due deference to the opinions of others. But I will observe, generally, that I believe no *one agent*—no *one cause*—no *one theory*, will be found adequate to the explanation of all the phenomena of the drift of this country and of Europe—applying the word drift to all accumulations of sand, gravel and boulders, except those which are now forming by rivers.

The observations of Agassiz and Prof. Forbes, go to show that the *movements of glaciers* are, and have been, causes. Observations of most navigators show, that for transportation, *icebergs* are causes—and all may see, that waves in shallows do wash up ridges of sand and gravel parallel to coasts. But what agent transported the great mass of the drift of New-England and New-York. On this point, I maintain that moving water in a given direction, is the *essential element of our reasoning*. This moving water may, or may not, transport ice—ice, if moved, must be moved by water. Starting with this element, and taking into view all the phenomena of drift and of scorings of rocks, I find no agent or power adequate to the solution of these phenomena, *but the rush of a northern sea, or waters over a part of this Continent, produced by a subsidence of land*, and aided, perhaps, by the rise of the bottom of the sea to the north. By this power, all the loose materials were pushed forward, en masse, and transported south, both scoring nd breaking up those surfaces of the solid strata, over which it assed.

Proof that this theory has a foundation, is found in the fact iat analogous changes in the relative position of sea and land as taken place; and also that immediately subsequent to the eriod when the rocks were scored in the manner now well known all geologists, those northern waters did stand upon, and cover rge areas of New-England and New-York. I refer to that eriod when the tertiary of Champlain, of Lubec, Portland, e., and other places, were deposited; a period of quiet which imediately followed that of drift, oceanic action and transporta-on.

Immediately succeeding the period of quiet, another one of evation must be recognized, during which some disturbance of e loose materials occurred; but in consequence of the wide area er which this elevatory action operated, the shape and contour the surface has been preserved.

I am aware that high authority is adverse to the admission of vertical movement; yet, adverse as it is, I know not how to concile facts and phenomena on this ground.

Such, then, are briefly the facts and conclusions which I have aived at, in my investigations during the last year. That there a many points which are not cleared up, and that much more ght be said, I readily admit. But what I have thrown out is sficient to answer the object of this report.

Note.—Since the above was communicated, observations in the sae field have been continued, and so far from abandoning the tloretical view which is here advanced, we see every day facts wich sustain it. The important fact, which we have frequently sted on other occasions as well as in this report, that New England and New-York, as well as the wide extent of territory west a north, has been submerged, and was evidently submerged just pterior to the great drift period, never ought to be lost sight of. Ts fact is substantiated by the marine deposit of Lake Champlain, a eposit filled in many places with marine shells; and what is to th point, this marine deposit rests immediately upon the grooved and scored rocks. We are to put these two facts together, an when put together what do they teach us ? first, that at a certai period some general agent was in force producing this very sco ring, and which may be seen from the Atlantic to the Rock Mountains. Then immediately follows this marine deposit upc the grooved surfaces of these rocks. Now, then, this whole cou try is beneath an ocean. Submergence has taken place, and th portion of the earth is quiet beneath the waters, and deposits a going on ; shell fish of the same species as those now living up our coasts occupy the bays and estuaries of this great sea. Then it regards a vertical movement, nothing need be said. The sea which this marine deposit was formed has retired, the plough fu rows those reclaimed fields, and maize grows where the Mya sa cava, scalaria and other shell fish lived and multiplied. Such a some of the facts which, to say the least, bear favorably upon t hypothesis. And then again, by the admission of a vertical mo ment since the drift period, we certainly remove those obstructic which oppose the passage of an ocean over the tops of our hig est mountains in New-York and New-Hampshire, the scoring whose rocks prove the passage in question.

Note 2. In connection with the above, we take this opportur to state that we have observed very interesting phenomena of kind which forms the subject of the above remarks, at Plattsbu and Cumberland Head, on Lake Champlain. On searching fossils at Plattsburgh, in August, 1844, in company with friend, Ransom Cook, Esq., we had occasion to split off a th layer of the Trenton limestone. On examining the lower surf of the removed portion, we found it covered with relief lin which led us to examine the surface from which it was tak when we found it scored with lines which corresponded with th of the pieces which we had taken up. The scorings run east west, or at right angles to those which we find on almost ev rock in this state. So interesting did we deem these ancient ma that we determined to search for them at other localities ; and are pleased in being able to state that we were successful in f ing the same stratum at Cumberland Head, four miles east. both of these localities the rock is not only scored, but polis d and worn down, showing conclusively the consolidation of ock at the time when it was thus scored. Notwithstanding this act seems so well determined, and moreover that a suspension for time of a deposition of the peculiar materials of this rock, still, he layers which succeed the worn and polished surface are those f the Trenton limestone. In Plattsburgh we find surfaces with ie ancient and modern scorings within ten feet of each other, and y comparison on the spot no one can observe any difference in ie character of the markings themselves ; though the former, as as been stated, run east and west, while the latter run north and outh. I had observed similar phenomena at Essex, several years efore this observation at Plattsburgh, and so stated the fact in ie of our annual geological reports ; but subsequently, fearing I id committed an error in my statement, made what I intended a orrection in a subsequent report. This, however, seems to ive been unnecessary. But as the facts seemed to me so extra-dinary, and had not at the time been noticed by any geological riter, I deemed that course right when there appeared some doubt to the correctness of the observation. Mr. James Hall has pub-hed in the reports, and elsewhere, an essay on mud furrows. iese present phenomena *in part* similar to the scorings of rocks diluvial action ; still, in no instance which he has given, nor in y which we have observed, is the rock beneath polished. In is case there is a hard, sandy rock, the inferior surface of which marked in relief by parallel ridges ; the surface upon which is reposes is a fine and soft argillaceous mass, and was probably in e state of mud when the marked stratum was deposited ; but it not polished, nor does it appear that the phenomena in the two ses are produced by causes of the same nature. All these facts so many incidents in the history of the earth. We may truly that wherever we go, or on whatsoever side we turn our eyes, re we find interesting changes ; these changes reveal many of former conditions of the earth. The collection and recital of all se phenomena will be hereafter formed into a complete and per-t history ; and the rapid accumulation of facts within the last rter century, indicates that the time is not far distant when this tory will be written.

lbany, June 1, 1845.

MANURES—THEIR ACTION.

We know of no subject in the whole field of agriculture where judicious and well conducted experiments are more needed, thar in reference to this. The absolute use of manure is denied by nc intelligent farmer at the present day, but nothing definite or fixec in relation to their mode of action—the manner and the prope time for applying them so as to produce the greatest effect—th kind proper to be used upon different crops—in fine, we may say nothing at all is known in regard to their specific use. Leadin agriculturists have been greatly at fault here. Agricultural societie have not directed that attention to the subject which they ought Every man who tills an acre of land owes it to himself and to hi own interest, setting aside his duty to the general interest, to in vestigate the matter in the most thorough way he can. Experiment only can determine the question, and they have not been made In the absence of facts then, we shall indulge a little in theorizin upon a few points in connection with this subject, hoping tha something may be suggested which will lead to practical results.

1. *Do manures owe their efficacy to their organic or inorgan portions ?* * This may seem to many a small matter, or one de serving no notice. It seems so to us, we are free to acknowledg in a practical point of view. But since many men of no sma eminence have decided, some in favor of one portion and some another, we may be pardoned for noticing it. Ever since th theory has been upheld by the professed followers of Liebig, th

* We use these terms in their ordinary acceptation. But we must confess that v have never been able to understand why lime or potash should be called *inorgan* any more than oxygen, &c. Their relations to the organs and in the organs plants are all similar. The one class are as necessary component parts of the pla as the other. We presume the names have arisen from the old idea, that the so call *organic* substances were all that actually constituted the plant, the *inorganic* bei only accidentally present. We would therefore suggest the adoption of somethi like the following alteration:

a. *Inorganic matter*--all simple substances found in the composition of living bodi —potassium—sodium—oxygen—carbon, &c. &c.

b. *Organized matter*—the parts of living bodies composed of these simple substanc —woody fibre—bark—muscle—nerves, &c.

c. *Organic matter*—the products of organized matter—sugar—gum—oil—starch &c. &c.

This appears to be a much more consistent nomenclature.

lants derive all their carbon from the atmosphere, the tendency as been with them to attribute the sole power to the inorganic atter. Indeed, Liebig himself gives credit to the organic portions nly for helping the plant to dispose of the inorganic portions of s food, which he seems to consider the most essential part of its ructure. That it is possible for the atmosphere to supply the rbon and oxygen and nitrogen to plants in sufficient quantities, ere may be no question; but *does it?* is one which it is not so sy to answer.

When one hundred pounds of wheat are burned, a quantity of hes amounting only to a little more than one pcund remains. ll the combustible part, or that which was consumed by the fire, nsisted of organic matter, or oxygen, hydrogen, nitrogen and rbon. The remaining ash is the earthy and saline portion of the heat. The very smallness of the quantity contradicts the notion the superior use of these materials in the food which has furshed them, and the large proportion of the other ingredients ght seem to warrant the belief that they were the efficacious ents. Such reasoning might be carried still farther, and the st quantity of any one ingredient present in the necessary food plants be considered the controlling power in relation to the ole.

But such reasoning is false in its whole extent. We know no r son why we should attribute peculiar virtues to one more than a other. A plant is a compound body, and all plants of the same kd consist invariably of the same constituents, in the same or nrly the same proportions. Each one must be regarded as e ally necessary in the vegetable economy, and the food must c tain all, or the plant will not thrive. The different quantities r uisite during the progress of the plant will be noticed hereafter. Bt what has been stated is the true philosophy of farming. It is t supply to the growing plant the whole food it requires to perfect it whole structure. If the soil already contains sufficient, no more n d be given—if not, it must be furnished by manures. If any o ingredient is wanting, that one must be applied, and so with th whole list. The soil may be rich in vegetable matter and yet n produce good crops, because it is destitute of salts. Supply th se and its vigor is restored. And on the other hand it is well known that to be fertile a soil must contain a certain proportion of vegetable matter.

That soils become exhausted of the saline portions more rapidly than of the other, cannot be wondered at, when it is remembered that these substances are restored in much the least proportions in ordinary cases. The solid excrements of animals which constitute the mass of manure commonly applied, contain but little of them, whilst the liquid excrements which abound in them are suffered to run to waste. The thorough, rational farmer will always restore what is taken away.

We might carry this idea out to a greater extent, by turning to the animal and reasoning from analogy, which will hold good, we think, in this point. The same materials are necessary in the animal economy as in the vegetable. Yet no one will pretend to say that one class of substances is more useful to the general lif and growth of the animal than another. All must be supplied i their due proportion.

We conclude, then, that neither the inorganic nor the organi portions of manures determine their value—that ammonia, suppose to owe its efficacy to its nitrogen, an almost undiscoverable quar tity in most plants, and by many called "the life and soul of ma nure," is not the controlling force—but that each substance nece sary to the plant has an equal effect in perfecting its structure ar promoting its growth.

The simple experiment that would set this matter at rest, wi suggest itself to any reflecting mind, and it is to be hoped th some one will make it.

2. *At what period should manures be applied?* The questic which we have just briefly examined, we have attempted to answ upon the general principle. But in replying to this we might ver naturally be led into the consideration of special manures, becau from the facts in the case it is unquestionable that at differe periods of growth, and also according to the kind of product to l obtained, plants must be supplied with different food. By refe ring to the first volume of this Journal, page fifty-three, tables wi be found giving the different quantities of ash left by burning di ferent parts of the same plants. It will then be seen that whe straw leaves 3.51 lbs. in 100, whilst the grain leaves but 1.18 lt Now these unequal quantities in the different parts show beyond

loubt that at one period of growth, a greater proportion of inorganic matter is necessary than at another—that the straw and the seed, although requiring the same materials, at the same time require the different elements in different quantities. The well known fact that the soil is more exhausted during the formation of the seed than at any other period of the growth of the plant, is explained upon this principle.

From the analysis of Sprengel it appears that the ash from 1000 lbs. of wheat contains more than 2 lbs. of potash, and 4 lbs. of silica, whilst the straw contains but one-fifth pound of potash and nearly twenty-nine pounds of silica. The great quantity of the latter substance in the straw is necessary to give strength to support its burden of grain. The variation is similar in other grains, and a like variation is seen in all the elements, in comparing the constitution of the straw and the seed.

The practical inference from all this would seem to be, that by accommodating the manures to the demands of the plant at different periods of growth, the straw or the grain might be improved at pleasure, or that we might at least expect a great control over the development of one or the other. How far this may be true it is impossible to decide, without more full and true experiment. This would consist in its simplest form in applying the same manure to two portions of the field at different times, to one portion when planted and to the other just before the crop goes to seed.

The experiments of Mr. Campbell, of soaking seeds in saline solutions, are very interesting in this connection. His object is to saturate the seed with the solutions, and, if we understand him, to thus supply them with all of those substances that they need for life, for he tried the experiment without the use of other manures, and in another instance in pure sand. It is to be presumed, however, that his expectation of reaping a tenfold crop by this means, in conjunction with other manures, has not been fulfilled, as we have never seen any statement of such a result. It has been stated before, that the probable good effects arise in this case from the vigorous start given to vegetation in the outset, by which the plant is early placed in a condition to appropriate large quantities of food, and also to obtain it under unfavorable circumstances.

If such is the case, great practical use may be made of the principle, and especially when in other respects, such as preparation of soil and manuring, the future wants of the crop are abundantly cared for. And if the principle is true, it will go far against the use of unfermented manures, particularly when the seed has not been previously prepared.

It is highly important that experiments should be tried on the effects produced by manuring at different periods of the growth of plants. Very little is in reality yet known of the principles which determine the action and force of manures, and consequently a great want of economy in the use of them, may be the result. By adapting the manure both in kind and in quantity to the wants of growing plants, great saving may be effected.

3. *How ought manure to be applied?* This question was briefly noticed in the last number of this Journal, when it was stated that manure is generally buried too deep in the soil. Since that time we have met with an article in one of the monthly journals, in which the writer attempts to show that the great loss to be guarded against, is not downward but upward. And he reasons in this way. Fill a barrel, whose head has been knocked out, with sand and pour upon the top of the sand, any kind of manure stirred up in water. After it has passed through the sand, it will be found to be almost pure water. Here the writer reasons only from the sense of sight. He has forgotten that all that is of use for the nourishment of plants is dissolved in the water and invisible whilst the dirt which floats in it is useless, and is all that is separated by filtering. If he had examined the fluid which had passed through the sand, he would have undoubtedly found it laden with the most fertilizing properties.

The tendency of the gases produced during the decomposition of vegetable and animal matter under the soil, to escape upward is in our opinion very slight. The soil, like all other porous bodies, has a strong attraction for some of the gases, and holds them with great force. It is a fact well known, that the carcase of an animal when covered with only a thin coating of earth, will undergo decay without tainting the neighboring atmosphere. The gases generated, do not escape into the air, but are held in the porous earth. But the rain falling upon the soil and passing through has the power of extracting these gases, which it must inevitably bear with it in its downward passage. Nothing which is soluble in water can be separated from it by filtering, and these soluble substances are the very materials, in the proper form to nourish the vegetable. We might state some very striking facts, showing that manures in solution are carried to great depths into the the ground. Such are wells which are often rendered useless by the leaking of neighboring sinks and dung heaps.

We would not be understood as advocating the application of manures to the surface, but that they should be thoroughly incorporated with the soil on the surface, or just below, and not buried the ordinary depth of the furrow, which should not be less than eight inches. The roots of very few cultivated crops ever reach that depth in the soil, and consequently if buried so deep the manure is to all intents lost. If well mixed with the surface soil, it is easy of access to the superficial roots, and deeper ones are supplied by the descending water charged with their food. Thence the good effects often experienced from top dressings to crops, of well decomposed manures.

The question however, would not be answered even thus, if the opinions of those are correct, who make the atmosphere the storehouse of all the organic food for plants. If they are right, manure should not be buried at all, but suffered to decay upon the surface, where all the volatile portions would mingle with the atmosphere. We cannot, however, subscribe to the opinion that even the carbon is now or has been at any previous age of the world, derived from that source; and it might be easily demonstrated, we think, that if the present existing carbon, which is now or has been at previous periods since the creation in an organized form, were converted into carbonic acid at the expense of the oxygen of the air, an atmosphere would be formed in which no plant could exist. And we deem it only wild and groundless conjecture that either plants or animals have existed at a former period, which have not analogical at the present time, and none now exist which could flourish in an atmosphere containing a much greater proportion of carbonic acid than the present. The practice of the farmer is however correct in the main. The roots are the proper mouths of plants, and their food is taken in mostly through them. That the leaves have an important office to perform is also true, but they cannot be regarded as of so much consequence as is attributed to them by the advocates of this theory.

In conclusion we would say, that it is very important that experiments should be carefully made in regard to the use of manures in reference to the points we have been considering, as well a others, and especially the economical employment of them. Ther is no doubt a great waste in the way in which manures are com monly applied. Spread over the whole surface and then ploughe in, especially if not partially fermented, their action is not confine as it might be to the crop only, and what benefit is derived fro them is slow and weak. They do not furnish sufficient food t produce a vigorous growth at any one time. Their efficacy is di fused, small as it is, through the whole growth of the crop, and a best a precarious support is afforded through the whole period.

Our soils after a course of tillage, become impoverished. Mu we expend large quantities of manure upon them to keep them up Or may we not compel the soil annually to produce all it will, ti it becomes exhausted and then by the proper application of pr per manures to the crop itself, still force a poor soil to bring for rich harvests? The example of China speaks loudly in favor this—a nation living within itself and separated from all others- increasing to an almost incredible extent—employing implemen the most rude—destitute almost of cattle and horses—and pe forming all their labor with their own hands—yet patiently cul vating their soil and stimulating it to productiveness, they ha forced it to yield a support to a population of three hundred m lions. And this they have done by adapting their manures to t wants of plants.

GUANO.

Guano has acquired a celebrity among the leading agriculturi in England and this country truly surprising, when it is conside that its introduction is so very recent. For although a specim was analyzed so early as 1804 or 5, by Sir H. Davy, and reco mended by him as a manure, yet it was not until 1840 that att tion was directed to it by the excellent publications of Lieb During that year a small quantity was brought to England, w which experiments were made testing its qualities as a fertilizi agent. So beneficial did it prove, and so sanguine were the pectations in relation to its becoming an article of considera trade, that a company was formed for its importation. This company succeeded in obtaining an exclusive privilege from the Peruvian and Bolivian governments. Within the last five years the lemand for guano has increased from a few tons to such an exent that it is estimated that in '43 and '44 there were upwards of 1000 vessels, of large class, engaged in transferring this manure rom its barren places of deposit to the ports of Europe ; a small roportion only was landed in the United States. Guano is conined, so far as discoveries have been made, to the west coast of outh America and the southwestern coast of Africa. It occurs n beds varying from thirty to sixty and sometimes one hundred eet thick, upon the islands and rocky promontories that skirt the oast. It is the product of birds—flamingoes, pelicans, &c., which aving been in possession of these islands for ages, in innumerable umbers, their droppings have accumulated to the enormous extent ist mentioned. This depth is undoubtedly increased by the carises of dead birds and seals, as the bones are found in great uantities at all depths. These birds are found frequenting the asts and islands of all latitudes in as profuse numbers, but as in or moisture would dissolve and render useless all deposits om them, and consequently prevent any accumulation, we find ue guano confined to those regions which are comparatively free om rain. The western coast of South America is, with the exption of some few points, almost barren, consisting of rocky and ndy deserts. Almost a total immunity from rain is a characteric of this coast, consequently the dung of the birds has been eserved in great purity. Among the deposits already opened e Iquique, latitude 20° 20′ south, Babellon de Pica, St. Lohos, ne miles south of Pica, Isle of Torricella, Islay, Jesus, the ands about the port of Arica, latitude 18° 20′ south, longitude ° 16′ west from Greenwich, the Chincha islands in latitude 14° ′ south, longitude 76° west from Greenwich. These last are ported as bearing beds 900 feet thick and of the best quality.

Although so lately introduced to us, yet this substance is noticed aong the earliest accounts given by the Spaniards of South erica. The Peruvians, and various Indians inhabiting that cntry have been accustomed from time immemorial to the use o guano. So great was their estimation of this manure that gat care was taken not to molest in any way the birds which they were aware produced the manure. Laws were prescribed by the Incas, and heavy penalties were attached to the offence of killing the birds. They made use, however, of the recent dung only which was gathered annually, at a certain season of the year ; this is undoubtedly better and stronger than the older deposits, which have thus been left to be opened by modern enterprise. Nor is i surprising that the Indians should esteem the guano so highly.

The soil generally, as before stated, is very thin and poor, presenting almost nothing in whole districts, but barren wastes. Ye notwithstanding all these disadvantages, the natives contrived t raise good crops, and with care were always sure of an abundan return for their labors ; but always with the aid of guano. By th application of this manure, fields of sand, where, only a few stunte weeds could find root, became as fertile as the richest of soil It is said that the natives come from the interior, one or two hun dred miles with one lama to obtain the small amount that anim can bear, and consider their long journey well rewarded.

The first specimens of guano were brought from the wester coast of South America, and all the guano used was from th locality until 1843, when by the enterprise of Mr. Rae of Liver pool similar deposits were discovered upon the southweste coast of Africa, and vessels were immediately despatched to th new treasure. The island of the most importance as regar quality was Ichaboe.

The extent of the manure upon this island was, in 1843, es mated at one thousand feet long, five hundred feet broad a thirty-five feet deep, containing from seven to eight thousand to which recent accounts state to be now entirely exhausted. Seve other islands have been opened, some off Angru Peguina, but t guano seems to be of an inferior quality to the Peruvian. Th is attributed to the fact that rains are more frequent upon the Af can coast than upon the American. It is quite probable ma deposits remain as yet undiscovered.

This manure has been analyzed by some of the most emine chemists of Great Britain. The average of those by Dr. Ure, genuine Peruvian guano, gives

1. Azotized animal matter, including urate of ammonia, together capable of affording from eight to ten per cent of ammonia, by slow decomposition in the soil, ... 5

2. Water,	11.0
3. Phosphate of lime,	25.0
4. Phosphate of ammonia, ammonia, phosphate of magnesia, together containing from five to nine per cent ammonia,	13.0
5. Silicious sand,	1.0
	100.0

nalysis of a specimen of African guano by Dr. Ure, gives

. Saline and organic matter containing ten parts pure ammonia,	50.0
. Water,	21.5
. Phosphate of lime and magnesia and potash,	26.0
. Silica,	1.0
. Sulphate and muriate of potash,	1.5
	100.0

Many other analyses might be given showing the composition f the different varieties, as it varies considerably from different ocalities, even in different cargoes, from the same deposit; but ie general results of these analyses show the guano from the acific to be superior to the African.

In order to determine the purity of guano it is only necessary mix a small quantity of guano with about ten parts of chalk id one part of quick lime, let them then be intimately blended, hen they should give off a strong smell of ammonia; next, moisten glass rod with muriatic acid, this held over the mixture should oduce a strong evolution of white vapor. This will determine e presence of ammoniacal salts. In a crucible heat to redness small quantity; this should reduce it to a white ash, when if ood, the ash will be nearly soluble in dilute muriatic acid.

The different analyses of guano show it to be composed, in an ninent degree, of those substances considered as most useful in anures.

Numerous experiments have been made in England, for the purpse of determining the value of guano as compared with other anures; both as regards the beneficial effects upon the soil, and e relative cost of the application. These experiments have been ried and tried upon all crops raised in England and Scotland, d by scientific men, and have the merit of authenticity. The sults seem to establish guano, in relation to other efficient anures, such as bone dust, barn-yard manure, &c., as four of the rmer to five of the latter.

The most approved method of applying guano, is to mix it with good earth—care being taken that they should be intimately blend-ed and sown broadcast, in the proportion of about three hundred weight of the guano to the acre. Another method is to drop it in the drills; but, if guano alone is used, care should be taken tha it does not come in contact with the plant, as it will kill the plan almost as surely as fire.

It should also be applied, if possible, just before the coming of rain; for if left dry upon the surface, the volatile salts wil soon evaporate. Thus, in a dry season, guano has been known t fail entirely—producing no effects whatever.

The natives of South America are obliged, from the dryness o the atmosphere, to irrigate their fields by artificial means. A very beneficial mode of using is, to make a solution of guano, an let it stand in a vessel, ready for use; this will do only for garde and pot plants; although it might be pursued, perhaps, advantage ously, upon large fields. Extraordinary effects have been produce in this way. One mentioned in third No. of Colman's "Europea Agriculture, &c.:"

"In Scotland, last autumn, two shrubs were shown to me, swee briars, growing in front of a two story house, and trained upon i sides; one at one, the other at the other end. The soil in whic they grew, the aspect and other circumstances, were the same.

"One, in the season, had grown six or seven feet; the oth nearly thirty feet! It actually climbed to the roof of the hous and turned and hung down, reaching half the distance down fro the roof to the ground. I judged this could not have been le than thirty feet. This had been repeatedly watered with liqu guano, by the hands of its fair cultivator; for this was another ex periment by a lady, (which I hope my American friends will bear mind.) The other had received no special care or manuring."

The minutiæ of many experiments might be given, to show th the value of guano has not been over estimated, so far as regards i use in Great Baitain. Experiments in this country have not pr duced such striking results, although it has been used here with good deal of benefit, especially on house plants.

A friend of ours has used it upon his garden vegetables, with exce lent results, this season; beets, tomatoes, &c., were watered with solution of guano, with very marked results. The proportions he material used were, one lb. of guano to one gallon of water, nd almost a wine-glass of the solution poured around each plant. solution a little stronger than this, destroyed some of the tomaoes. It will be seen that those who have been in the habit of sing a shovel full of manure to a hill of corn or potatoes, would ery likely fall into a fatal error, in the use of this substance, by xcessive doses; and from facts in our possession, we are confient acres of corn have been destroyed in this way.

The belief has been expressed by some, that there was guano nough in the world that could be obtained, to supply all demands or a thousand years at least. This, so far from being true, a little eflection will show that a few years, at the present rate of its use, ill serve to exhaust all deposits known of this substance; and, of ourse, from its source and well known mode of production, can ever be renewed so as to form, hereafter, an article of commerce.

Our farmers, then, will direct their attention to other sources of anure, to supply the wants of their farms, and will not expect, least, to obtain it in any considerable amount, after one or two ears at farthest.

HOW PLANTS ABSORB CARBONIC ACID.

BY WM. PARTRIDGE.

THE first number of the American Quarterly Journal, contains article by Thomas Hun, M. D., on the food of plants, wherein quotes Liebig, page 15, as follows—"the great value of the soil r vegetation, depends on its earths and alkalies, which seem to pply the inorganic constituents of plants. The humus or mould comparatively unimportant, except at certain stages of vegetan, in furnishing carbonic acid to the roots."

Again, p. 17, 18—"Carbonic acid is derived from the soil, here it is generated by the decomposition of vegetable matter, d from the atmosphere. The main source of carbonic acid, is, wever, the atmosphere. How can this be otherwise, when the ormous quantities of carbon which trees, the growth of centurs, for example have laid up, are contrasted with the very limite extent to which their roots extend. Very certainly where the acorn, from which sprung the oak that is now our admiration, ger minated a hundred years ago, the soil where it fell, did not con tain the millionth part of the charcoal which the oak now incloses It is the carbonic acid of the atmosphere which has furnished a the rest; that is to say, almost the whole mass of the noble tree.

"But what can be more clear or conclusive upon this subjec than the experiment of M. Boussaingault, in which peas sown i sand, watered with distilled water, and fed by the air alone, neve theless found in this air all the carbon necessary to their develop ment, flowering and fructification."

"If then the plant is vegetating in a soil which furnishes n carbonic acid to the roots, *the whole supply must be derived fro the atmosphere by its leaves*."

I believe that Mr. Liebig is in error in supposing that the leave by absorbing carbonic acid, supply trees or other vegetables wit the principal portion of their carbon. I shall offer some fact which I think will go far to disprove this assertion.

I am aware that it is up-hill work to call in question any theo of Liebig's, for so great is the confidence of his readers in h opinions, that it is considered mere querulousness to call any them in question.

I am also aware that my own positions may be erroneous. C this point, I have only one request to make, that any error I m fall into, may be shown, not merely asserted; and if the objectio are well founded, I will readily acknowledge the error.

Man is a theoretical being, and those who can produce the mo splendid and imposing theories, are sure to stand on the pinnac of literary fame. It is of little consequence whether the hypoth sis on which a theory is raised be well founded or not, provided be specious, for few men are capable of testing it by the touchsto of truth; and it is so much easier to believe than to investigat that any thing, however absurd, when supported with talent, wi be sure to meet with a competent number of proselytes.

We look with contempt on the theories of past centuries, whi we are deeply absorbed in those of the present day, which in the turn will become the objects of disproof by succeeding generation but theories, like governments, will some of them leave a splend train in their rear, whilst others will be thrown down and forgotte almost as soon as they are formed.

In tracing the operations of nature, I have always laid it down s a rule, to endeavor to discover the intentions of the Supreme lind, in the qualities and in the appliances of the objects of in-estigation. In tracing the operations of carbonic acid, we find it possess great weight, a weight much greater than any other gas; great that it may be poured from one vessel into another, with-it mixing with the surrounding atmosphere. If this gas were in-nded to feed vegetation through the leaves, then would its pon-erosity be adverse to such appliance. If, on the contrary, the is were intended to feed plants through the roots, then would this onderosity cause it to descend to the ground, and there supplying e necessary food by means of the roots.

The atmosphere is found by analysis to be always and in every uation the same, to afford in the diseased cell, in valleys, and on lls, the same results; yet we know that various gases are conti-ally pouring into it; but is is evident they do not chemically mbine with the atmosphere. Most of the gases are much hter than the atmosphere; these ascend beyond our reach, and scend again in rain and snow storms. Carbonic gas, the princi-l food of plants, being much heavier than the atmosphere, must cessarily fall to the ground, where it would afford nourishment t vegetation. Carbonic gas is called by the miners choke-damp; ad when in moderate quantities, is always near the ground. If a og, or other animal that holds down its head, pass into it, it is im-ediately killed by inhaling the noxious fluid, whereas the work-men, whose heads are above the gas, sustain no injury from it.*

Were the gases suspended in the atmosphere within the reach o animals, it would soon become totally unfit for sustaining ani-nl life. This would be peculiarly the case with carbonic gas, wich instantly destroys life. How wise, then, is the arrange-

Our correspondent seems here to forget the fact, of which he is certainly aware, th in all parts of the atmosphere the carbonic acid is equally distributed. The ex-amination of portions brought from the greatest height to which man has ascended h given the same quantity as is found near the surface. This arises from two cases—first, the constant motion of the air by winds, which would mix the different gs—and secondly, the tendency which all gases have to comingle even when at re. Thus, if a vessel containing hydrogen—the lightest of all gases—be inverted un a vessel containing carbonic acid—the heaviest gas—and kept in a state of per-fe rest for a few hours they will be found mutually diffused through each other, and th although the communication be only through a very fine tube. We say this only to orrect a matter of fact, and not as bearing upon the point which our correspondent is scussing.—Eds.

ment of the Supreme Being in giving it such weight that it sha fall to the ground, and be absorbed by that portion of organic n ture to supply whose wants it has been created.

Some twelve months since I gave to Mr. Maynard, who kee a multiflora garden in Brooklyn, a number of papers, each co taining from one to three scruples of supercarbonate of ammoni and requested him to apply them to his greenhouse plants; to small pot one scruple, to the largest three scruples, and to infor me of the result. In a short time he called on me to notice i effects on a hydrangea. I found the leaves were of a deeper gre and larger than any others, that the flowers were larger, of a rich color, and every way superior to all others. The contrast was striking, that all who saw it were desirous of purchasing that pla at an increased price. Now as one pound of supercarbonate ammonia can be bought at twenty cents, and is sufficient for o hundred and twenty-two plants, I know of no application that cheaper, and certainly none so efficacious. This fertilizer w stirred into the soil—a proof that the carbonic gas was taken by the roots—thereby producing its rapid and beautiful effe This salt contains about fifty-five per cent of carbonic gas.

Mr. Steane, apothecary and chemist, 184 Fulton street, Broo lyn, informed me that he applied some to a rose plant, which a peared to be drooping, and that he could see the spongioles of t roots come up to the surface and take it down. My attention w first drawn to this effective fertilizer by an observation made Mr. Steane.

I requested Mr. Leeds, an amateur in greenhouse plants, dr gist, corner of Atlantic and Court streets, Brooklyn, to apply so of the salt, in solution, to a rose plant that appeared in the l stage of decay, having lost its leaves, and collected a large crescence at the roots. He dissolved about two scruples of t supercarbonate in an eight ounce phial of water, and gave plant a little every day. In a short time the buds began to appe and the last time I saw it the plant had produced some full gro leaves, and a great many buds were putting forth.

Mr. Leeds has had a monthly rose in a large glass jar, plan in the usual soil. This jar is hermetically sealed, and yet plant has flourished, its leaves being of a healthy green, and grew faster and blossomed sooner than any similar plants expo o the atmosphere. It is evident that this rose tree obtained its ood from the soil in which it was planted, and not from the at- 1osphere. It has been kept several months in this state, and I resume will flourish so long as it can be supplied with sustenance rom the soil.

I know not how others may construe the facts I have given ; ut I view them as conclusive evidence against the theory of Lie- ig, "that the carbon of the plants is principally obtained by the aves absorbing carbonic gas." Nor do I consider the experiment f Boussaingault as affording the least proof in favor of this theo- , as the result would be the same whether the carbonic gas of e atmosphere where taken up by the roots, or absorbed by the aves. Mr. B. must have known, I presume, that sea sand has nerally more or less of broken shells in it, and that silicious sand ually contains about four per cent of carbonate of lime as one its components.

Before quitting this subject I would suggest a new application those who keep greenhouses—one that I believe cannot fail to oduce a very decided improvement in all their plants; and as e cost will be but trifling, I am confident will be applied by some nateur; and should the result answer my expectation, will soon universally employed. I would suggest that an apparatus be aced immediately outside of the greenhouse to engender carbo- c gas, that the gas be passed through a tube into the greenhouse an evening after closing up for the night. Any vessel, either one ware or metal, would answer the purpose, there being no sistance to the delivery of the gas. Some machine can be placed the end of the tube, inside the house, like a ventilator, by which eans this ponderous gas could be thrown over the whole mass of ants. It would be a cheap operation, as nothing but chalk or estone, and oil of vitriol water, would be required to engender the gas. In discussing this subject at a meeting of the Brooklyn tural History Society, our venerable president, Augustus Gra- m, Esq., suggested that the burning of charcoal inside the eenhouse might answer every purpose, and as this would be the st simple and least expensive, it would be well to give it a tl.

AGRICULTURAL SCIENCE, EDUCATION, &c.

BY N. S. DAVIS.

The present age is generally characterized as one of great, nay of unparalleled progress in every thing pertaining to man's physical, moral, and intellectual condition. For while space and tim are alike robbed of their ancient powers, by the steam engine an the electric telegraph; the almost numberless schemes for soci reorganization, and the *quite* numberless plans for universal inte lectual cultivation and education, each and all represented by the respective advocates as capable of elevating the whole race, ar speedily ushering in the millennial dawn with all its resplende glories, would almost make us forget that more than four thousa convulsive, struggling, heaving, toilsome years have rolled aw since man began his career on earth, and still three-quarters of th earth is covered with darkness, moral, physical and intellectu darker even than at the beginning; while of the inhabitants of t remaining quarter, not one-fourth have ever caught even a gli mering ray from the light of science, or a sip from the Pieri spring. And yet this fact, plain and palpable as it is, shou make us hesitate and reflect, before we attach too much importan or look too sanguinely to the results of any of the thousa schemes for ameliorating the condition of mankind. We wou not deny our faith in human progress; neither would we sa discouraging word to the warm-hearted philanthropist, who, in t ardor of his zeal, would regenerate a world in a day, if he, l Archimedes, could only find a fulcrum on which to rest his lev But we would look at the past and learn to be humble.

We acknowledge that the present is, in a moral and physi point of view, an age of convulsion, innovation and change. not of improvement. It is a time when, on the other side of Atlantic, the deep, and ever deepening tones of misery from lo oppressed humanity, are rising with volcanic power, beneath tottering towers of regal tyranny, and demanding redress.

And in our own boasted land, there seems to be a spirit of re less innovation in all the relations of man, which portends near approach of an important era in the history of our race. I why all this restlessness? Why this clashing of interest with interest—of section with section? Why this mingling of wealth and poverty; of merry huzzas and oppression's wailings; of ignorance and nowledge; of degrading vice and exalted virtue; of endless struggles after the most exalted attainments, and the tamest submission o indolence and physical degradation. Alas! we fear it is because e have yet to seek out and establish a system of legislation and *lucation* which will develop all the powers of man. But we are idely digressing from our object, which is simply to offer some iggestions on a subject of engrossing interest, at the present oment, in our own State; and which we are glad to find occupyg a conspicuous place in the American Journal of Agriculture id Science, viz: the agricultural education of the present and sing generation of our own citizens. There is, probably, at the esent moment, a greater sacrifice of time, labor and money, in e cultivation of the soil, than in any other department of human idustry. Of this, every intelligent observer is fully aware; and ince the imperious demand which has gone forth for the speedy plication of an appropriate remedy. Through the agency of ate and county agricultural societies, an interest has been akened in this subject, which pervades, to some extent, every wnship in the State. Concerning the nature of the remedy to applied, there is, also, no dispute. All agree that it consists in the application of scientific knowledge to practical farming.

But concerning the time, place and mode, of preparing our ricultural population to make such application, the greatest dersity of opinion exists. One says, give us a state agricultural sool, with a model farm attached, supported from the public tasury, where the science and practice of farming can be taught a the same time, to young men from every part of the State. Aother says, away with your great drains on the public treasury —only popularize the study of science—banish your *technical tens*, and give us text-books in the true vernacular tongue, and th district schools will be fully adequate to our wants. While a thd discards both of these, and points to the numerous academs distributed over the State, as the only proper place to commce and carry on this much needed work.

That there is a strong and perhaps increasing feeling in favor of th establishment of a well endowed State Agricultural chool the transactions of the State Agricultural Society, and the doing of the State Legislature during its recent session, as well as th published opinions and addresses of individuals, abundantly show But would such a school fulfil the expectations of its friends Would it be able to call the class of young men on whom we mus rely from remote sections of the State to any one location whic can be chosen ? Would it diffuse the greatest amount of agricul tural science among the people with the least expenditure of tim and money ? Finally, would it be able to maintain a permaner existence amidst the endless changes of party, and fickleness o legislation which characterizes our State ?

Doubtless if such a school were established, with an expenditu of money sufficiently lavish, not only to make the tuition free, bu also to pay the greater share of the board for those who woul attend, a respectable number could be gathered in from some qua ter. But we may seriously doubt whether it is necessary, in th country, to hire our youth to be educated. And even if it wer we believe a more economical mode of doing it could be devis than this. For the annual appropriation of $8,000 or $10,000 sustain such a school, would well sustain a separate professorsh in at least ten institutions already established in different parts the State, and thereby extend instruction to more than five tim the number that could be gathered into one place. But we are to that a model farm is as necessary as a school ; and that the theo and practice of agriculture must be taught together, and therefo a State institution is necessary. A model farm, if we understa the term, is a tract of land on which the various branches of hu bandry are carried on according to the strictest principles of scien But where shall it be located ? in the valley of the Mohawk Genesee, or on the hills of Herkimer ? Shall it be on a sand clayey, or alluvial soil ? We are very much inclined to thi that a model farm in one location, or on one soil, would be ve different from a model farm in another and on a different soil. is true, the same principles might govern the practice in bo places, but the difference in the circumstances under which th would be applied would make a wide difference in the practi aspect of the farms. Again we doubt the propriety of thus tempting to connect the study and practice of agriculture in school designed for youth. For what is the real object of edu on, whether general or specific, legal, agricultural, or medical? s it to learn a routine of forms, recipes, and arbitrary rules, or is to expand and discipline, and then store the mind with princi-les and facts?

If we wished a young man to become eminently qualified to ractise law or physic, we should by no means send him to Yale ollege to write out blank deeds, mortgages, &c., or to New-York niversity to make pills. But we might with propriety send him these seats of learning for the purpose of giving him a complete d profound knowledge of the principles or general rules, and cts which constitute the basis of all intelligent practice in either these professions. Precisely the same rule applies to an agri-ltural education. Take the young man whose mind has been veloped and disciplined by a thorough study of the elementary anches of education, and teach him the principles or laws which vern the decay or decomposition of vegetable and animal mat-rs, for example, and if he possess an ordinary share of common nse he will never be at a loss to find some mode of applying ose laws to the practice of preparing barn-yard manure. These ws teach him that in all such cases much gaseous matter is form-which must be retained by some absorbent; also that caloric heat is developed which must not be allowed to rise too high; d finally that the most valuable products are soluble in water, d therefore liable to be washed away and lost by rains, &c. d hence he will not need a model farm to teach him that a cover some kind is necessary for the protection of his manure. But ether that protection shall be a barn cellar, or a shed, must de-nd on the situation of himself and his barn. We believe one of e greatest errors in the present popular idea of education is, that must be *practical*, meaning thereby that it must consist in the dy of such things only as are directly reducible to practice in ordinary pursuits of life. Such an education is directly the erse of practical, in any proper acceptation of that term. It y indeed make a man of prescribed rules, and forms, and routine; mere *creature* of circumstances.

But the really practical man, is one who makes rules, forms, l circumstances his creatures, and himself their master, to nge and mould them according to his will. To do this he st be educated to think: and to be capable of deep, continuous and expansive thought, the mind must be disciplined by the patien and thorough study of all the elementary branches of science For practical purposes, a fully developed and well disciplined mind is of infinitely more value, than all the skimming, stear pressure models of development which can be devised.

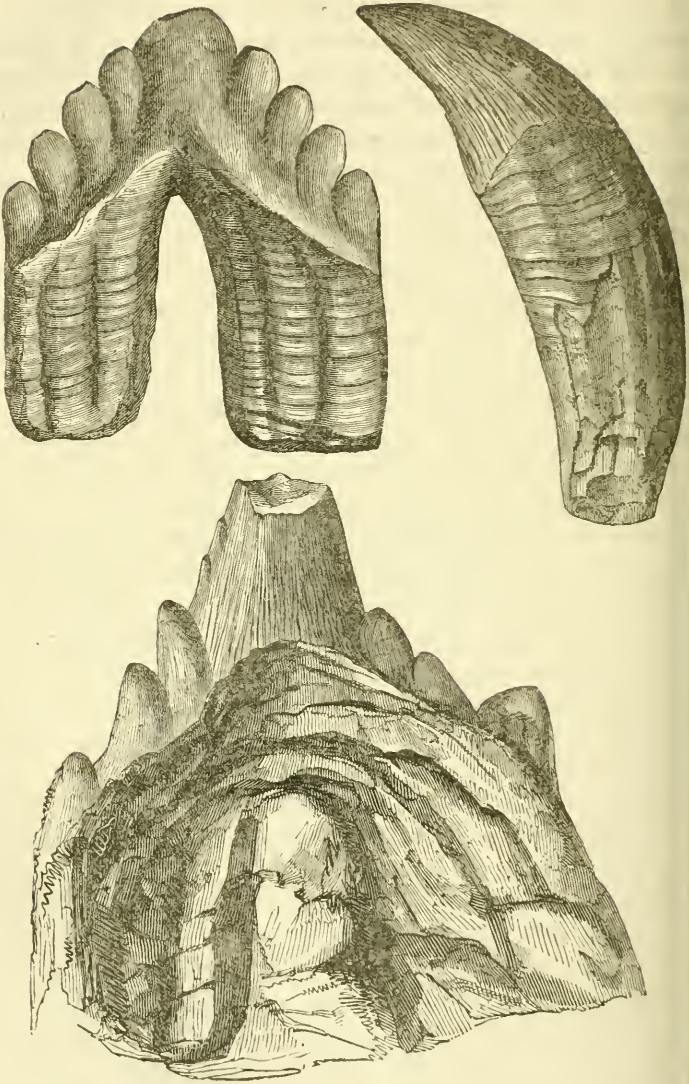
But we again digress from our object. We not only think th establishment of a State Agricultural School bad economy, and nc well calculated to answer the expectations of its friends ; but i the present unsettled state of the public mind, and the sleeples jealousy with which it would be viewed by a respectable portion c citizens, renders it very doubtful whether it could maintain a existence beyond the political lifetime of its founders. The oppo site idea that any process of simplification in regard to text-book on agriculture, can render the district schools alone adequate t the wants of our agricultural population, is also fallacious. The seem to be some very indefinite notions, even in high places, concern ing the condition of a great majority of the district schools in o country. Thence we hear men of high standing talking abo catechisms of agricultural chemistry and geology, so simple as be readily comprehended by "every child of twelve years old and therefore "admirably adapted for study in the common schoo of the State." But do such men know that nineteen-twentiet of the children in our district schools, at the age of twelve yea have scarcely commenced the elementary studies of geograph arithmetic and grammar. Surely not, or they would never talking about introducing to their notice the complicated and exte sive study of agriculture. Such children might indeed learn th catechism of agriculture in the same way that we formerly learn our catechism of Theology ; that is, as the parrot learns to s "*pretty Polly*," but who would be the wiser thereby ? Now, we sa with all due deference to high authority, sustained as it may be the *five* Irish prodigies from the Larne school, that agriculture is science requiring a discipline of mind, and a power of thoug and reflection for its useful comprehension, altogether beyond t capacity of *any* boy of ten, *twelve*, or fourteen years of ag And hence to urge such a study upon them would only serve divert their attention from those indispensable elementary stud which ought ever to form the foundation of all education.

There is, however, in all our district schools, a *small* class of ıore advanced scholars, who have arrived at a more mature age, and hose attention cannot be turned too speedily to the careful study f agriculture as a science. But we should object to placing in ıe hands of this class a text-book on any science, simplified and luted down to the capacity of *babes* and *sucklings*. For we hold the doctrine of St. Paul, that when children, we may think and eak like children; but when we become men, we should put vay *childish* things.

We are continually prone to consider education as little else an a loading of the memory with words and facts; and hence e more brief and simple these are rendered, the better, because e easier for the memory to retain them. The acquisition of cts is indeed necessary; but it is equally necessary that the judg-ent be developed; the powers of reasoning, the ability to com-re fact with fact, to seize on circumstances, however varied, and eld them for the accomplishment of a given end. In a word, e agriculturist not only needs to understand the facts and princi-es of the science, but he must have a judgment as fully deve-ped and well trained to apply those facts and principles under the various circumstances which the earth presents, as the legal vocate at the bar, or the judge on his bench. To think of thus engthening, maturing and disciplining the youthful mind, by the cessive simplification of text-books, is very much like teaching hild rhetoric by repeating to him *baby talk*.

But technical terms, at least, must be banished. If we mean by hnical terms, merely long, high sounding words, meaning no-ng, then we also go for their banishment. But if we mean reby the names which make up the nomenclature peculiar to a ticular science, as the names of oxides, alkalies and acids, in mistry, then we totally object to this innovation also. For in-ıd of being a hindrance to the learner, they are nearly all so ar-ged as to indicate either the composition or properties of the stance named; and hence, to learn their names is to a certain ent to learn the science itself; and to banish them for others common use would be to go, at least, one century backward in progress. Thus, suppose we set the student to learning the mon names of oil of vitriol, copperas, plaster of Paris, or gyp-sı, glauber salts, &c., &c., he not only gains nothing beneficial, but he suffers a positive loss in acquiring at least two or three false ideas. For who ever spoke the name copperas, without receiving the impression that copper entered into its composition, or plaster of Paris, without the thought of its coming from Paris. On the contrary, sulphuric acid, sulphate of iron, sulphate of lime, and sulphate of soda, are names not only more easily learned, but every one of them indicates the composition of the thing named. Besides, we should remember that all names, whether common or technical, are alike new, and to be learned by the scholar. Hence he would not only gain nothing, but positively lose much by the proposed banishment of names. But we have perhaps already extended our censorious remarks too far, and the reader may be ready to inquire what we *would* do, and how we would do it. Doubtless the first thing to be done is to prepare teachers for the work. For this purpose the study of agricultural science should be immediately introduced into the state normal school, and into all those academies where young men and women are trained for district school teachers. Again, at every session of the teachers' institutes, in the several counties, suitable persons should be engaged to give a course of lectures, exhibiting in plain and familiar language the nature and importance of the study, and the best modes of illustrating it. To accomplish all this, those who send young men to our academies and teachers' institutes, have only to ask it, and it will be done. For all these institutions depending on their patrons for support, will never long resist the expressed will of those patrons in regard to any particular study. Let this be done, and its introduction into all those district schools where there are scholars of sufficient age and attainments, would follow as a matter of course ; and then the whole work will have been accomplished. It will be seen that we ask for neither new legislation, nor aid from the public treasury. And why should we? There are already academies, seminaries, institutes, scattered over the state, almost within sight of every man's door ; and all entirely subject to the control of the people. Then would it not be infinitely easier, more economical, and wiser, to make them what they should be, than to thrust them aside for the establishment of new ones, involving the expenditure of thousands of dollars. Indeed, we are sure that half the money and less than half the number of speeches which would be required to get a law f he establishment of a State Agricultural School through both ranches of our legislature, would, if judiciously applied, procure he successful introduction of the study of agriculture into every chool in the state, where there were scholars sufficiently advanced o study understandingly. But we hope the day will be far disant when the science or profession of agriculture, or indeed any ther profession, shall be urged upon the minds of our youth *beore* they have laid broad, deep, and thorough, the foundation of good general education.

Binghampton, June 6, 1845.



Teeth of the Zeuglodon.

ON THE SUPPOSED ZEUGLODON CETOIDES, OF PROF. OWEN.

BY ONE OF THE EDITORS.

In 1843, I received from Alabama the vertebra of a large fossil animal, supposed to belong to the same species which had been described by the late Dr. Harlan, in 1832, under the name of Basilosaurus; and in 1839, was described and refigured by Prof. Owen, under the name which stands at the head of this article. These bones had remained till this spring in the boxes in which they were packed, but having time and opportunity to give them an examination, I took them from the boxes and placed them in the State geological rooms. I then commenced removing the matrix or rock in which the parts of the head were enveloped. In the performance of this work, I soon perceived that the teeth were quite dissimilar to those of the animal which had been described, first by Dr. Harlan and subsequently by Prof. Owen. The teeth, as will be seen by the annexed cuts, (by those who have seen the drawings of the above named gentlemen,) are very unlike theirs; and indeed, it seems impossible that these differences should arise from imperfection in the specimens, inasmuch as most of the broken teeth in my possession exhibit the peculiar forms I have represented, either by themselves or the casts upon the matrix. Besides, the figures in the London Geological Transactions represent the margins so entire in all the specimens of the teeth there figured, that provided Dr. Harlan's animal was the same, this peculiar margin could not have existed. For these reasons, I am very much inclined to believe that the animal in my possession is quite distinct, especially when it is taken into the account that the Zeuglodon had a long tail and a short neck, in which last characteristic it was supposed to have been similar to the Dugong; whereas, these vertebræ demonstrate, that the animal had a short thick tail and an extremely long neck, the heavier portion of the animal being towards the posterior extremity. In form and model, therefore, it resembled, generally, the Pleiseiosaurus, as represented in the restored skeletons. It is true, that it seems not a little remarkable that two such enormous animals should be found existing upon the same plantation, still that is a matter we have nothing to do with except to describe accurately what we find.

But the very interesting and important observations of Prof. Owen, on the anatomical structure of the Zeuglodon, apply also to many of these bones, viz : the solid double fangs of the molar teeth—their implantation in separate and distinct sockets; and to the jaw, which is hollow.

But some other important facts I have been able to determine by the specimens in my possession, viz: the convexity of the condyle, the inward curvature of the angle of the jaw, which projects beyond the condyle, in a manner not very dissimilar to that of our hystrix. The angle, the condyle and the coronoid process of the lower jaw, then, all form one continuous portion of bone; thus proving very conclusively that the animal did not possess a jaw of the composite kind or structure.

It would be interesting to institute a comparison of the jaw of this animal with the Thylacotherium, unless indeed, the jaw of the latter is supplied with molars too far removed in form and structure to furnish grounds for the admission of affinity—but in the figures which are given in Buckland's Bridgewater Treatise the molars are not very dissimilar to those of the seal family.

There is another fossil whose teeth, especially the crowns, resemble those in my possession; I allude to the Iguanodon. Both have serrated edges, but with this character the resemblance ceases. But as the Iguanodon is supposed to have been a vegetable feeder this resemblance is interesting, inasmuch as it may throw some light on the nature of the food of our animal; but still, it is supplied with large canine teeth, so as seemingly to balance the probability of its feeding upon vegetables. Connected too with the bones of the head, is a large rounded bone, like the palatine bone of a fish; a provision for a more perfect mastication than could have been made by the cutting grinders as represented in the figures,—provided that this palatine really belonged to the animal in question. It will be seen from the above facts, that we have some very interesting combinations—some anomalies which are quite as rare as any which have been furnished since the discovery of the remains of the sauroid fishes.

I now proceed to the main object of this paper, viz: to describe the teeth of the animal under consideration.

1. Teeth of two kinds; molars and canine. The first are hastate, or of the general form of an arrow-head, or of a spear. This form, however, appears under a modification, as will be seen by reference to the figures. The second variety is that of the ordinary canine tooth, or tusk. Molars, greatly compressed, margins serrated or lobed, and edged, terminated by a middle central lobe and rather rounded, and standing directly over the arch formed by wo solid fangs. Cementum, (enamel) extending over the crowns and fangs, but thickest up the crown and but slightly wrinkled. The transverse wrinkling upon the fangs (see fig.) appears only vhen the first coat of cementum (enamel) has scaled off. Fangs uperficially grooved, grooves varying in number on the two sides. The number of lobes, or crenatures vary: in the one figured, there re four; yet in another tooth only three can be seen, and in the ower tooth which stands by itself, there are three only; but the niddle lobe is serrated on the anterior edge as in the figure, and it tands obliquely to the arch upon which its base rests, or in other vords, backwards. Fangs nearly parallel with each other.

Canine tooth solid, compressed, tapering towards each extremiy, widest just within the alveolus, or socket. Cementum finely rinkled longitudinally over the part external to the alveolus, but xtends thinly over the fang, concealing the transverse wrinkles. . shallow, wide groove on one side of the fang extends to the ower end, on the opposite side; it is traversed by three or four arrow but shallow grooves with intervening ridges.

Measurements.

Largest molar, $3\frac{1}{2}$ inches wide at its insertion into the alveolus, or w; $2\frac{1}{4}$ inches high from the bifurcation to the termination of e middle lobe. Canine, 5 inches long and $1\frac{1}{2}$ in its widest part. Distance between the first and second canine, 2 inches; between e second and third canine, $2\frac{1}{2}$ inches. Breadth of the jaw at the sertion of the second canines, at their inside insertions, 3 inches. eight of the jaw from the angle to the top of the coronoid pross, 13 inches. The passage for the spinal marrow of one of the rvical vertebra has a transverse diameter of $4\frac{1}{2}$ inches, while the rtical is only $2\frac{1}{2}$.

It is difficult in the present state of our knowledge to determine hether this animal, whose teeth have been particularly described, ould be considered a distinct genus, or species, from the one described by Dr. Harlan and Prof. Owen. If the figures given by these gentlemen are correct, then there is no doubt of ours being quite a different animal and ought to receive a distinct designation But the vertebra and ribs figure, by Prof. Owen, are accurate representations of ours, and taking all circumstances into consideratio the writer strongly suspects *it is the same animal* ; and, admitting that the teeth have been described and figured so imperfectly befor and that they cannot be identified as parts of the animal to whicl they belonged, still we should not, in this case, wish to chang the name. To Prof. Owen belongs the merit of pointing out th position which this animal holds in the animal kingdom, and th name *Zeuglodon* is a good one, though the specific name *cetoides* is questionable. This we infer from the great length of the neck Of the bones beside the vertebræ, we have a femur, a humerus and the ulna and radius, with a portion of scapula ; a portion of a enormous pelvis, several ribs, two or three bones corresponding t the wrist, and both extremities of the lower jaw and the extremit of the upper jaw and many other fragments of some importanc The vertebræ extend in a line about 65 feet. We shall give i the next number drawings and descriptions of such as are the mo important.

Before we close, it is proper to notice Dr. Gibbes' new foss teeth described in the proceedings of the Academy of Natur Science of Philadelphia. The general form of these is much th same as those figures we have given. Two important difference according to the description, exist. Dr. Gibbes' teeth are all ho low, which denotes an approach to the saurian type ; the angle bifurcation of the fangs is quite different ; the fangs of his tee stand out at quite an angle ; while in mine the fangs are near parallel. If from any accident then, the teeth described by D G. lost their interior, or were solid, this evidently would make the two different species. If those teeth were solid, there is such a r semblance in the teeth that the animals to which they belong were of the same genus, but of different species. Then again, D Kock, who has been to Alabama for the express purpose of pr curing these bones, believes that his are entirely different fro those in our possession, and this may be so. The formation which these fossil bones belong, is the superior portion of the cr taceous group. All the fossils, with one or two exceptions, belo

:o this formation and not to the Eocene, as has been supposed. Among them are, anthophyllum atlanticum, plagigostoma dumosum, nodida cretacea, etc., all of which will be noticed in a succeeding ıumber. A few particles of the green sand are disseminated parsely through the matrix. The order of beds associated with he zeuglodon stratum, is as follows : 1, alluvium ; 2, nummulite eds, 40 feet ; 3, ferruginous layer, 1 foot ; 4, zeuglodon bed, rom 5 to 10 feet ; 5, lignite ; 6, beds of clay with sharks' teeth nd leaves of dicotylednous plants ; 7, lignite ; 8, beds with abunance of oyster shells, 70 feet—this is represented as a hard rock ; , green sand and marle, material soft, 10 feet. This section was ırnished by Dr. Kock. We had, however, previously been able determine the age of the zeuglodon from the fossil in our posession.

FARMERS' MISCELLANY.

HUSBANDRY IN CENTRAL NEW-YORK,

In letters to John Coon, Esq., of Albany. By one of the editors.

I. Hop Culture.

Waterville, May 23, 1845.

My Dear Sir—I know that you will agree with me when say, that what a man tells us in a set speech is comparatively little consequence ; at least, it is worth much less than what tells us in his daily and familiar intercourse, for in the latter ca he is less disposed to make a display, and has fewer motives f exaggeration. The best way to get knowledge is to visit him his farm, or in his workshop. We then see how he handles l tools, what he really produces, and how labor and strength m be applied to the best advantage, or so as to secure the most pı fitable result. If he is a mechanic, his shop tells a true story of owner. If he is a farmer, his fields and his flocks are witness and no palaver of words can conceal his defects, or hide and co up his ignorance ; if he is a slouch or a sloven, they show it ; he is a man who is up and doing with the dawn, they declare It is a poor place for a farmer to discourse largely on the beaut and profits of scientific farming, when his corn is smothering w pig-weeds and thistles ; or his onion beds are growing up w burdocks. The unmentionable one might just as well attempt prove himself a pious man, or a rhinoceros that he is a beau from the length and shape of his snout, as such an one to say tl he is a good farmer. If you see him at his plough, but o scratching the epidermis of his corn field, instead of going into bowels, you may surely make up your mind that he is eithe very worthy member of the society of lazy fellows, or else is tally ignorant of the value of the subsoil itself. Impressed w he truth and importance of these sentiments, I determined to visit ome of the leading farmers in central New-York, that the various ranches of husbandry might come under my own inspection, and s you have manifested so much interest of late in farming, and re introducing the improved modes of culture, I determined I ould occasionally give you the results of my observations. I ft Albany on the 22d of May, and made a continuous journey Utica, or into the heart of Oneida county, where my observa-ons commence ; and here I remark, that Utica and its immediate icinity is underlaid by a peculiar black slate, eminently subject to ecomposition. The soil thus formed is distinctly argillaceous, it is unquestionably excellent of its kind. Passing up the val-y of Oriskany creek, in the direction of Sangersfield, a succes-on of rocks is passed over, comprising the entire Clinton group, hich consists mainly of thin bedded shales, passing into sand-ones, and upwards through other silicious deposits, until we ach the Onondaga limestone, which passes through Sangersfield, adison, Waterville, and thence westward through a belt of coun-y five or six miles wide, to Lake Erie. The modifying influence the different rocks is not very distinctly seen at all places, in nsequence of the thick beds of northern drift which are spread er some fields to the depth of one hundred feet. In this section country diluvial hills are constantly met with, and it is by their rmation that the country is of that character which is denomi-ted rolling. They are sometimes conical, and sometimes in the rm of low, rounded ridges, forming in all those cases excellent nds for pasturage, and in many instances, land well adapted to llage, and particularly the growth of corn. Although I have marked that the influence of the underlying rock is not always rceptible, yet, in the region of Sangersfield and Waterville, and elt of country from six to fifteen miles wide extending east and st, we have to all intents and purposes a calcareous soil. It is oduced by an immense number of boulders and vast quantities sand and gravel, in which there is a large proportion of calca-us matter. The calcareous matter is derived partly from the enton and lower limestones which form the surface rock in the rthern part of the county, and the Onondaga limestone which lerlies a part of the southern towns. Many excellent farms along the valley in the route from Utica to Waterville, but as

I was obliged to take passage in the stage on account of the rair I was unable to learn as much of the character of the soil as I wished. I was quite fortunate, however, and fell in company witl a gentleman, Mr. Gurdon Avery, of Centreville, who has been en gaged in the hop culture over twenty years. From him I receivec a polite invitation to visit his vineyards and see his mode of cul ture. Accordingly, the next morning I went through all of hi fields, and became intimately acquainted with the whole manage ment of this vegetable, until it is fully prepared for our neighboı John Taylor's big stew-pan, where I propose to leave it, not bein yet sufficiently acquainted with the rather mysterious process c converting it into a kind of drink commonly called beer. The hoj I will just say is rather a difficult article to cultivate, or I may sa difficult to bring to a high state of perfection. Any person, to b sure, can grow a vine at the gable end of the house, where m grandmother always had one growing, or in some corner of tl garden, yet it is quite another thing to cultivate from two to te acres and secure a good yield, and bring the produce out in a me chantable state.

There are two principal departments in the hop business ; firs its cultivation, and second, its preparation for market :

1. *Its cultivation.* Hops require a rich, calcareous loam, ligl loose and deep, which will permit the roots to penetrate deep and widely in search of food, that the vine may grow rapidly the first part of the season ; for the more vigorous the start, t better the hop and greater the yield, all things being equal. T field on which hops are to be sown or planted must not ha been under the culture of this plant for at least twelve or fourte years. The field, if it is in turf or green sward, must be plough in autumn. Early in the spring let it be manured with rich baı yard manure, and ploughed again. Early in April as possib layers or slips of the hop are planted in rows six feet apart in c way and eight in the other. This year it is not expected to g a crop of hops. The field in the intermediate spaces is plan with corn, and the vines are suffered to run about the ground on to the corn as they please. Early the next season, howev the field, as soon as it is sufficiently dry is broken up with the cu vator. The cultivator for this purpose requires a set of teeth ab two inches longer than that which is used for corn. This bei

nished, the next step is to set the poles, using for this purpose an nstrument like a common bar, but which bulges out into an oval orm at the lower end, the largest part of which is about two inches n diameter. Two poles, about fourteen to sixteen feet long, are equired for each hill, and they are set about eighteen inches apart. The combined strength of both is necessary to support the weight f the vine securely. The hop comes up in numerous shoots, and vhen some of them are eighteen inches they require to be well oed, and at the same time two of the most thrifty are secured to ach pole by a woollen thread ; the others are suffered to grow a hile, or until the cultivator is sure that the two selected will rove to be good vines, or have escaped some dangers incident to e young state. The other vines are then broken off at the root, r four only allowed to grow. Usually the proper time for ex- rpating the supernumerary shoots is when the selected ones are x to eight feet long ; these then receive the whole strength of e root. The weather most favorable for the growth of the hop that which is warm and showery. Cold, dry winds are unfa- orable, or those which have now for some time prevailed.

The hop requires hoeing five times in the season. It must be ept free of weeds ; and this you will see is quite essential, as no eeds ought to ripen in fields which are cultivated for successive asons. The best poles are white cedar, and they should be two nd a half to three inches in diameter at base. Such poles cost om ten to twelve dollars per hundred.

The time for picking hops is when the flower is perfect. The oma and medicinal properties of herbs are in perfection at this age, and so is grass, which is the true and proper time for cutting, secure it in its highest state of perfection. In the case of hops is quite essential that the whole crop should be secured while in is state. In large vineyards, therefore, many hands are required secure it before it passes the perfect stage. The picking is ually performed by females, and this part of the work requires atness ; stems and leaves or vines should not be mixed with the ops.

To secure the necessary neatness as well as uniformity in pick g, Mr. Avery uses a large wooden box divided into four equal mpartments ; the box is supplied with four arms, one at each rner, for transportation.

As the hop is picked, it is carried to the drying house, where it is cured. This constitutes the second part of the business of hop growing.

The drying house consists of one and a half stories. The upper story is for spreading the hops, and the lower for furnaces. The furnaces which Mr. Avery has found after a great many trials to be the best, are constructed somewhat like a large oven, but hopper shaped; the base opens upward, so as to permit the hot air to communicate with the hops above. Mr. A. has four rooms side by side of twenty-five square feet each. The floor of each room is covered with gauze of hemp, with meshes which are one-twelfth of an inch in diameter. These form the surfaces upon which the hops are spread, about four or five inches thick. To supply the hot air good maple coal is the best material. It is burnt in furnaces below in one or two shovels full at a time, and such a bed kept burning in the six fuinaces for twenty-four hours is sufficient to dry thoroughly a charge of hops. The hops are then removed through a lateral door, into another room below, where they are strongly pressed in bags like bales of cotton, when they are ready for market. The labor attending their culture is not yet finished; the poles require to be arranged for winter. This is effected by stacking them on the field. They are brought from a number of hills and placed with the large end slightly in the ground in a leaning position, in a circle. The tops are brought together and then bound by the refuse vines, by which they are secured against winds. They must never lie upon the ground as they would decay much sooner than if preserved in an upright position.

The present price of hops does not vary much from seven to eight cents per pound, formerly they were worth twenty-five cents.

Hops may be continuously cultivated on the same field for ten or twelve years. By this time a grub which feeds upon the root has multiplied to such an extent that the whole root has become diseased, and incapacitated to fulfil its functions, and the crop necessarily fails. There is no other reason why its cultivation might not be continued longer, as the soil is manured every year, and preserved in a rich mellow state. The hop, therefore, leaves the field in a good condition for corn, which usually succeeds, and may be continued two or three years in succession. The worm which has destroyed the hop root does not attack corn or barley, nor any of our cultivated vegetables.

I shall not attempt to add any thing more, for I fear I have already tired your patience.

I say at once, therefore, that I am

Yours now and ever,

E.

II. Cortlandville, and Randall's Farm.

Cortlandville, May 27.

My Dear Friend—I write you, as you perceive, from Cortlandville, one of the finest villages in central New-York. I came here Monday morning, having spent the Sabbath at De Ruyter. By the way, I may state (though it is perhaps out of season by the time this is received, to speak of the weather) that Saturday passing through Georgetown on my way to De Ruyter, it snowed, but not sufficiently to whiten the ground, though it was quite cold and uncomfortable even with an ordinary winter dress. But Sunday morning, May 25th, there was a hard snow-storm ; the whole country, both hill and valley, was white ; still the fruit was not injured ; but subsequently the more tender fruits, such as grapes, were killed, together with beans, corn, &c., which were cut to the ground.

Cortland is situated in a pleasant plain, with sufficient variety of surface to give beauty to a landscape. The plain is bounded by imperfect terraces, as if formerly it had been occupied by a lake, which has been drained by a passage through the southeastern hills, in the direction of Onondaga creek. To the southwest, the valley extends six or eight miles, forming an excellent farming country, with meadows and hills which are adapted to most kinds of husbandry. Two or three miles in this direction, are some very important deposits of fresh water marl. These are, however, at the bottom of a very interesting chain of small lakes which drain to the north. The marl, as you well know, is very valuable for farming purposes ; it is extremely fine, white and beautiful, and is burnt pretty largely for domestic use, being dug out in summer when the water is low, and then moulded, like brick, and laid up in kilns and burnt, precisely like brick. The value of these marl beds has not been appreciated as yet, inasmuch as none of the farmers in the neighborhood have used the material upon their lands. The subsoil of Cortland is a gravelly drift, perviou to water ; though the soil cannot be said to be leechy. The surrounding hills are well rounded, and extremely well adapted to al kinds of farming except wheat, which for several years has no been cultivated extensively. Cortland, you will perceive, is sout of the wheat shales and limestones ; and among the drift, there i not a sufficiency of calcareous gravel, nor of the debris of shale, t give character to the soil. It is therefore made up of the harde sandstone rocks, and the shales of the rock beneath, which almost entirely destitute of lime. I may here say that it will com to this finally, that farmers in this part of the State will requi lime and ashes to renovate their lands. Springs of excellen water gush out in numerous places in the plains about Cortland but it is an interesting fact, that in the southwest extension of th valley, it is quite difficult to procure water, probably in conse quence of the drainage towards the village, or to the northeas and the depth of the pervious stratum of drift. Farmers shou always have an eye to the drainage of the country, and th should be able to determine in connection with this point, wheth there is an impervious stratum near the surface, to throw out t water. This is very essential where there are no living sprin in the immediate neighborhood of a proposed settlement. would please me in this connection to speak of the excell social and religious qualities of the people of Cortland, but it rather out of my sphere of observation, which I have prescrib myself. It is proper to say, however, that Cortlandville, as w as Homer, a mile and a half northwest, are settled mostly New-England people, and have all their institutions in the m flourishing condition—churches, schools, academies, &c.

Immediately after my arrival, Judge Bartlett, our present Sen tor, gave me a warm reception, and though laboring under health, took me in his carriage to all the interesting spots with six miles of the village, and what was worthy of commen dation, waited with great patience for me to gather the rocks a their characteristic fossils, and which it may be well to say, those of the Chemung group.

As soon as I had taken this general survey of Cortland vaited upon our mutual friend H. S. Randall, Esq., whose elevated nd correct views of education, joined to his activity as county uperintendent of common schools, has secured him a fame and onor which extends beyond the bounds of the State. But it is s an agriculturist that I visited him, and it is in this sphere I hall speak of him. But I will only say at this time—as I have lready spun a long yarn—that his farm is one mile from Cortındville, and is sufficiently elevated to overlook the village, nd from it you have a fine landscape, though not sufficiently bold) call forth strong admiration ; it is beautiful but not romantic, nd sufficiently hilly to be free from monotony or tameness. The eauty, however, is increased by a number of valleys which open ıto the plain in different directions, and by the contrast of woodnd and meadow, and a thickly settled village with its streets, and ountry mansions scattered upon the distant slopes. In some rections you have long, vista-like views, and in others, the view limited by the wood-clad hills, which always rise up in even, ıbroken slopes, and which are based by imperfect circular terces. The soil of the farm is (and in speaking of this farm I n speaking of a class of farms, and not an individual farm,) a avelly drift, in part with sufficient clay to give consistence, and sufficient degree of tenacity to prevent leeching ; it is, strictly eaking, a grain and grazing farm ; that is, it produces excellent ırley and maize and is, of course, excellent for grass. Good heat can now be raised, yet it is not so profitable as other crops ıd other kinds of husbandry. The farm is divided into lots of oderate size, by excellent stone fences, banked up by earth eighteen twenty inches on each side, which arrangement increases greatly e durability of the fence. In cultivating grains, Mr. R. informd me that he follows, usually, a three course system ; first, Indian rn and roots after grass—second, barley—third, wheat with ass seed. The first and second crops sometimes reversed in eir order. When a fourth grain crop is determined upon, Mr. R. ys he never sows wheat after corn and roots, as the amount of anure applied to them, will not allow the straw of the succeedig crop of wheat to stand until ripening. He rarely sows oats, d these only on the poorer and more humid portions of the rm.

This is the result evidently of experience, and may, without doubt, have a general application to most farms in this particular range and this particular geological formation. The animal manures of the farm are applied exclusively to hoed crops, and usually ploughed under. Mr. R. is now attempting a series of experiments in orde to test the comparative advantage of ploughing under or dragging in on the surface. When dragged in, it is rotted in heaps and th drag follows the cart. The night soil is manufactured into poudrett by placing it, early in the spring, in alternate layers with gypsum earth, leeched ashes, coal-dust, &c., &c. This is intended to b applied to the turnip crop. In addition to these natural resources Mr. R. purchases as many bushels of gypsum as there are acres o cleared land, and in addition to which, he has purchased thi spring, one-half of the ashes of an extensive ashery. By thi course of treatment, it is evident that Mr. R. intends to maintai the fertility of his lands.

Mr. R.'s roots were sown at the time of my visit, May 26 In addition to potatoes, he cultivates the ruta baga, mangel wurze and carrots. He received the two premiums on turnips last year the yield amounted to eight hundred and fifty bushels to the acr which was the lightest crop for several years. The previous yea his crop was nine hundred and fifty bushels, and drew the fir premium of the State society. The roots are stored in a roo house, and fed throughout the winter to the cattle.

I have now spoken somewhat at length of Mr. R.'s farm an its management, I now deem it high time to close,

By expressing my wishes for your prosperity.

E.

III. Randall's Stock.

Cortlandville, May 28, 1845.

My Dear Friend—In my last I was speaking of the manag ment of Mr Randall's farm, his crops, rotation, etc. I now pr ceed to speak of Mr. Randall's stock, which appears to be we cared for, his cattle being provided with warm stables and h sheep with sheds; and for feeding, all his arrangements a made with an eye both to comfort and economy. Considering h farm as strictly a stock farm, all his straw and coarse fodder required to be consumed there. His cattle, he informs me, are supplied with turnips and straw, which are sliced and fed at 5½ A. M. through the winter. Two other feeds are dealt out during the lay, viz: one of straw and another of hay. The sheep last win-er were fed three times a day, besides a gill of oats and oil meal ı head, mixed in equal parts. Every animal is required to con-sume the whole of its fodder, or else it is forthwith shortened. The cattle are all Durhams, or their crosses. The crosses are with he Ayrshire, New Leicester, Holderness, Holstein and Native. saw about thirty head together. They were all compact and ıardy-looking animals, and some of them are animals of great beauty. The stock bull is a superior animal, (admitting that I am judge,) by Col. Sherwood's "Archer," out of Mr Waddle's "Gazelle." In breeding and raising stock, Mr. R. is governed y the principle, that fashion nor long pedigree alone, shall induce im to raise or keep a delicate animal, or one whose constitution s not vigorous. The cows must be milkers; failing in these re-pects, any animal is put unhesitatingly to the knife, though its edigree may be as long as a monarch's.

Of swine Mr. R. raises the pure breed, but believes that the alf bred animals are the best for slaughter.

I now pass to Mr. R's sheep. I have not omitted his flocks ll now because I considered them of the least importance. I ather consider this topic as more important than those which ave preceded it. It is all-important, in the first place, that sheep hould be hardy, then, superadded to this, they should carry a heavy, ne fleece; or in other words, those sheep which endure the cli-ate well, and which shear the greatest weight of fine wool, are e best adapted to the interior of New-York. Taking this view, Merinos are, according to Mr. R., the best variety. A person erhaps, might well inquire of me, where are those to be obtained, nce the Saxon mania has almost extinguished them? However, at we may be satisfied that there are pure bred flocks which have escended from the importations of Livingston, Humphrey, Jar-s, etc., recent publications seem to assure us; and here I may y in passing, that one of these pure bred flocks is owned by Mr. . This opinion, which I first formed after seeing them, was after-ards confirmed by the attested pedigree published some time nce. There is a question, however, which appears to me of some moment ; it is this—have the flocks preserved their original charac-teristics, or have they degenerated ; and if the latter, should new importations be made ? As it regards degeneration, I barely re-mark, that the test must be found in the fineness and weight of wool. It appears from statements submitted to the State Agri-cultural Society last winter, that Mr. R.'s flock *averaged nearly five and a half pounds of wool.* This was sold for 48 cents per pound. I have compared samples of it with those from the Meri-nos imported by Seth Adams into Massachusetts, and to the eye the staple of the former is superior to that of the latter. Mr. R thinks his wool will average better than that of the originally im-ported sheep, of which he showed me many samples ; and wha imported flock ever approximated to the average weight of fiv and a half pounds of washed wool ? As it regards fineness, I pro-pose to test the quality directly by measuring when I return ; fo I find different persons' eyes and judgments differ very materially As this flock has become so celebrated by carrying off the first pre-mium of the state society, and the society's gold medal, as the bes managed flock, I will give some additional information of hi flock, which I have derived directly from the owner. It consist of about one hundred breeding ewes, mostly Paulars, but contair some other varieties of the same breed. After a moment's inspec-tion I could readily distinguish the Paulars by their heavier an more compact carcase, shorter legs, more wrinkled skins and dark crusted wool.

I saw some rams and ewes got by a Rambouillet ram, which wa a choice one of the variety ; their dams, prime Paular ewes. Th half blood Rambouillets, were lighter colored, longer legged, le heavy in the fleece, and altogether bearing no inconsiderable re-semblance to a cross between the Paular and Saxon. Many ew were shown me which though they were only coming two or thr years old, sheared last year from 5 to 6½lbs. of washed wool p head ! It seems, to be sure, almost incredible, still, when yo examine the density of the fleece and its fibres, as it stands on th skin, and then stretch out the ample folds, the whole story is told it is no longer incredible, for one of those skins seem to be capa-ble of covering a carcase twice as large as the one to which it be-longs. On many of these sheep there is not an inch of skin fro the nose to the tail, which was free from folds and wrinkles ; bu specially are these folds ample upon the sides. These corrugaions form no obstacle to shearing as might at first be supposed, as hey can be drawn smooth enough for the shears to pass over them. believe it has been erroneously supposed that the Merino owes uch of its weight of fleece to its gum. There is, it is true, a coniderable crust upon the surface, or the extremity of the wool, which does not readily wash out in cold water; but the oil nside of the wool where there is no concrete gum, washes as eadily from the Merino as the Saxon. Indeed, the distinguished anufacturer, *Samuel Lawrence, Esq.*, of Boston, in answer to inuiries addressed to him last year, stated the fact that the shrinkge in scouring, between Merino and Saxon wool both washed in e ordinary manner was only seven per cent. Mr. R. considers e outer crust a decided advantage, as a protection from cold and orms, but objects entirely to any inside concrete gum which he inks of no use—or only of use to take in the inexperienced puraser; a course as injurious to the ultimate interests, as to the putation of the wool grower. I observed that the wool of all s sheep opened free from this gum.

I saw in addition to the above, six reserved rams, some of which e intended to be used as stock rams, and others to carry out me small experiments in crossing. Two were Paulars, the third ed by *Francis Rotch*, the fourth from Consul Jarvis' stock hrough the Sandford buck,) and the other two, the half blood mbouillet stock already alluded to. Some of these were choice imals; but the two Paulars (one of them the prize ram,) were really perb animals. The oldest now coming three, sheared 8 lbs. for s first fleece, about 10 lbs. for second, and Mr. R. is confident s third, or present fleece, will exceed 12 lbs. of washed wool! r does the Merino attain his full weight of fleece until four. For crease, weight and quality of fleece, with all peculiar characterics of the Merino, I never have seen an animal which excelled n; and the other Paular, a yearling, bids fair to equal the first, prize ram.

To secure confidence in all Mr. R.'s statements, in regard to ight, Mr. R. adopts a plan worthy of imitation. At shearing, ne individual of well known character is invited to bring his n steelyards, and he weighs and makes a minute of each fleece a it is taken from the sheep. It is true, such testimony is not strictly necessary, but it is satisactory to strangers, and it silences those low cavilers who are ready at least to affect to discredit results which they lack both enterprise and skill to bring about.

Mr. R. has reared about 100 per cent of lambs the present season, which, taking into consideration the number of ewes under proper breeding age, was certainly quite unusual; a fact which speaks well of the skill and mode of management. But one Paular lamb perished. All are indelibly numbered on the day of their birth according to Von Thaer's method, and their pedigree recorded.

So much for the sheep, and as this seems to be a proper place for closing this letter, I now subscribe myself,

Yours, &c. E.

IV. Farm and farming of Mr. Hopkins.

Auburn, May 30, 1845.

My Dear Friend—It was my design when I came to this place to have called at once on our friend Mr. Sherwood, the former great land Admiral of New-York, for the purpose of seeing his fine stock of cattle and sheep; but I found he was absent on a tour to the west. I must therefore wait for another opportunity.

But now, as cattle and sheep cannot form the subject of my letter, I will speak of Auburn, though I do not expect to give you much information of the place, which is not already in your possession. Auburn is located about centrally between Albany and Buffalo, on the great railroad thoroughfare; it is nine miles east of Cayuga Bridge, at the termination of steamboat navigation of Cayuga lake, and which opens a communication south, of forty miles, and through an excellent farming country. Its location though inland, is highly advantageous, whether we regard it as a place for business or social intercourse. But what gives Auburn superior advantages for business, is the water power upon the outlet of Owasco lake, which passes directly through the village. The creek issuing from this lake descends rapidly five or six miles, or to be more particular, it falls in fourteen miles—that is, from Auburn to the canal—two hundred feet, and between seventy-five and one hundred between Auburn and the lake. By this descent forms a site for mills at every half mile, from its source to the nal. The lake is a body of water twelve miles long; it is a eat reservoir, not liable to fluctuations during the year, and it has e advantage of a comparatively high temperature during the inter. In addition to the above, good quarries of limestone have en opened, which furnish excellent stone for building. The cessaries of life, too, must be comparatively cheap; what may termed the common elegancies of life, are free to all. The untry itself, though not romantic, or marked by bold and striking atures, is yet sufficiently diversified with hill and dale, cultivated lds, with tasteful farm-houses and noble woodlands, to make it l that can be desired for a country residence. All the fruits of temperate clime grow here, or may be grown, in perfection. pple, pear, peach, plumb, are sure to thrive if they but receive mmon attention, as is proved by their abundance in all ordinary asons.

In my rambles about the country, I was quite fortunate in being rown into the company of Mr. Ira Hopkins, a successful and telligent farmer, who kindly showed me his farm and gardens, d introduced me to his son in Mentz, who also holds the ough and sows his fields and conducts his farming on scientific inciples. He has been eminently successful in the cultivation the *teasel*, and in my next, I will give you an account of his ode of raising and curing it for market.

But to return to my new friend, Mr. Hopkins, senior. He first companied me to his farm three miles north of Auburn. On r way, he called my attention to a large field of wheat, which d been very badly managed by the owner. There was certainly ry striking evidence of a want of intelligence and practical ill in its management, which I suspect is not uncommon in diffent degrees. The field in question, when taken in hand, was in full strength, as appears from the fact that it bore a heavy crop timothy when first ploughed. It was broken up last spring and wed to oats; but, contrary to advice, it was ploughed when wet, d so wet, that the water followed the plough in the furrow; the nsequence was a return to its original compact state; or rather, state worse than compact—a hard, lumpy condition. The crop oats, as had been foretold, was less than one-half the ordinary eld. After the oats were removed, it was again ploughed and sowed to wheat; and now, June 2d, it is a spotted concern—here a bunch of spindling wheat—there a patch of rough naked ground—and certainly the prospect of success is no better than with the oats the preceding year.

Among many other things relating to agriculture, Mr. H. gave an account of a singular experiment which he had tried. It wa to see whether winter wheat could be treated as spring wheat, by which a crop could be obtained the first season after sowing. I had been said that it could be, and said with so much confidence that Mr. H. determined to test the point by trial.

Accordingly, following the precise directions, Mr. H. prepare a bushel or two of wheat by first moistening and then rolling it i plaster and a few ashes, and then wetting the whole so as to secur its germination, when it was put away into his chamber and suf fered to freeze. In this state it remained till near the time fo sowing spring wheat, when it was again taken in hand and sepa rated, the roots and plumulas being an inch or two in length an forming a dense interwoven mat. It was again rolled in plaste and sowed on land well prepared for wheat. It soon appeare green, or grew well, and looked flourishing, and with a prospect c success for a time; but after a while it ceased to grow, stoo stone still, and only here and there did a stem consent to send up slender, spindling head. It was therefore an unsuccessful exper ment. It must, however, be conceded that there was somethin in the proposal which had a show of reason in it, a possibility, an hence it was well to put it to the direct test.

Fearing I may not interest you, I will close by giving you on or two results of Mr. H.'s success in farming. On one field c about ten acres which I visited, this gentleman raised eighty bush els of corn to the acre, and this without extra labor or extra ti lage. The crop was preceded by wheat, on land which is usuall termed a clay loam. I do not speak of this as any remarkabl yield; I only speak of it as a profitable crop. Again, Mr. H has raised forty bushels of spring wheat to the acre without goin out of his ordinary mode of culture. The facts go to prove wha I stated in the commencement of this letter, viz: that Auburn an its vicinity has a rich soil. This is due in a great measure to th gypseous shales which crop out from beneath the Onondaga lime stone. These shales are brought up by a slight uplift or fractur hich extends several miles to the northeast. This overlying mestone is fissured and probably cavernous, and a large proportion of the surface water sinks into the rock, collects, and forms nderground streams, which issue at different points in the form of rge springs. The most remarkable of these is at Springport.

Yours, &c., E.

V. Culture of the Teasel.

My Dear Friend—I now propose to fulfil my promise given i my last, to describe to you the culture of the teasel, as concted by my friend, Mr. Hopkins, to whom reference has been nde.

But first I will speak of the teasel itself. Botanically it is an ieresting plant. In books its generic name is *Dipsacus*, which snifies *thirst*, in allusion to a quantity of water which collects in te axils of the leaves, which being concave give a lodgment at tose places, and what perhaps is not very singular, is, this fluid ejoyed the reputation of being a good cosmetic, though in reality is nothing but pure water.

There are two species of the teasel, one, called the *sylvestris*, fm its inhabiting woody places; the other, *fullonum*, referring t the class of men by whom it is used, viz: the fullers. Now nst persons scarcely distinguish them apart; they regard both a one, and this is not very remarkable, as they look very much ake; but an inspection of the hooks of the scales or chaff of te flower heads will set one right; the latter has hooks bent outwrds, while in the sylvestris they are straight. It is by the bent a l exceedingly fine points of these flower scales or chaff that they a fitted for the office in which they are employed, viz: that of rsing a nap upon woolen cloths; and so important are they, tt not a piece of broadcloth can be made without them. No nchine or process has yet been devised which can perform this wrk, though many attempts have been made to supply their place. Te teasel forms a natural family of plants by themselves. Their leves are either opposite or stand in circles (whorls) around the stn. Their flowers are situated at the end of the stem, and are cdlected in an elongated oval head. Some persons probably consider them as a kind of thistle ; but their heads are really differ ent, though the family stands next to the great family of plant known in botanical treatises as the *compositæ*—a family in whic the thistle tribe is found. The teasel is a biennial plant, or re quires two years to come to perfection. It is hardy, belongs t the temperate climate, and bears frost well. It is not difficult fo thorough-going farmers to cultivate it. It may be cultivated o almost any kind of soil, provided it is not too rich ; the be teasel is, however, raised upon a rather stiff clayey loam. Tl ground is to be broken up early in the spring ; the seed is sow in drills three feet apart, and may be put into the ground any tin from the first of April to the first of June. It is better, howeve to sow as soon as the field is sufficiently dry, as the young plant not injured by frost, should it occur, and an opportunity is give for a wider extension of its roots. The seed, when sown early April, will require first hoeing by the middle of May, or wh the leaf is about two inches long. Without entering upon exact detail of what is to be done, it will be sufficient to state th the plant will require much the same treatment as maize or Indi corn ; or that during the whole period it will require to be ke free from weeds. Attention so as to secure the growth of t plant is not so difficult as curing the teasel and putting it in a co dition for market. This part of the business I will now speak

It may be considered as ready for picking when it has just p flowering ; or when the petal (flower leaf) is ready to drop. He is an important fact to be noticed ; the crop must be attended and gathered at once ; for at this stage only are the heads a awns of the floral leaves sufficiently elastic and tough to be adapt to the fuller's use.

If, then, a careless farmer attempts to raise the teasel, he w ten to one, lose his crop, or let it injure, for want of immedi attention at the precise time at which it is required. But this not all ; the teasel being gathered at the proper time, would still lost without careful drying ; for at this time it is not like the head of the wild teasel which we see in the autumn, but it full of the juices of the plant ; and these must be evaporated a mode which will prevent mould or mildew, and at the sa time preserve the elasticity of the hooks. To effect this, Mr. He kins has erected a number of buildings in form and size of ommon corn-house or corn-crib, only the spaces between the thin cantlings are a little wider, in order to admit of a freer entrance of ir. In the interior, temporary scaffoldings are put up about two eet apart, which are also formed of scantlings laid upon supports, ith inch spaces between each. Upon these platforms the teasel laid to dry. Here, being freely exposed to currents of air passg through the building, the moisture speedily evaporates and is rried away; and being at the same time in the shade, the mateal preserves its elastic property as well as flexible state, upon hich its great utility in cloth dressing depends. From these rearks, it will be seen that the requisites for raising and curing od teasel, are first to cut it at the proper time, and second to dispate the moisture without injury to the head; and farther, that a zy farmer is not the man to raise teasel. Such is not Mr. Hopns. His teasel commands the price of the imported article, and fact is the best sent to market. An acre, well managed, yields on an average, 75,000 heads. Their price in market varies from ght to twelve shillings per 1,000. Ten shillings is about the edium price. This plant is not supposed by Mr. Hopkins to haust the soil, but rather to benefit it, partly by the mechanical tion of the roots, which being somewhat of a tap form penete deeply, and hence divide it; and thereby it is better prepared f corn and other crops. Without doubt a large proportion of t matter of the plant is strictly derived from the atmosphere tough the intervention of the soil; still, like all other vegetable dies, it has its inorganic constituents, which must be derived fm the soil itself, and hence, thus far, the plant must impoverish t soil. So much then, for the teasel, which will probably always br a fair price and pay for cultivation; yet, comparatively few sm disposed to grow it, either from the care which they are uwilling to bestow in curing it, as well as on account of the time uired for the article to grow; as nearly two years must elapse bore there is a return for the labor and expense incurred in its ctivation.

My subject being exhausted, I must close.

Yours, &c., E.

uburn, June 5, 1845.

VI. Gleanings from Greatfield.

Aurora, June 6, 1845.

Dear Friend—I have just returned from a visit to Davi Thomas. Now if I consulted my feelings only, I should brea out into something which you would call his praise. There ar however, some strange customs in society: for instance, you ma talk as wickedly of a living man as you please, especially when l is a candidate for an office. You must not, however, speak in h praise, unless you intimate at the same time, or before you clos that after all there are some indications that he may be a hyp crite, or a great scamp. The contrary, however, becomes the ru when a man dies. You must then show your charity by givi at least a thin coat of whitewash, though the individual was notorious thief. The latter may be very well on some accoun still, truth is a little too precious to be trifled with, and too valu ble a commodity to be sacrificed on any occasion. But let us turn to David Thomas, not however to praise, but simply to spe of his pursuits. David Thomas then, is, strictly speaking, a bo nist of the first class. Not, however, one of those who has on studied the characters by which plants are named and distingui ed, he is not one who has guzzled down and stored in his mem a multitude of strange words; but he is one who has studied *affinities* of plants and has made this knowledge highly useful their cultivation. It is for this reason that he is the best *pomolog* in this State. He has made it his great object to settle a few gr and important problems in fruit growing. His object is to det mine what is the best mode, the easiest and shortest mode of p curing fruits; what kinds are upon the whole the best, and h they may be improved. These are great problems, and a lo industrious life is full short enough for their settlement.

Before I proceed with my gleanings of Greatfield, I will sa few words of the soil of Aurora and of its vicinity. Two ki mainly predominate. Near the lake, and especially towa Springport, a drab, stiffish clay predominates. It is a pale fa color, though sometimes a deep annatto red. The other is rat a calcareous loam, not however, as a general rule, with suffici lime to effervesce with acids. It is a drift mainly, having b derived from the sandstone, shales and limestone immediat north. The first, or drab colored clay, is derived from the gyp us shales below the water lines; the red slate which reposes upon ie Niagara limestone furnishes the coloring matter to this import- nt deposit. These shales give the wheat growing character to is region, and this particular soil diminishes as you go up the ke. There is one great advantage in this soil, it will produce heat as long as the world stands. I will at any rate stake my putation on this assertion, that this particular soil will endure r this particular culture longer than any other wheat soil in the nited States. You need not ask me now of the grounds upon hich my opinion is founded; this I will state at some future pportunity. I believe that I have already stated that farmers ppose that wheat is a peculiar favorite of the limestone re- on; limestone however, is not, in this case, the element, the im- rtant element of the soil of the wheat region; or the element hich is mainly instrumental in giving this character so much ominence in wheat growing; but the peculiar slates and shale ing between the Onondaga limestone (in this part of the State) d the Niagara limestone. They seem to have the proper ele- ents for this crop. What I have called the calcareous loam, oduces, it is true, very good wheat. Nevertheless it is mecha- ically at fault, it cannot hold the root of the wheat; hence it ffers often from frost or freezing, and is raised out of the ound.

This is the case, for example, as far from the lake as Poplar dge, where the soil has a large proportion of foreign drift, and here it is not less than one hundred feet deep. It is here that e influence of the drab clay is mostly lost. Poplar ridge is 670 t above Cayuga lake, which runs parallel with it. From this ge the country slopes very uniformly to the lake, though several ep ravines are formed into the Hamilton slate and shales, by the eams which flow across them. Though it is rather a common servation that large bodies of water protect from the frost, still, ough common, I will state that this year has furnished a very narkable instance in confirmation of this common opinion. The sts of May and June for instance, have done little or no damage the borders of the lake, while 300 feet above, at the distance of nile and a half, grapes were cut off.

Setting out trees, transplanting herbaceous plants, whether wers, fruit, roots, &c.—Every person is interested in transplanting vegetables, and for a matter of so much importance it is rather singular that so little is known of safe and secure methods of performing it. David Thomas pursues the following. Remove the plant with as little disturbance to the roots as possible, then mud them, that is, cover the roots with a thick paste of tenacious mud, and close the operation by sprinkling sand on the outside, or dust them over. This preserves the roots effectually. They neither dry, nor are they so liable to injury, by abrasion, &c. Another method, where large trees are to be transplanted, is the following. In June, cut a narrow trench at a proper distance from the trunk of the tree, sufficiently deep to divide the roots ; the distance will depend upon the size of the tree, for the great difficulty in transplanting large trees is their weight ; but at any rate, take in this trench as much as can be transported with the tree. Let the tree stand till late in autumn. Then transplant the whole. During summer the mass of earth enclosing the large root will be filled with new fibres and small roots ; the tree when thus removed, goes on with its growth with little interruption only.

Grafting.—The wax used by David Thomas is spread thin upon muslin, like adhesive plasters. These plasters, cut into proper shape, are wound around the stock and at the junction of the graft. In order, however, to secure certainty of success, wind the scion also, to a point near its extremity. The great benefit of this mode arises from the moisture or sap which is retained by the impervious plaster. This method of grafting is also extremely neat and elegant.

Fruit.—There is a very wide difference in the time required for grafts to bear fruit. The Bergamot bears in from twelve to fifteen years, requiring a pretty large part of a man's life before he can partake of its fruit. Some others will begin to bear in one or two years, producing fruit equally valuable with those which require a greater length of time. Dearborn Seedling, David Thomas considers among the best of our pears, if not the best.

Our friend has succeeded in engrafting the *Robinia hispida* upon the common locust ; he, however, considers the calcareous soil of Aurora as unfavorable to the growth of the locust. Some trees, he says, have but little choice in the selection of their food; others are very fastidious, and this is a case of the latter.

David Thomas finds that manuring shrubs and trees is of nuch consequence as that of grain. A very striking example was iven in that of a pear, which for many years had produced execrable fruit, but which, on being hoed and manured well, produced mmediately fruit of the highest flavor. Superior flowers also esult from similar treatment.

To transplant cabbages and similar plants, David Thomas suffers hem to be set in water twelve hours before putting out. They arely wilt down when thus treated, especially if set near the close f the day.

To prevent plants from heaving by frost, press the earth strongly nd closely around the root,—especially let plants be treated in his way, which are set out in autumn.

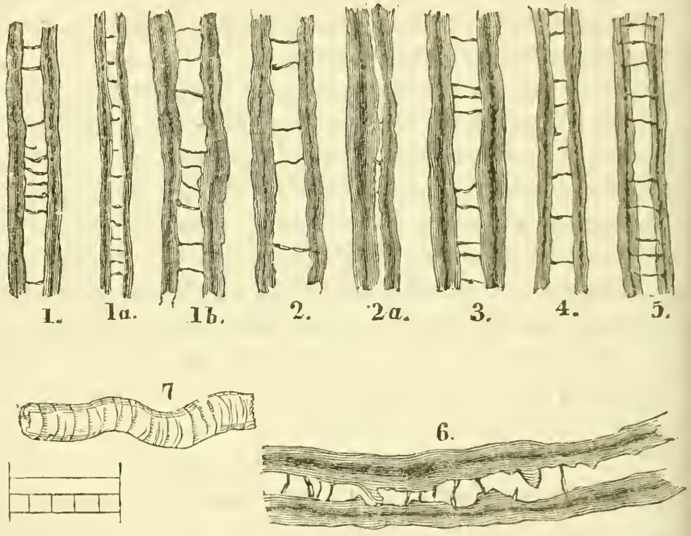
Many other modes of treating particular plants were detailed to ne; but as I have already trespassed, probably, on your patience, will close by stating that an Agricultural Institution is growing p in Aurora, under the immediate supervision of Mr. Young and)r. Thompson, gentlemen who are every way qualified for this nterprise, and with which David Thomas is connected as counellor. Aurora is an excellent township, and the farm of the Institute is very pleasantly located, overlooking the Cayuga lake.

I am yours, &c. E.

VII. Wool and its Structure.

My Dear Sir—Having given you a pretty full report of the arm and stock of Mr. Randall, embracing many details also in he several branches of husbandry, I now propose adding a few vords as an appendix to that report. I gave some intimation vhen speaking of the fineness of the wool of Mr. R.'s sheep, hat on my return home, I would furnish something more exact as test for fineness than the naked eye. In fulfilment of this intiiation, I have been engaged since I returned, in measuring the iameter of the different staples which I procured while at Cortandville, and which I have compared with others obtained of our iutual friend, Luther Tucker, Esq., of the Cultivator.

The different kinds are indicated by numbers. I have prepared scale which is equal to 100 millimeters; a millimeter is equal to).039 of an inch. The hundredth of a millimeter, and the fibres f wool, are all subjected to the same magnifying power of an excellent Chevalier's compound microscope. The comparison is both absolute and relative ; but it is highly interesting to see the perceptible difference between the different fibres of wool. The microscope also reveals other differences ; some of the fibres appeared rather uneven, or flattened, and destitute of a clear and distinct pith or tube ; and in fact I may remark, that the microscope is really the best method of testing the real quality of wool. By this instrument I shall be able, at any time to make other experiments which may serve as standards of fineness.



No. 1, Mr. Randall's ; No. 1 *a*, fibre of Mr. Randalls' prize Paular Merino buck No. 1 *b*, fibre from one of Mr. Randall's fleeces ; No. 2 and 2 *a*, fibres from Mr. Adams' wool; No. 4, Remilles' wool, Shoreham, Vt. ; No. 5, fibre of S. O. Burchard fine wool, Shoreham; No. 3, fibre of Charles L. Smith's wool, Shoreham; No. fibre from Collins' Grandee. The last five were taken from wool left at the Cultivat office. In all the fibres examined, there is a very great uniformity in the parcel only slight differences, in fact, could be detected in the several diameters. No. 7 show the structure of wool as seen under the microscope. In the corner is the scale measurement. The finest fibre, as magnified in this cut, is equal to about eighte hundredths of an inch in diameter.

Another inquiry equally important with the preceding, came u in this place: What is the strength of a single fibre of wool, an is the coarser comparatively stronger than the fine ? I set abou answering those inquiries at once, and now give you the resu below:

Mr. Randall's No. 1 *b*, on three trials, supported on an average, 62 grains; or, rather, broke when tried with the weight of 62 grains.

Mr. R.'s No. 1 *a*, broke with 57.1 grains.

The fibre from Collins' Grandee, on three trials, supported on an average, 84.6 grains.

Mr. Smith's specimen of Shoreham, Vt., on three trials, gave an average of 67.6 grains.

Fibres of wool present rather a smooth surface and a cylindrical form, or a flattened cylindrical form. There are no serratures, as has been represented, but the fibre is not of an equal diameter throughout; it presents also, projections which seem to be owing to disease. It is probable that the characters of the best wool are roundness and equality of diameter, and freedom from the projections here referred to. The fibre is traversed by transverse septa, or divisions, and probably when the wool is growing vigorously, they are at equal distances. Under the microscope these partitions, or septa, are often interrupted, or project only half way across the hollow part of the fibre. From the experiments which I have made on the strength of the fibre, it appears generally, that the fine wool is proportionably stronger than the coarse—though I found in some experiments, that the strength was in a direct proportion to the size or diameter. Further experiments seem to be required to settle conclusively these interesting and important inquiries.

There seems, however, to be some diversity of opinion as it regards the form and structure of a fibre of wool. I have examined the fibre often under a microscope, but still I have not yet seen that sharp, serrated structure, which good felting wool is represented to have. There is no greater difficulty in observations upon the fibre of wool and hair, than any other small object. To give you my opinion of the structure and mode of growth, I have only to say, that, like all other organized tissues, it is composed of cells; but in wool, hair, &c., the cells are arranged in a single row, like a string of beads. The newest cell of the root or bulb pushes out the hair—or in other words, it grows at the base. These cells have a slight conical shape—the lowest one jutting over or inclosing the base of the one next above. This gives in some cases a ringed appearance. The rings, too, in many cases, as those of a hair, for instance, resemble those on the horn of a sheep. These rings are farther apart or sharper, or are better defined in fine furred animals, such as the otter and beaver, than in the wool of sheep.

In concluding this letter, let me suggest a practical and not difficult method of registering wool: Let a wool-grower determine with the microscope (using always a given power,) the diameter, structure and form, of the fibre of the wool, from the standard parts of the fleece. This would require not more than three or four specimens. These are to be drawn on a card of a convenient size, in the mode I have represented in the wood cut. To this, let small locks or specimens of the wool from those parts be permanently attached; let as many samples as the breeder or wool-grower wishes, be treated in this way; or fill up the card. It is easy to see that when this is done, it gives a permanent or durable record of the fineness and other qualities of the wool of every sheep whose fleece is thus registered. All the changes which may take place in the offspring, or in subsequent breeding, may be immediately determined by the microscope. What would still add to the value of such a mode of representation, the card or plate can be put on copper, and multiplied indefinitely. Friends, manufacturers, wool-growers, &c., might in this way be supplied with the best kind of registers of the flocks in this country. The person, to be sure, would have to attach a small lock of the wool to each sample of the measured fibre; but this might be done in a few moments. The great utility of this method, is the certainty of the results. We may, to be sure, judge of fineness by the eye, and determine with a low degree of satisfaction, other properties also. But men after all, will differ; your eye will not probably fit into the socket of my own; and then when you can guage a thing as a cask of liquor, what's the use of guessing? Let us then have the wool guaged and registered, and not go through the world guessing and guessing, and after all, never fully satisfied.

I am, yours, &c.,

E.

Albany, June 25, 1845.

PRACTICAL DIRECTIONS FOR THE FLOWER GARDEN.

PART II.

BY M. SUTTER.

V.—MANAGEMENT OF PLANTS IN THE FLOWER GARDEN.

Having spoken in general terms of the care and proper atten-on of the flower garden, it may be serviceable to attend more par-cularly to some particular kinds of plants which are generally ıltivated. These may be divided into *annuals*, or those which row from seed, flower and ripen their seed and die in one year; *ennials*, those which flower and die in the second year after be-g sown, and *perennials*, which live for a number of years and ɔwer every season.

Annual flower seeds should be sown in the open borders as soon the weather has become settled and warm in the spring, and not ·fore. As they will generally flower in about two months from e time they are sown, there is no need of hurry to get them into e ground early. Disappointment will generally attend such ıste. Those kinds, however, which will bear transplanting, may sown in pots in the house, or in a hot-bed, whence they can be moved to the open ground in proper season. Those which will ıt bear it, should not be sown till they can be safely trusted in e spot where they are intended to grow. Some, like the cypress ne, will not germinate until the earth has become very warm, d such should be soaked in warm water, before sowing them, a w hours. But artificial watering should not be resorted to after anting, except in case of severe drought.

After they have come up, when they have attained the height an inch or two, they should be carefully thinned out so as not stand too thick and crowded, the earth stirred and loosened out the roots, and kept perfectly free from weeds Their growth beauty will be increased by an occasional watering with liquid nure. In want of showers, free use of rain water from the tering-pot should be made every evening. The ground should be quently stirred with the hoe and every means used to promote a ɔid and healthy growth.

There are some annuals of great beauty, the seed of which does nt come to perfection, or whose seed, if sown, will not produce the same kind. Such are the verbena, petunia, pansies, &c. These must be propagated from cuttings, taken in the fall and kept in the house through the winter. Those mentioned, as also the annual phlox (drummondii,) dwarf larkspur, and many others should occupy a bed by themselves. As they trail along the ground they will in a few weeks entirely cover the bed with their rich and varied colors. Others may be sown in drills, circles or patches, according to the taste of the cultivator.

Vines should be provided with proper frames to climb upon. These may, with a little taste, according to the kind of plant, be made to present a beautiful appearance, giving them the form of a fan, bell, pyramid, cone, lyre, &c.

Some hardy kinds of annuals may be sown in September, which will bring them so forward as to flower very early in the following spring.

The treatment of biennials is in general the same as that of annuals. They should be planted in a bed by themselves the first year, and in the autumn or spring of the following removed to their place for flowering. Many of these can best be propagated by layers or cuttings, taken off in the summer. A great deal of trouble often attends the cultivation of annuals and biennials, but many of them will amply repay all the care bestowed upon them.

Perennials are plants which live from year to year. Some will flower the first year they are sown, while others require from one to several years to reach perfection. No particular directions need be given for their cultivation. But some of them, which require peculiar treatment will be considered individually.

In planting the flower garden, those plants which grow to the least height should be placed in advance so as not to be excluded from view by the taller kinds. Considerable taste may be exercised also in the arrangement of colors to produce the greatest effect by contrast.

VI.—OF BULBOUS ROOTS, TUBERS, &C.

These form a very valuable part of a well provided flower garden, and as they require, in some respects, a peculiar treatment, a section is devoted to them. Many of them require to be taken up every year, and kept out of the ground for a few weeks, and then replanted. They all require a light, rich and deep soil to flow ı perfection. Some need not be taken up oftener than once in ıree years. They should then be separated and planted again fter the soil has been well manured. None should be removed ɔr any purpose whilst the leaves are green. As a general rule, ıey may be taken up when their leaves begin to decay, and ept out of the ground from one to four months, and then replanted fter the offsets have been removed. The flowers should be inched off as soon as they begin to decay, as the root loses its rength by going to seed.

When bulbs have been a long time out of the earth, and their ıtal energy is weakened, they should be planted in a perfectly dry ɔil, and not have a particle of water till they begin to grow. hen it may be given in very small quantities till the leaves are vo or three inches long, and appear of a good healthy color, when ey may be watered freely. In this way they will be revived in year or two.

As a general thing, bulbous roots appear the best when planted a bed by themselves. When scattered about the borders they ow to very poor advantage. The earth should be dug a full ade deep, well pulverised and made very rich with rotten maıre. The beds should have a southern exposure, and the centre the bed, or the north side, should be raised a few inches the ghest. At the setting in of winter they should be covered with layer of straw, litter or leaves two or three inches deep.

Bulbous roots are propagated almost entirely by offsets. In me they increase very rapidly, whilst others send out but one or vo a year.

AMARYLLIS.

There are numerous varieties of this bulb, some of which, as formosissima or Jacobean Lily, produce flowers of exceeding auty. Most of them may be cultivated in pots, although many well in the open ground. When grown in the former way they ould not be planted till the flower-bud shows itself, and then ould receive but little watering till they have become well arted. They should not be covered more than half with earth; d whilst in flower should be watered freely, but less afterwards. il—fresh loam largely mixed with leaf mould or peat and sand—e-half loam, one-third sand and the rest leaf mould or peat. If they are planted in beds, it should be done about the last of April or first of May, in rows one foot apart, placing the bulbs six inches apart, and not quite covering them with earth. In October take them up, and keep them in a dry room through the winter. Propagated—by offsets, which are not to be removed from the main bulb till just before planting. These will flower the second year.

CROCUS.

These should be taken up as soon as the foliage is decayed, and in October planted in fresh soil—loamy sand—foliage not to be removed till decayed. These may be grown in pots in the winter in the house, and the flowers, which close every evening, will open in a strong lamp-light at night—propagated by offsets.

DAHLIA.

As soon as the sprouts begin to start in the spring the root should be carefully divided with a sharp knife, leaving one or two good buds attached to each root ; set them in pots in light, rich earth, in a warm room, and water them well. About the middle of May or the first of June they may be transferred with the ball of earth entire to the open ground. If they are not turned out till June they will display their flowers after the hot season is over.

The soil for dahlias should be very rich and deep. A hole should be dug a foot or eighteen inches deep, and filled with fresh earth mixed with one-third good manure.

When the plants are turned out, good stout stakes of sufficient height should be placed in the ground by the side of them, to which they should be tied as they grow, to prevent their being broken down by the wind.

When the tops are first injured by the frost, they should be cut down within six inches of the ground, and the roots covered with a thin layer of straw or litter, and left to ripen. In a week they may be taken up, shaken clean from earth, and packed in dry sand and in a warm room for winter. By not suffering them to ripen well in the ground before taking them up, many people lose their dahlias in the winter.

DAFFODIL, JONQUIL, NARCISSUS.

Select such bulbs as are rounded towards the base, with full round tops—not mouldy nor with decayed fibres at the bottom

Plant six inches deep and eight inches apart, in August or September. They should not be taken up oftener than once in three years. Some of them are very pretty grown in pots during the winter. These should be planted in October. Soil, light fresh loam, mixed with very rotten cow dung, and dug deep. Propagated by offsets.

GLADIOLUS OR SWORD LILY.

Plant them in pots in March or April, and turn them out as soon is the weather is warm. Give very little water till they start, after which they should have an abundant supply. Take them up n the fall, and keep in a warm room. Soil should be very rich and well worked. Propagated—by offsets, which are very abundant in some species. These are to be taken off and planted separately. By seed, sown in peat and sand in the spring, and well vatered before and after they come up. In October the young bulbs should be taken up and dried, to be planted in the spring. They will flower the second or third year.

HYACINTH.

These bulbs should be planted in a dry, airy part of the garden, he earth to be dug to the depth of a spade or more, and mixed vith one-third its quantity of sand, one-fourth of rotten cow dung nd peat. These are to be well mixed together, and the bed made vith a slope of several inches towards the south. Plant the last f October, four inches deep, and put a little sand in the hole on op of the bulb. Cover in the winter with straw or leaves. Lift hem about five weeks after done flowering, or when the stem is alf decayed. Dry slowly and by laying root to root and covering vith a slight layer of earth. Keep till ready to plant in close rawers or dry sand. Propagated from offsets.

To flower them in glasses, put them in, in October, the water bout half covering them. Keep in a cool dark room till started, then they should have the warmest room in the house and all the ght possible. Change the water at least once a week.

TIGER FLOWER.

Plant in pots in March, or in the open ground in May. Lift hem in November and cut off the stalks, dry them and keep in dry and till time to plant. They must be kept carefully from frost in the winter and also from too much warmth. Soil must be light, rich, free, sandy and dug deep. Propagate from offsets, to be separated a few days before planting.

TUBEROSE.

Same treatment as Gladiolus.

TULIP.

The bed for tulips should be made in an open, airy place, three and a half or four feet wide. The bulbs to be planted in the end of October seven inches apart, four inches deep, and half an inch of sand on each bulb. When in flower, tie up the stems to nea rods. They should not be allowed to go to seed, as it weakens th bulb. When the foliage begins to become of a yellowish brown color, and the top dies, is the precise time to take them up. Lif them carefully, and place in a dry, airy situation till August o September, when the brown skins, except the last one, and th fibres and offsets are to be taken off, leaving the last brown ski till time to plant, when that, also, is to be removed, leaving th bulb perfectly white.

Choose such bulbs as have not lost the brown skin, nor are mou dy nor soft at the root end; full, solid, and rather pointed at th other. Soil, three-quarters good loam, one-quarter leaf-mould o peat, one-sixth two year old horse dung, one-eighth sea sand, we mixed and made two feet deep. They will do very well in a ver rich common soil, well pulverized and deep. Propagated fro offsets.

VII.—CARNATION, ROSE, &C.

The following plants are noticed here, in order to excite, if po sible, a more general attention to them. The almost endless var eties of each, which have been produced within a few years, wou form a beautiful garden of themselves. But a proper selectic made from them, and placed in every garden, will add greatly its beauty and variety.

ROSE.

Of the summer rose there are many varieties, embracing almo all colors. They may either be disposed at proper interva throughout the beds and borders, interspersed with other plants, they may be planted as shrubbery, scattered throughout the law ɔr grass plat. Many of the taller kinds will appear better in the atter way; whilst those which are more dwarfish in their growth, will show better in the borders. The varieties of trailing roses, nake an elegant appearance on trellice work, or trained in front of cottage porches. These grow very rapidly, and require proper pruning, as do all summer roses.

The moss-rose in its different varieties may be successfully budded upon other stocks, but is inclined to run out in a few years nd fail, unless great care is taken to destroy all the shoots that ome up from the root, and which consume the nourishment of he bud. It does better, propagated from layers. Yet those budded upon other stocks, stand the winter better. The wild weet-brier makes about the best of native stock for budding roes upon. It is itself a good addition to the shrubbery, giving out s it does, particularly after a shower, its powerful but delightful erfume. It sends up from its roots long and stout shoots, which nay be budded high with hardy monthlies, and make beautiful tandards.

A great many of the monthly roses, are hardy or half hardy, and ill stand the winter perfectly well, with a slight covering of traw. These kinds of plants are not so much injured by severe old, as by sudden thawing, when the sun shines upon them in the inter; and if they are protected from the direct rays of the sun, ney will survive the winter very well. Those which grow tall nd erect, may be bound up with straw, and the shorter ones may e laid upon the ground and covered there. The covering ought) be removed as soon as the spring opens.

Monthly roses, for the most part, produce their flowers from the ew growth of wood, and those shoots which spring up nearest the round, are always the strongest. It is advisable to cut the old nes down in the spring, in order to encourage the production of ese shoots. Soil for roses should be made rich with manure, as ey are what are called gross feeders. For those grown in pots, ood fresh loam, with leaf mould and manure and a little sand.

Propagation. Summer roses are usually propagated by layers, dividing the root. Layers should be put down in the summer, hen the young wood has become partially ripe, and the next year ey will be ready to remove. They may be raised from cuttings om young wood. Dig a hole of proper dimensions, one foot and a half deep, and fill it with fresh stable manure ; over this, place five or six inches of good sandy soil. In a few days it will be ready to receive the cuttings. If it is desired to raise trees, the lower two buds ought to be cut out. The cuttings may be four or five inches long.

Monthly roses may be grown from layers or cuttings planted according to directions given under the head of propagation of plants. Put them out in July and August, and remove as soon as rooted.

CARNATION : PINKS.

No family of flowering plants is more deserving of cultivation than that of the pink. The splendid varieties of the Carnation and Picotee, rich in color, and of most delightful perfume, should be found in every garden. They are very easy of cultivation, the grea care necessary for them, being in their propagation, as they ru out in two or three years, if not renewed. Choice kinds shoul be grown in pots, well drained. The plants, whether grown i pots or in the open borders, should be tied up to neat rods, eacl joint being tied as it grows. Soil, for those grown in pots, equa parts of rotten manure, one year old, and fresh, sound loamy eartl and one-sixth coarse sea sand. These are to be mixed in the fall frequently turned through the winter, and in the spring it will b fit for use. The soil for those in the open ground, should be mad very rich, if possible about the same as the above ; and they wi make a better appearance if they occupy a bed by themselves, tha if set out singly among the flowers.

Propagated by layers. Stir the earth around them, and have quantity of fresh earth to put over them. Keep them regularl moist and shaded, and they will take root in three or four week when they should be cut off with half an inch of old wood, and a ter a few days removed to their place, or they may be left ti spring before removed. The best time for layering the Carnatio is whilst in full flower or very soon after. They may also be pr pagated by cuttings ; but this requires more care ; and is not so ce tain of succeeding. The Paisley pink can be easily propogated i this way.

By seed. The seeds should be selected from the choicest kin

›f half double varieties, sow it in the spring in drills, and when he plants have attained the height of two inches, transplant them nto beds for flowering the next summer. Very few need be expect-d to be double varieties; but those which are good may be se-ected, and the rest thrown away. The seed from half double nes is said to produce the best flowers. Endless varieties are roduced from seed.

PANSY OR VIOLET.

Little attention is paid to this plant in this country, although in ritain it is thought of sufficient importance to have shows appro-riated and premiums offered for it. Immense numbers are pro-uced, of great size and beauty. Soil should be rich, and they ould not be too much exposed to the sun. Propagated from ed, and by dividing the root; this should be done in the fall, so rly that the plants may become rooted, to flower in the spring. the seed be sown in the spring as early as the weather will per-it, some of the plants will flower in the fall.

There are a few annual flowers which deserve particular atten-on, on account of their varieties and their flowering through the hole summer. These should have each a bed appropriated to em; and as they all trail upon the ground, they will in the course the summer, cover it entirely with a mass of flowers.

VERBENA.

Of this there are a number of varieties, worthy of cultivation, d every year is producing new ones. The different colors may planted in a bed by themselves, or mingled in the same bed. hey may be planted about two feet, or less, asunder, and suf-red to creep upon the ground. Soil should be rich and well orked. Propagated by cuttings which will root well in good il or charcoal, or by runners which take root at every joint. hese must be taken up in the fall, potted, and kept in the house ring the winter, to be planted in the spring. Some kinds do not ot at the joints of runners, and must be raised from cuttings anted in the summer.

PETUNIA.

This may be raised from seed, but rarely can any good varieties produced. A few of the best colors can be produced by layers or cuttings which root freely in any good soil. They also trail along the ground, and cover it with their various colored flowers. It may be planted just as was directed for verbena ; and the cuttings, after being rooted, must be kept in the house during winter

PHLOX DRUMMONDII.

This showy annual is raised from seed. Although all its flowers are beautiful, yet it has this peculiarity—that no two roots produce flowers alike. They vary in shade of color, or in the forn and size and color of the star in the centre, so that a large bed o it produces an almost endless variety. The seed should be sowi in rich, light soil, in pots, in March. It will then have attaine sufficient size to transplant singly in an open bed by the time it i warm enough. They should be set out about four inches apai each way. The seed should be carefully gathered as it ripens, a the little pods which contain it open with a spring, which scattei it. As soon as these pods turn to a yellowish color they must b picked and laid by to dry.

VIII.—OF PLANTS KEPT IN ROOMS.

Plants kept in close rooms require much care in order to kee them in even a tolerable condition. But it is gratifying to obser that scarcely a parlor can be found without these delightful orn ments ; and the humblest cottager is gladdened by her neat pot roses, or her beautiful geraniums. Many are always in good co dition and thriving, yet some seem to be looking forward as anxiousl as a consumptive patient for the opening of spring, when they ma turn out and breathe the fresh air and look the sun full in the fac

Plants are very apt to be killed by kindness, in the house durin the winter. They are of course kept in rooms but partially lighte their roots are often drenched with water, their leaves suffered collect a covering of floating dust, the temperature of the room kept up to seventy or eighty degrees in the day time and at nig suffered to fall down almost to the freezing point,—a change su ficient to throw a man into a fit of rheumatism, and in the mid of all this their guardians wonder that they do not thrive. Und such treatment it should not be expected.

The temperature of the room should never be suffered to fa below forty degrees, but should be kept uniformly below sixt legrees; and all sudden changes in it should be avoided. If the steady coal fire be kept in one room and the plants in another, onnected with it by folding doors, the temperature will generally e kept high enough. Great care should be taken at night that hey do not get chilled or frozen. A moderately damp atmosphere s better than a dry one.

They should have as much light as possible; if not, the leaves vill grow slender and pale, and the whole plant will acquire an nhealthy appearance. A room with a south or southeastern exosure is the best, and they should be kept near the window.

Every day that the weather will permit, the window should be pened a little to admit the fresh air. This is very necessary for he health and vigor of the plants.

They should be regularly watered. This does not by any means onsist in drenching them with water; but whenever the earth in he pot is becoming dry, and not before, water should be applied 1 sufficient quantity to wet the whole mass. Succulent plants nd bulbs do not require much water unless whilst flowering; once week will be found often enough. Plants should be watered in he morning. Liquid manure may be advantageously applied to ich as continue growing through the winter.

The foliage should be kept free from dust. Occasionally the rth on the surface of the pots should be stirred to a little depth, promote the circulation of air about the roots. If the plant is healthy, wash it clean, both leaves and stalk—remove half an ch of earth and supply its place with pulverized charcoal, rough which it is to be watered. All decayed leaves should be moved.

All woody plants require more or less pruning. This should be ne directly after they are done flowering, or early in the spring. ther in the spring or fall, the roots should be examined, and if ey are decayed or matted, they should be removed, and the ant repotted in one of a larger size—unless it is desirable to keep e plant small—and fresh earth added. A portion should be removed from the surface of all the pots, and a top-dressing of new il given. It will be very servicable to frequently stir the earth i the pots during the winter, loosening it with a sharp pointed ck, as deep as possible without injuring the roots. This should done when the earth is dry, just before watering it. In the spring, as the weather becomes warm, the plants should graduall be accustomed to the air, by giving it free admission ; and abou the middle of May or the first of June, they may be carried out They should not be placed in full glare of the sun, as shinin full on the pots, its heat will be apt to destroy them, but in th shade of a hedge or wall, where the sun will fall on them morn ing and evening. The pots should never be exposed to the sun it is a good plan to plunge them in the earth up to the brim which serves to keep up a uniform moisture ; or a level bed ma be made in a shady situation, upon which may be poured a cove ing of lime left after whitewashing, and on this, a layer two three inches deep, of coal ashes well packed down, and on this s the pots. During the summer, they should be watered eve evening, and in very warm, dry weather, in the morning. Whe not in flower, they may be frequently showered from the rose a watering-pot ; but when in bloom, it injures the petals of t flowers.

On the approach of cold nights in the fall, the pots should washed off clean, and where they have not been before change a top-dressing of fresh soil should be added, and then brought in the house. But they should not be exposed to any artificial he till the air of the house is reduced to 40°. Through the day th should have free air, taking care to exclude it early in the aft noon, if there is danger of a cool night. The great difficulty keeping plants in good order in a room, is, that they are apt to ha too little light, and very often too much water, and are expos to ruinous changes of temperature.

Pots should be well drained by placing a few broken pieces earthen over the hole in the bottom. This is necessary not o to carry off surplus wet, but also prevent the roots from gro ing through. The pans in which pots are set should never ha water standing in them, except in the case of those plants wh natural habits require abundance. But if water runs through, must be poured out. Where plants have been frozen, they sho not be thawed in a warm air, nor the sun suffered to shine up them. They should be showered with cold water till all the fr is out of the leaves, and then kept in a shady and cool place they have recovered.

In removing plants from the open ground to pots, for the wint great care is necessary not to break the fibres of the roots. They hould be taken up with as much earth as possible, the roots pread out equally on all sides, as the earth is put in ; shake the pot, o settle the earth firmly around them. Give them a good watering, soaking the earth effectually. The same care is necessary in emoving cuttings and layers into their respective pots.

There is no trouble in removing plants from one pot to another. They can be taken out with the ball of earth entire and placed n the centre of the new pot, fresh earth shaken in around them, nd gently pressed down. If the ball does not turn out readily, invert the pot and strike on the top of it with something solid, or push t gently with a stick, through the bottom, at the same time holding the hand firmly on the earth in it, to prevent its falling.

Plants are apt to be infested with insects—the most common of which, is the aphis—usually called the green fly. Enclose the lant in some tight vessel, and fill it with tobacco-smoke for one r two minutes. This will kill them ; or they may be destroyed y hand. The red spider can be killed by fumigating with ulphur.

When flowers have withered after being cut off from the plant, hey may be revived by cutting off their stems and immersing hem for a few minutes in hot or boiling water. When it is esirable to preserve flowers or buds, after being cut, for several ays, they should have their stems immersed in water and placed n a perfectly dark place till wanted.

ANIMALS USEFUL TO THE FARMER.

Under this head we are not about to write a dissertation on the orse, the ox, the sheep, nor the alpaca. This, we fear, would be abor lost. But we mean to call the attention of the farmer to ome other creatures, which are not only sadly neglected by him, ut actually destroyed wantonly, and whose life, we should perhaps be fully warranted in saying, would have saved to him more han the value of many sheep. They are none other than the ittle birds. If it were only for the beauty they add to this world, e should think that alone would restrain the wanton hand that estroys them. But few are aware of their actual use.

Different families of birds are adapted to various purposes; but those that inhabit our woods and frequent our farms and dwell in the neighborhood of man, are mostly those that live upon insects and worms. And there can be little doubt but the increasing ravages committed every year by injurious insects may be attributed to the destruction of those birds which eat them. The family of "woodpeckers" are provided with a bill fitted to extract the grubs from trees. They walk up and down the body of the tree, prying into every crack in the bark, picking up every little worm they see, and probing each hole the grub has made, to find their prey. But they have nearly disappeared before the guns of the rascally, idle boys. And to this cause we may probably lay the growing destruction of forest and fruit trees by the boring insects. These birds were very abundant in our boyish days, but we see no more of them now, from the big "red-head" in the forest and orchard, down to the little "chickadee" in the dooryard.

The common caterpillar that lives on the apple and cherry tree is increasing in numbers every year, and doing an immensity of injury; and the farmer or the fruit grower is called upon to destroy them with his own hands. The birds—their natural enemy—have disappeared. We have seen, this spring, thousands of trees entirely stripped of their leaves by these insects, and on the land attached to one country seat in the county of Westchester, we saw a row of nearly a hundred wild cherry trees covered with their nests, and not a leaf. The common robin has been often seen to sit by these nests and eat the caterpillars from them; and we are informed by a gentleman that a pair of wrens that had built a nest in a knot-hole in the side of his house, were seen for one whole day carrying these insects from a web in a neighboring tree, to their young. We have seen the bluebird do the same with the black caterpillar that feeds on the elm. But these harmless and useful birds have not escaped the young sportsman, and the orchards must suffer the consequences.

The "Maybeetle" that feeds upon the leaves of the cherry tree, does great damage to the fruit grower.

The following curious calculation will show the value of every one pair of these insect-eating birds to the farmer. It is taken from "Anderson's Recreations:"

"A cautious observer, having found a nest of five young jays, observed, that each of these birds, while yet very young, consumed at least fifteen of these full-sized grubs in one day, and of course would require many more of a smaller size. Say that, on an average of sizes, they consumed twenty apiece, these for the five, make one hundred. Each of the parents consumes say fifty ; so that the pair and family devour two hundred every day. This, in three months, amounts to twenty thousand in one season. But as the grub continues in that state four seasons, this single pair, with their family alone, without reckoning their descendants after the first year, would destroy eighty thousand grubs. Let us suppose that the half, namely, forty thousand, are females, and it is known that they usually lay two hundred eggs each, it will appear that no less than eight millions have been destroyed, or prevented from being hatched, by the labors of a single family of jays. It is by reasoning in this way, that we learn to know of what importance it is to attend to the economy of nature, and to be cautious how we derange it by our short-sighted and futile operations."

We say, then, spare the little birds. They may be of use in saving thousands of dollars to the farmer, and we hope no one will allow the boys to murder them for sport.

We wish, for the same reasons as above, to recommend the *toads* to mercy. They are generally regarded as a loathsome thing, and often killed. But we can assure our readers that they are very useful in a garden for destroying insects. Peach trees are often infested with *ants*, which feed upon the fruit just as it begins to ripen, eating a little hole into the peaches, which causes them to rot before they are ripe. Now we can recommend the toad as an effectual remedy against them. Make a box around the foot of the tree and place one of these animals in it, and he will keep it entirely clear. He may also keep off, in some measure, the regular peach insect. For the latter purpose, however, we would rather encourge the small species of woodpecker to live near us.

Some of these small birds, by proper care, can be rendered quite tame and domestic. The wren and the bluebird can be easily collected around a garden by simply putting up little boxes on poles for them to build in ; and the little wren will destroy the worms and millers, and sing you many a merry note into the bargain.

IMPROVEMENT IN AGRICULTURE.

The great improvements made in agriculture in Britain are often spoken of, and it may be interesting to some to know wha they are. We therefore propose, occasionally, to lay before ou readers some of the most prominent ones, and leading to the mos manifest results.

To the slow and cautious farmers of this country, many of ther will appear strange—and we will not find fault with such men, they pronounce them incredible. But they are nevertheless, record ed facts.

The first is a letter in the Farmer's Magazine, London, from gentleman who had purchased a farm of 130 acres, in Essex, f £3,250, and he states he has already expended £5,200 in perm nent improvements—about $26,000. The result is not given, the improvements have but just been completed, and among the between 80 and 90 miles of drains, being four yards apart and inches deep.

In 1799, Arthur Young said in his report on the improved sta of the farms in Lincolnshire, which had been produced by t year's labor in embanking and draining, and which occupy betwe 20 and 30 square miles of country—"Its produce before w small—letting for not more than 1s. 6d. per acre, but now fr 11 to 17 shillings an acre." Another fen was made, by drainir worth £20 an acre, which had before been only worth £3—a the rent raised from 7 to 20 shillings; and he adds, "there cann have been less than 150,000 acres drained, and improved on average, from 5 to 25 shillings an acre."

We continue our quotations from the same author. In speaki of drainage in other parts of Lincolnshire, he says of land wh before was good for nothing, that, "though the expense had be estimated at £400,000—its value was rated at £2,000,000, le ing a profit of 1,600,000 to the proprietors.

The same writer mentions another tract of land of 17,0 acres, which "before draining was worth but from 1s. to 3s. per acre—now it is from 10 to 30s." We might go on quoti from this writer, instances of the same nature to almost any tent. But these only show that the soil is improved, from fact that the higher rent could not be had unless the land had reased in productiveness. But the benefit is not all on the side f the proprietor. The tenant is glad to pay the increased rent, nd finds his interest in it, as the following will show :

"The parish of Limber, 4,000 acres, was formerly let to four enants, at 2s. 6d. per acre, and all four became bankrupts. It as been enclosed—is well farmed, and at the present rent the enants are doing well. In some instances, considerable fortunes ave been made."

In many cases the tenants join with the proprietors in the cost f improvements, and in some cases even make them alone. One istance is cited where the annual bill of the tenant for bones was om £1,500 to £1,800. "He died a few years since, and left a rtune."

Mr. Pusey, in his report on the agriculture of Lincolnshire, efore the Royal Agricultural Society of England, records the llowing remarkable fact. The gentleman with whom he was urneying, pointed out to him a pillar 70 feet high by the road-de.

"It was," says Mr. Pusey, "a land lighthouse, built no longer nce than the middle of the last century, as a nightly guide over e dreary waste which still retains the name of Lincoln Heath, it is now converted into a pattern of farming. This Dunston llar, lighted no longer time back for so singular a purpose, did ppear to me a striking witness of the spirit and industry which our days has raised the thriving homesteads around it, and read a mantle of teeming vegetation to its very base ; and it was rtainly surprising to discover at once the finest farming I had er seen, and the only land lighthouse that was ever raised. Now at the pillar has ceased to cheer the wayfarer, it may serve not ly as a monument of past exertions, but as a beacon to en-urage other land owners in converting their dreary moors into nilar scenes of thriving industry. Within living memory it was no means useless : for Lincoln Heath was not only without lture, but without even a road. When the late Lady Robert anners wished to visit Lincoln, from her residence at Bliholm, groom was sent forward previously, who examined some tracks d returned to report that one was found practicable. Another nily was lost in this heath twice in one night, in returning from a ball at Lincoln, and was obliged to remain upon the waste til morning."

Since 1823 one portion of this heath (no longer) has been occupied by one tenant, who has realized a large fortune; and if sucl are the results under a heavy rent, what may we not expect fron improved agriculture in this country where the owners till the soi and have no outgo in the shape of $5 to $7 for each acre for rent And what would our farmers think of farming, when, besides th rent, a capital of $20,000 is required to carry on the operations But such is the case in some parts of England.

We shall close this article by quoting from an article in th London Quarterly Review, a passage on the subject of irrigation

"Sir Thomas Ackland's farm of Clotsham, which hangs almos precipitously over the valley of Holnicote, at 1100 feet above th level of the sea, affords a good instance.

The name of Catch Meadow indicates the process by which th irrigation is effected. The ground is not reshaped by the costl process required for the irrigation of meadows that are naturall level, but 'shallow gutters are carried around the slopes of th shelving field, tier above tier; and no separate channel is require for carrying the water off, because after flowing over one carri it is caught in the next below, from which circumstance the nan is derived.' The ease with which these catch meadows are forme is remarkable. A field at Winsford, so steep that one could n climb it without the aid of hands, having been limed and plant with potatoes for two years, and overlaid with water-gutters alo the slope, has been converted at a trifling cost, from waste, roug ground, worth 5s. an acre, to a field bearing perpetual grass, wor at least 40s. an acre; and Mr. Blake, of Upton has brought le than 400 acres, which had not been let for £1 an acre, to produ £1200 a year, chiefly by catch meadows, which he formed out moor land, and lets as summering ground to the lowland farme

NEW PUBLICATIONS.

'OOD'S CLASS-BOOK OF BOTANY.—Part 1. The Elements of Botanical Science ; Part 2. The Natural Orders.

THIS Botany is designed to give the genera and species of the ants of New-England and of New-York, arranged in the orders the Natural System, as illustrated by the most distinguished otanists in Europe and America, and ending with the Ferns. As e author is a correct and intelligent teacher of Botany, and iderstands the science in its present improved state, he is admi-bly fitted to adapt the work to the great object of instruction in is branch of Natural Science. Such a work has long been a de-ideratum in our country. Except among a few connoiseurs in otany, no progress has been made in the teaching in our semina-es, as all those who saw the meagre results of the artificial sys-n of Linnæus, have felt little interest in continuing their efforts. ue, Linneus accomplished a vast amount of good in this study ; t he adopted the artificial system only for the reason that no tter method could then be formed, and led the way, so far as knowledge enabled him, in laying the foundation of that Natu-r System which has been immeasurably improved, and indeed en carried to all that degree of excellence which the advanced te of botanical knowledge admits. All this is unfolded with eat clearness and excellence in this work. The language of the tural System, as it has been so admirably presented in Gray's tanical Text Book, forms the first part of this Botany ; and natural orders, so far as illustrated in the great work of Torrey l Gray, with their names, constitute the second part. The ana-ical tables, which come under the descriptions of the several ers, lead on with great ease to the genera, while the tables of Linnean classes and orders conduct the student, by the most y steps, to the natural orders, or the genera, where the plant under analysis may be found. All the use which Linnæus designed i thus made of his artificial system. The student will be both delighte and surprised to find the path so direct and easy to the objec sought. All the difficulties, which arise from the nature of the ol jects, will not indeed be made to disappear, but they become less nu merous and less formidable. The plants, too, will be studied in the natural relations, associated with their kindred genera and specie and in their natural families. Structural Botany is consequentl made the basis of the arrangement. The logic and taste will l gratified by the systematic method, and the improvement in son of the particulars. A brief synopsis will make this obvious.

The *elementary* tissues and *compound* organs are first presente This leads to the obvious great division of plants,

a. *Flowering or Phenogamous* plants, produced from *seeds.*

b. *Flowerless or Cryptogamous* plants, produced from *spores.*

To this division another name may be given from the seeds a spores, the former designating the *Cotyledonous*, and the latt *Acotyledonous* plants.

The *flowering* plants are divided into two great natural divisio *Exogens* and *Endogens.*

1. Exogens, grow by layers or *external* accretions, bear *reti lated* leaves which fall off by an articulation, have *discotyledon* seeds ; bark, wood and pith separable.

2. Endogens, grow by *internal* accretions, bear leaves w *parallel* veins, have *monocotyledonous* seeds ; bark, wood and p not separable.

The Exogens are divided into

Class I. *Angeiosperms*, having covered seeds, as in the o pink, lilac.

II. *Gymnosperms*, with naked seeds, as in the pine, fir, &

The Endogens are divided into

Class III. *Aglumaceous*, destitute of glumes or scales, as (chis, Lily.

IV. *Glumaceous*, have glumes or chaff, as the rye, wheat, a all the grasses.

The Cryptogamous are divided into

Class V. *Acrogens*, grow by extension of their point, as fe mosses, &c.

VI. *Thallogens*, grow into a flat expansion, as seaweed, lichens, &c.

The clearness and beauty of this natural system, thus dependent on structure and growth, command universal approbation. So far there is little improvement to be expected or desired.

CLASS I. *Exogens*, then divided into subclasses, depending upon the corol—as

SUB-CLASS 1. *Polypetalous*, p. 13, 2. *Monopetalous*, p. 168, and 3. *Apetalous*, p. 314. This constitutes the arrangement, more nearly approaching nature than any other yet proposed. Under these divisions are arranged the several *Orders* of the Exogens, in their improved form and description, and the genera and species lead to the desired result. It thus is evident that this work is unique in our country; unlike any other ; superior in its application to any other ; and giving the student advantages possessed by no other. It has deserved popularity where it has been examined and used. It elevates Botany as a study, as well as a science. It cannot fail of exerting a happy influence on the mind. C. D.

Rochester, June 14, 1845.

TRANSACTIONS OF NEW-YORK STATE AGRICULTURAL SOCIETY, together with an abstract of the Proceedings of the County Agricultural Societies, 1841-2-3-4.

The current age is a remarkable one, if for nothing else, from the fact that every thing of a public nature is done through large organizations. Whether in morals, benevolence, politics or science, all is done by conventions or societies. The people of the present day are unmovable, individually, and we are inclined to the belief, that, were it not for the movements of masses organized and combined, such would be the apathy of men, that they would sink back into a solitary, selfish misanthropy. Great impulses are necessary to set the wheels in motion, and when started, the steam must be kept up almost to the bursting point, or the huge car of society begins to retrogade towards utter inactivity.

We have sometimes felt disposed to find fault with such a state of things, and look upon it as furnishing evidence of a sort of negative tendency to dissolution. But when we remember that the world has long been, and is still becoming more and more artificial every day, we settle down more satisfied to let it take its own course. Yet we are by no means indifferent lookers on, while the play is acting. We watch with deep interest the movements of all the old machinery, and when any new is introduced, we regard it with still deeper interest, to ascertain how it will work in, cog for cog, with the old. We seem to live in the second edition of the age of the pyramids—revised and somewhat improved, perhaps—but an age when thousands must combine to build up those structures which posterity will gaze at, and wonder, as we do at the huge piles on the sands of Memphis. That was an age of brute force, leaving vast records of what human strength could do The improvement in this is, that science, and the knowledge o the laws of nature, are superseding physical power, and steam is made to do the labor of man. Thus the monuments which we shall leave, are those which, invisible to the eye, are built up in the heart of every child that shall ever be born.

It must be acknowledged that to this law of association, if we may call it so, is the present state of society to be attributed and in no other place do the effects of this law show themselve more plainly, than in the business of agriculture. We are perfectly aware, that the benefits of association for the promotion and improvement of farming, are generally attributed to the concomitant circumstances, such as the Fairs which are held annually, with great excitement—the spirit of emulation aroused by premium and the comparison of each other's products, &c.; but we profes to look deeper, and account for it upon this great law that i governing the age. Men will do great things in masses, when they will do nothing singly. But attribute it to what cause w may, nothing can be plainer, to a mere superficial observer, than the fact that since the institution of agricultural societies, a grea improvement has been made in the art and science of farming And if they continue to be conducted on plans commensurate with the demands of improvement, we may safely congratulate ourselves upon the prospect of a still more rapid growth in prosperity, and the attainment of no mean degree of eminence in agricultural operations.

The first agricultural society in the State of New-York, wa organized on the 26th of February, 1791, in the Senate Chamber in the city of New-York. Chancellor Livingston, Simeon De Witt and Doctor Mitchell—all names of note—were engaged in the enterprise, and drew up the "Rules and Regulations for the Government of the Society." The object of this association was not solely the encouragement of agriculture, but it was for the "Promotion of Agriculture, Manufactures and Arts." The Society was not incorporated till the 12th of March, 1793. Immediate efforts were made to render the enterprise useful. A circular leter was issued, asking information on various points of husbandry; and it is worthy of remark, that the same questions, or many of them at least, may be, and are asked, at the present day; and so little attention has been given to them, that they still remain unanswered. What effect this Society produced upon the condition of farming, at that time, we are not able to ascertain. The volume of Transactions published in 1801, contains numerous essays and accounts of experiments, far superior to many of those put forth at the present day, and evincing an interest in the subject, which would do honor to many men of similar stations now. These articles are from the pens of such men as Dr. Mitchell, Robert R. Livingston, Ezra L'Hommedieu, &c., &c.—men whose hearts were in the cause, and whose efforts deserved the reward of success.

The discoveries of modern science had not opened to them the relations of organic and inorganic matter—the true constitution of plants, animals, and the soil—and consequently, their reasoning in regard to the action of manures and the life of vegetables, would appear to us very unphilosophical. But let us remember, that to our children, our's may appear equally so. Satisfied as we may be that we have arrived at the truth, it cannot be denied that the astonishing discoveries of the present age, instead of fixing as absolutely certain any conclusions, have a tendency rather to make us fear that a future day may show us to be in equal error, with our predecessors. In some things the writers of that day have taken a step in advance of our own times. As an example, take the following extract, from an essay "on the growth and nourishment of plants," in which the writer has gone beyond that sect who insist upon the atmosphere as the only source of carbon to plants.

Page 336. "I believe we are on safe ground, when we say the plant receives no nourishment from the earth. Many have been the experiments of raising plants, shrubs and trees, in boxes filled with earth ; and this earth being weighed after the shrub or tree had grown to maturity, and after taking out the tree, the dirt is not found to have lost any of its weight. It thence follows that the earth is only a bed to hold up the plant or the tree that it may receive its nourishment from some other source."

Here will be seen at a glance the whole doctrine of atmospheri food, which a certain class of physiologists contend for, and hav sought in modern times to establish by reference to the same ex periment. But we must enter our unqualified protest against th doctrine as a whole, because—

In the first place, we do not believe the experiment. The ligh which chemistry has lately thrown upon the structure and compo sition of vegetables, makes the contrary too true to allow us t believe any such thing. The fault lies in the way the experimen has been tried, as can readily be shown. Thus—

The ash left by burning dry oak wood with the dry leave amounts to only 4.71 lbs. in 100. Now supposing the trees ex perimented upon to contain the same proportion and to have bee raised from the seed in the box, and there to have attained th weight of 5 lbs., then the quantity of ash left would be but .2 of a pound, which is all the inorganic matter that could ha have been extracted from the soil, and being so small, would ve probably not be observed in weighing, especially when the diffe ence in the moisture of the soil might have compensated for t whole loss.

Again, if the soil serves only to keep the tree in an uprig position, why will the tree not continue to thrive if cut off direct above the roots and inserted in the soil, or merely propped up pe pendicularly. Too much is now known of vegetable physiolog to leave room for such theories. Plants draw nourishment fro the air, but they draw equally important food from the soil.

The practice of very many farmers at this day would seem be built upon such a theory as that we have noticed. Althou the use of manures is well known, but probably not thorough understood as regards the mode of their action, and though th application is insisted on by all rational farmers, yet multitud seem to view them as of little or no consequence, and suffer th to lie and waste unused.

Such theories as this are, however, only the exceptions his volume of the Transactions. As a general thing, it contains in amount of valuable common sense matter, well digested opinion, ind strong facts, which is surpassed by no volume published since, n the more palmy and flourishing years of the society.

From the early part of this century till 1832, we find no great vidence of the progress of this association. At this time a numer of gentlemen assembled in Albany and organized again an gricultural society. Little interest, however, was excited in the ubject, and it sustained little more than a nominal existence, alhough incorporated by the legislature, till 1841. It was then eorganized, and an appropriation was made, by the state, of 8,000 a year for five years, to be applied by the state and county ocieties, for the promotion of agriculture and household manufacires in the state. From this time we may date the more imporint operations of this association; and for the four past years of s existence it has annually given to the legislature a large volme of reports of its doings, to which is added a large amount of atter which is unfortunately quite unconnected with its operaons, and much of which, it is proper to say, is mixed up with igue speculation and some gross errors. We regret that we are ompelled to say this, for those who are employed in the preparaon of such books should be exceedingly careful what kind of atter is incorporated in it. The farmer is not as yet a man of ience, and is not consequently capable of separating what is rong from what is right. The desire for knowledge relating to s business is gaining ground, and is already very extensive. All at is written on the subject is eagerly sought for, and a large ortion of intelligent agriculturists are ready to seize upon any unsel that promises to show them how they may increase their ops and compete with more productive portions of the country. hus they are ready to receive as true the principles advanced by ominent men in whom they have been accustomed to place conlence; and if the practice does not prove the doctrine true, they e disgusted and discouraged, and often ready to recur to their d condemnation of book-farming. The agricultural population becoming every year more and more ready to enter upon the provements which have within a few years been introduced. it they must have the results of their own experience to confirm eir experiment or the whole is counted false. They need cautious, candid encouragement. All that is recommended for their benefi must be true, and bear out its recommendation in practice. The abominate speculation and mere theory ; and thus those visionar enthusiasts who would raise farming by one grand effort to pe fection, will find them a capital check upon their headlong enth siasm.

We will not be understood as condemning the volumes befo us. On the contrary we give great credit to the state society f the work. At the same time we unhesitatingly say, that the contain much that had better been left out, for it has no conne tion with agriculture ; and some which had better never bee written, for it is full of error, and as such renders the autho and the Society liable to censure. The latter appears under th sanction of science, whilst true science will reject it.

We think the Society have erred in the choice of men to deliv the addresses at the annual Fair. Not but they are men ampl sufficient to do justice to the high claims of agriculture; but it is subject which needs not eulogium nor praise. These it receiv from all men, and its highest honor is the prosperity and happine it confers upon a nation. The farmer needs instruction, not praise and we submit it as our humble opinion that an address filled wi good practical information—examining briefly the principl of the practice of agriculture, and setting forth inducements to a vancement in knowledge of the art, would be vastly more usef to the thousands of hearers, than poetic rhapsodies. And in sa ing this we are conscious that we do not speak unadvisedly. W know it to be the opinion of a large—we might perhaps say—t largest portion of the farming community, who attend these Fai They are common sense men and want to hear common sense.

We must make an exception here in favor of the last preside of the Society, in all whose productions we notice that intima knowledge of the wants of the farmer, and the capacity to me them, that makes his writings all assume a highly practical chara ter. But we would not be called fault-finders, any farther th we deserve it, and in these remarks we feel confident that we a correct.

Since the state, by legislative aid, came to the rescue, and beg to uphold its own true interests, by encouraging the farmer, th state and county societies have made rapid advance. Many of th ounties soon organized societies under the new law and establish- ed annual Fairs, which have generally been kept up, and with in- reasing interest. In some counties, however, and some of them ot less populous or less interested in agriculture than others, no novement has even yet been made. From some cause, which we can- ot fathom, an extensive prejudice fills the minds of farmers in some arts of the country against the use of such societies. This is not s it should be. In this, all should be united. In union is strength; nowledge is catching in some measure, and when men associate a common effort they can do what they please. The results of hose societies which have gone into operation, show this to be minently true in regard to farming. We will not say that all is wing to this, but to whatever cause it is attributed, we must give rge credit to this for the rapid and real improvement which has een of late so extensively seen in the farming interest. These cieties have done good and are capable of doing much more. But e opposition or even the disaffection of a few may essentially nder their progress.

A good feature connected with this subject, is the formation of rmers' clubs for the free and social discussion of the various sub- cts connected with the pursuit. These, we believe, wherever ey have been formed, have exerted a salutary influence and have wakened a lively zeal in those who are engaged in them. The ports which have been published in numerous papers, show the scussions to be of a somewhat rambling conversational character, t we will not say that they may not be better on this account. e are, nevertheless, inclined to the opinion that a little more or- r and system would be preferable.

In 1841, the State Society held its first annual Fair under the w organization at Syracuse, and in the following years at Albany, chester and Poughkeepsie. They seem to have been character- id by great enthusiasm and increasing interest. They have fmed an attraction not only for the farmers of this state, but tse of some of the most distant states in the Union are seen tre. And the manufacturer also sends there his wares, which he formed a very important item in the great variety exhibited. Te crowds collected on these occasions, amounting to several thou- sds, are the strongest evidence of the hold they have taken upon tl public mind. The present year is the last of the term for which the appropriation was made by the state, but the legislature at their last session have renewed the grant, and we may look with confidence for continued zeal and increasing prosperity and usefulness, unless, among other fruits, some apple of discord should find its way into the concern.

For each of the past four years, the Society has made a repor of its doings and those of the county societies. These form the volumes whose title is placed at the head of this article. Wit some portions of these books we might lawfully find much fault But we will pass that by for the present, lest in denouncing indi vidual errror, we should be accused of being inimical to the whole What fault we have found above, we were, for this reason half ir clined to blot out after it was written. But, as Pilate said "what I have written I have written."

And we will close this article with a few suggestions to suc individuals as have the management of the numerous Fairs that o cur annually in the various parts of this state.

1. Would it not be well to diminish the number of premium on animals, and increase the number and amount of those on t products of the farm and garden, and household manufacture The reasons for this suggestion are, in few words, these : The o ject of premiums ought to be to encourage and stimulate the re farmers—those who live by tilling the soil. Men of large fortun can pay enormous prices for fine horses or high bred cattle, a can always carry off the prize, although it is a matter of no co sequence to them, inasmuch as they have purchased them for th own pleasure and use. In these the common farmer can offer competition. But in the products of the soil he can vie with t wealthiest, if he will study his business, and especially if the pri depends upon the economical production of a crop. The intere of the country also, we think, require this, for the direct produ of the soil is of the first importance in the support of the peop

2. We would suggest the offering of premiums, and so large to attract proper attention, on new articles of culture. It is high probable that by this means those soils which have ceased to b their former burdens might be made to produce abundant cro and thus add to the wealth and happiness of the nation.

3. Complaints are sometimes made of favoritism in conferri premiums. This might be avoided by having all articles numbe

nstead of having the maker's or owner's name attached. It would t least take away all excuse from grumblers.

4. We would suggest the propriety of having lectures, or at east addresses, of a practical character, as well as scientific, deli- ered at these Fairs. They should be short and comprehensive, nd two or three may be given on each day. Besides the instruction mparted at the time, they would serve to awaken an interest which vould spread itself into all neighborhoods, and be productive of asting benefits.

And lastly, we would suggest the importance of at least attempt- ng the formation of clubs under the auspices of the local socie- ies. We are satisfied that this is the true way to stir up the far- ners of this country to improvement—to cultivate their minds nder the influence of social feelings, and thus secure the two reat objects of prosperity and happiness.

HE FARMERS' AND EMIGRANTS' HAND-BOOK: Being a complete guide for the farmer and the emigrant, comprising the clearing of forest and prairie land—gar- dening—farming generally—farriery—cookery—and the prevention and cure of diseases; with copious hints, recipes and tables: By Josiah T. Marshall, author of the "Emigrants' True Guide." Second edition, revised. New-York—D. Appleton & Co., 200 Broadway. Philadelphia—Geo. S. Appleton, 148 Chesnut street. 1845.

PROBABLY no book has been more needed for a few past years han such an one as this. In the tide of emigration to the west, osts have gone utterly ignorant of the wants and trials of a new ountry, and consequently quite unprepared to meet them. This e know full well from personal observation, and often in that coun- y has it been our lot to condole with families who had gone there ll of hope and expectation, but knew not that they were leaving ehind them all the comforts they were to experience for years. Iappy, comparatively, they who had the hardihood to struggle rough the trials and sickness they met, and find success at last. uch a book as this before us would have been invaluable, and we dvise all who think of emigrating to buy it. We see only two hings in it to find fault with. The author advises shooting birds hat trouble the fruit—and he has given the old rates of postage nstead of the new. This is rather singular in a book published nce Congress adjourned.

RHEUMATISM—ACUTE AND CHRONIC: A Prize Essay by G. C. MONELL, M. D., Newburgh, N. Y. Published for the Orange County Medical Society, pp. 144 H. G. Langley, 8 Astor House, N. Y.

WE notice this essay for the purpose of commending it to our brethren in the profession of medicine. Restricted as such essays must necessarily be, it still furnishes almost all that is known of a practical value as it regards cause, symptoms, diagnosis and treatment. The essay is well put together, and its several parts are well proportioned. It furnishes a great many authorities under the several heads, which will be found of considerable value to the reader, as it will enable him to pursue the subject to a greater extent, if he chooses. A physician cannot study too thoroughly the several kinds of rheumatism, inasmuch as it is one of the most common diseases of our climate, all classes being subject to it, except children. Upon the whole, we regard this work as a model essay, being in spirit, style and arrangement worthy of imitation by all who write monographs of our diseases.

THE FARMERS' LIBRARY AND MONTHLY JOURNAL OF AGRICULTURE, No. 1; July 1845: Edited by John S. Skinner. Greeley & McElrath, Tribune Buildings. $5.0 per annum.

JUST as we are going to press we have seen the 1st No. of the above work, which of course we have not had time to examine. The first forty-eight pages are filled with a reprint of Petzholt's Agricultural Chemistry; the remaining sixty-four pages with essays &c. A fine engraving of Stephen Van Rensselaer forms the title page, and in the body of the work is an engraving of the Southdown prize wethers exhibited at the Smithfield Show, and one of the vegetable silk plant from Tripoli.

The name of the editor will be sufficient guarantee of the character of this journal, which we cordially recommend to the public.

CORRESPONDENCE AND MISCELLANY.

EXPERIMENTS

SENT BY THE DORCHESTER FARMERS' CLUB.

Having stated in April last, that I had on hand an experimenal investigation of the efficacy of the several new philosophic nosrums, recently offered to the agricultural community, it may be xpected that I should offer, at least a partial report of their proressive indications, so far as the advance of the season may llow.

I regret to say, they have, in no respect, exceeded the moderate iews I had entertained of them, and freely expressed on the occaon alluded to; yet I would feel wholly unauthorized, to pass a onclusive judgment upon them, until final results, obtained by yself, and others, may have fully developed the degree of characer to which they may be entitled.

The guano, and the Hauterive solution, are alleged to be *proctive* against *Insects*, as well as *nutritive*—and to promote the rowth of vegetables, in an extraordinary degree.

To these two points, I will concisely call your attention, as far observation has enabled me.

I have this season used the guano steep with a portion of my ed corn; and agreeably to the rules prescribed by the venders the article; that is, about 80 hours, in the solution, which was epared as directed by the same authorities. In the Hauterive lution, the grain was steeped as directed from 18 to 24 hours.

The field in which the experiments were made, contains about ty acres, and was placed under a winter furrow—as usual in my ltivation—and manured, broadcast, in the spring—excepting ly about two acres left for a fuller experiment.

Several acres, embracing the manured and unmanured, were anted with each of the steeped grains, as well as the unsteeped, and the whole accurately marked—and without these marks they cannot well be distinguished—no superiority indicating the steeped portion, is discernible.

No part of the field is injured by the well known cut-worm (*phalena devastator*,) which has committed great ravages in the country generally ; but I owe this exemption to the winter furrow, which exposed the pupa to frost ; indeed, the whole being free from this pest, the steeps cannot claim credit for it.

But unfortunately for these steeps, as *protective* against *insects*, several spaces of some square perches of my corn have been infested by numerous aphides on the roots, which I was led to detect by the yellow color and stunted growth of the plant ; the microscope disclosed the agents of the mischief, which, at their first period, were not visible to the naked eye, though subsequently plainly so ; these injured spaces were partly within the range of each of the steeps—unequivocally contradicting the idea of their *protective* character. Upon some portions of the injured spaces, I applied the guano in powder, mixed with three parts earth, without any advantage yet experienced from it—but possibly there may be, in more time. With the same view to this insect, I have lately applied a strong solution of the guano about the roots, which will probably have an earlier and better effect. Indeed, I have no doubt this is the most economical and effective mode of its application for *nutriment* also ; the whole dose will then come within the immediate command of the organs designed by nature to introduce it into the circulatory system, for the final purposes of the plant ; and without waste.

I will here remark, that with one of the infested portions of corn, I made trial of a strong infusion of tobacco stems, pouring around each plant half a pint of it. In a few days—to my surprise, for I had supposed the case desperate—the plants thus treated, began to assume a green color, and are now improving.

It is to be lamented, that a branch of science (entomology) so intimately connected with the farmer's interest, should be so much neglected. Were the habits of the numerous insects injurious to vegetation, intimately understood, the farmer would have his antidote for the various tribes—perhaps infallibly at hand, on all occasions. A periodical entitled the "American Quarterly Journal of Agriculture and Science," lately established at Albany, New-York, conducted d by Drs. Emmons and Prime—gentlemen of eminence in science –has commenced, in its second number, a series of articles upon isects injurious to vegetation, with descriptions and colored figures f the insects; price three dollars per year. This Journal should ave a place in every farmer's library. Without attention to this nportant but neglected branch of science, the interests of the irmer will be eternally obnoxious to the fatal ravages of the umerous insects that are annually multiplying in kind and number, and frustrating his well planned and laborious designs.

An instance of a new variety of these formidable pests, has late- occurred in our neighborhood, which threatens our wheat crop, an unknown extent. A member of our Club (Dr. Tubman) iclosed to me a few days ago, an insect from the head of his rowing wheat, and feeding upon the grain. It is, as you will per- ive, a minute species of the "Calandra" family. It is not the Calandra granaria," which we have had frequently in our grain, hen housed, which is a long, slender beetle; but this, the new ie, is a short thick beetle—color silver gray, and four black dots n the elytra—that is, two on each. The most of this group are rmidable enemies to the various kinds of grain.

I have placed on the table a small species of gryllus (grass- opper) which has, this season, for the first time, appeared in my bacco beds, and done much injury. They were considerably ated by a powder composed of soot and sulphur, sprinkled over e beds before the dew had disappeared.

Now returning from this digression, to the manures, I will add at the poudrette, which on a former occasion, I informed you, had prepared with sulphate of iron, I have recently applied to y tobacco crop, two spoonfuls to the plant—it is quite *inodorous;* d I think, *rich*—its effects will be reported when obtained.

I have in progress two experiments with electricity—*atmosphe- c* and *terrestrial;* with the former, as you have just now seen, my garden I have been the most successful; the rows of rad- ishes and corn were extended through the electrized space and on ch side of it, and were planted at the same time and under equal vantages; those within the electric range—both corn and rad- ies, are as you have seen to-day, more than double the growth d luxuriance of them without it. The upland rice, which you w, passing through the range, and out of it, was perishing from the drouth when the battery was applied, and no effect is seen or to be expected.

From the remarkably changeable temperature of the season, varying frequently from sixteen to thirty degrees in twenty-four hours, I was sanguine in the expectation of an unusual quantity of thermo-electricity, developed in the eastern atmospheric current, and I have not been disappointed ; but how the *galvanic plates* have failed I am at a loss to conjecture.

This battery was settled precisely under the most recent method and authority ; the plates of copper and zinc each four feet long and fourteen inches wide, were connected by a copper wire tre bled and twisted, to ensure a full capacity for transmission, and al buried.

Within the range were planted forty grains of corn ; as yet non of the plants evince any effect, except those nearly in contact wit the *connecting wire* and with the *plates of the battery ;* and those as you have seen, are palpably injured in growth and appearance compared with other portions ; *possibly* from an excess of the *elec tric aura*, collected and accumulated by the long continued drouth or waves of the free electric fluid—the all pervading ocean—co lected by the battery, and insulated and condensed by the exces sive aridity of the intermediate earth—by which the antagoni forces were held in suspense ; thereby exerting an undue energ upon the insulating walls and the immediately adjacent bodie within their sphere ; analogous to the case of antagonist electric ties, *hovering in proximity* in the *clouds* and *earth*, without pow to overcome the resistance of the dry atmosphere between them and quiet the disturbed excitement.

I have another battery, planted a few days ago, embracing som tobacco plants and potatoes, and on a plan by which I may pro bably unite the forces of the *thermo and hydro electric current* with which I hope to be more successful, unless the *drouth be r peated*, and the *caloric suspended*—improbable events we wou hope.

Finally indeed, I may emphatically say—I offer for your in spection some ammonia which, I obtained from rain water, aft the late long continued drouth, when much of this article so essen tial to vegetation is necessarily accumulated. You will perceiv that this ammonia retains the offensive odour derived from its pu rid origin—the dead carcasses of the earth ;—this fact, stated by Liebig, is so singular, that I confess my incredulity until, a few ears ago, I satisfied myself of its truth in regard to both snow nd rain.

I have nothing to add, but to ask your pardon for the long race have taken on *one of my hobbies*, when really I had only intended short canter.

JOSEPH E. MUSE.

Saturday, June 28, 1845.

PHILADELPHIA AND HORTICULTURE.

Gentlemen—It is a fact worthy of notice that in our large wns and their immediate vicinity, the most energetic and best rected efforts for the improvement of the various branches of griculture, spring up. Little as we might expect to find here a ste for rural pursuits, it is nevertheless true, that within the brick id mortar walls of the city there actually is found a zeal and iterprise, far outstripping the most active energies of the coun-y. Very many there, are taking a deep and strong interest in e progress of agriculture, and directing to the subject an untiring re and patient perseverance. And we need not marvel at it ; for am ready to confess the surprise I feel, that any man who loves iture and worships nature's God, if only in a little corner of his art—can ever be content—shut out from the green fields and trees id flowers, and know no change of season but from the burning n of summer to the frosts and snows of winter. And I am not rprised, that under such circumstances men should try even on teir few square feet of soil, to produce some of the fruits and wers that waken remembrances of the country.

But this is not all. Our cities are of necessity the head quar-ts of science ; and it is there that its application to the arts must tested. It requires leisure and money to carry out experiments i any branch of knowledge, and the farmer has no great share of her. If then he labors to supply the large cities with food, l him remember that he may not only receive an equivalent in oney, but also in that knowledge which is both an aid to his bor, and a special source of happiness to himself and his children.

I was not fully aware of the extent to which these facts are true, till I made a visit a few days since to the city of Philadelphia. I am no sight seer, and consequently did not employ much time in looking up the lions of that city ; although I did more in that way than I am in the habit of doing. But I was gratified with what I saw of the horticultural enterprise of many gentlemen there. I was fortunately able to attend one of the meetings of the Pennsylvania Horticultural Society, connected with a semi-monthly exhibition of horticultural products. The show was not large on this evening, but it was good ; consisting principally of flowers. I was, however, particularly attracted by a few strawberry plants exhibited by Dr. Brincklé. This gentleman—I called at his house but was unfortunate in not finding him at home—has devoted himself with singular perseverance to the producing of new varieties of this plant, in which I understand he has had great success. He crosses different varieties with judgment, and has produced some remarkably fine fruit. But a fact worthy of notice is, that all the plants are grown in pots or boxes in a room in his house, with a southern exposure during the cold weather, and in the small yard in the rear of his house in summer.

The Pennsylvania Horticultural Society was instituted in 183[illegible] and now numbers more than 700 members, paying annually the sum of three dollars each, by which means and the amount raised at the exhibitions, a sufficient fund is obtained for carrying on its operations with vigor. Its exhibitions are open to all for the display of their productions and for competition, whether members of the society or not, its object being the advancement of horticulture universally. In many societies I have no doubt a great hindrance to their progress and prosperity, as well as to the good they might do, is to be found in the fact that every one is required to become a member before he can become a competitor.

This society holds its stated meetings on the third Tuesday evening of each month ; and during the season of fruits and flowers intermediate meetings are held. It has a library containing upwards of four hundred volumes for the use of members, and it consists largely of the most valuable works on horticulture. No wonder, with such a society, under efficient officers, that Philadelphia holds the place it does as a horticultural city. Probably n city in this country is before it, unless it may be Boston, in point of fruits.

Most of the flowers I saw at the exhibition, were from the garden of R. Buist, 140 South 12th street. I visited the establishment of this gentleman, and spent an hour pleasantly walking about his grounds and greenhouses. Mr. B. is the author of an excellent work on the cultivation of flowers, and one called "the Rose Manual." The varieties of this favorite flower have become so numerous as to require a work containing full directions. This want Mr. B. has supplied.

Mr. B. mentioned some experiments he had been trying with guano. One table-spoonful in a four inch pot of pure sand destroyed the germinating power in seeds. When one-fourth part of that quantity was used the seeds germinated and grew well. With two table-spoonsfull of artificial guano the effect was the same as in the smaller quantity of the natural guano, showing a difference of 1 to 8 in favor of the natural.

I spent an afternoon very pleasantly at the house of Doct. Mitchell, six miles from the city. This gentleman has made great improvements in the short space of three years, in which he has been upon his farm. But persevering enterprise will accomplish in a short time, what many a man would require a life time to effect. The Doctor is devoting his personal attention to the cultivation of foreign grapes. He has a large grapery under glass, and has it stocked with choice varieties, which he tests carefully, and rejects all that do not suit him. At the time I saw them, the vines, of only three years growth were loaded with tempting clusters, but not yet ripe. One cluster I must mention in particular, and, mark reader, upon my own credit for veracity—for so Doct. M. charged me, lest he might lie under the imputation—but no matter, the the fact is a fact for I helped him measure it—the cluster was *two feet, four inches and five-eights* in length, and exactly *three feet* across the wings. This was the grape of Palestine; and reminded me of those described in the Book of Numbers, 13th chapter, 23d verse—"And they came unto the valley of Eshcol and cut down from thence a branch with one cluster of grapes, and they *bore it between two upon a staff.*"

I was desirous of visiting the farm of James Gowan, Esq.; but he was absent from the city and I missed the opportunity. You have probably seen his report of his farm and its management, which he made to the Philadelphia Agricultural Society last fall. Farmers would do well to read it and imitate him.

I will take this opportunity to express my thanks to those gentlemen, through whose hospitality and kind attentions I was indebted for many happy hours in Philadelphia.

Yours truly, P.

Lyonsdale, Lewis county, N. Y., June 2, 1845.

Prof. Emmons:

Dear Sir—I called at your room just before I left, but did not see you. I wanted to see you in relation to the analysis of the soils which I left with you. If you will send it in an answer to this, you will very much oblige

Yours truly,
D. S. HOWARD.

P. S. The ore bed of which I left you a sample, is likely to prove truly valuable, as it seems to be inexhaustible, and the deeper it is dug, the purer is the ore. D. S. H.

Analysis of the two specimens of soil referred to in the above letter. The first is said by the writer to be really good for nothing.

First Specimen.

100 parts contain	Silex,	92
	Water,	5
	Per ox. of iron and alumine,	3
	Vegetable and animal matter,	1 to 2

From this examination, it is evident that it is lacking in some of the essential elements of fertility. Lime in any of its combinations does not exist in it. It is also deficient in vegetable matter.

Plaster, with clover, would do this soil good. But probably a better course would be, to treat it with compost of peat, straw or any vegetable substance, and ashes, mixed with barnyard manure. Still, it appears as if the attempt to renovate such a soil, must depend upon circumstances. If situated not far from the barnyard, or a muck swamp, it may well be attended to. Under other circumstances, it would involve considerable expense, and probably loss.

Second Specimen—much better Soil.

100 parts contain	Silex, ...	74
	Water, ...	4.25
	Per oxide iron and alumine, ...	5
	Vegetable and animal matter, ...	15.5
	Lime, ...	.5

It was not examined for phosphates.

What is interesting to notice in these two samples of soil is, that at first view, they look exactly alike, and a person might be deceived in the first. On washing it, however, and especially after the action of acids, it is seen to consist almost entirely of a gray sand, derived from granite probably, as it is mixed with a few grains of feldspar.

South Norwalk, May 31, 1845.

DEAR SIR—In connection with this I send you a specimen of a kind of soil found at a locality in this vicinity, which some of our farmers have lately begun the use of as a manure, though being ignorant of its composition and properties they consider it only an experiment. It may be very common, though I have never met with it. It covers an area of some acres, I should think, and its depth is not ascertained. A pole has been sunk in it to the depth of twenty feet or more without finding bottom. If you are familiar with it, so that you can inform us what it is; whether mineral or vegetable matter, or a mixture of both, without the labor of chemical analysis, it would be a favor.

Yours sincerely, JAMES H. COFFIN.

This is not properly a soil, but *peat* of excellent quality; and where fuel is scarce would be good for that purpose. For agricultural purposes it is of course invaluable, containing about 95 per cent of vegetable matter. Its ashes we have not examined. Its greatest benefit is obtained by mixing with ashes, potash or lime, for some time before being applied, or by forming it into a compost with animal manures. If ashes are used which have not been leeched, from sixteen to twenty-four bushels (according to the quality) are to be mixed with one cord of peat, and suffered to lie in a heap for a few days, although it is often put on the ground immediately. If potash is used, about thirty pounds are dissolved in water, and the same quantity of peat as before wet evenly with it. But the most common, and by far the easiest way of using it is as a compost with animal manures. For this purpose the barn-yard is to have a thick layer of peat put upon it, which may be mixed with the manure of the yard by the feet of the cattle; and thus it serves the double purpose of increasing the actual quantity of manure by being itself converted into it, and also of absorbing the gases and liquids which might otherwise be mostly lost.

Still another mode of preparation is, to make a pile of alternate layers of peat and stable manure, using one load of manure to two or three loads of peat. This should be covered with a thick layer of the peat, to prevent the escape of the gases formed by the action which takes place in the mass. Or the peat may be well soaked with the liquid manure of the stable yard, which will have the same effect. They should remain in this state until fermentation takes place, when they are to be put upon the land.

For any of these processes the peat should be dug six months or a year beforehand, and exposed to the action of the atmosphere and afterwards made into compost.

South Stephentown, April 14, 1845.

Sir—I have been reading for a few days past the two numbers o the Quarterly Journal which I procured at your office.

I am much pleased with the work, and confidently expect tha it will yet do far more for agriculture, than any thing of the kin which has been published in this country.

I have been particularly interested in the experiments of Mr Campbell, on the effects of soaking seeds in chemical solutions and have determined to repeat one or two at least of his experi ments, provided the expense will not be too great.

I should like to try the effect of sulphate of ammonia on abou two acres of land where we intend to sow oats. If you ca inform me what will be the expense I shall be much obliged t you. Mr. Campbell states that he "prepared the various mixture from the above specified salts, exactly neutralized." I suppose that the sulphate of ammonia was neutralized by the addition o some alkali, as potash or soda; but I am not sufficiently versed i chemistry, to determine either the substance which should be use or the quantity which is required.

Respectfully yours, SAMUEL P. ROLLO.

We have not seen any account of the final results of M Campbell's experiments, but we have regarded them as doubtfu in some respects. Soaking seeds in mineral solutions is by n means a new thing, and is attended with some good effects, but we are not ready to receive the full extent of Mr. C.'s faith. The process no doubt gives a vigorous start to vegetation, and enables the plant at an early period of its growth to prepare for its future support. It will also serve to protect the seed, and perhaps the young plant from the depredation of worms.

The expense of preparing the salts we cannot state. They could, however, probably be procured of any druggist, and as sold by them are already "neutralized." We shall be glad to hear the result of the experiment, and of course recommend a portion of the field to be sown with seed that has not been soaked, in order to ascertain the effect correctly.

Our friend and correspondent Wm. Case, Esq. of Cleveland, Ohio, writes thus:

I wish I could get some information relative to the application of Galvanism and Electricity to Agriculture. We have nothing of the kind here. I have tried Galvanism unsuccessfully—probably owing to the drouth, the return current passed back through the deep and damp ground far from the roots.

In answer to which we would say that we are not at all surprised at the result. The truth, however, in the matter is, there is nothing to be expected in the premises. It is not many years since the story was going the rounds, that cress seed was planted in the morning, and was grown in season for the dinner table by the aid of electricity. The cress story, and the last story from England, detailing the wonderful effects of electricity, belong to the same class. Both are doubtful.

GREATEST IRON MINES IN THE WORLD.

In Newcomb, Essex county, N. Y., in one mine, there is sufficient ore within two hundred feet of the surface to make eighty million cubic feet of iron. Two other mines, within two miles, are nearly as extensive as this; and at all, the ore may be quarried out to the open day like flagging stone. To increase the value of these mines, they are in the midst of a wilderness of wood, and situated directly upon a great water power. The western states abound in lead and copper; the country south of Lake Superior in copper and silver; the southern states in gold. Pennsylvania, Ohio, Illinois, Indiana, with many others, in inexhaustible beds of coal, associated also with iron ore, and all these in a country rich in the great staple of the vegetable kingdom. Well may we inquire, what country abounds so much in the elements of prosperity as our own? And let us rejoice that these elements are neither owned nor controlled by a despot, but belong to the people.

LEAD, SILVER, AND GOLD MINE IN NORTH CAROLINA.

This mine is in Davidson co., ten miles southeast of Lexington. It varies in the amount of the valuable metals which it yields at different depths.

At the depth of forty feet, the ore yielded, when dressed, fifty per cent of lead and from twenty to one hundred and twenty ounces of silver to the ton of lead. The value of the silver varied from $1.80 to $2.00 per ounce; its price being enhanced by the large proportion of gold found in combination with it at this depth. At sixty feet the ore had increased in richness; and the greatest value which portions of the ore had attained, amounted to five thousand ounces of silver to the ton; but those were only small portions. The silver is in a metallic state. The average yield is one hundred and twenty ounces to the ton. The value of the whole yield of the mine for twenty-seven months, was two thousand six hundred and sixty-one pigs of argentiferous lead, yielding silver and gold to the amount of $13,288.68.—*Taylor's Report on the Washington silver mine.*

ARTICHOKES.

We agree with the Prairie Farmer, that Artichokes are hardly worth cultivating. They are not so nutritious or prolific as po tatoes, and will certainly be attended with more trouble and labor and exhaustion of soil, if a business is to be made of their production.

HENS,

To be kept laying through the winter, must have warm quarters and be fed considerable animal food.

In order to fatten fowls rapidly, they should be well supplied with charcoal, broken into small pieces. They will become very fat if shut up and fed on this substance alone.

EXTRACTS

FROM

DOMESTIC AND FOREIGN JOURNALS.

PROCEEDINGS OF THE AMERICAN ASSOCIATION OF GEOLOGISTS AND NATURALISTS;

At the Annual Convention, held in New-Haven in April, 1845; with remarks by one of the Editors.

The gentlemen composing the Convention, assembled at the old dining hall of the boarding house back of the Centre College Building. About forty persons were present, and enrolled their names. Among them we find the following:

Dr. Barrett, Middletown;	Dr. Charles T. Jackson, Boston
Prof. Silliman, New-Haven;	Dr. D. Humphrey Storer, do
J. D. Dana, do	Prof. C. Dewey, Rochester, N. Y.
J. D. Whelpley, do	Dr. Stephen Reed. Lancaster;
B. Silliman, Jr., do	Prof. J. Johnson, Middletown;
Prof. Olmstead, do	Prof. J. R. Loomis, Waterville
Prof. C. U. Shepard, do	Prof. H. D. Rogers, Phil., [Me.
Dr. J. Bacon, Boston;	Prof. J. W. Bimly, West Point
J. E. Teschemacher, do	Prof. H. H. Haldeman, Phil.;
Francis Alger, do	Prof. John H. Redfield, N. York

The time of meeting was named to be half-past two. A littl before three, Prof. Silliman rose and called the meeting to order and expressed his regret at the unavoidable absence of Prof. W Rogers of Virginia, who was to have acted as chairman. H therefore nominated Prof. Dewey of Rochester, N. Y., in his place and this was carried, and Mr. Dewey took his seat as President.

The secretaries of last year were to have acted this year, bu Dr. Lawrence Smith of South Carolina being absent, Mr. Denni Olmstead, Jr., of New-Haven, was appointed in his place.

LIST OF PAPERS TO BE READ AT THIS MEETING.

On the Tracks of Birds and Animals found at Middletown, Connecticut; illus trated with figures of new species: By JOSEPH BARRETT, M. D.

Evidence of Congelation in the Red Sandstone, as exhibited by Regular Tr angular and Rhombic Marks of Great Distinctness.

On the Origin of the Constituent and Adventitious Minerals of Trap and the Allied Rocks: By JAMES D DANA.

A Review of Chemical Theory: By Mr. WHELPLEY.

The Geology of the Country around the Mount Savage Iron Works, Maryland. By THOMAS H. WELD, of England.

The Geology of Mississippi: By Mr. WAILES, of Miss.

The Gypsum of New-York: By Prof. DEWEY.

Question of the Existence of the so-called Taconic System of the United States: By Prof. H. D. ROGERS.

The Geology of the Upper Missouri: By Prof. H. ROGERS.

Synopsis of the Fishes of North America: By Dr. D. H. STORER.

On a Chain of Erratic Serpentine Rocks, in Berkshire Massachusetts: By STEPHEN REED.

Communications or papers were also promised by Mr. Peter A. Browne of Philadelphia, Dr. Dean, and Lieut. Maury, in a day or two.

Prof. Silliman then presented a paper from Lieut. Hardy, R.N., on the Polecat Tree of Missouri, and the Holly Tree and Mistletoe, of England and America. He then went on to state that the President of the last year, by custom, delivered the address of the present year; but he had recently seen Dr. Locke, at Cincinnati, who was unable to attend.

The articles of the constitution were then read, by which it appeared that the name of this society is the "Association of American Geologists and Naturalists."

Prof. Silliman then read a paper from Lieut. R. W. H. Hardy, R. N., of Kilkenny House, Sion Hill, near Bath, England, on two ubjects: 1. The Mapolite root bark; or polecat tree root bark of Missouri. 2. The mistletoe and holly barks, and their medicinal properties. Lieut. Hardy said that the bark of the root of the polecat tree, or mapolite, possessed wonderful and strong anti-scorbutic properties; and would cure gums that were sore, swollen nd tender, even when the teeth were loose. He cured a man with t at Sonora, in Mexico, in three days, whose gums were so bad that is pillow used to be covered with coagulated blood of a morning. n general cases, it cured scorbutic gums, &c., in one day's use of he bark. He never knew it to fail. A piece of the root bark is o be masticated till all the pungent properties have left it; then hew another piece, and so on till a cure is effected. If the disease eturns, repeat the remedy. He speaks of its anti-scorbutic properties in the same manner as we do of the properties of cinchona r sulphate of quinine as a cure for ague. Its therapeutical properties were first shown to him by an American, Mr. Gibson, a unter or trapper, who married a woman at Opossum, in Sonora, Iexico, whose wife Hardy attended. It is found in great abunance on the banks of the Missouri, where its smell disgusts all ho come near it. Mr. Hardy took some of it to England and as used it there with great success in every case. The second ase was the produce of the mistletoe berries and the inner bark of the holly tree, (bird lime,) made into a plastic state and spread on cloth. Take three pounds of yellow beeswax and one pound of bird-lime ; melt the wax over a slow fire ; add the bird-lime by degrees, so as not to have it boil over ; keep the vessel after this on the fire forty-five minutes, so that the bird-lime and wax are fully incorporated ; spread this mixture on cloth and cut it into proper size for plasters. In cases of neuralgia, put the plaster over the part where the pain is. The plaster will retain its virtues till every part of it is worn from the cloth, and it does not materially interrupt the action of the skin. A repetition of it has equal effect. Also the carbonized ashes of the bark of the holly, mixed with its own weight of calcined alum, rubbed on the gums, where neuralgia proceeds from a tooth, will give relief. This is for neuralgia in all its forms, and the relief is almost simultaneous with the application. He has cured three cases in this way ; he however alludes only to secondary effects, leaving the primary cause of neuralgia to be otherwise disposed of. But he thinks even the primary disease (when not the result of organic derangement) can be cured by this bark, when made into a salt with sulphuric acid, and given internally. Lieut. Hardy thinks the Druids of old knew these virtues in mistletoe and holly ; and hence the great reverence they made the people pay to them ; and got up the superstitious notion that a sprig of holly or mistletoe would drive away a demon : and thus the practice of decorating houses at Christmas and New-Year's therewith.

Dr. Barrett said that he did not know what was meant by that tree—the polecat. He was sorry the Lieut. did not send a specimen of it—a flower, a leaf or a piece of the bark. With regard to the mistletoe, the Lieut. could not have read Southey's "Book of the Church ;" where Southey has shown up the way in which the Druids and priests of old humbugged the people by means of a very fine plant, thus getting a large share of their worldly goods. As for neuralgia, it was best relieved by taking off the surface with a blister, and then adding morphine.

President Dewey said there was no necessity for the Lieut. sending over a specimen of the polecat tree ; it would be best known by its smell, (laughter,) wherever found, without any flower, bark, or even leaf : like certain animals, a knowledge of its whereabouts was speedily carried through the air to speak for itself.

Mr. J. D. Whelpley said that diseased gums were not difficult of cure—any powerful styptic would do this ; a solution of nitrate of silver, for instance ; or any acrid vegetable, either green, or as an extract. No external remedy will cure neuralgia—not even division of the nerve. It is supposed to be caused by pressure on the nerve where it passes out at the base of the skull. The mistletoe is useful only as a mere alterative, and has no virtue as an external application.

The second paper was then read; it was from Mr. C. J. W. Wedderburn, Prof. of Anatomy in the Medical College of Louisiana, on the "Influence of Atmospheric Pressure on the Tides." Prof. W. had made observations in regard to this, in the Bay of Pensacola. He observed that when the barometer ranged high, the tides were always low, and vice versa: the ordinary mean range of the barometer was 29.50; the ordinary tide range was from three to four feet in the Gulf of Mexico. During a strong N. E. wind, with the barometer very low, the tide at Pensacola would be very high; though the tendency of such a wind would be to force the water out of the bay. With the wind from the N. W., the tide would be very low, whilst the weather was very clear; a change in the barometer to a small extent would frequently produce a rise of from one to three feet in the tide. And thus he thought a tide table might be made by which any commander of a vessel could know by his barometer how much water there would be on the bar of a certain harbor in the Gulf; and this was of great value, because the depth of water on all the bars in the Gulf is very small, and at Pensacola it is only twenty-two feet. During N. W. winds there, they have generally clear weather, with the barometer ranging high and the tides low.

This was the substance of the paper.

The President here said that he had just remembered the name of a plant he had seen in a garden at Rochester, and no one knew how it got there; it was *selia trifoliata*; and smelling abominably was called the skunk tree; perhaps that was the *mapolite* of Lieut. Hardy.

Mr. Redfield said in relation to atmospheric pressure on tides, that half an inch of mercury only made a difference of six inches in the tide. Dr. Wedderburn has overrated the matter. So in the case of the N. E. winds causing high tides; a rise in the tide at Pensacola must be produced by some cause operating out of that bay. Thus a N. E. wind at Pensacola would be an East wind at Yucatan, and a S. E. wind at another place, forming, as it were, a circuit of winds, all tending to drive the water into the Bay of Pensacola.

Mr. Rogers said that some years since, great changes were observed in the level of the Swiss Lakes in times of great storms; and scientific men in Switzerland called on us to observe if there were similar changes in our great northern Lakes. Here is a great gauge to go by. Has any one made these observations on Lake Erie or Superior? Is there not some other force at work, much more than what is due to static altered pressure? Is there not a dynamic force at work, as well as that of the change in a superincumbent column of atmosphere? The dynamic force of the wind operating on the waves of a lake, sustained through hours and days, is of far more effect than mere static pressure, as indicated by th barometer.

Mr. ——, said that in the Lake Onondaga, after a long storm the winds would blow the water high up on one side of the lak and leaving it low on the other. He had made the same observa tions on the action of the wind on water. In still air, a light win *clings* to the water, and moves a surface of two or three inches i depth. After a long South or S. E., or S. W. storm, the fisher men on Long Island say that the whole sea is blown up on Lon Island; this occurs every three or four years; it makes large san banks; these are held there by short grass; the sea beats ove these and forms Lagoons, and these are filled with fish, and thes remarkable changes in the land are brought about by wind.

Prof. Johnston, of Middletown, said that at the gale of la September, the barometer fell 1½ inch, and the tide rose five fe at Middletown.

Prof. Loomis said that in the State of Maine the tide rises six eight feet from long continued east winds; there would be n storms, but merely a long continued wind from the east. In o case the tide rose from this cause so as to move a log a distance three or four rods, which had lain there for fifty years as remer bered by the oldest inhabitant.

Mr. Johnston said that in the great gale of September, 182 the steamboat left New-Haven for New-York; there was a gre rise in the tide that night; the boat anchored off Morris' Cov there was a ledge of rocks generally bare close by; the boat pa ed her cable and was lifted clear over the ledge safely into de water by the rise of the tide.

Prof. Rogers said that much of this effect was also owing to t peculiar property of the adhesion of wind to water, one of t most beautiful laws in the economy of nature, otherwise the mosphere would slide over the surface of the sea, and all the l neficial effects of storms would be lost. Another thought occur to him: the ordinary beat of the surf would not throw up the coral reefs to the height we find them; it is done by the wh mass of the ocean, pressed on by the trade winds for a long tin that thus piles them up so far above the ocean level.

Mr. Redfield made a few observations on the effects produced the shape of shores, by what are called converging waves, and th upheaval force.

Prof. Rogers said that the committee of last year had mad call on the Secretary of the Navy requesting him to cause obser tions to be made in relation to certain points in Hydrography, M teorology, Natural History, &c. &c. Now, sir, we propose to se a request to the Secretary of War to institute a new and separ line of inquiry on the great subject of the level of the Contine the observations to be made at the mean tide level; respecting the oscillations of this part of North America. The rise and fall, of a great part of the coast of Scandinavia has been observed by Swedish geologists and noted. And it is now pretty certain that no part of the earth's surface is stationary.

Prof. Silliman.—I should like to add inquiry into a subject I am ignorant of and have no means of informing myself about. It is the average elevation of continents above the level of the sea.

I. The average elevation of North America;
II. The average elevation of South America;
III. The average elevation of Europe;
IV. The average elevation of Asia;
V. The average elevation of Africa.

By the deduction of particulars from known data we can come pretty nearly to correct data.

Prof. Rogers.—Humboldt has published data about the mean level of certain lands. He gives the mean level of Asia 800 feet above the ocean; and it is astonishing how small a part the mountains have to contribute to the earth's elevation.

Silliman.—What does he give, sir, as the elevation of North America?

Rogers.—Some five or six hundred feet as the average.

Silliman.—That is even within my mark; I have said less than quarter of a mile, and then have been thought romancing; and even this may be caused by the mass of the earth swelling by expansion.

Rogers.—By probably the general wavering of the earth's crust, Sweden rises several feet a century; and it would not take long to bring all Europe to its present level.

Prof. Loomis.—The pilots of Maine say that the tide is sinking every year; and that certain rocks on Maine shore are now visible, *over which* they could formerly conduct vessels at any tide. is so especially at the mouth of the Kennebec.

Prof. Rogers observed that the north shores appeared to be going down and the south coming up; else why were all our south shores sandy flats, and New-England a rock-bound coast from Cape Cod its north-east border. The middle and southern States—all the sea islands from Long-Island to the Florida Keys, indicate a general rise of the land south. *This Continent is swinging on a hinge great pivot*, the point of which is at about the Bay of Massachusetts. The south part is rising and the north going down; not exactly in their moral or intellectual qualifications, unfortunately, as recent changes indicate. (Laughter.)

Prof. Silliman.—Where did you put your pivot sir? (Laughter.)

Prof. Rogers.—About Cape Cod I think it is fixed. (More laughter.

Prof Silliman then observed that the change of level in New-Haven harbor must be owing to other causes than merely the setting up of silt, as is generally supposed.

Mr. Redfield pointed out on the new chart of New-York bay where a few years since there were 40 feet of water, it is now solid shore. This was done by the continual abrasion of the ocean against the bolder shore of Jersey south of Sandy Hook; this was the principal source of supply for making sand bars every where and not what was brought down by rivers from up the country.

President Dewey said he once heard as a reason for the great rise of the tides in the Bay of Fundy, that it had a moveable bottom (laughter) which sank down very low and in came the tide then the bottom swelled up again and out went the tide. He was glad to find that we were turning round properly on a pivot

The Convention then adjourned till to-morrow at 9.

[The subject of a change of level in the northern parts of New York and New-England engaged the attention of the Editor many years since. In 1834–5, on his way to Nova Scotia, he observed that the coast in that vicinity was skirted by a deposit of marly clay in which the remains of moluscous animals of species now living in the water were very abundant. The elevation of the formation was stated at the time at forty feet, and the inquiry was raised whether this single formation did not indicate a comparatively recent elevation of the coast; it was so regarded at the time, and numerous facts which have since fallen under his observation have confirmed the opinion thus early expressed; which so far as geologists had then expressed their views, was certainly among the first. Men often express opinions upon a subject, long before they are in possession of facts which bear at all upon the subject. In the existence, however, of this deposit so much above the adjacent water, we have a fact clearly indicating a change of level at this place. It of course required an extension of the same fact in order to establish a general rise of the coast. Since the time referred to, many localities have been discovered of precisely the same character, as the tertiary of the St. Lawrence basin, which has been fully described in the reports of the 2d geological district of New-York. See American Journal of Science and Arts No. 2, Vol. XXX., the report of 1837. Also final report of the geology of the 2d district of New-York.]—Ed.

SECOND DAY.

The President, Dewey, took the chair, and among the distinguished savans present (new arrivals) were President Day, Prof. Hitchcock, Prof. Bailey, of West Point, Prof. Coffin, of Norwalk, Ct., Dr. S. Bacon of Boston, Dr. Jackson of Boston.

Prof. Rogers, from the committee on business, said they had prepared a programme; the report was read of the committee appointed last year, on addressing a memorial to the Secretary of the Navy on the subject of the Gulf Stream. Lieut. Maury is chairman of the committee; the report is but provisional, and the committee desire to be sanctioned in a continuance of functions. It contained a copy of instructions to officers of the navy for making observations on the Gulf Stream, and a letter of the Secretary of the Navy, who wishes these instructions to be given to the officers of the Columbus now going out, in order to further the views of the Association in a thoroughly analytical examination of the Gulf Stream. The nature of the instructions may be gleaned from the following subjects to be inquired into:

Course and set of the stream.
Temperature of the water at different depths.
Depth of current and velocity at different depths.
Fluctuations of the current in gales of wind.
Character of the bottom in various places.
The difference between the edges and centre of the stream.
The limit, force and set of different currents.
The line of deep-sea soundings to be noted between the coast and Gulf Stream ll along the coast; which would be of great value to vessels approaching the oast in bad weather.
The nature, extent and course of the Gulf Weed.
The places, appearances, &c., of any drift wood; some of which drifts from le Mississippi and is lodged on the Tortugas.
Icebergs and the currents around them.
The strength and durability of storms.
Meridian altitudes of the stars.
Sights on the instruments to take P. M. as well as A. M. observations.
Streaks of warm and cold water; their limits and breadth.
Formation of shoals and spits of land.
Fishes of various Islands, and what are preferred for food.
Volcanic regions, their altitude, appearance, &c. &c.
Geological structure of all islands.
Rise and fall of tides at all places.
Corals, mollusca, fishes, &c., at all places.
And for all this an abstract log is to be kept.

The committee also say that the prismatic azimuth compass is o be employed mounted on its tripod and placed abaft the binnale, and to be placed as free from the influence of the guns and l other ferruginous matter as possible; and the difference between and the ordinary compass, to be also carefully noted. The entire bsence of coraline in the Gulf, which is always found in simir latitudes in Asia, &c. is to be carefully noted; as this is ipposed to indicate counter currents of hot and cold water, at fferent depths and on different sides; for this it is proposed to use Sykes's thermometer. These observations it is also believed will also bring out proof of the existence of a deep shoal one hundred and twenty miles south of St. George's Banks. The coast of Georgia shows that the Gulf Stream on quitting the coast of Florida does not run due north as before, but to the northward and westward; and this will explain the apparent problem why the Gulf Stream runs with greater velocity off Cape Fear and Hatteras. Careful observations are also to be made in relation to a stream of warm water setting from the coast of China to the north-west coast of America; and it is expected to find currents well marked running through Bhering's straits along the north coast of America into Baffin's Bay, and along the coast of northern Asia.

The committee add that our ships have all the necessary instruments except Sykes's thermometer; and the skill of American officers is so proverbial that the body of information thus collected would be invaluable.

On motion, the committee was continued *ad infinitum*, and the report accepted; report to be matured by the committee and Mr. Redfield, and transmitted to Washington to the Secretary of the Navy to be sent out in our ships of war to China.

No remarks were elicited by this report.

Papers on oceanic drift were called for. None came at the call.

The President called for the paper by Dr. Reed, on a chain of erratic serpentine rocks in Berkshire. He stated that the chain begins at Canaan Hill, Columbia Co., with the talcose slate. The hills are crowned by slate or greywacke, but melted so as to lose their slaty character. These are carried down the hills, and over hills, and we go down the valley between the Canaan and Richmond Hills, and there meet immense masses of these rocks—boulders—close by the State line. We go on through Richmond valley, and find 50 blocks, twenty thousand cubic feet in size, above ground; go on a little south, cross Lenox mountain into another valley, and there meet more boulders; through Stockbridge, east of Lenox mountain, and meet them again, all of the same geological character. Within about two hundred rods of Canaan, slate comes to the surface; and hence proceeds another chain parallel to the first—not a specimen in the valley beneath, but many south of the southern range. The metamorphic rock crowns the summit of all. This is an intermediate range between the talcose slate of the Taconic range, and the greywacke west of the Hudson. The only rock in situ in Richmond county is lime. These boulders have no scratches; their angles are perfect; they have been brought by water, and "this side up with care," seems to have been marked on them, and attended to; edges and angles distinct beyond belief. The range is thirty miles long, and only twenty rods wide. The hill crossed by the boulders is one hundred feet higher than Canaan hill, th starting point. They form an unbroken chain of rocks; the largest and most numerous of them are on the eastern side of the hills they cross; a few are on the western side.

Prof. Hitchcock said it could not be accounted for on any known theory of drift how these boulders were placed where they were. It was remarkable to see this chain of boulders for a few rods wide and miles in length, like the grading of a railroad—carried over the hills in an oblique direction—an unbroken chain. We can see the outline very clear. Edges and angles, sharp and unbroken; it goes straight to a certain point for twenty miles, and then turns at a sharp angle of twenty-five degrees. What iceberg could have carried them all to that spot—some half as large as this room? How could it detach them from the parent rock? How could water carry them in a bee line in this way, and carry them oliquely over these hills seven hundred feet high? It was answered by some, supposing the ice to freeze round an island—or top of mountain—and then immense earthquake waves come and rock them off, and these boulders thus dropped by the waves.

Dr. Jackson supposed it owing to the existence of ancient lakes, and their freezing; the ice and water brought these boulders left them on the shores of the lakes. We see this going on in Lake Superior now—every kind of boulder of the upper country is found scattered around the Sault St. Marie—or the outlet of the lake.

Prof. Dewey observed that Prof. Hitchcock had shown that icebergs, &c., had carried large blocks of greywacke of Catskill over hills twelve hundred feet high into the Housatonic valley.

Dr. Barrett said that there were enormous masses of dirty yellow quartz lying in Middletown, rounded, oval, like an egg, and flat like a lapstone. One in front of a Mr. Bacon's house, from its size and shape, was called Bacon's pudding; these were lying several feet above the level of the valley of the Connecticut; had the land risen on which they lay, or had the Connecticut river fallen? Had we any means of knowing what was the height of the Connecticut four thousand years ago? Now the Nile, five hundred miles above its mouth, at Phile, is twenty-four feet lower than it was four thousand years ago.

Prof. Hithcock said that the terrace lines along the valley of the Connecticut, alone show that the river was once at those heights. We have no means of gauging it within any historic record.

Dr. Jackson said that the ancient pot holes eleven feet deep in the hardest granite on the tops of mountains dividing Merrimack and Connecticut were full of pebbles, and show that the Connecticut and Merrimac were once connected. Eleven hundred feet is the height of the mountain on which they are found.

Prof. Silliman spoke of the remarkable pot holes on the Franconia mountain, twenty by fifteen feet in size and fifteen feet deep—water flowing through there now—most beautiful example of the connections of different streams; no workman could carve it out so skilfully. It should be visited by all scientific persons.

Dr. Jackson said, that long before *the present continents were elevated above the ocean*, water must have passed through this mountain gorge between the Merrimack and the Connecticut rivers.

Prof. Silliman said that no doubt the true mode of transport was ice and water; but their great power was much underrated Lieut. Ringgold, of the Expedition, said he coasted along one iceberg over seventy miles in length—a mere stranded iceberg Here, then, was a mode of transport for the largest blocks we ever find; the blocks once torn off from the parent rock, and frozen in then the ice melts, and the boulders drop down in line for forty fifty, or sixty miles.

Mr. Hays, of the Exploring Expedition, believed the great transporting agents to be the small icebergs of four or five miles long, which in the South Seas are continually detaching themselves and pieces of rock along, but never carry the rock above two miles from the source, and thus a line of boulders might be distributed like those lines of boulders spoken of by Dr. Reed.

Dr. Reed said the angle in the line of boulders in Berkshire county was a direct angle of twenty-five degrees and not a curve

Prof. Hitchcock said that these remarks threw more light on the great moving power of these boulders than he had ever met with before; but the chain was so narrow and regular.

Dr. Reed said the width of the chain was about 15 feet only and never more than 30 feet wide. As to icebergs breaking off the top of these rocks, why did they not break off the tops of the hills close by, only a few feet lower, where the slate comes to the surface?

Dr. Jackson alluded to the carrying of the large copper rock from Isle Royal, Lake Superior, to the Ontonagan river on a raft of ice.

Prof. Rogers said that before they could establish such theories they must first prove or presuppose the permanent submersion of the present Continents below the level of the sea; and he challenged proof of this from any one, as he had often done before if such had been the case, there would have been great ocean tide marks to show when and where this Continent was submerged But in the midland valleys of the American States there was no marine deposit in proof of this; no marine clays or marine shells in the valleys of the Ohio, or any of those regions. There was proof that an arm of the sea ran round at one time from the St Lawrence down through Lake Champlain, making an island of

New-England; and also proof that an arm of the sea once ran from Lake Ontario to the Hudson river, making an island of the upper part of the State of New-York; but there was no proof that this whole Continent had been submerged, as the gentleman insisted on presupposing. He must insist on accounting for it in another way; by volcanic force acting on the great oceans of the north. This would produce all the wonderful results we are daily otherwise astonished at. Bodies of water hurled along with tremendous velocity will carry large masses of stone suspended for a long distance. From the mouth of the river Amazon large bodies of stone are carried out by the velocity of the water a great way to sea before they sink. And in this way one force from the north meeting an opposing force, it is very natural that these angles should be thus formed, as described by Dr. Reed of the chain of serpentine boulders in the paper read to them this morning. A sudden irruption of an Arctic Sea, upheaved by a volcano, would be equal to all the phenomena of this character. But he was surprised that the subject of waves of translation was not considered in this relation. Waves of translation are caused by a movement of the whole body of the sea from its surface to the bed of the sea. Who can count on the immense force of such a moving power? The great tide wave goes round the earth twice in 24 hours. But the velocity of sea waves, engendered by earthquakes, has a velocity of 30 miles a minute—twice the velocity of sound. *The earthquake of Lisbon threw a succession of* 36 *enormous waves across the Atlantic to the shores of Antigua in* 10 *hours.* Ten successive shocks at exact intervals of 35 minutes. We must look for explanation to a great volcano bursting out in the Arctic Sea, throwing waves across the southern Continents, and these are still farther carried forward by the successive rocking of the great crust of the earth; in their course ripping off all the projecting crests of the highest hills and leaving them where we find them; and simply accounting for all the phenomena we find on the earth's surface.

Prof. Rogers continued in a most eloquent manner to combat the theories of the dynamic force of icebergs, &c., as moving causes of these deposits, and to prove by actual data the precise velocity of certain seas, and streams, and the large number of pounds weight they would carry to given distances.

Prof. Silliman said that the Catskill mountains and hills of Ohio were formed under water—there was no necessity for sinking the mountains—they were under water before—they were upheaved from beneath the water and presenting their salient points; getting encrusted with ice; then suppose that Prof. Rogers' great power was set in motion, breaking off these icebergs and whirling them round and round; these angles might thus be formed; and thus all these theories are easily reconcilable with each other.

Mr. Whelpley said—It was necessary to account for the trenching out of the valleys in addition to the other matters alluded to, and explained the geological phenomena connected with the breaking of the dam of Mill Rock, near New-Haven, the trap rocks, and other places in the vicinity; and contended, very modestly, that the trenching out of the valleys, the deposition of ranges of boulders, the formation of the terraces of the river valleys, could all be accounted for on the supposition that the subsiding and raising of the earth's surface was gradual.

Prof. Hitchcock moved to lay the subject on the table; it had generally formed the dessert of our entertainment, and now it bid fair to occupy the place of their dinner. (Laughter.) He hoped however, to hear of it again; he believed the understanding was that gentlemen should be allowed to mix their ice and water in quantities to suit themselves. (Laughter.)

The subject was then laid on the table.

Invitations were then tendered and accepted for all present, *including the reporters*, to go and take supper with Prof. Shepard and examine his beautiful collection of minerals. But the reporters had so much work to do that they could not avail themselves of the Professor's very appropriate courtesy.

Prof. Silliman then said that he would be on the bridge to-morrow morning at 8 o'clock, ready to conduct any gentleman to the *top of the East Rock*, so as to get a good view of the curious formation of the surrounding country.

An unfinished paper on the fossil fish of the United States was read by Mr. Redfield for his son, and the meeting adjourned.

AFTERNOON SESSION.

The General Committee were then appointed of the following persons:

Prof. Dewey,	B. Silliman, Jr.
Dr. Jackson,	Dr. Binney,
Prof. Silliman,	Prof. Hitchcock,
Dr. J. C. Booth,	John L. Hayes,
E. C. Herrick,	Prof. Rogers,
Mr. Redfield,	Dr. Dana.

Mr. E. C. Herrick was appointed Treasurer.

Prof. Hitchcock then made some remarks about the Geology of Western Asia. He had received one hundred specimens from Mount Olympus, some of which—calcareous spar—were very curious; he had three hundred specimens of a series of rocks between Trebizond and Ooroomia he would write about hereafter. He was curious to get a bottle of the water of the Caspian sea, and this spring he received a bottle of it through the British consul at Teheran, which must have come at least twelve hundred miles on horseback. The consul got several bottles of the water from the Russian Admiral commanding the squadron in the Bay of Astrabad; he made one of his captains go and fill the bottle far out in the Caspian Sea. An analysis of this water gave n 1000 grains 13.2 grains of solid contents; of free carbonic acid .24 equal to .5 of a cubic inch; and there is a large quantity of sulphuretted hydrogen in it—.67 of a grain; and his is a much larger proportion than we generally find in sulphur springs. The result I give thus:

	Grains.
Sulphuric acid,	2.3
Chlorine,	4.9
Lime,	1.4
Sodium,	2.5
Magnesia,	1.3
Carbonates lime and magnesia,	0.4
Gypsum and do. do.	0.4

Or thrown into the form of salts thus:

Sulphate of magnesia,	4.36
Chloride sodium,	5.17
Carbonates of lime and magnesia in solution,	0.46
Chloride calcium,	2.08
Sulphate lime,	0.44
Sulphuretted hydrogen,	0.71

This water contained no iodine and no bromine; its taste is peculiar; and it is a weak saline.

A bottle of Caspian water from close to the shore only gave grains of solid matter in 1000; and nearly one of sulphuretted ydrogen—a very large proportion of the latter indeed, owing to ıe decomposition of the sulphates by organic matter.

The analysis of the ocean water on the eastern coast of Africa so shows large quantities of sulphuretted hydrogen, produced by ıe decomposition of organic matter at the mouths of rivers on the past. This can be seen by reference to Prof. Daniel's analysis. nd this sulphuretted hydrogen, from this organic matter, is the ıuse of the terrible fevers on the coast of Africa, where the malaa is said to prevail, and in all hot climates.

Prof. H. also said that Mr. Perkins had sent home a very curiıs account of a salt pond in Persia, the water of which was five et deep, and the salt at the bottom five feet thick; the water as separated from a large salt lake by a small sand bar; in high inds the lake water was washed over the bar into the pond, and ence was evaporated and salt made by the hand of nature. e also sent home an account of a curious cave near Ooromania, ıt of which flows a stream of carbonic acid gas similar to that the grotto Del Cano near Naples.

Dr. Booth said, that he formerly analyzed the Croton and huylkill waters; the former had five grains of solids, and the tter four, to the gallon; now, in the absence of disturbing uses, the Croton only contained less than four grains to the galn, and was purer than the Schuylkill; but the purest water he er analyzed, was that of the creek at Washington city. The water of the Yellow Springs in Pennsylvania contained silica in solution; and he thought sufficient attention was not paid to the presence of silica, as he believed it acted a very important part in mineral waters, and he believed it to be soluble in pure water.

Dr. Jackson thought the solution of silica was owing to the presence of crenic acid; you cannot separate them.

Dr. Barrett considered that the presence of shells had a grea effect in purifying water.

Dr. Jackson agreed with this view, and mentioned as an illustration the lime pond in New-Hampshire; where large quantitie of organic matter were converted into food by shell fish; they ha concentrated the lime in the water—the organic matter into shell; and formed a large deposit of shell marl.

The Convention then adjourned.

EVENING SESSION.

The chairman announced the business to be:

1. Foot tracks in the sandstone of the Connecticut valley, b Dr. Barrett.

2. Classification of the animals that made the tracks, by Pro Hitchcock.

3. New fossil foot tracks in the new red sandstone of Pennsy vania, by Dr. Dean.

4. Evidences of the congelation of the new red sandstone, by D Barrett. (This paper was deferred.)

Dr. Barrett said that it was in 1826 he first found tracks of bir in the red sandstone of Connecticut, and told Prof. Silliman of i He now would show the track of a new animal, a right and le foot; the centre toe is a little worn; I called it a canthodactylus the treading was quite heavy. The next track is that of an anim with a tread as heavy as the hippopotamus; the foot is 8 inch in diameter; part of the second foot is broken. A third specim comes near the elk or some of the ox tribe. It is evidently th of a hoofed animal. It is in pale grey soft sandstone; and tl track is filled with blue grit. It is in a slab of pavement in the stree of Middletown. The stone is 21 inches wide, and 3 feet 5 inch long; the tracks are in the middle of the stone; the foot mar are 13 inches wide and about the same length; also the same di tance to the front of the next step. All the slabs with tracks car from a quarry one mile west of Middletown, near the comb fa tory. They are rare in the Portland quarry; the one most co mon is about 5 inches long, and is unlike any before known. I thinks the large foot track to be the same animal that Dr. Ki described, but his animal's feet were only half the size. He al found foot tracks of birds of a gigantic size, 14 inches long and inches wide. He also saw tracks of a pair of feet that looked ve much like the human foot, but not quite so long; he showed drawing resembling two clubbed feet. He found one slab 14 feet long that had the tracks of at least a dozen different animals crossing it. He felt certain that if ever that aforesaid quarry should be re-opened it would be found rich in foot tracks.

Dr. Barrett exhibited very excellent drawings of all these foot tracks, which excited great curiosity among the audience.

Prof. Hitchcock said that formerly he gave names to the tracks found in the red sandstone instead of the animals that made them; because, except the tracks, there is no relic left of those animals worth mentioning. But at the suggestion of Mr. Dana he had made out a classification and nomenclature of all the animals whose tracks had been found in the red sandstone of the Connecticut valley. These animals were chiefly birds of a very low order of organization. He then read off his list of names given to these birds. The species were 35; and the genera were 20; he tried to make the number smaller, but could not without classing together species that are more unlike than what we find in living animals. He had measured the feet in every possible way, with care, the same as phrenologists measure the head; and done all in his power to classify them correctly.

Prof. Silliman read a letter from Dr. Dean of Amherst, who has found fossil foot marks in a new location near Amherst. He began by stating the incredulity with which the announcement of the discovery of these foot marks was received. Since then all the geologists of England have given in their adhesion to the subject. Since then enormous birds (fossil) have been discovered in the alluvial deposit of New-Zealand, and sent to England, of a larger size than any found and claimed by Prof. Hitchcock. Recently specimens of bird tracks have been found near Greenville in Penn.; also some like terrestrial animals; air-breathing, warm blooded animals, › toed and long foot; also some of the large hand-footed tribe—ike the human hand—now by Dr. Owen proved to have belonged to a large Batracian animal, one of the *frog tribe*—a frog as large as a bull, or an elephant—*one of the great croakers of his day!* There are numerous tracks of these frogs where they kept dancing about on the rocks, and these are many hundred feet below the new red sandstone, and they are below the coal. These convince me that whilst the earth was being fitted to pass into its present state, after the era in which it was occupied entirely by marine animals; then came the ornithold era, then a reptilic era, then the interesting series connected with the coal beds, then the enormous Saurian reptiles through the great series of the Lias and the Oolites up to the chalk; passing through that peculiar formation we come to the period of terrestrial animals and to the era of the present forests and that of man. Dr. Dean states that he has found 10 or 12 specimens of these five toed foot tracks, with the bunch part, like the ball of the hand, and behind each track there is an oblong, irregular *depression*, which depressions are arranged in the sandstone opposite to each other as the tracks are; making it appear that the animal's hind *feet* did not touch the ground when he was too deep, but that he sat on his haunches, and the nature of the depression makes it seem that one part of the hind leg was evidently folded under the other. These marks were very curious, and opened a new field for inquiry. Numerous bird tracks were also found along with the tracks of quadrupeds; the papillæ of the integuments are perfectly preserved.

Prof. Silliman then exhibited Dr. Owen's fac simile plates of the fossil birds found at New-Zealand, the thigh bone reaching from a man's knee to his shoulder.

Prof. Rogers then exhibited a map of the coal beds and intermediate layers of Pennsylvania, where Dr. King found the fossil foot marks. He described the great Pittsburg coal basin as being a seam of coal 10 to 14 feet thick, and occupying an area of 14,000 square miles—twice as large as Massachusetts—and of a very pure coal. The basin or seam in which the foot tracks were found by Dr. King stretches south to Alabama, west to Ohio, and north to Lake Erie; and occupies an area of 63,000 square miles—larger than all England and Scotland. It is 150 feet below the seam of Pittsburg coal—there being eight good working seams of coal in Pennsylvania below that of the Pittsburg; and only one good working seam above it.

Prof. Rogers also said that all these foot tracks found in this region except one, were said by Dr. King to be in relief; and i so they could not belong to any animal. He believed them to be made by reptiles; it was was the place to look for Batracian animals; he did not expect to find the tracks of winged, air-breathing animals; and if they proved to be so, it would be indeed a discovery in the history of the populating of our globe that would possess the highest interest. The subject should be inquired into at once.

Mr. Haldeman stated that one of the New-York State Geologists had suggested that these apparent foot tracks in the carboniferous series might be marine plants.

Prof. Silliman said this idea was abandoned soon after it was first promulgated.

THIRD DAY.

Dr. Barrett read a brief paper on the evidences of congelation in the new red sandstone of Middletown and Chatham. He had long seen evidences of solar heat exhibited in the red sandstone—by the cracks showing the baking process, and the temperature of the earth at that time; and he had looked a long time for evidences of cold or freezing. He had at last found evidences of triangle and rhomboids, &c.; some five or six inches and more on the sides; and thus affording a very interesting evidence of the various degrees of temperature at the time those birds lived and walked over the earth, at the time those tracks were made that were alluded to yesterday. This fine old meteorological record of the weather in those days, (being so much more ancient and interesting than the records of ancient Egypt,) were thus stereotyped on the spot, and sealed up, to be opened and exhibited to us thousands of ages afterwards, as a true record of that part of the earth's history. He had some difficulty in regard to the large size of the rhombs and triangles he found in the sandstone; but after much examination he found in 1841, after a frost, specimens of similar triangles and rhombs, formed by the crystalization of the water during the night; some of the triangles were twelve inches in length; some of the rhombs were eighteen inches long; and what was remarkable, these crystals of ice had pressed upon the thin crust of mud beneath, and made indentations similar precisely to the evidences of congelation he had found in the red sandstone; and while making his observations, animals came along and actually walked over the ice, pressing it down on the mud beneath—breaking through and making tracks in the mud precisely similar in manner, &c., to the evidences of bird tracks found by Prof. Hitchcock in the red sandstone of the Connecticut valley, in such beautiful perfection. Dr. Barrett also said that he had carefully examined the sandstone used in the new library building of Yale College, and he can show in the cracks thereof evidences of the solar heat that produced them; some of these had been partially filled up by sand and mud. He could also show rain drops of the old world in this sandstone—also the ripple marks of waves, and one triangular crystal of sandstone. He could show where there were marks of the strong waves and weak waves—wshoing very clearly that in that terribly old world, water was subject to the same laws that it is now.

[The phenomenon referred to by Dr. Barrett furnishes no evidence of congelation—it is merely the effect of drying, or crystalization. All rocks exhibit similar conditions.]—*Ed.*

Mr. Silliman, jr., said that he thought the appearances spoken of by Dr. Barrett were attributable to the rhomboidhedral cleavage so often witnessed in the red sandstone, which had frequently been regarded as a species of semi-crystalization—little else than the jointed structure peculiar to the new red sandstone.

Prof. Johnson said that the remarks alluded to by Dr. Barrett were very different from the jointed structure of the sandstone, so peculiarly noticeable in the pavements of the streets of Hartford.

Prof. Rogers said it was highly important that the angles of the rhombs, &c., mentioned by Dr. Barrett, should be measured. He conceived that the temperature of the earth, at the time of the formation of the sandstone, was far above any possible point of the crystalization of water.

Dr. Barrett said that he did not refer to structure at all, but to indentations in the mud.

Prof. Rogers said that, still, there was a kind of indentation that belonged to structure.

Dr. Barrett said he was satisfied that, by the features he had that day explained, he could readily determine the temperature of the earth at that "very olden time," within about twenty degrees.

Prof. Silliman said that, if they went on with this subject, they would freeze up all their time. He moved to drop the subject for the present time.

A very interesting and curious paper was then read by Mr Dana, on the minerals of the trap rock series.

Dr. Jackson followed with very able and unusually clear remarks, on the subject of the minerals of trap *dykes*. He said that wherever two rocks come together, one of igneous and the other of aqueous origin, there is always a chemical action between them. Not so, or scarcely to any extent, where a rock of igneous origi goes through a rock like limestone, which though of aqueous origin, has undergone chemical action and crystalized. For example when trap dyke goes through lime rocks, the rocks unite without any commotion, and a pure silicate of lime is formed. So when the trap passes through clay rocks or clay slate, the slate is baked hard, and jasper and jasper minerals are formed. So when the trap passes through granite, no amygdyloid is formed. But when the trap passes through sandstone rock, you then see that there has been a violent tumult—considerable effervescence, and either amygdyloid is formed, or a trap tufa which is sometimes porous and cellular, as the scoria or lava of the volcanic regions of Etna &c. Again, where the trap rock runs through granite, we find sulphurets of iron formed; where the trap goes through clay slate we find the same minerals resulting: when the trap goes through limestone, we find galena and the ores of zinc; and where the trap goes through the red sandstone, we find copper produced. This is peculiarly the case in Nova Scotia; no lead is found in the trap there, but pure copper; the sulphurets of copper lay in the sandstone; heat was required to expel the sulphur; nature did this when forcing the heated trap rocks through the sandstone, and the pure copper is thus reduced from the ore. We see abundant evidence of this also, in the copper of Lake Superior, where the same process has been going on. [Specimens were here shown. Abundance of sulphurets of copper are found in the red sandstone filling fossil plants.

In answer to questions, Dr. Jackson stated that the base of the trap rock agreeing with the sandstone, prevented any great disturbance when the former passed through the latter, whilst the fineness of the sandstone accounts for the cellular nature of what trifling portions of amygdyloid is found at the point of contact. He fully agreed with Mr. Dana, that the agency of hot water was employed by nature to fill up the cavities of trap rock minerals with crystals by deposition. He also instanced the beautiful arrangement by which when trap rock passed through gradual limestone, and the metalic oxides were present, we have all the varieties of cinnamon and other garnets, according to the modifications of the oxides; by the fusion of that limestone in contact with its walls. And he instanced the fact that wherever these cinnamon garnets, &c., are found in the loose soil, it is an evidence hat limestone is close by, and is thus a valuable guide. Dr. Jackson placed the rocks in the following order of age. The oldest vas the porphyry; next the porphyritic traps, then the blue trap, hen the brown trap, then the bastard containing olivine, &c. And t is curious to see the many different points of the compass to vhich these different series bear; the porphyry runs from nearly outh to north; the porphyritic trap, from S. W. to N. E.; the blue trap, from W. S. W. to E. N. E.; the brown trap, nearly east and west; and the basalt from E. S. E. to W. N. W.; thus going all round the compass; and of course the various different eries of trap rocks must frequently intersect and cut through each other, and at Bald Head, York; and at Rye, near Portsmouth, N. H., we have very fine specimens of these interesting trap dykes. Dr. Jackson also spoke of the fact, usually overlooked, that sea vater from all parts of the earth contains phosphates. Every specimen of water brought home by the exploring expedition, gave this esult. He had analyzed the hot waters of the Geysers, and found o boracic acid therein; the silica there was held in solution by austic soda; on exposure to the air, the soda, absorbing carbonic cid from the atmosphere, becomes carbonate of soda, and the silia falls down in a solid mass.

Mr. Dana had previously related the singular fact, that silica remains in a semi-fluid state long after deposition, and is thus easily ermeable by solution; oil and water it was well known would lter through chalcedony, and it was in this way that quartz and halcedonic geodes contained in their centre other and very different mineral substances in a beautiful crystalized state.

Prof. Silliman produced a fine specimen of native copper found ear Wallingford, Conn., where the trap had passed through the red andstone, and a mass of one hundred pounds weight had been thus ound.

Mr. ——— exemplified the agency of hot water in producing great mineral changes, and instanced the upheaving of a mass of trachite from beneath the sea at Oonolaska, where the sea was made warm for three miles around it. Again, at Banda, a large rock of trachite was forced up through the sea gradually, and heated the water for a great distance, and the rock remained hot for a year afterwards. Also, the similar case at Sabrina, and at Deception Island in the South Shetlands, where there was no eruption, a mass rose up in three or four years, and the water was hot for miles around.

Here Prof. Shepard asked Mr. Dana if in connection with the order of super-position he had ever seen quartz upon datholite? Mr. Dana said he had seen phrenite upon datholite, but not quartz; and also quartz upon zeolite.

Prof. Shepard fully agreed in the great agency of hot water in forming amygdyloid minerals in the trapian rocks.

A very brief paper was then read by Mr. ———, on the Geology of the Island of Jamaica, and one by Dr. Hitchcock, on the polarity of common trap and boulders; and the meeting adjourned.

AFTERNOON SESSION.

A very able paper was read by Mr. Dewey, on the Gypsum of New-York.

The rest of the afternoon was spent in a desultory but very interesting manner, by conversations between the members, on various scientific subjects.

Mr. Haldeman of Philadelphia introduced a new and important chromatic wheel, and explained the same.

It was proposed to appoint committees of members who live near the mouths of all large rivers going into the sea, to note the amount of sediment annually carried by the rivers into the sea.

It was also proposed to memorialize the Secretary of War to cause general observations to be made on the change of the level of the coast; also observations on mean tide level.

A new form of improved mountain barometer was introduced by Prof. Jackson or Johnson, and proper stress laid on the necessity of improving the barometer, on account of its great superiority in determining the height of mountains.

The meeting then adjourned, and the members went to Prof. Silliman's residence to partake of his hospitality, where they enjoyed a most intellectual treat.

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FOURTH DAY.

After the previous day's minutes had been read and corrected, the names of several new members were presented for approval as was the case yesterday.

Prof. C. N. Shepard then gave a very interesting account of a new locality of meteoric iron, at the head of St. Augustine Bay, on the southwest coast of Madagascar. The information came from Lt. H. C. Flagg, who touched at a town at the head of that bay in the John Adams, U. S. ship of war. The people are in the wildest possible state of savages: their hair is long and black; features Caucasian; clothes of not much account; and their only weapons the spear and fish hook. When the John Adams' people offered these savages some American iron in exchange for provisions, &c., they rejected it with disdain, saying that they had native iron in their own island of a far superior quality, and pointed to some elevated land about six or eight miles in the interior, where they said they found large quantities of pure malleable iron, and many large boulders of it—one boulder being at least sixteen feet in diameter. This iron they skilfully worked up into spear-heads of a very destructive and superior character, and fish-hooks; their great skill in working this iron they obtained from the buccaneers, who frequented the island very often after the capture of Mozambique by Vasco de Gama. Prof. Shepard said he had analysed a part of one of these spear-heads, and found it to be true meteoric iron; it contained nickel. Its specific gravity was 7.8, and its analysis gave—

Iron,	96.66
Nickel and traces of cobalt,	3.34

and the structure was different from that of any pure iron that we know of. The largest specimen of meteoric iron previously known, was a piece of about 30,000 pounds, in South America. This piece found in Madagascar, if correctly described, must be much the largest. Certainly the deposit in Madagascar is a very extraordinary one. It is certain that this iron came from Heaven, although it has since been put to very base purposes; for just before the ship John Adams reached Madagascar, the crew of a British merchant vessel were murdered by these very natives; and the spear in the room probably drank the blood of a son of "perfidious Albion."

THE SEA HARE.

Prof. Shepard then exhibited a very fine specimen of a curious and rare animal called the sea hare by the ancients—*Lepus Marinus*. The animal is of an oval form, with peculiarly shaped tentacula; when the animal is moving in the water, its tentacles look like the ears of the hare in running. Pliny frequently speaks of the *Lepus Marinus*, although he never described the animal. This little animal was supposed to be most deadly poisonous, and whoever touched the peculiar blue liquid which is emitted from its body, was considered by the ancient Romans as sure to die within as many days as there are days in the life of the animal.

Prof. Silliman.—How did they get at the number of days in the life of the animal, sir? (Laughter.)

Prof. Shepard.—That was determined, sir, by the number of days at the end of which the person died. (Increased laughter.) Nero was supposed to have been poisoned by it; Domitian, it was said, poisoned his brother with this fluid; and it was commonly believed that this fluid was one of the most powerfully concentrated poisons in the world. Apuleius was once arraigned on a charge of poisoning, merely because it was proved that he once employed a person to catch one of these little sea hares. Whereas, it is now known to be one of the most harmless and inoffensive little animals in the world. It is a true moluscula; its class is the gasteropoda of Cuvier, and of the order techtebranchiata; *and this is the only species of that order ever found in our waters.* I obtained it on the shore at Charleston, S. C. It could scarcely move when I took it from the water. As soon as I placed it in a white pocket handkerchief, it drenched the handkerchief with a beautiful carmine or deep purple fluid, as though it had been drenched with blood; this appears to be its only mode of defence and is discharged from an appendage close to the gills, through millions of pores, there being no general outlet; secreted like saliva; it has no ink bag, like the cuttle fish, but like it, can discolo the waters round it; it will color a hogshead of water as dark a port wine. It lives along the shore; feeds on fuci; the body i five inches long, and the foot is five and a half inches long. I could not come from the West Indies; it is a slow traveller an has many enemies. A different species is found in America others at Marseilles and Barbary.

GOLD AND DIAMONDS OF BRAZIL.

Prof. Shepard then made a few very interesting remarks on th elastic sandstone of the gold region. He produced a specime from Buncombe county, N. C., which very much resembles th elastic sandstone of Brazil. In Charleston he met with a ver eminent scientific man named Shreiver, of Hessia, (formerly a stu dent of Gottingen) who had passed a year or two in Georgi making observations, and who had several specimens of this beaut ful sandstone. He had been induced to collect these from tl fact that Baron Eswege had, in describing the gold and diamon regions of Brazil, shown that the elastic sandstone prevails ex tensively there. The fact also induced Dr. Eglehart tc searc carefully the Ural Mountains, and there he found this elastic san stone in abundance. He then predicted that diamonds and plati would soon be found in those Ural Mountains, and on searchin that region, both diamonds and platina were found there. This mineral was itacolemite ; interlaminated with primary rocks, mica slate, and talc slate. It was 100 feet thick in Hall county, and takes a northeast and southwest course, on the east bank of the Chattahoochie, through Habersham and Raeburn counties. At one locality in Hall county, they actually found a diamond at one of the gold washing deposits ; it was worth about $35. Another diamond was found by a workman, which was unfortunately broken in pieces. Mr. Schreiver examined this mine after it was abandoned, and washed the sands there carefully for two weeks, but found no more diamonds. But still, said Prof. Shepard, there is not the slightest doubt but that plenty of diamonds will yet be found in those regions. This place was at Linnville Mountain, Burke county, N. C. : it is a spur which puts out from the Blue Range, near the Black Mountain ; the Linnville River is on the north side of it, and the Katawba River is on the south side of it ; there, and twenty-five miles off, at Broad River, there must be many valuable gold mines. From the course of the rocks, Prof. S. thought he would find it intermediate between Burke and Raeburn counties, and on examination he did find it there. By the report of the geology of South Carolina, page 17, by Dr. Tuomey, this mineral is found in Pickens county, S. C., with conglomerate talc and oxide ; and at another locality forty miles east, in York county. Thus, this curious formation of elastic sandstone is very extensive in the south, and is every where connected with the auriferous or gold region. And from the analogy of this rock with those in Brazil and the Ural Mountains connected with the gold region, there is not the least doubt, but that before long we shall find in Georgia and the Carolinas a valuable diamond-bearing rock. This rock is properly of a transition character ; for although there is some difficulty in classifying it, as some portions seem strongly to partake of the character of rocks of the primitive series, yet the diamond-bearing rock is undoubtedly of the transition order ; it is in layers not conformable to the stratification of the country ; and we must search it out, not where it is indubitably of a primary character, but where it partakes somewhat of a secondary character. In Stafford county, Conn., we have also a kind of flexible sandstone called firestone ; a mica slate slightly flexible ; but the talcose slate, usually found with the gold and diamond-bearing rocks, with us runs out.

Dr. Jackson asked if any platina has yet been found in the United States ?

Prof. Shepard—None.

Jackson—I have seen a letter from Alexander Humboldt, in which he says that from the similarity of our gold region to that of Russia and Brazil, he has no doubt but that we shall find gold and diamonds in them.

Prof. Olmsted said that twenty years ago he saw two specimens of this flexible sandstone at a farm house in Lincoln county, Georgia, five miles south of Graham's Iron Works; this was also in the gold region. One piece was as flexible as an eel; it was six inches long and two inches diameter; it was cylindrical and shaped like an old fashioned pestle. I asked the farmer to give it to me, but he refused, and he must have had the organ of firmness largely developed, for when I asked him to sell it to me, he said he had concluded to keep it; but he consoled me with this remark, that if he could have made up his mind to part with it, he would not have charged me a cent for it. (Laughter.)

Dr. Jackson said there was a mineral very much like it that was used instead of granular quartz at the glass works in Keene, New-Hampshire. Was it possible that gold might be found in situ in that region. Native gold has been found in Vermont.

Prof. Shepard said it was doubtful if the native gold said to have been found in Vermont came from that State originally. It might have been washed to the spot.

Dr. Jackson alluded to Gen. Field's specimen, which undoubtedly was found *in situ* in New-Hampshire.

Prof. Dewey—Well, but gold has been washed out of the sand in Vermont.

Professor Shepard—Yes, sir, but it is believed the sand had first been salted with gold. (Laughter.)

Dewey—Well, I should like to know who can be salting the earth in this way.

Prof. Hall said he always looked upon the flexible sandstone to be a sedimentary rock.

Prof. Shepard—That agrees with the opinion of the French traveller. He was a little confused where to place it; but some of it was evidently a transition rock; and the diamonds and gold in Brazil are found only in sedimentary rocks.

Prof. Booth said that there was a large diamond in Philadelphia that had been found in a pudding stone with oxide of iron and manganese.

Prof. Shepard said that those found in the gang were not considered genuine.

TAKING SILICA OUT OF VEGETABLES.

Dr. Jackson then related a very interesting process he had invented of depriving vegetables of their silex. This was resorted to in order to use common reed poles to make paper and cordage &c. He used for this the fluohydric acid.

For this purpose he used a lead cylinder full of reed poles crushed and moistened; he placed some fluor spar in a lead retort on a sand bath ; he poured on the fluate of lime some sulphuric acid ; this drove off the fluo-hydric acid, which, passing through he reeds in the retort, entirely deprived them of their silica, which silica was precipitated in the glass through the lead tube, in a gelatinous deposit. In this way most beautiful paper could be made of cane poles, or common reeds ; as tough as bank note paper, and quite white. Fluor spar was four cents a pound. It is a good node of analysis, also, and only occupies about five minutes. We an use straw or grass, &c., instead of poles, and we have also ound that milk of lime first passed through the cylinder will take ip much of the silex from *green* cane poles.

Mr. Redfield said that Gov. Reed of Bermuda had sent out to iim a quantity of the fibres of the arrow root plant, after the rrow root had been pressed out of it ; and that if any one wantd to make paper out of it, he should be happy to supply them vith any quantity.

Dr. Jackson then introduced a specimen of Kenkrenite and one f Nepoline, found at Litchfield, Maine ; the same, precisely as is ound among the gold, &c. of the Ural Mountains. They are the rst specimens ever found here.

Dr. Jackson then gave the result of his analysis of the Rosenale cement, and the Connecticut hydraulic lime ; and stated hat the best quality of these was when the oxygen of the bases as in such a proportion as to form a bi-basic compound. He dded that the presence of manganese, of sulphuric acid, of potsh and of soda had been too much overlooked in these compounds.

Prof. Rogers read a paper on the slaty cleavage of rocks, and a aper by Mr. Storer of Boston was read on the "Fishes of merica.

The meeting then adjourned.

AFTEROON SESSION.

Prof. Coffin read a brief paper relative to the prevailing winds North America ; and pointed out the fallacy of making observaons by the old mode ; for example, out of twelve observations, if four instances the wind blew from the north, in three from the uth, two from the southwest, one from the west, and one from e southeast, the prevailing record would be that the wind mainly lew from the north for a given time ; when in fact the prevailing inds would be from the southward. He also pointed out the error calculating surface winds, and various other erroneous matters ito which ignorant men, self-styled "wind-regulators," have illen.

The winds follow a uniform track from a point nearly west ; d then from the north, toward the Rocky Mountains. But we have a less decided law in regard to wind than nearer the equator, and get out of the influence of the trade winds. Whenever the winds are registered, the change in the barometers must also be noted. The observations at the surface of the earth are very imperfect.

Mr. Redfield said that the War Department ordered, *erroneously*, that in all observations on clouds, the course of the lower strata of cloud should be noticed. This was all wrong.

Prof. Rogers trusted that Messrs. Coffin and Redfield would prepare a digested report of the prevalent course of the winds, and the systematic currents of the earth's atmosphere, on this Continent.

Prof. Olmstead hoped this would be done; and then the term "inconstant as the winds" would become obsolete; and it would be seen that the winds obey laws as well as other bodies in nature.

Mr. Redfield hoped the inquiries and reports would be independent of each other.

Prof. Rogers said that it was well known that committees of one always worked much better than any others: but there was a way to make committees of two work twice as well as committees of one—by each making an independent report.

Mr. Redfield declined, because of other business.

Finally, Prof. Coffin was appointed to post up all the vagaries of the winds on this continent.

Prof. Bailey made some very interesting remarks on that singular plant found in mines, which glowed with a phosphorescent light, making the mines look like enchanted palaces. It is called *Rhizomorpha*; he exhibited some specimens of it, which he had found in this country, not in mines, but in between the bark of the decayed stumps of old chesnut trees. He said it would be found by search, in the stumps of any decayed trees. It looked like a lot of small dark brown strings, fibres, or tendrils of decayed plants, but when taken into a dark room, it exhibited a beautiful phosphorescent light. It appeared to do this by the absorption of oxygen and the exhalation of carbonic acid; a reverse process from the ordinary combustion of vegetables. Any person could get this plant out of the fields, and exhibit the phenomenon in his own parlor. It appeared to be phosphorescent, however, only whilst growing.

Prof. Rogers said that the phosphorescence of the glow worm was also supposed to be owing to the absorption of oxygen, and the exhalation of carbonic acid gas, a similar process to the respiration of animals.

Dr. Jackson said that common calcareous spar, when placed on a hot shovel, becomes one of the most beautifully phosphorescent substances we know of. It glowed fiercely with a golden yellow light.

Dr. Jackson then read a paper on the copper mines of Lake uperior, in which he showed that the copper ore of that region s largely mixed with silver, particularly in the valuable mine on agle River. In a ton of the rock ore as delivered by the miner n the bank, he found, by analysis, that there was the following alue: Of silve , $87.25; copper, $42.10; total value, $129.35. o that it was more properly a silver than a copper mine. He xhibited some very fine specimens of the silver and copper obained from that place.

The meeting then adjourned.

FIFTH DAY.

COPPER MINES OF LAKE SUPERIOR.

Prof. Jackson had said in his statement that the islands between ake Huron and the Sault St. Marie were of the same fossiliferus character as the limestone of Niagara. At the Sault we come the red sandstone. Here the rapids are two or three miles wide nd nearly a mile long; the fall is about 18 feet; it would be very asy to make a canal round them, as the excavation for the whole ile would be in soft, grey sandstone, easily blasted, and the sides f which would form good walls for the rocks. On the flat round between the Sault village and the Lake there is a large uantity of boulders of many tons weight; of sienite, porphyry, reenstone, trap rock, with epidote and sandstone. These have ll been brought hither by drift ice; and we have abundant proof f this all along the shores of the Lake. There are two well arked old shores of the Lake. One is a gravelly beach a short istance off, and another is at the base of the hills; and there is a rge bog between the two. The soil on the hills is good, and suports fine trees—rock maple, birch, larch and Norway pine. rue, there is no limestone on the borders of the Lake; but there e enormous veins of calcareous spar, enough for all the purpos of fluxing the copper ore; and the old red sandstone which found up the Lake will just do to build the smelting furnaces ith. The rocks dip all round the Lake towards the water at an gle of about 18 degrees, and run N. E. and S. W. The preiling rock in the neighborhood of the copper is coarse conglomate, with trap dykes intersecting. The ore is a hydro-silicate copper, and was known to the old voyagers as the green rock. eins of black oxide of copper have been opened at Point Keeewenon that contain from 60 to 70 per cent of copper. Bluffs conglomerate and trap dykes intersecting are found *in place* beveen Agate harbor and Eagle harbor, with veins of calcareous spar, interspersed with datholite and pieces of pure native copper these have the same evidences of igneous origin as the trap rock There is also a vein of phrenite 4 feet wide, and every crystal in which had a crystal of copper attached. In short, every vein tha is found or opened in that region, (no matter what the base is contains more or less silver. But the best mine yet found is th ore on Eagle river; the vein is from 1 to 13 feet wide, and the vein contain metallic copper and silver; amygdaloidal globules wit crystals of copper and particles of silver; and frequently we sav pure copper and pure silver in the same globule. We also fin leaf copper and leaf silver; and octahedral crystals of silver (Dr. J. here exhibited fine specimens of all these minerals.) Th great copper rock found on the Ontonagon river had serpentin attached to it; and the only copper we find that is mixed up wit serpentine is on Isle Royal, whence that great rock must have bee carried on a raft of ice and landed above the rapids, as there is n copper *in situ* within miles of where it was found. In Nova Sco tia the copper that is found is just where the trap goes through th sandstone, and igneous action has probably reduced the ores t native copper. But the copper on Lake Superior, I confess, think to have been *part of the primary copper of the globe*, (a Dr. Houghton also does,) brought up from the molten mass by th trap rocks. It is a badly wrought slag; as if old Pluto had no separated all the metal from the slag before he let the trap roc push it up for the service of man. There is one vein of coppe 11 feet wide and one mile long, that will repay all the outlay o the Company. The Cornish miners there have sunk four shaf on the banks of the river, intending to work the mine under th river. One shaft is already 60 feet, another 40, another 30 fe deep—all done by hand power. The deeper they go the riche the mineral is; and it contains about one-fourth silver. Col. Gra tiot has the superintendence there. And in working one singl exploration shaft at the Eagle river mine, the metallic conten brought out by hand are worth $30,000! The rock is amyg daloidal, and blasts very easily; it does not take more than twen ty minutes to make a hole for a blast. There is no water in th shafts at all, although they have worked down 25 feet below the be of the river; and instead of the water of the river troubling them when the dam is built it will be their greatest friend. The wate will raise the ore from the mine, pound it, blow the blast for th smelting furnace, and saw the wood for the buildings. The pre vailing ores there are the black oxide of copper and the silicate o copper; there are no sulphurets of copper found in the whole re gion. One valuable large vein contains, in the clear ore, 25 pe cent of copper, besides silver; and the deeper they go the bette it becomes.

Prof. Dewey suggested that if that was the case universally, he best plan for speculation would be to buy *under* somebody. (Much laughter.)

Dr. Jackson warned people, however, against being too sanguine; there would be a good many poor mines opened there; and is many bad speculations as there were in the Maine timber lands. (Laughter.) The copper veins are easily found; they run south 25 degrees west, and wherever we find a ravine with the depression conformable to that line we are sure to find a vein of copper; or a wet place in a ravine where the plants grow luxuriantly, it is a proof that the vein decays faster than the enclosing rock, and that vein is copper. The best flux necessary to reduce copper ore is he calcareous spar, and that is found in great abundance there. The great question is, "Will these copper veins hold out?" In he West India copper mines the native copper changes to sulphurets as we penetrate the mine. The laws of gravity are in favor of the fact that the deeper we go the richer will be the vein. How shall we go down in the earth until we come to that spot where we can ladle out the melted copper? I forget how far Professor Rogers said that would be.

Prof. Rogers.—About ten miles! (Laughter.)

Dr. Jackson.—We have abundant proofs in our specimens that he copper and silver must have melted together; we find silver in he copper, but we never find a trace of the copper in the silver. We find also zigzag veins of silver running through the copper. Now if we try to make an amalgam of these metals, if we melt the copper and bring the silver to a contact with it, part of the silver will unite with the copper and the rest remain pure silver in mechanical contact with it; but if we melt the silver and bring the copper in contact with it they will thoroughly amalgamate. And his singular segregation we find done by nature in the copper veins of the Lake Superior region. The plan proposed for separating he copper and silver in these ores, is to make all the copper into blue vitriol, then make the silver into a chloride of silver, reduce it, and send it to the mint. The copper ore will be broken up at he mine, carefully washed and picked, and then packed up in kegs and sent down to Boston to be smelted. There is also an ore of antimonial silver found in these mines. The sandstone of this region has no copper in it; but at the point of contact with the trap rocks, there is a little native copper. The rich vein of black oxide of copper opened at Fort Wilkins is 14 feet thick, and contains 0 per cent of copper. In a ton of the rude ore, as delivered by he miner at the pit bank on Eagle river, there is the following per centage:—

Of Silver	\$87 25
Of Copper	42 10
Total	\$129 35

And in a ton of the ore as delivered at Boston, there is $568 worth of silver and over $200 worth of copper; so that it is more properly a silver mine than a copper mine; 17 lbs. 9 oz. of the clean metal was obtained from 50 lbs. of the ore, by careful assay; 50 lbs. of copper ore gave 11 lbs. 4 oz. in large pieces of coppei and silver, besides the washings; and an assay of that yielded 662 grains of pure silver, or equal to 25.2 of silver to a ton of ore.

Dr. J. also stated his observations on temperature. On Lake Superior, in August, the air was 53.8 Faht. at noon; the wate was 48.2 Faht. in lat. 47 deg. North. On Lake Huron, July 23d, the air was 66.5 Faht. noon; and the water was 68 Faht. both observations taken while the winds were blowing pretty fresh.

Prof. Shepard expressed great doubts whether the copper region of Lake Superior would not be a failure after all. He though it was a formation analogous to the new red sandstone of the Connecticut valley. Copper was found in numerous places along thi valley, diffused through quartz and barytes spar, and entangle with trap at the contact surface of the primary and secondar rocks. It was found thus chiefly on the western frontier line o the secondary; at Rocky Hill near Hartford, and at Enfield Falls Here was found native copper, red oxide and black oxide of cop per, copper pyrites, &c.; all washed down from their original ma trix into the valley, and washed into the crevices of the sandston He conceived this valley to have been once a lake, at the botto of which were large masses, sheets and boulders of copper. The came the trap dykes fusing up to the surface, and brought up th copper, through which they passed, the copper resting on bo sides of the trap as at Mount Carmel. He conceived Lake Sup rior to have been originally a primitive formation; the new re sandstone was found on either side of the Lake; and the copp found there was swept by waters into the vertical chinks of th sandstone; then as the trap came through it melted the copper or producing results analogous to those in the Connecticut valle and thus he concluded that the Lake Superior copper ore is merely superficial formation reduced from copper ores pre-existing in t sandstone. The presence of silver could also be accounted for; the great copper regions of Germany which exists from the coa of the Elbe to the banks of the Rhine, in the rich copper mi wrought near Rottengen in 2,000 tons of copper there were foun 20,000 marks of silver, or equivalent to 10,000 lbs. weight silver.

Dr. Jackson said he had doubts before he went up to La Superior, but he is now satisfied the copper ores there could n have been reduced from sulphurets by the action of trap dyke

You may melt a sulphuret of copper in a furnace 1000 times, but you never can reduce it to pure copper unless carbon be present. He was also satisfied that the calcareous spar veins, containing copper which he found there, are true igneous dykes, cutting up through the strata the same as the trap dykes; and that the copper ore of that region is part of the primary copper of the globe. The ore had been traced for a mile, and contained 70 per cent of copper. But still he warned the public against any wild-goose speculations there.

TRAP ROCKS, &c.

Dr. Whelpley then made a few remarks on the theory of the trap rocks of the Connecticut valley, &c. He observed that the new red sandstone here was bounded by ridges of primitive; the dip of the sandstone was a little to the south of east and the trap comes up through conformable to this dip. The trap goes east of north through Connecticut to Massachusetts. Serpentine and argillites principally compose the primitives on the borders. The whole of Connecticut, the west half of Massachusetts, Vermont, &c. were once covered with this new red sandstone. It is seen isolated at Woodbury, Conn.; where the trap is pushed up through the sand, it has vitrified it. The sandstone between the dykes is soft and friable.

Some considerable discussion here took place relative to the origin of the crescent-like form of the trap, which by Mr. Whelpley was thought to be owing to the obliquity of the trap in the original formation, and by Mr. B. Silliman, Jr., to surface denudation.

FRESH WATER FORMATION IN OREGON.

Prof. Bailey gave a very interesting account of specimens of fossilliferous siliceous infusoria, brought from Oregon by Lt. Fremont; they were similar to those found now beneath the peat bogs of the United States, and had ceased to be an object of surprise, although they must cease to be an object of interest. There was an unusual degree of interest attached to these infusorial strata of Oregon, as they occurred under circumstances unparalleled. They are all fresh water infusoria; and are from near the river on the eastern flank of the Cascade Mountains, which are volcanic and are 15,000 feet high, in long. 121° 10′, lat. 44° 35′. Over these infusorial strata there is a deposit of scoriaceous basalt 100 feet thick, beside other strata. So that these smallest specimens of creation have been thus hermetically sealed up to the present day.

Prof. Rogers observed it was a subject of the highest interest that we had at last found a *genuine fresh water formation in the United States*; and over which remains the lava of volcanic craters now extinct, like what is met with in Central France. It was a most interesting matter ; and at the proper time he would show that there was also a fresh water formation on the Upper Missouri, and also many others he hoped to find in the United States.

Prof. Bailey said that nearly all these fossil infusoria that he had examined were of species that now existed. He showed drawings of the Eunotia gibba, Spicula of Spongilla, Gallionella distans, Surillella splendida, Gallionella nov. sp., &c. &c.

Prof. Silliman said, then, that down to the limestone of the Hudson river series, &c. we had these microscopic forms accompanying us as far as we had any proofs of life at all.

Prof. Hall said that Lt. Fremont had found specimens in Oregon of the cretaceous period, and some very similar in lithologica formation to the Bath Oolite ; also south of this he found an argillaceous limestone, and fossil ferns in shale ; these were east o where the infusoria were found. The whole of the Oregon regior was of the greatest interest to the geologist. Through several degrees of it to the south of where the above were found, there existed immense salt lakes and mountains of salt. And through al the recent limestone formations there the trap rocks have passec up and disturbed the strata from the Rocky Mountains to the Pacific shores. And over all there were seen numerous extinct vol canic hills, and also some volcanoes still in activity.

The meeting then adjourned to dinner.

AFTERNOON SESSION.

After some trifling preliminary business, such as arranging th order of committees, &c. the President said that the subject for th afternoon was

THE TACONIC SYSTEM OF ROCKS.

Mr. Haldeman stated that Mr. Emmons considered he had dis covered a new sedimentary rock much older than any of the Silu rian series.

Prof. Rogers said himself and his brother had long since show that all those rocks, supposed to be older than the New-York Pa leozoic rocks of the Apalachian chain, are parts of that same serie of rocks, folded and changed by plication—by some change o mineral type, and by igneous metamorphoses, which had almos destroyed their fossiliferous character. If Professor Emmons' so called Taconic System was correct, we should have had whol mountains and plains made up entirely of this group. Not merely as he says, that the Taconic rocks have been uptilted and then th fossiliferous rocks of New-York been deposited on the uptilte edges of the Taconic rocks—the earliest life-bearing period of th globe. Emmons places the lower Silurian rocks of England, an his Taconic rocks, on a level long anterior to the New-York group.

But his fossils, on which he rests this data, are identical with those of the Trenton limestone and the New-York slate. Some few are ıot identified as yet : but it is impossible to go into a new locality of an old and well explored region and not find some new fossils : but all these others evidently belong to the same species we have ılready described as belonging to the New-York system. The Nereites of Prof. Emmons give no evidence of belonging to a ower group than those of the older Silurian of England, or the New-York group to which they had already been referred.

Prof. Hall then exhibited a section of the rocks from the slates vest of the Hudson river, crossing the Hudson near Troy, and going east to the Connecticut river. He denied that these were ny older than the old Silurian range of England, or than the fossilliferous rocks of the Hudson, or Paleozoic groups. He found in hem trilobites and encrinal stems and univalve shells precisely imilar to those of the Trenton limestone, between Troy and the own of Adams ; and still farther east he had found that singular nd characteristic fossil, the *Scolithus tubulites* in the granular uartz. If they were an entirely different series of rocks, as Mr. Emmons said they were when he called them the Taconic group, ve should not have found the fossils so closely allied to those of ıe other formations.

Pof. Rogers confirmed this view.

Prof. Dewey still had his doubts about it. He thought they vere older than the old Silurian group.

[The views of the gentlemen who took part in this discussion f the merits of the Taconic system are erroneous. They misunerstand the principles upon which the system is based. Instead f being based on fossils it is really based on *superposition ;* the owest member of the New-York system being superimposed upon ıose of the Taconic system unconformably. The fossils are emloyed only as collatteral evidence—and the statement made by Ir. Rogers in regard to them, is far from being true—for there is ot a single fossil of the taconic system which is found in the New-Iork system. Whoever, then, rejects the taconic system, rejects ıe very principles which he maintains in other cases ; it would e equally consistent to reject the evidence we have of the diverty existing between the carboniferous and new red systems. Mr. ogers says, if the so called taconic system was correct, we should ıve had whole mountains and plains made up entirely of this roup. Though we deem this remark as of little importance, ıll it is just what we have. The taconic range of mountains, ith their valleys and plains are well known parts of the taconic system. The remarks of Mr. Hall are equally untrue. We chal lenge that gentleman, or any other member of the association, t(produce a fossil of the Trenton limestone from a member of th taconic system, and Mr. Hall knows full well that up to the tim of this meeting, not a single fossil common to the two sys tems has yet been discovered. We are happy, however, in ob serving that the views of Prof. Dewey coincide in the main wit our own, and also, that many more distinguished men are adoptin views favorable to the separation of the taconic rocks from thos which constitute the New-York system.]

ALABAMA PRAIRIES.

Dr. Kane exhibited some specimens of chalky fossil and rock from the prairies of Alabama, similar to the green sand of Del ware; the bottom of the tertiary. Also some curious statemen about the boring for water by artesian wells near the Tombigb river.

The convention then elected the following officers unanimously

Dr. Jackson, of Boston, President for next year.

B. Silliman, Jr. Permanent Secretary.

Prof. Silliman then gave a very brief but interesting account the iron mountains of Missouri, 700 feet high, made up of lar blocks (not strata or veins) of hydrated peroxide of iron; and t meeting adjourned to hear Prof. Rogers' lecture at the Midd Church on volcanoes and earthquakes; after which they all h an elegant supper and conversazione at Mrs. Whitney's hospitab mansion.

SIXTH DAY.

The Chairman, Dr. Dewey, having taken his leave of the Ass ciation last evening, with a few appropriate remarks, on the no ination of Prof. Olmsted, Dr. Binney, of Boston, was elected Chairman.

Dr. Jackson expressed his sense of the honor done him by ele ting him as Chairman for next year.

On motion of Prof. Rogers, it was

Resolved, That a committee be appointed to memorialize t Legislature of the State of New York on the subject of diffusi the Reports on the Geology of that State.

Prof. Silliman, Prof. Rogers and Dr. C. T. Jackson were a pointed a committee for that purpose.

Mr. Dana then read his report on a new and philosophical system of nomenclature, the principle features of which are as follows :

The name originally given to a group or species by its founder should be retained to the exclusion of all subsequent synonyms; he system having originated with Linnæus, this law is not to extend to the writings of antecedent authors.

When several genera are united in one the name of the earliest, f otherwise unobjectionable, should be selected as the name of the whole group.

When a genus is subdivided, the original generic name should ot be canceled, but retained for that portion of it which was considered typical by the author.

When a generic name has a synonym exactly equivalent with it n its original application in making a subdivision of the genus, his synonym should not be adopted as the name of either of the ew genera formed; *except* when its type belongs to a different ection of the genus from that of the other name, and both sections are elevated to genera.

A name of a species already in use for another species of the ame genus should be changed; also a generic name in Zoology efore employed for a genus in the same kingdom.

When the name of a species is afterwards made the name of a enus to include that species, a new specific name should be given.

In writing systematic names the rules of Latin orthography hould be adhered to, except in words derived from proper names, n which only the termination should be latinized.

The best names are those derived from the Greek or Latin languages; the former being preferable for generic names and the latter for specific.

Mr. B. Silliman, Jr. read a paper by Lieut. Johnson, on the Geology in the neighborhood of Fort Ouchita; 70 miles south of he fort he found the same limestone that is found to the north f it, but altered by action of heat with nodules of iron. At Ft. Vayne, on Red river, he found Lignite or Bovey coal, and alum eposit, with springs impregnated with alum; and he believes that he whole of that region was once a large lake rising over all the ills in the neighborhood, and in which the mastadon, &c. used to ambol and luxuriate. Still farther on he found granite rocks, imilar to that found ten miles south of Fort Ouchita; also fifteen niles north and west of the fort; also, limestone changed by eat, containing iron; west of this the granite bears east and vest; then the limestone bears south 10 degrees east; then the trata become warped and stand east and west. And in many laces he found where bitumen had just ceased to flow; and one lace where it was still flowing. The extensive settlement of

Texas, away towards the Rocky Mountains, is *geologically impossible*, for the greater part of it is an uninhabitable desert, incapable of cultivation; leaving the habitable portion of Texas a place no larger than the state of Missouri.

Prof. Hall remarked on the utility of crustacea in the identification of strata. He had identified 60 species and 22 genera of trilobites in his recent survey. He also stated that he had had for two years in his possession a specimen of *a recent trilobite* (a remarkable and new fact) picked up on the shores at New Bedford; the eyes are precisely like those of the trilobite (pediculus marinus trilobus) and so is the general shape of the body; he believed it a genuine species of calimina; although the trilobian structure was not quite so perfect as those of the fossil trilobites o: the Dudley and Trenton limestone.

Mr. B. Silliman, Jr. then read a very interesting paper by Dr Dickerson, of the Geology of the Mississippi Valley, which showe that stalactites and mastodon bones have been found in the Natche bluff. Also, a description of a curious animal found in the Mammoth Ravine, as it is called, near Natchez, which is styled th "nondescript." Its head was 18 inches long and 11 inches wide there was a place for a trunk like that of the elephant; the tusk were 11 inches long; there were no traces of any eye sockets; n foramina for the passage of an optic nerve; no place for eyes a all; it was a blind animal; had 16 teeth; its fore leg was fiv feet long, and very powerful; the bones were completely fossilized, and were very ferruginous.

Another paper, by Col. Wailes, showed the miseries that wer suffered in Mississippi for want of any rocks or stones; on th account, they had nothing to check the overflowing or off-cuttin current of the river with; no stones to build embankments with no stones to make roads with, or to keep roads in repair; n stones to build abutments for a bridge; so there are no bridges no stones to build cellar walls with; so all the houses are built o sticks. Truly, a lamentable state of things for Mississippi. Th paper also spoke of the numerous bones of the mastodon, foun in the mastodon ravines in Mississippi. The only stone found i Mississippi, is that found at Grand Gulf and Jackson; it is a te tiary sandstone, very poor, and liable to decay; and the Sta House at Jackson is built with it. The only waterfall in Missi sippi falls over this sandstone and is *five feet high!* In the bluf near Walnut Hills, fossil shark's teeth and many fossil shells a found. Iron ore has not yet been worked in Mississippi, but the are many beds of iron in the state. The marl is abundant, an will be very valuable to the planter; and can be found in an of the ravines; 700 bushels of marl have been put to the acr and the crop of cotton, corn, &c., has been much increased thereby and exhausted cotton lands can be renewed by it, avoiding the necessity of opening new plantations; this marl contains 35 per cent of carbonate of lime. Specimens of nearly 20 mastodons have been found above the blue clay, and in such a state as to show conclusively that *these mastodons perished where they are found!* The teeth, &c., of the fossil horse have been found, showing that these antedeluvian horses were not unfit associates for the horses of the present day! And above all other remarkable facts, there has been found actually *a piece of human skull* lying in the same bed with the nondescript blind animal before descriped, and in a state which shows that this piece of the human skull has undergone precisely the same changes as the bones of that animal, and the same degree of fossillification. There can be no mistake in this being the skull of a human—an animal that walked upright; and one that must have lived at the same time with that nondescript animal. Some remains of the large Saurian have also been found in the blue clay near Jackson, Miss.; the joints of the bones are beautifully perfect, six inches in diameter, and twelve inches long. This animal was 100 feet long, and is believed to be found only in the United States. Shark's teeth, &c., were also found in the same soil.

Prof. Rogers regretted that more had not been done towards determining the geological age of the basiloro-saurian, or zeuglodon. He moved a resolution that a committee be appointed to enquire into and determine the geological age of that animal. This was carried, and Prof. Rogers was appointed that committee.

Prof. Bailey read a very curious paper on fossil coniferous wood.

Mr. B. Silliman, jr., then called attention to the abundance of cobalt found in the mine La Motte, Missouri.

Dr. Jackson then said that the glass-makers of New-England were much troubled by the cobalt in the red lead made from the mine La Motte lead ore; it makes blue flint glass instead of white; and is easily tested by putting the red lead in a crucible and melting it with borax; if a blue bead results, then cobalt is in the red lead.

AFTERNOON SESSION.

Mr. B. Silliman, Jr., then made a few very interesting and able remarks on the cypress trees of the Mississippi region, and of the bayous of that place. He alluded particularly to the peculiar manner in which the cypress tap roots and knees grow under water, and convert water into land.

Mr. Whelpley then made some remarks on the similar way in which the northern lakes were filling up with vegetable matter.

Mr. B. Silliman then read a paper by Dr. Webber, on a new form of attraction.

It was then resolved that the committee on State surveys should be continued in connection with the United States linear surveys. Professor Rogers proposed that this society should be called the "American Society for the Promotion of Science;" the initiation fee to be two dollars, the annual payment one dollar, and a fund to be raised for publishing and forwarding their views; and also to apply for an act of incorporation. Laid over till next year.

The following names were then announced as committees on the sedimentary deposits of rivers:

Mississippi River—Dr. W. W. Dickenson, Riddell, Forshay.

Connecticut River—Prof. Johnson, Dr. Barrett.

Kennebec River—Prof. Loomis.

Susquehannah River—Prof. Haldeman.

Some remarks were then made on the value of the phosphates in agriculture; and Dr. Jackson showed that Earl Dundonnald pointed this out in his work in 1795, long before Liebig ever thought of it, or was born.

Various votes of thanks were then passed, and the Association broke up in high glee, till September, 1846.

[From the Farmers' Cabinet.]

JAMES GOWEN'S REPORT TO PHILADELPHIA AGRICULTURAL SOCIETY.

To the Committee on Farms:

Gentlemen—It is known to most of you, that since I became farmer, I have spared no pains to fulfil the duties of the calling, i a manner creditable to the community in which I live, as well a to myself and the Agricultural Society to which I belong—tha while improving my own practice, I have endeavored, by sundr means, to stimulate others to compete with me in spirited effort to arrive at excellence in the highly useful and delightful pursuit of agriculture; and to promulgate as far as in me lay, such im provements and results, as were likely to promote the general in terests of the farmer. In carrying out this object, I have as pa of the system, always been found competing in crops and cattl for the premiums offered by "The Philadelphia Society for pro moting Agriculture." It is therefore in accordance with this prac tice, that I now present my farm as worthy of note, when yo come to award the premiums committed to your distribution: i view of which, and in fulfilment of the rules and regulations of th society, I submit for your consideration a general statement of i character and condition.

The homestead farm contained, when I removed to it in 1834, about 60 acres; since then I have added to it by purchase, some 40 acres, all of which is contiguous; making over 100 acres, exclusive of the woodland farm in Cheltenham township, Montgomery county, part of which is cleared and worked by me, and is in fine condition, as you may recollect from my communication on the crop of rye raised there in 1842.

From long neglect and a bad practice, previous to my coming on the homestead, I found it in every respect in a wretched condi-ion. The results of bad ploughing and bad seeding, were visible n the unevenness of the surface; and the pernicious weeds that seemed to have entire possession. I at once took up the old fences which divided about 40 acres into small fields, ploughed it up, eradicated the briers and brambles that filled so large a space along those fences, and removed the stones within ploughing depth. It was cropped according to circumstnnces—alternately with potatoes, corn, grain, &c., until the soil had been brought into proper sub-ection in the fall of 1839; when it was laid down for grass, by sowing it with grain and timothy; since which it has not been disturbed, with the exception of about eight acres in rye, this year; and yet this last summer it cut, I may safely say, two tons to the acre, and expect it to do as well next summer, should the season prove favorable. By this practice I brought every inch of the land to bear, and saved ten years expense, or wear and tear of the six fences which formerly stood inside this section. The fields in future will be divided by hedges of the *Maclura thorn, or Osage orange*, raised by myself; four of these hedges already in, with plenty of quicks on hand to supply the remainder. These remarks you will please observe, apply to the land lying on the southeast side of the lane that divides the farm. The land on the northwest side, opposite, called the Spring fields, was, if possible, in a still worse condition. Owing to the swampy nature of part of it, and the washings from the higher lands on the other side the lane, the posts were every spring thrown out of place as the frost left the ground, while the ravines furrowed out by the thaws and heavy rains, set at defiance all attempts at cropping or farming. To obviate the yearly setting up of the fences, which was not only expensive but vexatious, I substituted a stone and lime wall for the post and rail fence. The wall is about half a mile long, is two feet below the surface at every point, two feet broad at base, and averages over six feet high from bottom, ending with an eighteen inch coping. One large under drain, with grating at mouth, takes the water from the lane, while several smaller drains keep the surface of the land perfectly dry. The ravines were well killed up, and ever since, for a series of years, good crops of potatoes, corn, grain and grass, have been taken, where formerly grew spatterdock and rushes.

The land added to the farm at sundry times within the last five or six years, was, in the general, in as bad a condition in many respects, as the worst of that already described; indeed, it could furnish material for a more repulsive picture than any that has been drawn yet; but as most of you have repeatedly seen it in its original state, I need not trouble you with a description. To show its condition now, I need only remind you, that two years ago I obtained a premium for raising upwards of four hundred bushels of Mercer potatoes to the acre, on this land; and that on the succeeding year, from the same potatoe land I took upwards of fifty bushels of wheat to the acre, without any additional manure. Also, that last year I submitted a field of some seven acres of corn, on another portion of this land, which yielded at the rate of 200 bushels of ears, equal to 100 bushels of shelled corn, to the acre. My reports on the condition of these fields, and the aforesaid crops, are in possession of the Society. The corn land was in this year with potatoes and oats. The potatoes, four acres, yielded over 200 bushels to the acre; the oats were very good—it is now laid down with wheat and orchard grass. This sketch, with your own personal observations, will afford you some idea of what I had to contend with, and what I have accomplished in the way of improving land, and the present condition of my farm.

From the difficulty and expense in procuring manure from the city, and after three or four years experience in that mode of supply, I gave it up, and adopted the plan of making a supply on the place, by an increased stock of cattle; from which I have derived my sole supply ever since, with the exception of light dressings of lime and gypsum, and a small lot of stable manure which I was tempted to purchase a few weeks since at auction, and which I can dispense with, should I meet a purchaser before its removal in the spring. The keeping and breeding fine stock had in itself strong claims upon my judgment, as well as my taste; as I could never think a farm was what it should be, unless it could exhibit fine cattle, as well as an improved culture. To maintain this stock and bring my land to a high state of cultivation, by the most efficient and economical practice, has been a leading object; and to accomplish this, required no ordinary management on such a farm. The stock in cattle has ranged for years, from forty to fifty head, in addition to the necessary horses, with a large stock of swine for breeding and fattening; and these I have fed from the produce of the farm, except the purchase occasionally of some straw, and supplies of mill-feed for the horses and swine, and some meadow hay for the cattle, selling frequently its equivalent in timothy. During the same period, I have sold hundreds of bushels of rye, some wheat, and on an average, four hundred bushels of potatoes annually, with some three to four hundred bushels of carrots, besides providing for the family. But the chief income was derived from the cattle, of which I shall speak more at large presently.

My expenditures during the whole period, could not be otherwise than large; as I could not put up so much stone fence, and picket fence, as inclose my farm, without incurring a heavy outlay; but I view these improvements as cheap in the end. It may be safely inferred, that there is not at this day, any farm of the same extent in this part of the country, that can so easily be worked, or will require so little expense for a series of years in keeping the fences in order, especially when the hedges are taken into account. I am also of opinion, that taking in view the condition of the soil, as to depth and richness, as well as its being entirely free of stones and other impediments, that I can make it produce as much as any farm of its size in any part of the country, for a series of years, and at as small an expense.

The secret of keeping so large a stock on so little land, consists in my practice of partial soiling, and green crops, whereby I make some four or five acres do the work of thirty acres, in the "slow and easy go way." From May to August, my cattle are confined to one or two fields, most commonly one, to which they are driven, more for exercise, in the cooler parts of the day, than for pasture; they being fed in the stables, early in the morning, at noon, and at night, with food cut for them from a lot adjoining the barn-yard. This food is generally of lucerne, orchard grass and clover, oats and corn. The patches from which the corn and oats are cut, are always sowed with turnips in August. No one can credit, unless he has had proper experience in the matter, the quantity of food that one acre of lucerne, one of rich orchard grass and clover, and one of oats and corn, afford from May till August, nor can he estimate the great saving in manure, much less the comparatively good health of the cattle, from not being exposed on naked fields, under a fervid sun, toiling all day in search of food. This practice allows me to crop almost the whole of the land, and to make some 120 to 150 tons of hay annually. In the fall, from August till November, the cattle have the whole range of the mowed lands, as I do not cut second crop grass for hay. Then for winter feed, I have always an acre of sugar beet, half an acre of sugar parsnips; half an acre or more of carrots, for my horses; and generally three to four acres of turnips. I report to the committee on crops this season, over 100 tons of these roots. In 1843, I gathered from one acre, 1078 bushels of sugar beets, 60 lbs. to the bushel; carrots at the rate of 687 bushels; sugar parsneps, 868 bushels. This year, 972 bushels sugar beets; 970 bushels carrots; 700 bushels sugar parsneps; and from three and a half acres, 2500 bushels of turnips, sowed with timothy seed.

The farm buildings consist of three substantial stone barns, one 70 feet by 33, another 50 by 26, and another hipt roof with cupola, 57 by 25, besides a large overshoot stable and hay-house, stable high, of stone, 60 feet by 30—the lower floors of all these are made of broken stone and lime, planked, being vermin proof. There are also a corn crib capable of holding 1200 bushels corn, one barrack, ample hog pens, and sheds for carts and wagons. The barn buildings have been filled this fall to their utmost limit, except the corn crib.

A substantial stone wall encloses the principal manure heap; the drainings from this heap are led into a place of deposit, in which are received also a drain that runs under ground from the kitchen, as well as drainings from the pig pens, and the washings from all the yards. These drainings form an important item in the supply of manure to my land; it is a saving which I cannot estimate at less than $200 a year. This liquid by a simple process is applied to the patches of roots, &c., and to this may be ascribed my great success in raising such crops.

The dwellings, green-house, shrubbery and gardens, I need not describe; but it is in point to notice the nursery of young ornamental trees, and Maclura for hedges, raised on places mostly waste on other farms, from which I have an ample supply for my own setting out, and a considerable stock to spare of Magnolia Tripetalla, or Cucumber tree, and Silver Maple, of fine size, suitable for transplanting. I sold over fifty dollars worth last spring of these trees, and have several hundred dollars worth still on hand, for sale.

Of improved cattle, my first effort was with the celebrated "Dairy Maid," still owned by me. Her first calf, Leander, by Whitaker's Prince of Northumberland, was reared, and kept by me, for breeding. Dairy Maid's calves alone, exclusive of Leander, have already sold for more than $500. It would be curious to trace her profit at this day, by stating an account of her first cost, her keep, and that of her son Leander, crediting her by sales of her own calves and grand calves; deducting for the portion of capital which was invested in the dams that produced the grand calves. To do this would extend this paper to an unusual length. Suffice it to say, that Dairy Maid has long since paid for herself and that those who laughed at me for giving $540 for one cow may turn this statement over in their minds, and think, whether since 1838 any investment of theirs, to same amount, in any other branch of husbandry, has paid so well. But they may exclaim "I cannot do the like again." Yes, I can—for if the price of fine cattle be reduced through their becoming plentier, (thanks to those who made them plentier,) the principal invested may not be so large, in the purchase of one animal to begin with, but there can not be a doubt if she be superior or superlative, the produce of of such an animal will realize as good a percentage in future, as did that of Dairy Maid. But there is a satisfaction beyond that of the pocket, and that is, that Dairy Maid's breed will be of infinite service to the country. Her calves and grand calves, are pretty well scattered already—and I make no doubt, but wherever found they will demonstrate the high character of the parent stock.

My sales for the last two years, exclusive of Dairy Maid's calves, amount to over $2000. The stock now on hand is about forty head, principally Durhams, among which are Dairy Maid, Cleopatra, Walnut, Victoria, Ellen Kirby, Miss Model, Victorina, July, Bessy Bell, &c. &c. The butter sold for the last two years exceeds $750; this is a respectable item, when the calves that were reared and the supply for my family are taken into view. From early fall to spring, the butter averaged 70 lbs. per week—the quality highly appreciated abroad, as well as at home. In butter, cream and milk, there is no stint at Mount Airy; so of fruits, vegetables, hams, &c. If I be a large producer, I may be also classed as a large consumer; and did I not produce, the markets would have to suffer accordingly.

In the hog line, I have been quite successful, at least in bringing the animal, by judicious crossing, to great perfection. I fatted off my old Lincoln and Berkshire boars, and my Hampshire and Chester county sows, last month; they weighed from 400 to 450 lbs.; sold for $86.24. Have sold the last two years of pigs, designed for breeding, $150. Bacon, lard, &c. over $120, besides having on hand 14 fine young barrows, last fall's pigs, now ready for slaughter, which will weigh from 250 to 300 lbs. each, value $150. The stock on hand consists of one fine boar of Lincoln, Hampshire and Berkshire breed; one brood sow of Berkshire breed, twelve shoats and seven pigs. The sow and pigs are the same that took the premium at the last agricultural exhibition.

Building and work, independent of the farm, induced to the keep of a heavy stock of working horses, consisting of five, employed occasionally hauling stone, sand, &c. They are the same horses originally purchased at and since the commencement of my farming operations; having neither *sold*, *lost*, nor *exchanged one*. The two carriage horses average 20 years old each; my favorite of these is quite 25; so much for management in this department. The implements—wagons, carts, ploughs, harrows, &c., &c., are in keeping with the farm, and are well kept as you may have observed.

I keep no farmer on the place, in the character of manager, having never as yet been able to find a man qualified to conduct the operations of the yard and field in manner as they should be.

My practice is to hire one man for general work, at $20 to $25 per month; also, two hands for out-door work alone, who are capable to work at any job of farming; they have employment from early spring till first of December, at 75 cents per day—these three find themselves. Then there are two men engaged constantly, feeding and taking care of cattle, feed, manure, &c., who receive from $10 to $12 per month and found. By this arrangement I have always a pretty strong force to act on emergencies, and to avail myself of seasonable operations. My work is generally wel done and timely done.

I have thus given you a general insight into the condition o my farm, and the system by which it has been brought to its present state of perfection. If substantial fences, clean fields, wel worked land, good crops, good barns and splendid cattle, be essential to constitute a good farm, I trust you will find none of thos features wanting on mine.

Very respectfully, your obedient servant,

JAMES GOWEN.

Mount Airy, December 24th, 1844.

AMERICAN CHEESE.

On the motion of Sir P. Egerton, one of the members for th county of Cheshire, a return has been laid upon the table of th British House of Commons, relative to the importation of foreig cheese which exhibits the following figures :-

	From Europe.	America.	Total.
1841,	254,995	15,154	270.149
1842,	165,614	14,098	179,712
1843,	136,998	42,312	179,310
1844,	160,654	53,115	213,769

By this statement we find that the importation of America cheese has quadrupled during the last three years, and during th last year the importation amounted to 53,115 cwt. To ou American friends we say—send to this country nothing but a goo article—introduce more color into it, and we are sure that in ano ther year England will use four times the quantity of its previou consumption. We shall also be pleased to find that the manufac turer and exporter get a larger share of the prices for which it i sold in England.

The writer of this has now upon his table an American chees equal to the celebrated "Stilton" for which twenty-five cents pe pound is obtained, while this excellent "American" is sold a thirteen cents only. A similar return has also been made by orde of the House of Commons, containing an account of the quantities of cured provisions of all kinds imported into England from our colonies and foreign countries, for the year ending January 5, 1845.

The following are the particulars of the return :

	1843.	1844.
Salted beef, ...	60,633 cwt,......	106,766 cwt.
Salted pork, ...	27,118 "	30,780 "
Ham of all kinds,..........	6,919 "	6,732 "
Bacon, ...	418 "	36 "

It also appears that a large quantity of that imported in 1844 was taken for ships' stores, viz: salted beef 77,248 cwt.; salted pork, 16,987 cwt.; hams of all kinds 6, 298 cwt.

GERMINATING SEEDS UNDER COLORED GLASS.

The following remarks by Mr. Hunt, the Secretary of the Royal Polytechnic Society, in England, relate to a most curious discovery; and one which may prove very useful to the cultivators of rare exotics. We hope some of our readers will be stimulated to repeat the experiments, and to send us the results.

"It is scarcely necessary to explain that every beam of light proceeding from its solar source is a bundle of different colored rays to the absorption or reflection of which we owe all that infinite diversity of color which is one of the greatest charms of creation. These rays have been known to possess different functions.

"The light which permeates colored glass partakes, to some considerable extent, of the character of the ray which corresponds with the glass in color; thus blue glass admits the blue or *chemical* rays, to the exclusion, or nearly so, of all the others; yellow glass admits only the permeation of the *luminous* rays, while red glass cuts off all but the heating rays, which pass it freely. This affords us a very easy method of growing plants under the influence of any particular light which may be desired.

"The fact to which I would particularly call attention is, that the yellow and red rays are destructive to germination, whereas, under the influence of violet, indigo, or blue light, the process is quickened in a most extraordinary manner.

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AGRICULTURAL GEOLOGY.

On the agricultural adaptations of that portion of the Taconic Region which comprises the Counties of Dutchess, Columbia, Rensselaer and Washington in the State of New-York, and Berkshire in the State of Massachusetts.

The adaptation of certain belts or sections of country for particular products, is one of the first subjects to which agriculturalists ought to direct their study. As yet it has received but little attention, and that little has been bestowed in so vague a manner that the data hitherto collected are insufficient to found a sure basis of agricultural practice. We hear, for instance, of a wheat-growing region; of a grazing country: but the reason why they are particularly adapted to these ends is imperfectly understood. If the inquiry is put to the farmer, Why certain parts of the western country produce wheat? he would be puzzled to return an answer, and perhaps would be obliged to state the simple fact that the land is found by ample experience to yield good crops of this grain. And again, if the inquiry should be varied and put into this form, Why cannot wheat be raised in a certain other section of country? the answer would probably be similar to the preceding, or simply an appeal to experience. It is true, that in some cases, a particular cause may operate locally to interfere with the growth of a given crop, as the prevalence of insects, or some other equally deleterious temporary influence. These special cases, however, are not those we have in view, and hence will not affect the truth of our proposition, that the particular adaptations of certain belts of country require farther investigation than they have hitherto received.

The condition and composition of a soil are important points of inquiry; inasmuch as upon these, and a few other modifying causes, depends the peculiar adaptation in any given instance, and the capability of being fitted for any given product in its highest state of perfection. It is proper, however, to proceed with greater particularity, and enumerate the most important circumstances which modify, or in fact create conditions, that adapt soils for certain kinds of crops. It is proper to say that causes operate in very different degrees, or they are not by any means of equal power; and it will probably be found that some, which have heretofore been but little thought of, act with greater effect than has been suspected. Of the circumstances which modify the adaptations of soil, it is considered that the presence of sand, clay, and of many of the earths, are among the chief. In addition to these, the character of the subsoil, and of the surface rock, are quite important. Then, again, climate is not to be left out of the list of modifying causes. Only a slight variation in this particular may in many instances forbid the cultivation of crops, which, at a little distance only, are profitable. But in considering the crops adapted to a particular region, it is undoubtedly proper to make the following distinction, namely: those which will grow tolerably well, and really ripen their seeds or fruit; and those which reach a high state of perfection (the quality of the first class being inferior to that of the second). Now here is a case which requires a nice judgment, and the question of profit comes up; and it is on the question of profit alone that the farmer is to decide whether he will grow this particular crop, or some other. It is not whether it will grow and make something; for it is sometimes the case that the whole question of profit turns upon the difference of value between a good article and a middling one, and it may be supposed that the difference of expense in cultivation will be in favor of the good article. This will appear to be true, when we consider that where nature has done her work well, there is less left for man to do: he is saved much labor and expense in preparing the ground. But then again there is another question to be considered, namely, that though the producer cannot compete in market with an article superior to his own, yet will it not be profitable to cultivate it for consumption at home, or in the family; or will it be better to pay in labor at the rate of one dollar for a bushel of wheat, than eighty-seven and a half cents in cash to a neighbor? There is still another view of the subject, and it is one which relates to the adaptations of certain sections of country. It is this: As Mr. A.'s farm produces excellent corn, and Mr. B.'s produces excellent wheat, may they not effect a mutual exchange of their products; or, if they choose, each of them turn their grain into cash, and thus supply their wants at a cash price? These are questions which are continually arising, or at least ought to be considered and taken into the account before a farmer determines upon a particular crop or a particular kind of husbandry. The bare fact that a particular kind of grain will ripen, is not sufficient cause why we should engage in its culture. The questions are, will it be profitable in market; will it be more profitable to consume it at home, than to furnish my family with it by means of cash in hand? The expense of taking to market, and of going to market to buy, will often decide these questions. A farmer, for instance, can afford to take cheese or butter to market, but not wheat or oats.

With these remarks, we proceed to the subject before us, the character and adaptations of the soil of the counties we have named at the head of this article. These counties, taken as a whole, possess great uniformity of soil, as well in the composition as in position and exposure. This uniformity is due to geological causes: causes, which, on the one hand, originated the soil, and, on the other, distributed or spread it over this particular territory; and we may as well speak of these causes now, as at any other time or in any other place. In the first place, we need only say, that the soils were derived from the same rocks upon which they now repose. This is not often so distinctly the case as in this instance. The result here is due to two causes: first, the strike of this system of rocks; that is, they extend nearly north and south several hundred miles, passing beyond the Provincial line on the north, where they still continue in this same direction through the eastern counties of Canada. The second reason why the soil is the same as that which the rock would produce, is, that the special agent, whatever it may have been, which was instrumental in distributing the soil, moved from north to south. In consequence, then, of the great extent of these rocks to the north, and of the movement of the soils from north to south over them, they possess the same character that they would have held had they never been subjected to the distribution here described. It is unnecessary to dwell farther upon these geological facts : it is sufficient to state them in this place as facts, which we may at some future time consider in other points of view. We may, however, refer the reader to an article in the third number of this Journal, on the subject of *drift*, in which the facts and principles relating to the movement of soils is treated generally. It will be seen that the subject is one of great interest, and is of much practical importance.

This belt takes in one entire system of rocks in breadth, extending, according to observation, from the Hudson river and Lake Champlain, to the foot of the Hoosic and Green mountains in Massachusetts and Vermont. It passes over one entire range of mountains, viz. the Taconic, lying between New-York and Massachusetts, and extending north into Vermont and Canada. The breadth of this belt is between thirty-five and forty miles ; and so far as physical and chemical characters are concerned, the soil of this whole belt is very uniform. Far to the north, climate will of course alter or change the husbandry ; but were it not for this, we might consider the belt as extending through Pennsylvania and the Southern States. As climate is an important element in husbandry, we propose, first of all, to call the reader's attention to this subject.

Climate.

From what has been observed in regard to the extent of this region, it will be understood that there must necessarily be both variations and differences in its climate. Extending far north, it must necessarily pass into a rigid climate ; and to the south, into one that is mild and temperate. Between the Canada line on the north, and Mount-Pleasant on the south, there must obtain a difference of 3 – 4° in mean annual temperature. There will also be found a difference of temperature between the level of tide water at Hudson, Albany or Troy, and the mountain belts which traverse this region from north to south, of between 4 and 5 degrees. Nevertheless, with these differences of temperature either from latitude or elevation, none of the ordinary products fail of returning good crops, when well cultivated.

The climate of this region will be better understood by giving the results of observations, commencing in the north at Granville, Washington county, lat. 43° 20′. Its elevation is estimated at 600 feet above tide. Its mean temperature, as observed, is 46°.03. Its mean temperature due to latitude and elevation, is 45°.41. This gives 0.46 lower temperature than the mean for the State of New-York.

Salem, 18 miles south of Granville, lat. 43° 20′. The observed mean temperature is 45°.54. Temperature which is due to latitude and elevation, 45°.59. This result is 1°.35 less than the mean for the State.

We select, in the next place, a town upon the eastern verge of the district, viz Williamstown (Mass.), lat. 42° 43′. Elevation 800 feet above tide. Mean temperature, as observed, 45°.59. Calculated temperature, 48°.16.

Lansingburgh, which is nearly west from Williamstown, on the extreme western verge of the district, is the next place at which observations have been made. Elevation, 30 feet above tide. Mean temperature, as observed, 48°.17. Due to latitude and elevation, 47°.96.

Poughkeepsie, on the east bank of the Hudson, lat. 41° 41′, and elevated 50 feet above tide. Mean temp., as observed, 50°.74. Due to latitude and elevation, 49°.67.

The last and most southern point to which our observations are intended to extend, is Mount-Pleasant, in lat. 41° 09′, and elevated 125 feet above tide. Temperature, as observed, 50°.08. Due to latitude and elevation, 50°.30.

The difference of mean temperature, as observed, between the most northerly and southerly points of observation, is 4°.94, within a range of latitude of 2° 11′.

Several of the places in the range of our observation are noted for the extremes of heat and cold, or for the wide range of the thermometer ; and some are noted for early frosts, which in some places are ten days earlier than at others. North-Salem, Kinderhook and Lansingburgh experience frosts earlier by ten days than does the valley of the Hudson generally ; and the opening of spring, too, is many days later at the former places. These latter considerations are important practically. The foddering season is thereby lengthened, and the maize crop runs a greater hazard of being cut off or injured by frost, and hence the necessity for the farmer to put in requisition all his means to secure this crop from a failure.

The changes of temperature, though they are gradual as we ascend the Hudson, are more sudden and abrupt at some spots than can be accounted for either in elevation or in latitude. It may be, and probably is, often due to cold winds, from which some points are less sheltered than others ; and were our observations extended, so as to embrace a greater number of places, many more would be found in this section of country equally bleak and frosty.

From data obtained from the Reports of the Regents of the University of the State, it is found that this belt of country does not enjoy so mild a climate as Western and Central New-York. The extremes are greater and more sudden ; though it is questioned whether it is not as exempt from early and late frosts as those parts of the State, with the exception of the limited belts which extend along the inland lakes. In the Taconic region, there are no bodies of water to exert a perceptible influence either in retarding the appearance of frosts in the autumn, or in warding them off in the spring. In this section, however, the severity of the frost never destroys forest trees, as it has in some parts of St. Lawrence county, and it is extremely rare that their foliage is injured to any great extent in the spring. Corn, when in the blade, rarely suffers in those places where it can be grown to advantage. The leaves are, indeed, sometimes killed to the ground, but the plants immediately spring up and grow without suffering damage.

Quantity of rain.

Our data are insufficient for the whole district, as the observations are limited to four or five places. Selecting a single year, we will give the results which have been obtained.

In Granville, Washington county, the whole quantity of rain which fell during 1844, was 28.88 inches. In Lansingburgh it was 26.94 ; Kinderhook, 39.49 (and the average 35.55 for 9 years). In Mount-Pleasant, 23.31 (in 1832, it was 53.46 ; 1834, 40.97). As these places are all virtually in the valley of the Hudson, the average quantity of rain which fell in that year was 30.35 inches.

The number of clear days at Kinderhook the same year, was 195 ;

at Lansingburgh, there were 209. The number of cloudy days at the former place was 122; at the latter, 111. These places are central for the Taconic region, as it regards north and south. At Granville, Washington county, in the north, there were 192 clear days, 174 cloudy, 51 rainy, and 16 snowy days. Towards the south, at Mount Pleasant in Westchester county, it was clear 199, cloudy 166, rainy 107, and snowy 19 days. These observations are strictly in the valley of the Hudson. The results would be different if observations were made along the bases of the Taconic and Green mountains.

Geological relations of the underlying rocks.

The surface rocks, as a class, are slates, differing somewhat in durability, or power to resist the action of the weather. Those of the valley of the Hudson are more disposed to decomposition than those of the eastern part of the district. Limestones and sandstones form only narrow and inconsiderable belts, running in the direction or parallel with the mountains and hills. The following is considered as a sufficient description of the rocks of this system.

Skirting the valley of the Hudson, and the shores of Lake Champlain, a green slate constitutes the surface rock. It embraces a few thin non-fossiliferous beds of impure limestone; besides which, it is often traversed by thin seams of calcareous spar. This slate is often fragile, and disintegrates easily; and it forms an excellent argillaceous soil, though it contains some lime. At many points it crops out beneath the Calciferous sandrock, one of the oldest rocks of the New-York system. This belt of slate forms the surface rock almost fifteen miles in breadth; or, it continues east to Canaan in Columbia county, where it is succeeded by the Sparry limestone, a rock which is about 500 feet thick. In composition, this slate is composed of silex, alumina and iron, with a trace only of magnesia and lime. Seams of white quartz are not uncommon. But this slate does not resemble in composition the Hudson river shales, although it is considered by many as identical with them. It contains more alumina and iron, and much less lime and magnesia: the iron is in a state of protoxide. Some inconsiderable patches or belts of it are largely charged with what appears to be a mixture of the hydrous peroxide and the carbonate of iron. When composed thus, it forms a deep red soil, which yields excellent grass for sheep or cattle. A place opposite Catskill is of this description, and may be seen from Catskill point.

The Sparry limestone forms a long belt, running near the base of Petersburgh mountain, north through Arlington in Vermont. A point where it may always be recognized, is the tunnel for the Great Western Railway. The tunnel is 500 feet in length, and 200 feet below the surface, and is wholly in this limestone. The adjacent slate is black, in consequence of decomposed pyrites. This limestone contains some alumina and magnesia. It may be distinguished by its checkered appearance, which is owing to narrow seams of white calcareous spar traversing a dark blue ground ; for there are certain other limestones which resemble this, and from which it cannot be known with certainty unless inspected in place. This rock decomposes slowly, and thus makes but little soil. Slate of a coarser kind succeeds the sparry limestone eastwardly ; and it is immediately to the east of the sparry limestone, that the range known as the Taconic mountains occurs. These are almost entirely made up of a silvery gray slate, in which we find rarely thin beds of impure limestone : it is called magnesian limestone. This rock forms a warm soil ; but most of the country where it is found, is high land. It abounds in masses of milky quartz, in the cavities of which we find carbonate of iron. Chlorite also is common, and is mostly associated with the quartz.

At the eastern base of the Taconic range, we find the Stockbridge limestone. It is white, gray or clouded, and is frequently a dolomite or a magnesian limestone. When thus composed, it is often very friable and tender, and subject to disintegration. It is also frequently siliceous, and then it is equally disposed to crumble. It forms, in both cases, a warm and excellent soil for maize and grass.

Another range of slate succeeds the Stockbridge limestone on the east ; but as its characters are nearly the same as that which forms the Taconic mountains, we pass it by without further remark.

The last rock of this system, is the Granular quartz. The lowest part of it is a puddingstone or conglomorate, sometimes a ferruginous breccia. The main body of the rock is an indestructible fine grained sandstone. Sometimes, however, it is granular and friable and then forms the white sandy quartz. The soil it makes is coarse and siliceous in an eminent degree.

The rocks which we have now imperfectly described, form belts which run nearly north and south to an indefinite extent, and parallel with each other. Sometimes they are intercepted by the opera tion of a variety of geological causes. On the east side of this system, the quartz rock reposes against and upon the gneiss and mica slate of the Green mountains; and on the west, the Taconic slate passes beneath the New-York system in the Hudson and Champlain valleys, which fact may be seen at Burlington, Charlotte and Addison in Vermont, and at Whitehall, Bald mountain, Galesville, Granville, Lansingburgh, Troy and Greenbush in New-York, besides many other places which might be mentioned. The order in which they may be studied to the greatest advantage, is to pass over the system from west to east, or from the great vallies of the Hudson and Champlain to the top of the Green mountains. The bands or belts of rock which have been described, will be found in the range of the places which have been given, either north or south of them as the student may be located.

Springs of water.

The springs which gush from the Taconic hills, and which have their origin mostly from the slate, in many instances yield comparatively pure water; at least, it contains less lime in combination with acids, than is found in the water from the slates of the Hudson river. We have springs which contain only four grains of solid matter to the gallon. A few weak chalybeate springs flow from the slates without regularity: they are all small, and take their origin from the slate, charged with sulphuret of iron or pyrites. The most interesting springs, however, are the nitrogen springs of Hoosic, Lebanon and Williamstown. The water of these springs is soft, and has a temperature above the mean of the place in which they are situated. They do not come out from any one of the rocks exclusively, but are supposed to indicate a fracture extending deep in the bowels of the earth, and with which they are connected. These springs, too, are the largest which occur in this vicinity, some of them discharging sufficient water to turn a mill-wheel. The wells of the valleys, especially when sunk in clay, fill with hard water, and frequently contain gypsum in solution; but when sunk in gravel or sand, they often furnish soft water. The temperature of the water of some of these wells is as low as the mean of the place, not differing much from 45°.

The form and surface of the whole section under consideration is well calculated to furnish a great abundance of water, in springs, brooks and rivers. It is, in other words, well watered; and what is of the greatest importance, a very large proportion of the farms might be irrigated by the small streams of the hill-sides, although as yet no attention has been given to this very feasible and efficient method of increasing the productiveness of the soil. The small quantity of lime which these streams frequently contain, would be a useful acquisition to the vegetation of the region.

Forest trees and wild plants.

The whole range which we have under consideration, forms but one botanical region. There are, it is true, plants of the mountain and plants of the valley, yet the mountains nowhere become strictly alpine. The greatest change appears upon Graylock, the highest point in this region, where the forest trees become dwarfish, but by no means excessively so.

The number of species of wild plants growing in this region will not differ materially from 1500, exclusive of the Cryptogamia. There are upwards of seventy species of forest trees, including, however, a few of the dwarfish or shrubby willows. Of the order Coniferæ, we find the *Pinus strobus*, white pine; *P. rigida*, pitch pine; *P. canadensis*, hemlock; *P. balsamea*, fir; *P. alba*, single spruce; *P. nigra*, black spruce; *P. fraseri*, Fraser's pine, on Saddle mountain or Graylock; *P. pendula*, hackmatack; and *P. resinosa*, yellow pine: the two junipers, also, grow upon the dry hill-sides. Of the Amentaceæ, there are four native poplars; six birches comprising the white birch of the mountains, the yellow and the black birch of the ordinary hill-sides and forests, and the *glandulosa* a shrub of the swamps; the chestnut, whose station is upon the moderately high ridges; the beech of the plains and hills; the buttonwood on the banks of streams; and eight or ten species of oak: black, white, red, chestnut, shrub, quercitron and post oaks. We have also two elms (the american and the slippery), and five maples: the elms occupy the low lands; two of the maples occupy the plains and lower hills, and the mountain and striped maples are found upon the mountain sides.

In this region we find about eighty grasses belonging to the order Gramineæ, or true grasses; and over one hundred of the order Cyperaceæ, or cypress-like grasses, being the coarse grasses of the swamps.

It does not appear that the distribution of plants in this region is influenced by the kind of rock which has furnished the subsoil, with the exception of a few instances in which a limestone basis seems to have produced spots congenial to a peculiar growth.

FACE OF THE COUNTRY.

All that is peculiar to the surface of this region, may be described n a few words. It is, in the first place, hilly, and the hills are long owards the more mountainous parts, and run north and south. Towards the western slope, adjacent to the valley of the Hudson, hey are more rounded, like haycocks, and rise up from circular lepressions, many of which are peat swamps with marl, and always ontain more or less muck. The hills are frequently composed of ounded gravel, but sometimes of that kind called flat gravel. Upon he extreme eastern border, the hills are highly charged with cobbletone, derived form the granular quartz. Cobblestone almost as urable, of a reddish kind, occurs in the western hills, derived from he Potsdam sandstone and a siliceous variety of the Calciferous andstone.

The hills under consideration are those usually called "drift ills;" that is, they were formed by the great northern current of ater which passed over this country at a former epoch. The time hen this event happened is not determined, only it was one of e latest of the great changes which have happened, and which ere preparatory for the residence of man. We regard the drift urrent, then, as having given shape to this country; as having worn own all the asperities of the rocks; as having mingled the soils om the different rocks; in fine, as having performed in these reects most essential changes of the surface, and such as were well alculated to favor the operations of the husbandman.

The actual elevation of some places will convey to the reader a etter idea of this region, than if we confined ourselves to general atements. Along the eastern margin of the region, in Massachuetts, we have the following elevations, namely: Bed of the Hoosic ver at Williamstown, 580 feet; Adams village, 764; Lenox vilge, 1178; Pittsfield, 1035; Richmond, 1091; all estimated above de at Albany. Sheffield rises 630 feet above tide water at Derby Connecticut. The elevation of the Taconic range, between Neworl and Massachusetts, is from 1200 to 1600 feet. From this height, the Taconic range gradually diminishes to the level of the Hudson. The hills are less and less elevated till we reach the vicinity of the river, which is bordered or edged by a range of hills about 200 to 250 feet in height. This elevated ridge is found on both sides of the river, and is distant from it three-fourths of a mile or less, so that the width of the immediate valley of the Hudson rarely exceeds two miles. Without occupying more space in detailing the facts relative to height, we may state generally, that along the same ranges north and south, the height of the places given is an index to those which are omitted; that is, the valleys situated north or south of Hoosic, the height of which has been given at certain places, will give the approximate heights of places in the same range north and south for the valleys or for the mountain ridges; and to form a just idea of the face of the country, we have only to conceive long narrow valleys bounded by long narrow hills or mountains. The northwestern slope, where the rock appears, is always steeper than the southeastern. Where the hills are merely of drift, they are steepest upon their north sides.

The upper half of the Taconic range is too steep for the plough, especially on its western side; but on the eastern side, it is, or may be ploughed for two-thirds the distance to the tops of the mountains. This peculiarity in the steepness is owing to the uplift of the rocks, which break out, and are bare, or more or less exposed upon their steep sides; and it is here that their dip will be found, and that they may be seen to plunge steeply to the southeast at an angle varying from 30 to 60°.

The passage of the drift over the surface of the rock has worn it smooth. This circumstance has an important bearing in determining the condition of the soil, as it favors the passage of water over the surface, and serves to dry the soil sooner than if it were rough. Especially are the channels which are cut by the drift movement upon the upturned edges of the slate, calculated to effect a speedy drainage.

We conclude our remarks on the face of the country, by referring the reader to the woodcut fig. 1. It represents the eastern face of the Taconic range, as seen from the south end of Stonehill in Williamstown, Massachusetts, and looking southwest.

Taconic range of mountains.

Soils of the Taconic Region.

We have already estimated this as forming one botanical region: so too we may say of the soil, that it is but one, and similarly constituted throughout the district under consideration. By this generalization, we do not mean to convey the impression that sand and clay and other elements are so mixed together that neither predominates throughout the whole region, and that there is an entire uniformity of soil; but we intend to say, that if any one town, or indeed almost any part of a town, is selected, its soil will represent that of any other town in the region; or the kinds of soil which are found in any given place, are also common to other places. Then, again, the adaptations as a whole are remarkably similar: or, to employ another comparison, the rocks, for instance, are mostly slates, yet there are small belts of limestone and of sandstone; but these are so inferior in extent that they do not impart a predominating character to the system, while the slates have a predominating character. So we may say of the soil, that although sand and clay are found, they are too limited to give character to the region. We of course leave out of view the clays and sands of the tertiary formation.

The first character we have to notice, is that the soil is a *course soil:* it is not only often full of cobblestones, but it is of a coarser grain by far than the western wheat soils. This we consider as one of its best characters: it admits air freely, and is not at all disposed to pack. We never see rain water standing in pools upon the surface, but it invariably sinks out of sight. The color of the soil is a light drab, darker when moist; the lightest colored being the poorest. As a whole, the soil is a proper admixture of the elements clay and sand, the former in combination with the protoxide of iron.

The local distinctions which are made, are the following: First, clayey soils, which occupy the vallies and the lower elevations, or the bases of the hills; and secondly, gravelly and sandy soils, occupying also the vallies, but more commonly the hills: clay is often beneath. The clayey soil has not the tenacity which belongs to the plastic clays; that is, it does not adhere with a death grasp to one's boots or shoes: it is usually a sandy clay. Where the clay is deep beneath the surface, the soil is inclined to be leachy, though rarely immoderately so, and there is scarcely a patch of this description which may not be cured of this infirmity. The kind of soils termed alluvial, are confined to the banks of streams, and are necessarily narrow, in fact mere lines. It is extremely rare that intervale land extends a mile from the banks of the river on which it is situated : this is even true of the Champlain and Hudson vallies.

ANALYSES OF SOILS.

1. We select one from Columbia county : it is of a light gray, and was taken from a field of corn in Chatham 4-corners. The corn was in a flourishing condition, and had been lightly manured with stable manure. The soil was composed of

Water	5·00
Vegetable matter	6·00
Silex	78·50
Peroxide of iron	6·25
Alumina	3·50
Carbonate of lime	0·66
Phosphate of magnesia	0·16
	100·07

2. A specimen of soil from over an impure limestone in Hoosic alls : texture coarse, with angular grains, reddish and uncultivated.

Vegetable matter	5·00
Water	3·00
Silex	78·00
Peroxide of iron	8·50
Alumina	4·00
Carbonate of lime	1·40
Phosphate of magnesia	0·10
	100·00

3. A soil from Sheffield, on the eastern side of the Taconic range, nalyzed by Pres. HITCHCOCK, by the alkaline method ; the result, owever, does not differ in the main from that given by the acid method.

Water	2·00
Vegetable matter	2·00
Silica	70·68
Alumina	11·61
Oxide of iron	10·10
Lime	0·80
Magnesia	1·63
Soluble salts	0·15
Loss	1·03
	100·02

4. A peculiar calcareous soil of Berkshire was found by Pres. HITCHCOCK to be constituted thus :

Water - - - - - - - - -	3·80
Soluble geine - - - - - - -	0·93
Insoluble geine - - - - - -	1·90
Carbonate of lime - - - -	30·57
Sulphate of lime - - - - -	1·40
Phosphate of lime - - - -	1·03
Lime - - - - - - - - - -	0·09
Silica - - - - - - - - - -	46·43
Alumina - - - - - - - -	6·82
Peroxide of iron - - - - -	4·01
Magnesia - - - - - - - -	1·03
Loss - - - - - - - - - -	1·30
	100·00

But this soil is rare, and is only found in the immediate vicinity of a decomposing limerock. We give it for the purpose of showing the excess of lime it contains. It is a very fertile kind of soil, and might even be advantageously employed as a manure on the adjacent and poorer portions of land. Its color is red. We have observed that soils of a reddish cast, when occurring near a limestone, are always fertile ; and Pres. HITCHCOCK supposes, that as the iron was originally in the state of a carbonate, it furnishes carbonic acid to the growing plants during its own conversion into an oxide.

5. Analysis of the marly clays of Berkshire and Williamstown, by Pres. HITCHCOCK :

Silex - - - - - - - - - -	60·24
Alumina - - - - - - - -	15·53
Protoxide of iron - - - - -	7·57
Carbonate of lime - - - -	11·70
Magnesia - - - - - - - -	1·86
Water - - - - - - - - -	2·30
Loss - - - - - - - - - -	0·80
	100·00

6. Another analysis by the same author, of a specimen of marl from Pittsfield :

Geine - - - - - - - - -	6·60
Phosphate of lime - - - -	0·70
Carbonate of lime - - - -	86·40
Carbonate of magnesia - - -	0·46
Silex - - - - - - - - - -	3·10
Water - - - - - - - - -	3·00
	100·26

7. We give one more analysis, being that of a soil from Rensselaer county: color brownish drab, and texture coarse.

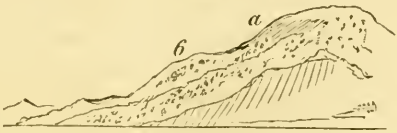
Water - - - - - - - - -	2·50
Vegetable matter - - - - -	4·00
Silex - - - - - - - - - - -	80·00
Alumina - - - - - - - -	4·00
Peroxide of iron - - - - -	4·00
Phosphate of magnesia - - -	3·00
Carbonate of lime - - - -	2·00
	99·50

We have selected the foregoing analyses out of many which we have on hand, for the purpose of showing that although limestone exists abundantly in our district, it is contained only in small proportion in the surface soil, while we find magnesia in almost every specimen. This last is an important element, and we consider its presence as explaining why this region is so well adapted to the raising of maize or indian corn. Phosphate of magnesia, it is now known, enters into the composition of this grain; and it is highly probable that, where this substance is deficient, corn does not reach perfection.

An improvement proposed.

This consists in deep draining. We have observed many farms, with an acre situated as represented in the following diagram:

Fig. 2.



At *a* is a hardpan (with the soil upon it), say eighteen inches below the surface, and the slope extending towards *b*. Lands thus situated, and based upon a hardpan or stiff clay subsoil, will be invariably too wet. At *a*, springs frequently gush out; and the whole slope, though well exposed, will be inclined to produce the poorer grasses, and to become mossy; and although no water appears on the surface, yet it subsides so slowly that the temperature is always low. The only remedy in such cases is deep draining. Places of this description are so numerous in the Taconic region, on both sides of the range, that it appeared proper to call attention to the subject.

Agricultural productions, and modes of cultivation.

All the ordinary cultivated vegetables grow well here ; but we will first speak of maize. The seed is generally planted by the middle of May. The best farmers prefer, and we think with reason, to get the crop planted as soon as possible in the spring ; for should a frost nip the young leaves, the plants will be retarded a little, but will grow and spread their roots beneath the soil, though they may apparently make but little progress at first. Some say, however, that you had better wait till the weather is warm, and frosts no longer threaten ; for they have seen late-planted corn spring up at once, and overtake the early planted which has borne the buffetings of a squally spring. Yet the soundness of this course does not appear ; for the early planted corn is also the earliest in ripening, and stands the best chance to escape early frosts in autumn, which is a matter of far greater consequence ; besides, it is not so liable to be injured by drought. Let it then be planted as early as possible, that it may escape the frosts of September, and also so shade the ground in July that it may protect itself from drought. Whoever observes, will find that the months of July and August make or unmake the crop of corn ; that however untoward the weather of June may be, if only that of July and August are favorable, corn will ripen. Some farmers, if not most of them, plant their corn on sward which has been ploughed up the preceding fall. If the soil is rather sandy, the furrow is turned flat, and afterwards harrowed only lightly, so as not to break in upon the furrow : this mode stands drought better than if the furrow be oblique. Before planting, it is customary to wet the seed and roll it in plaster (this is an old method) ; and then afterward, say at the first hoeing, apply a table spoonful of plaster to each hill. Ashes are in high esteem : a single handful, cast around the hill of corn just before rain, produces great effects. It is agreed by all farmers, too, that the soil must be stirred, hoed or harrowed ; nevertheless great care is requisite in these operations not to disturb the roots. The best farmers cut up the whole hill, in harvesting corn, with a sickle. This operation, near the Hudson river, is performed about the tenth of September. By this mode, more fodder is saved for milch cows. It has become an established rule now, in selecting seed corn, to select the first that is ripe.

Winter rye. This crop is not raised in large quantities for food. Our best farmers prefer sowing it early in September. We have known it to be sowed in January with success. When raised upon the uplands or the sandy hill-side, it yields better flour than that furnished by the crops of the lowlands. Two opinions prevail as to the time of cutting this grain. One class say that it should be cut while the joints are green ; the others that it should not be cut until fully ripe and dry.

Winter wheat, in a large part of this district, has not been much cultivated for many years, on account of the insect (*Cecidomya*). This year, more wheat has been raised than usual ; sufficient, it is supposed, in many towns of Berkshire in Massachusetts, for the farmer's home supply. This also is the case in many of the towns west of the Taconic range.

Barley. The country best adapted to the growth of barley, is the range of hills west of the Taconic range : they are considerably less elevated ; the soil is always coarse, and the climate cool. The soil is generally what is termed a yellow loam, with a hardpan about eighteen inches below the surface. The towns celebrated for this crop, are Sandlake, Grafton, Berlin and Stephentown ; and in this range, north and south, the same conditions exist which would ensure a successful cultivation of this grain.

Flax. This is cultivated successfully upon what may be termed the hard and coarse soils at the base of the Taconic range, at an elevation of 1000 feet above the tide at Albany. It is sown about the twentieth of April : twenty-eight quarts of seed to the acre is sufficient. Ashes is considered the best manure, and is sown upon the field just as the flax is coming up. Over 380 lbs. of flax have been raised to the acre on this elevated land. When the seed is filled out, or plump, it may be pulled : if not quite ripe, it perfects itself in the swarth.

Oats, succeed well on all the hills of the Taconic system. It is sown about the fifteenth of April ; the land to be twice ploughed, and well harrowed. It requires a hardpan to succeed well. It will probably grow and ripen in these hills, 3000 feet above tide at Albany.

Peas. This sure crop, and excellent one for fattening hogs or feeding in the summer, is discontinued by some farmers on account of the bug. Some, however, sow late, say the tenth of June, and escape that insect. Peas are said to be the best crop to precede wheat. The advantage of this crop is that it grows and ripens in mountainous regions, or one subject to frost, and hence may be a substitute (together with oats) for corn in fattening swine and feeding horses. They grow well in Hamilton county and the western part of Essex in New-York, 2000 feet above tide.

Potatoes. This crop, too, is adapted to the hard coarse soils of the Taconic range.

Clover and grass. The wide range which clover and the grasses admit of, adapt them to all climates. Probably, however, no better field for grass and hay exists in New-York and New-England, than upon the country between the Hudson river and the top of the Green mountains. In seeding down, but two kinds are used, timothy and the red clover seed : these are frequently mixed and sown together. Moist still weather is a proper condition for sowing. The quantity varies with different farmers : some use eight, others go up to fifteen or sixteen quarts of the mixed seed to the acre. The quality of the crop is undoubtedly varied by the quantity of seed sown : sixteen quarts to the acre would grow thick and fine, and ensure a greater certainty of covering the ground with a turf or sward, which is a matter of some consequence. Some sow only four quarts to the acre. The nature of the soil must be taken into consideration in determining the quantity to be sown.

In conclusion, we would say that the counties enumerated are eminently adapted to the growth and perfection of maize, in most situations from the Hudson valley to an elevation of about 1000 feet on the Green mountains. Above this elevation, frosts interfere, and the ears of corn do not fill out perfectly. Barley, peas and oats may be cultivated in still higher situations, and may be used as a substitute in feeding cattle, swine and sheep. This region is also well adapted to the grasses, and good hay will always find a market. The hay of the Hudson valley is preferred by dealers at the eastward, although some improvement might still be made in the manner of curing and pressing it.

THE LOST RACES.

It will not be denied, we presume, that the extinction of entire races of animals is a subject of great interest to man; that it is a phenomenon well calculated to excite inquiry. It is a circumstance, too, which seems to be of some consequence to us personally: not that any immediate danger, on this score, need be apprehended for our own personal safety and well-being; but it is of such a nature as to lead us to reflection and inquiry in regard to the mode of operation of those influences which have resulted in such extinction. We do not here refer to the extinction of the lower orders of beings, the mollusca and crustacea; but to that of the higher orders, those warm-blooded terrestrial animals which rank in the animal scale next to man. Shall we not inquire, then, since the higher animals have perished by families, and entire races have become extinct at a very recent period, May not the same influences which operated in the case of the warm-blooded terrestrial animals, operate also on man as a race, in such a degree as to terminate his career upon the earth? These lost races, whose remains lie buried in the most recent beds, at the very surface of the ground which is ploughed and sowed by the hand of man, breathed the same atmosphere that we do, basked in the same sunlight, drank of the rains of heaven, and partook like ourselves in many of the commoner pleasures of life; yet, through the influence of physical agents, entire species have passed away; and had not their bones been durable, their former existence would never have been suspected.

Can we assign a cause for this catastrophe? Was it a sudden tempest that swept over the ancient hills, and laid in one common ruin all that then had existence? Was it an overwhelming flood that poured forth the fury of its waters, and drowned the animals quietly grazing on the plains and hillsides? Or did an earthquake rock the earth and tear up its foundations; swallowing a part of the living races, and destroying others by noxious vapors emitted from the suddenly opened caverns? Or did some slow and subtle poison diffuse itself through the living frame, begetting a sluggish motion of the blood, destroying the elasticity of the muscles, and gradually enfeebling the external senses, till finally the body became an easy prey to the elements, and the last individual of the race sank down and perished? Towards the solution of these inquiries, we have no evidence save that of analogy. Life begins at a point; radiates from that point; gathers strength and power in its progress, till it reaches its acme; then begins to faulter, till finally it turns backward, runs a retrograde course, and terminates, as it began, in a point. Species commence their course in a single pair of individuals: they multiply and increase, until the race attains its maximum of development in numbers and physical perfection; when a stationary period intervenes, and is succeeded by one of decline; the life-power of the species slowly retires, exhausted of its force by its diffusion through the great flood of beings which it has served to animate, till finally becoming too dilute and feeble to sustain the vital energy, it lingers for a moment like the flickering and dim light of an expiring taper, and then disappears forever. Nations too arise from a few individuals, or from a feeble colony, a score of men perhaps: they press onward and become a strong people; they extend their power on all sides, and every successive step serves but to increase the national strength and prosperity, until that strength and prosperity reach their highest limit; when, as it were in the fulfilment of a law of nature, an inevitable decline commences; the centre of the body politic gradually loses its power over the circumferential members; its efforts to supply vitality to the extremes exhaust itself, and it falls sooner or later a prey to its own weakness.

We see this principle illustrated, as we think, in the lost races themselves. How often is the geologist able to point to the very origin of a race; not perhaps to the first progenitor, but to the time when, like a feeble colony, it began its career in a score of individuals only. From such small beginnings, for instance, arose the numerous species which have successively tenanted the ancient waters of our planet: they grew and increased in numbers, till they filled the depths of the sea, and spread themselves on every shore; but though possessing this wide domain, they were not destined to hold it forever: in numbers, and in perfection of specific development, they reached the limit assigned by nature, and thence began in their turn a downward course, dwindled away to a feeble and imperfect condition, decreased in numbers, and finally perished, never to appear again on this sphere of existence. Recent discoveries corroborate the soundness of these views. We observe, perhaps for the first time, a single mollusk at the base of the New-York system of rocks. As the deposits of this system are piled one upon another, this mollusk increases in numbers with every additional ascending deposit, and, before the middle of the series is reached, has spread so widely, and so countlessly multiplied itself that it nearly fills the mass of the rock. From this point upwards, however, no increase, but a diminution in the numbers of this same mollusk occurs with each succeeding deposit, till a few solitary individuals only remain. The relation here stated holds true for both the vertical and the horizontal plane, in all the extent of the system of the New-York deposits : go east or west, we find always the same order of increase, decrease, and final extinction of the species.

We have expended many words in attempting to convey a single idea, to exhibit a single fact, which, after all, may be condensed in the three words that serve to define a well-known character employed in musical notation : *crescendo et diminuendo* <>. With this harmonical symbol before us, our whole idea is comprised in a diagram ; the complete progress and final close of the march led by each earthborn race is expressed in a formula.

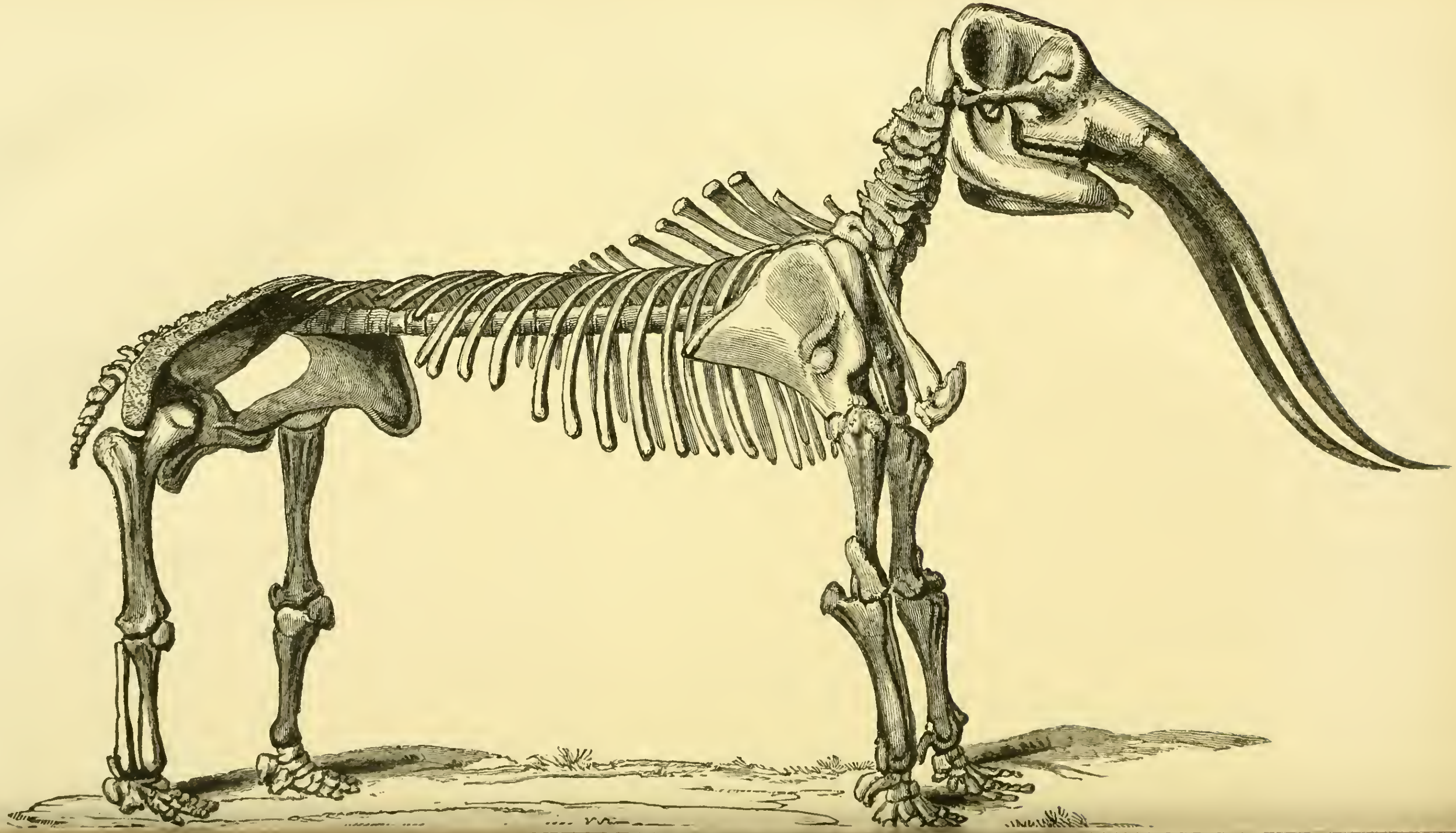
We have been led into the foregoing train of thought, by the discovery of the remains of a species of deer in the freshwater marl beds of Orange and Greene counties in this State. We first obtained the jaw of this extinct species from the marl pit of Mr. Stewart in the latter county, and afterwards one of the horns from a similar pit in Scotchtown in Orange. This deer was about the size of the reindeer of the north, and, like that animal, was provided with a flattened (though more slender) horn ; but it differs specifically from the reindeer, in the possession of two brow antlers instead of one, on a single shaft, and quite near its base. No other bones have yet been found, and hence the height and bulk of the animal have not been accurately determined ; but that in this country the genus CERVUS contained a species which is now extinct, is, by this discovery, placed beyond a doubt.

But a still more remarkable species has also perished : we allude to the great Irish elk, whose remains are found in the same beds as those of the deer just spoken of. The horns of this gigantic creature had a spread of ten feet, and hence he must have been one of the most majestic animals of the forests of his time.

Of all the species of extinct quadrupeds, however, the mastodons and elephants are the most remarkable. An animal twelve feet high and proportionately long, provided with tusks curving upwards and outwards to the extent of ten feet, must have been a unique object upon the hills in our vicinity. What their habits were, cannot be well determined now ; but we know that they must have been vegetable feeders, and have browsed upon trees of no mean height and size. A circumstance of some interest in their history is, that they appear to have been confined to the western side of the present valley of the Hudson ; for so far as observations have been made, their remains have not been found either north of the Mohawk valley, or east of the Hudson river. Although the bones belonging to many different individuals have been discovered in the counties of Albany and Greene in this State, and in the adjacent counties in New-Jersey, still this part of the continent does not appear to have been their favorite haunt. We must go into the valley of the Mississippi, if we would form a true conception of their former numbers and importance. The Bigbone licks are known the world over, as the cemetery of hundreds of these animals. But here they are not solitary and alone : numerous bones of other animals, known now to be extinct, lie entombed with them in those saline deposits. The horse, the ox, the buffalo, and some others, appear to have been their companions, and to have made these spots a favorite resort. Still farther west, they were equally if not more abundant. Not long ago, a collection of bones was brought from the Mississippi valley which must have appertained to more than five hundred individuals comprising those of all ages, the young, the mature, and the old The Helderberg hills seem to have been the limit of their wanderings in this direction, the base of the Rocky mountains their extrem west, and the valley of the Mississippi the centre of their range

The most interesting question in regard to these animals, is tha which inquires the cause of their extinction. On this question w are not prepared to sustain an opinion, nor even to offer one that i any thing like satisfactory to ourselves. If we recur to the flood o Noah, we are by no means authorised to believe that we have as signed the true cause ; though, upon a superficial view, that cata strophe seems to offer a plausible solution. The investigations o geologists show that many deluges have occurred, at different time and on different portions of the earth's surface. The subject, how ever, is one that is still in a course of investigation : time will unfol her secrets ; and we are persuaded that facts bearing directly upo these points will yet be disclosed, which shall reveal to us the whol mystery of the lost races.

Pl. 4.



GREAT AMERICAN MASTODON.

In the month of August, 1845, whilst excavating marl on the farm of Nathaniel Brewster, Esq., six miles west of the village of Newburgh, Orange county, N. Y., the workmen struck upon the skull of a Mastodon. The work was carefully conducted, and at the close of the second day they had succeeded in exhuming the entire skeleton, with the exception of the toes of one foot, which were probably carried out with the marl. This is the most entire skeleton of this remarkable animal ever found. The bones are in a singularly perfect state of preservation, retaining still a large portion of animal matter even in the spongy portions. The skeleton has since been arranged and set up, and this has been done with great care and the strictest attention to the articulating surfaces of all the bones, which we believe has not been the case with others which have been put together. Such we believe to be the fact from the drawings we have seen of the one arranged by Mr. Peale, and from the description given to us of others which we have had no opportunity of seeing. The amount of cartilage to be supplied between the vertebræ has been misconceived, and thus the back has been made much longer than in the living animal. In the present instance, a perfect gage was furnished by two ribs, which, during the life of the animal, had become united longitudinally. Each one of these ribs articulated with a verteber; and in bringing these articulating surfaces together, the exact amount of intervertebral space was found. This, in connection with the ribs which articulated with two vertebræ, determined the amount to be supplied; and thus the back of this skeleton is said to be from two to three feet shorter than those which have been made according to the fancy of the owners. The intervertebral substance is only half an inch in thickness.

As the discovery of this singularly perfect skeleton of an extinct race of animals has excited a very extensive curiosity, it may be interesting to many to have a particular description of the condition in which it was found. Portions of twelve skeletons of the same animal have been discovered in the same county within the present century; but in no case have bones enough been found to give a full idea of the structure and character of the animal, and in almost all cases the bones have been in an advanced stage of decomposition.

Locality and position. Like all others found in this vicinity, this was buried in a peat-swamp, but, in this case, of very small dimensions. The whole peat formation here is only four hundred feet long and one hundred and twelve wide, lying between two low ridges of slate hills, the whole valley being about two hundred feet wide. The clay which underlies the peat bog, descends gradually from both sides, and once formed the bottom of the small pond which occupied this spot. It slopes down very gradually till within six feet of where the bones were found, in which spot it is but six feet below the surface. At this point, however, it makes a sudden descent, and the bottom cannot be reached by sounding with an iron rod.

Beginning at the bottom, then, the following are the deposites which have gradually formed and filled up the pond :

1. Mud, more than 10 feet.
2. Shell marl, 3 feet.
3. A layer of red moss, 1 foot.
4. Peat, 2 feet.

Just below No. 3, in the top of the marl, and barely covered by it, lay the skeleton. The direction of the backbone was north and south. The head was thrown crosswise, so that the tusks pointed nearly to the west. Every bone occupied nearly the position it did when the animal was alive. The back of the skeleton was upward ; each of the vertebræ in place, from the first of the neck to the last of the loins. The ribs were projected downwards on each side. The head was upon the top of the neck, and the lower jaw slipped a few inches to one side. The hindlegs were spread out on each side, each bone in its place to the very feet. The whole position was precisely that of an animal that had become mired, and perished in its ineffectual struggles to extricate itself, and it had doubtless died in the place where its bones were found.

In the midst of the ribs, imbedded in the marl and unmixed with shells or carbonate of lime, was a mass of matter composed principally of the twigs of trees broken into pieces of about two inches in length, and varying in size from very small twigs to half an inch in diameter. There was mixed with these a large quantity of finer vegetable substance like finely divided leaves, the whole amounting to from four to six bushels. From the appearance of this, and its situation, it was supposed to be the contents of the stomach ; and this opinion was confirmed upon removing the pelvis, underneath which, in the direction of the last of the intestines, was a train of the same material about three feet in length and four inches in diameter. This was composed almost entirely of the twigs, some of them not even crushed, and retaining still the form and structure of the tree from which they were torn.

This is by no means a solitary instance of the discovery of this matter. The same has been found in connection with other skeletons. In Godman's Natural History, under the article Mastodon, is recorded an instance of the same kind, and the species of plant found was detected. He thus quotes from a letter of Dr. Barton : "Very lately, in digging a well near a saltlick in the county of Wythe in Virginia, after penetrating about five feet below the surface of the soil, the workmen struck upon the stomach of one of those huge animals best known in the United States by the name of *Mammoth.* The contents of the viscus were carefully examined, and were found to be in a state of perfect preservation. They consisted of half masticated reeds (a species of *Arundo* or *Arundinaria*, still common in Virginia and other parts of the United States), of twigs of trees, and of grass or leaves."

A good deal of doubt existed at the time and afterwards, as to the character of the substance ; but in the case we have now before us, there can be no doubt. The appearance of the matter, and the peculiar position in which it was found, are unquestionable evidence of its being what it was supposed to be, the food which the animal had eaten.

History of the animal. As far as is known at present, the whole race of mastodons is extinct. There is no evidence of their existence at this day. But the numerous remains of them found in this country, indicate that they have at some period lived in great numbers on this continent. At what time this was, we shall consider hereafter. Their range, however, does not appear to have extended over the whole of North America, but to have been confined mostly to the rich alluvial vallies. Portions of two skeletons only have been found north of Orange county in the State of New-York. East of the Hudson river, portions of two have been discovered. Orange county, however, seems to have been the northern limit of their range, and the Hudson river the eastern boundary. Passing then south through New-Jersey, and thence westward through all the great western vallies, throughout this whole region the bones are found in greater or less abundance. The saltlicks of Kentucky have furnished the most of these remains; and it has been stated, that from one of these localities alone, portions of more than one hundred skeletons have been removed. This species of mastodon is peculiar to this continent, no remains of it having been found in any other portion of the globe.

The first bones and teeth of this animal were found as early as 1712, at Albany; and were noticed in the Philosophical Transactions, in a letter from Dr. Mather to Dr. Woodward. In 1739, a French officer, by the name of Longueil, discovered some of the bones, teeth and tusks, near the Ohio river; and the next year, large quantities of similar bones were washed up by the current of the same river. After this time the bones were occasionally found, down to the present, but often very much decayed, and never in sufficient quantities to make an entire skeleton. The scientific world is much indebted to the late Mr. Peale, who, with great labor and at much expense, procured, in 1800, sufficient bones to enable him to construct a tolerably complete skeleton, which is now in the Philadelphia Museum.

But though the living animal is unknown to us, the aboriginal inhabitants of this country seem to have been well acquainted with him. Many people are disposed to place very little dependence upon Indian tradition; but however vague such tradition may become in relation to particular facts, by long transmission from generation to generation, yet it must have something real and true for its origin. Such we believe to be the fact in relation to this animal. We shall, therefore, give a few of these traditions as concisely as possible.

In President Jefferson's Notes on Virginia, we find the following tradition of the Indians, in relation to this animal:

"That in ancient times a herd of these tremendous animals came to the Big Bone Lick, and began a universal destruction of the bear, deer, elk, buffaloes, and other animals, which had been created for the use of the Indians.

"And that the Great Man above, looking down, and seeing this, was so enraged, that he seized his lightning, descended on the earth, and seated himself on a neighboring mountain, on a certain mountain rock, where the print of his feet are still remaining, from whence he hurled his bolts among them, till the whole were slaughtered except the big bull, who, presenting his forehead to the shafts, shook them off as they fell, but at length, one of them missing his head, glanced on his side, wounding him sufficiently to make him mad; whereon springing round, he bounded over the Ohio at a leap, then over the Wabash at another, the Illinois at a third, and a fourth leap over the great lakes, where he is living at this day."

A Mr. Stanley, who was taken prisoner by the Indians, and carried beyond the western mountains to where a river runs westward, says that these bones abound there, " and that the natives described to him the animal to which these belonged, as still living in the northern parts of their country."

The following we extract from Dr. Kock's pamphlet on the Missourium*: "One man, in 1816, has asserted that his grandfather told him he saw one of these animals in a mountain pass when he was hunting; and that on hearing its roar, which he compared to thunder, the sight almost left his eyes, and that his heart became as small as an infant's."

Period of their existence. The opinion is a very prevalent one, that these animals were antediluvian, and most persons reject with a sneer the idea that they have lived at a very recent period. But the first opinion has no shadow of ground for belief, and all the evidence seems to show that they have existed not many centuries since.

Mr. Jefferson, in his Notes on Virginia, reasons thus: " It may be asked why I insert the mammoth as if it still existed? I ask, in return, why I should omit it as if it did not exist? The northern and western parts still remain in their aboriginal state, unexplored and undisturbed by us, or by others for us. He may as well exist there now as he did formerly, where we find his bones, &c." The same reasoning which he used, will apply, with a diminished force it is true, to our own times. There are still vast portions of this continent yet unexplored by the white man, and inhabited only by hostile Indian tribes. Vast gorges of the mountains in the west might

* Doct. Kock discovered, in 1840, the remains of the animal which he has called *Missourium theristocaulodon*, in the Osage country. The grounds upon which he has given it a new name appear to be very questionable, and are by no means sufficient to make it any thing more than the Mastodon, the remains of which are so often found even as far west as Missouri, any more than to make the *Hydrarchos* from the *Zeuglodon* described in our last number.

still contain the living animal, and yet we be utterly ignorant of his existence. But we will not contend for his present existence. We will examine briefly the evidence of his having lived within a very few centuries.

In the first place, the testimony of the Indians, but a few years back. They stated in the early part of this century, that this animal still lived north of the Missouri river. They called it "Pere du bœufs" (father of cattle). But how shall we reply to the question, if the animal has lived in these parts of the country within so short a time, why did not the early white settlers either see them or hear of them from the Indians? To this we answer, that after the discovery of this country, the settlements of it took place very slowly, and then was principally in those parts which have not apparently been in the track of the mastodons. That they did not hear of them from the Indians is not wonderful, for there was nothing to excite enquiry with regard to them. If a bone of one had been found at that period, and thus enquiry started, doubtless something would have been ascertained far more distinctly than has since been learned.

That they were not antediluvian, is settled by the fact of their being found in a deposit of marl and peat, all of which has been formed in modern times, and which is still forming.* Moreover the fact that the bones in this skeleton, from Orange county, are so fresh, containing a large portion of animal matter, and that the contents of the stomach and intestines were found unchanged apparently by time, is strong evidence that this individual has lived at a very recent period, and we may put down five hundred years ago as the most distant time at which he lived; and we are strongly inclined to the opinion, that if extinct now, they have not been extinct one hundred years in the western parts of this country.

* The rapidity with which this peaty formation is deposited, may be inferred from the following fact. Forty years ago, an excavation for marl was made seven feet deep, within twenty feet of the spot where these bones were found. By the operation of the ordinary natural causes, that pit is now filled to nearly the level of the surrounding surface. The deposit must have been much more rapid, at the time that the peat here was first formed, when every year large quantities of leaves were accumulated in it, besides the rank vegetation which annually grew and decayed there.

It is a curious fact, also, that after these marl pits become filled with water, though unconnected with any stream or pond of water, they in a few years become stocked with eels, catfish and sunfish.

Anatomy of the mastodon.

The skull. The bones of the skull are wonderfully large, and as well preserved as the other bones. The posterior part is flat and broad, measuring in height one foot eleven inches, and in width two feet nine inches. The *foramen magnum* for the passage of the spinal marrow, is three inches and a half in diameter. In the centre of the occipital bone are two deep cavities for the insertion of the *ligamentum nuchæ*, separated by a thin bony partition. The frontal bone is two feet four inches wide, between the orbits of the eyes. The outer plate of bone is very hard and three quarters of an inch thick, where we find eleven inches and a quarter of cellular bone, extending down to the brain. The cavity of the brain is small, occupying only the lower portion of the skull. In front of the nares (nostrils), between the origin of the tusks, is a cavity as large as that of the brain, and is probably the *antrum highmorianum.*

The insertion of the tusks into the intermaxillary bones, is two feet five inches, extending quite back of the orbits. These tusks were ten and a half feet in length, and two feet and an inch in circumference where they enter the socket. With regard to the direction of the tusks, we are convinced from observation of a number of skulls, that their direction is as accidental as the horns of cattle. Some follow the first curve, downward and outwards, the points in one which we have seen being eleven feet asunder. In the skull of this skeleton before us, they first curved downwards and outwards till they were seven feet apart, when they curved inwards and slightly upwards till they approached at the points within two feet of each other. The socket of the tusks is curved and flattened so that it was impossible for the tusks to have turned in the sockets, during the decay of the soft parts, as is supposed by many to have been the case.

The whole skull, lengthwise, is bounded on all sides by nearly straight lines. The lower jaw is nearly straight from the angle to the front, and measures in that line two feet ten inches. The condyloid process by which it is articulated with the head, is distant from the coronoid process one foot. In the front of the lower jaw, at the commissure, is a small round tooth, eleven inches in length and one inch and a half in diameter, and inserted into a socket seven inches deep. This is on the left side of the commissure. On the right side is a partial socket, as if another tooth had once been there. It appears that the young animals had these two teeth, but lost them at a later period of life, as the remains of the socket only are found in skeletons of old animals.

The teeth are, in this skeleton, two in each row, making eight in all. The front tooth measures three by four and a half inches ; the back tooth, three and a half by seven and a half inches. Like the elephant, this animal probably changed its teeth during its growth ; at each change, the back teeth crowding forward, till they eventually crowded out the front ones.

The length of the head, from the occiput to the front of the inter-maxillary bones, is four feet and one inch, and weighed, with the tusks, 694 pounds.

There are seven bones of the neck, nineteen of the back and three of the loins. The first seven bones of the back are characterized by very long spinous processes, the longest measuring two feet. From the third they diminish in length very rapidly to the eleventh, when they are almost lost. The bones of the neck are much more upright than in the elephant, giving to the animal the appearance of carrying a high head. Atlas, 3 ft. 8 in. in circumference.

The ribs are forty in number ; twenty on each side, and the longest measures four feet and seven inches. The first and second ribs on the right side appear to have been broken by some accident during the animal's life. During the process of healing, the first rib has formed a bony attachment to the sternum or breast-bone, which is a triangular bone of large size and one foot seven inches long. The last two ribs on the right side have also been united logitudi-nally. The scapula (shoulder-blade) is two feet and ten inches long, and two feet and nine inches wide, having a long and sharp acro-mion process.

The humerus (shoulder) is three feet and five inches long, three feet and two inches in circumferance at the upper end, and three feet and five inches at the lower. The ulna measures two feet and three inches, from the articulation at the humerus, to where it unites with the foot. The olecranon process is seven inches long, and two feet four inches in circumference at the base. The circum-ference of the elbow is three feet nine inches. The radius is small and slender, and crosses from the inside of the ankle to the front of the elbow. The articulating surface of the elbow is one foot three and a half inches long, and seven and a half inches wide.

The bones of the fore-foot resemble in form those of the elephant, but project forward instead of being arranged in a perpendicular column, and the toes have evidently possessed great power of flexion.

The pelvis is a broad massive bone, and was taken up entire. It measures, between the illiac extremities, six feet and one inch. The pubic and sacro-illiac symphyses are completely united by ossification. The pubic bone, from the anterior to the posterior edge, measures two feet. The thyroid foramen is nine and a half inches long by five inches wide. The diameter from the sacrum to the pubis is twenty-two inches ; the transverse diameter nineteen.

The femur (thigh-bone) is three feet ten inches long, and seventeen inches in circumference at the middle. The head of this bone is two feet in circumference ; around the trochanter, three feet. The great trochanter is very large, but in place of the lesser trochanter is only a swelling and roughness of the bone.

The tibia is two feet six inches long, and two feet seven inches in circumference at the top. The articulating surface, where it receives the thigh-bone, is one foot transverse diameter. The fibula is two feet two inches in length. The bones of the hind-leg resemble in a wonderful degree the same bones in man ; and it is not to be wondered at, that when these bones have been found, they have sometimes been mistaken for the bones of gigantic men.

The bones of the legs, the tusks and the proboscis in this animal are similar to those of the elephant. The structure of the remainder of the skeleton is entirely different. The head of the elephant is formed of bones more or less rounded throughout. The occiput consists of two large lobes of bone, one on each side, with a deep groove between. The lower jaw is convex on the lower side, and teeth in that jaw are with the crowns concave from the front backwards, receiving the upper teeth which are convex to fit them. The teeth of the elephant are nearly smooth, while in this animal they are formed of two rows of conical prominences, from which the animal receives its name, the two Greek words of which the name is composed signifying a *nipple* and a *tooth.*

It was formerly the opinion that this animal lived partly upon flesh. There is, however, satisfactory evidence, from its teeth and from the contents of the stomach, that its food was principally the small twigs and branches of trees. It had little, if any, lateral motion to its lower jaw, and of course could not masticate its food very fine.

All that we know of the habits of the animal is to be inferred from its structure, and tradition. Its form, compared with the elephant, is apparently about the same as the horse compared with the ox. He was probably comparatively a graceful animal in his movements; and with his elevated head, ornamented with such enormous tusks, appeared terribly majestic. The opinion of some that he was the behemoth of Job, is without any foundation; yet the description of that animal in some respects may well apply to this.

EDUCATION OF THE AMERICAN FARMER.

There are many questions which are fully answered when the objects to which they relate are well understood; or if the assertion is too broad, we are at least safe in saying that the way for their solution is then fairly opened. But if the true object sought, is not apprehended, or is but dimly seen, then the chance that we shall obtain a true answer is extremely small. It may seem paradoxical, it is true, for a person to put an inquiry without knowing, himself, the true objects of his inquiry; but this is often the case, and especially so in those questions which relate to education. If then the question should be put, What is the best plan of an education for the American farmer? we say, determine first what the objects of education are, and then you are in a fair way to answer the question. All are agreed on one point, viz. that the standard of education ought to be raised; but there is a disagreement as to the plan, and what branches ought to be taught. One party says that the farmers ought not to be educated at our colleges; for what is there taught is not adapted to meet their wants. It seems to us that the party which thus reasons, or which makes these assertions, labors under a misapprehension in three respects: 1. It misapprehends the object and aim of an academical course of study; 2. It does not clearly see the wants of the pupil; 3. It does not apprehend the end and objects of education in general. Now we take this position: that the young man who designs to be an agriculturalist may be thoroughly and properly educated at our colleges, as they are now organized; or if they are not, in every respect, adapted to meet his wants, they require only a slight change in their arrangements. But let us be understood: we do not take the ground that an agricultural college, such as is contemplated in some quarters, would be useless; but that a course of study, such as is pursued in our colleges, is far better and superior in its adaptation to the wants of the farmer himself, and the interests of the farming population. We have three reasons for this opinion: 1st, The college course of study furnishes more ample means to the pupil, by which he may educate himself; 2d, It supplies his wants; 3d, The objects of education are thereby answered. These reasons, it may be said, run into each other; and so they do: still, each one implies something which the other does not. We shall, however, in illustrating our views, treat them as one under different forms of expression. One remark we would make in this place, viz. that many persons claim to be educated when they have finished their college course: it is a natural, though a very bad mistake, and there is scarcely any thing farther from the truth. It is true that if a man is educated at all, he is self-educated, whether it be at college, or sitting on a bench in the chimney corner and studying by the flaring light of pitch pine knots: it is always a self-education as far as it goes.

To proceed: What does a college course of study do for the pupil; or what is it intended to do? It puts tools into his hands to work with; or perhaps this is too general and too figurative in its expression: we therefore say again, that it puts principles into his head for the better guidance of his talents. To be still more particular, Does he study Latin and Greek? It is not that he may talk Latin or Greek, or even read it in after life; but to learn the construction of language, and the different ways it may be used to persuade and influence men. Does he study mathematics? It is not that he may become a practical mathematician, and spend his days in solving problems in mathematical science; but that he may know the power of numbers and signs in demonstrating truth; that he may acquire a control over the faculty of attention, over the train of thought, and call in, in their true succession, the ideas which link together a demonstration of a proposition, or truths which are to be evolved by a chain of reasoning. Does he study chemistry and natural history? It is not that he may spend his life in the laboratory, working in acids and alkalies; but that he may know the principles which control the composition and decomposition of bodies, the characters which distinguish them, and the uses they subserve in the economy of nature. Does he study astronomy ? It is not that he may become a practical astronomer, and spend his days in viewing the phases of the stars, or in measuring their distances from us ; but that his mind may be enlarged in attempting to comprehend the greatness of the firmament, the vastness of the starry system, and the power of its Creator. But, though we say that it is not the design of the plan of college study to make either of these characters, yet it is possible to make one or the other ; an astrononomer, a chemist, a mathematician or naturalist. We have, however, not yet finished all we intended to say of the objects of a college course of study. Does he study logic ? It is not that he may spend his life in disputation ; but to acquaint himself with the relation of antecedent and consequent, with the mode in which fallacies may be attacked and refuted, with the methods that reason pursues in seeking truth, and with the laws that regulate its movements and give it its greatest strength and power. Does he study moral and mental philosophy ? It is not that he may become professionally a teacher of morals ; but that he may understand the fundamental principles of right and wrong ; that he may know the power which knows, and which actuates the movements of the man. Does he study political economy, or the law of nations ? It is not that he may become a politician by trade, or a jurist or a judge ; but that he may know on what principles our constitutional rights are based, by what bonds our political associations are held together, and what are the usages which control the intercourse of states and nations.

In these reasons we may recognize several great departments of knowledge, in each of which there are some principles that are called into action almost daily.

The first kind is that of language, the great medium of intercourse between man and man, between states and nations ; in fine, the power which controls the world.

The second, is that of numbers and signs, by which the low and the high is measured, and by which the light and the heavy are weighed, ratio expressed, and time and distance computed.

The third kind relates to physics, which takes cognizance of forms, composition, characters general and specific, the mutual or reciprocal actions among bodies ; it is in fine related to all that administers to the physical well-being of creatures in life.

The fourth relates to matter and bodies at a distance, but still which has its practical application in navigation and geography, and in fixing the position of places, through which intercourse between states and nations is safely conducted.

The fifth, that which explains the relations of men in their civil and municipal capacity, the foundations of law and justice, and of government.

The sixth, is of mind and the spiritual part of man, that which is emphatically the *me*, the subject ; *that which knows*, is cause itself, the last and highest source and power ; it is life in its essence and spirit ; it is that which is to live when matter has mouldered and fled to its primary elements.

What nobler objects can be proposed by an Agricultural College? But do they meet the wants of the farmer ? And here we are again driven to the inquiry, What are the objects of the farmer ? Are they comprehended in all that relates to the tillage of land ? That the tillage of land is one object, need not be told ; but, are there not other objects which have an equal claim upon him ? Yes, and they are objects which stand connected with that wide range of knowledge detailed above. He has to do with them more or less all his days, and in every relation in life.

But we propose to particularize farther, that we may press home the force and power of our argument. Is he the head of a family ? he is expected to be a model upon which all eyes of the family may be profitably turned : he buys and sells ; he directs and controls ; he exercises rights where others have rights which must be respected ; he is to conduct schemes and plans for the common good, to a successful issue. For these and many more functions, he wants language to communicate ; numbers, to compute and reckon ; knowledge of kind, character, value, place, relation, trade and commerce, and of the principles of right and wrong which must guide every adventure. Is he a neighbor ? he is still to be the same model of excellence, though in a larger and more extended sense, only he advises, but does not command or direct : mutual rights are to be maintained and respected ; obligations are to be punctually satisfied. Is he a citizen ? he has many of the same functions to fulfil, but in a still wider field. He has rights in common with others : on what principles do these rights rest? He has rights of person, rights in his citizenship, rights in his property. These rights are embodied and set forth in a charter, termed a constitution, or a charter of rights. The principles on which some rights rest are self-evident; in others, there is complexity involving mutual but oftentimes conflicting interests and unsettled questions. They involve questions concerning man as a species, as a person, a citizen, a subject; concerning man as a governor or judge, as a special member of the body politic, as one of a nation of men, as a minister of good to his race, and finally concerning MAN AS THE REPRESENTATIVE OF GOD ON THE EARTH. For all these functions, it is essential that stores of knowledge should be accumulated; that the intellect and affections should be cultivated; that the reason may go forth untrammelled to the work. If there is truth in these views, then those who maintain that the functions of the farmer are bound up in the tillage of land, be it little or much, degrade his station, limit his sphere and belittle his destiny.

Let it not be supposed from the tenor of the above remarks that it is our wish to spiritualize, in the platonic sense of the word, the pursuits of the laboring man and of the farmer, that he may soar above the ordinary occupations of life, and live in an unprofitable meditation of abstract truth; or withdraw his mind wholly from what is visible, and fix it upon the fancied essences, or more properly the vapors of things: for we belong to that class who wish that realities, those things which are tangible, and which are fruitful in their several spheres, should be the main subject sought after here. While, however, we would guard the mind from ancient error, we would by no means have the student pursue a course whose tendency is to impart the belief that buying and selling is the chief good, and wealth the great object: we would still have him pursue that course which elevates the mind, which improves the intellect, and which shall lead him to regard his spiritual part as the noblest, whose education is after all the great and main thing, and to which all things else are to be subservient.

Whatever view we may take of a plan of education, if we would be true to nature, we must keep in view the fact that man is a compound; that he is both body and spirit; that he has compound wants, wants of the body and wants of the spirit; and we must keep in view the relative value of the two. Nor should we forget that he was not created for a solitary existence, but to maintain an intercourse with his fellows; and that he cannot be independent of them, or can not say I have no need of thee, however humble his fellow's rank may be. He, too, is the subject of government and law. Obedience is to be learnt, as well as taught. Can it be supposed, then, that too much culture can be bestowed upon the mind of man; that in view of man as he is and must be, it is at all probable that his advantages will, under any circumstances, be too great, or beyond his capacity for improvement, so rich that they will be regarded as lavished and lost upon him?

Again, a more thorough education for those who till the ground, than has hitherto been contemplated, seems especially demanded, to enable them to avail themselves of the discoveries of modern science. This, however, is a position which many are now ready to take, although its importance cannot be so well appreciated by those who are placed upon the very rich soils of our country; but those who are tilling soils already exhausted of their natural fertility, see the necessity, and would see it still better, if they could not sell or exchange their farms for the new and exuberantly rich lands of the west.

Leaving this point as it is, we remark once more, that the times and the circcmstances of our country require more than ever the cultivation of the minds of this great class of the citizens of our Republic. It was safe in the morning of our country, when oppression taught our fathers the value and the price of liberty, for the husbandman and mechanic to commit most of the duties incident to office, to those who were by their profession allied to a public life. But now in this age, it appears to us, that to the owners and cultivators of the soil should more especially be committed this trust, as they have a paramount interest in the affairs of the state and nation. They who are withdrawn from the sinister influences of a dense city population, where the unworthy and the demagogues of the land are wont to congregate, should now stand up in the halls of legislation and justice, and at least possess themselves of that power to which their numbers entitle them. Some may sneer at the expression, but to us it is plain, that, to the cultivators of the soil is committed the destinies of this country; that to them more especially is committed the great duty of handing down, unimpaired, our institutions to posterity. If this is true, it follows that the intellectual faculties should receive that share of culture which is contended for in this our essay.

We would not by any means be understood, in these remarks, to say that farmers are to become politicians, in the odious sense of the phrase. We mean only that they should understand as much of history, of law and of legislation, and of rights as they are defined in our constitution, as shall enable them to stand up by the side of our professional men, and to encounter successfully the demagogues and party hacks which in these days seem to swarm and multiply out of all proportion to the rest of society. Who, of all our citizens, are so well prepared to act dispassionately and rightly, as those who are located at a distance from the hot beds of party spirit in our cities, and upon a microscopic scale in our villages; as those who quietly plough their fields and gather their harvests? But ignorant men are not fit for responsible posts: it is not the mere tiller of the soil, the untutored laborer, but it is the enlightened workman, the educated farmer, to whom we would commit our great interests; to the plain and unsophisticated but not uninstructed sons of the soil, unskilled it may be in intrigue, but who, when they march up to duty, when they exercise their own personal rights, or act on behalf of their fellow citizens by a delegated power, do it without fear, though frowned upon by the scheming partisan and the ambitious office-seeker.

To conclude, we declare that we care not how many institutions are founded, by what name they may be known, or when or by whom our young men are educated, *provided it is done;* but let not our farmers deceive themselves by founding institutions whose objects are partial and narrow, and which leave out of view those courses of study which are necessary to fit the pupil for the discharge of the duties of a citizen of this republic.

ON THE STUDY OF ENTOMOLOGY.

BY HON. J. BARLOW.

It is gratifying to the general reader and naturalist, that the Quarterly American Journal is devoted, in part, to the interesting branch of natural history, yclept Entomology. This is one of the most fascinating as well as exceedingly useful studies to which we can give our attention; and of all persons most interested, and who may be benefitted by it, are the farmers of our country. Their habits and business of life give them enviable opportunities to enjoy the exhibitions of beauty and wonder of this department of living nature. They are constantly surrounded by teeming myriads of the insect tribes; and if they become familiar with the habits, natures and transformations of these swarms and armies of living creatures, pleasure and profit must be their reward.

For us to remain ignorant of this department of the handywork of infinite power and wisdon, is inexcusable. They were not created in vain, but for definite uses and purposes. Whilst some are apparently predatory, others are of great use to us, and defensive of our interests. It would be impious in us to denounce them as loathsome and useless; for omniscience brought them into being, and it is for us to study their uses, and not despise, condemn and destroy them.

It is true, many kinds are destructive to our property, and in self defence we destroy them; for man will act selfishly even with a worm. But whilst we thus view and tread upon the mischievous worm for intruding upon our pretendedly exclusive rights, we must not forget that man also trespasses against the rights of his fellow man.

Not only will pleasure and profit result from this study, but moral instruction can be drawn from the exhibition of wisdom and power as displayed by the great author of all things, in establishing the laws and order that govern and regulate the changes and transformations that are manifested and undergone.

It is not with indifference that we can witness the changes from the lifeless egg to the living crawling larva; from this to the dormant aurelia; and from this to the gay and splendid butterfly, gilded with its golden tinges, mounting upon its gaudy wings, triumphant over the creeping things of earth, flitting from flower to flower, and sipping the sweets gathered in their cups and upon their leaves. It becomes entirely changed in nature and habits, in form and appearance, from eating the crude leaf, to sucking the honied luxuries of the lilac and rose.

Not only do we draw moral, but high religious instruction from this source. A type, a shadowing of a change from grovelling humanity to spirituality; from mortality to immortality; from an earthly to a heavenly form and existence, through the mysterious power of our creator, is opened to our vision, as if in aid or harmony with scriptural revelation.

Why should we then deny ourselves a knowledge of this branch of natural history and philosophy? The pleasure and utility flowing from a knowledge of botany, are acknowledged by all. It is admitted that a familiarity with the flowers and plants of the field improve the mind and heart. But I think it will be readily acknowledged by all who are familiar with both branches, that entomology is more gratifying to the student and enquirer, and more useful to the practical man of the field and farm.

A knowledge of it is easily attained, and readily understood even by children. The young become pleased with the first lessons, and are made wiser and better by the study. The mind which is ignorant of it, and loathes the sight of the worm, becomes entirely revolutionized and fond of the pursuit. The caterpillar that is deemed an intruder upon the carpeted floor, or leaf of the cherished rose, will not be denounced and rudely crushed as a "filthy worm;" but will be looked upon as a harmless creeping thing, hastening to seek some secret recess or hiding place, where it may safely suspend or enwrap itself, and undergo its change through its defenceless chrysalis to the perfect insect of the wing. It will be seen in prospect, or perhaps within one short week, flying around the hall or garden, eliciting the wonder and admiration of every beholder.

The Journal, being devoted to agriculture and science, is a medium through which will be carried information on this rich and important subject to those most to be improved and benefitted by the study. The wants of those who could not be gratified and supplied from the periodicals of the day, nor from any other source within their means and reach, can now be supplied. It is therefore peculiarly gratifying that such a source has opened through your periodical, and it is to be hoped that a circulation may be secured which will give a general diffusion of this branch of natural history.

With permission of the editors, I shall be pleased to write occasional articles on this subject, which, in my estimation, will be interesting and moral as well as useful.

A BIRDSEYE VIEW OF THE VEGETABLE PRODUCTIONS, CLIMATE, SOIL, AND AGRICULTURE OF THE DIFFERENT COUNTRIES OF THE AMERICAN CONTINENT.

BY C. N. BEMENT.

United States.

The vegetable productions of the United States are exceedingly various : there are some, however, common to every section of the Union. Maize, or Indian corn, an indigenous American plant, is cultivated from Maine to Louisiana, but succeeds best in the Western and Middle States. It is adapted to a greater variety of soils and situations than wheat, and yields generally double the produce : and of the first quality, and in a high state of cultivation, has been known to give over one hundred bushels to the acre. Wheat is also cultivated from one extremity of the Union to the other, but of superior quality in the Middle and Western States. The cultivation of tobacco begins in Maryland, about the parallel of 39°, and continues through all the Southern States, and in the Western States, chiefly south of the Ohio. It forms the staple of Maryland and Virginia, where it is raised to a greater extent than in any other part of the Union. Besides the large quantity made into snuff, segars, and manufactured tobacco in the country, 90,000 hogsheads are annually exported. The soil and climate favorable for cotton are not found beyond 37°, though it can be raised as far north as 39° on both sides of the Alleghanies. It was first cultivated for exportation in 1791, and is raised from the Roanoke to the Sabine, forming the staple of the Southern and Southwestern States. Rice crops require great heat and a marshy soil, and are cultivated to a great extent in the Carolinas, Georgia, Alabama, Louisiana, and as high as St. Louis in Missouri. The sugar cane grows in low and warm situations, as high as the latitude of 33°; but the climate favorable for its production does not extend beyond 31° or 30° : It is now cultivated to a great extent in Louisiana. Oats, rye and barley are raised in all the Northern, and in the upper districts of the Southern States. Hemp, flax, and hops, are produced of an excellent quality. Hemp grows naturally in the Western States, and hops in the Western and Middle States. The vine has been successfully cultivated in various parts of the Union ; and the mulberry tree grows spontaneously, and has been extensively planted of late years. Fruits of all kinds of the temperate and tropical climates, and the culinary vegetables which have been introduced from Europe, thrive here. The dairy and grazing are also important resources in the northern and western parts of the country, and great quantities of beef and pork are raised for exportation particularly in the west. The number of sheep in the United States has been estimated at about twenty millions, yielding about fifty million pounds of wool annually.

Texas.

Climate. The climate of Texas is mild, agreeable and healthful: the heats of summer are moderated by the sea breezes, but are sometimes excessive during a few hours before sunset, when the breeze dies away. Scarcely any rain falls between March and November, and the vegetation often suffers from droughts. In November, north winds set in, and heavy rains begin to fall : these winds blow during December and January, when the mountains are covered with snow, and the cold is sometimes severe ; but the snow seldom lies long in the lower districts. In the early spring, the rains are very copious.

Vegetable productions. The live oak is found of large size in the maritime regions, chiefly between the Galveston and Matagorda bays : the white, red, post and spanish oaks ; the cotton-wood, ash, elm, and sycamore or button-wood ; the black walnut, hickory, pekan ; the locust, musket, and bow-wood ; the wild cherry, mulberry, chinquapin, parsimmon, etc., are among the natives of the forests, and there are extensive cane brakes between the Colorado and the Brasos. The soil and climate are favorable to the growth of sugar cane, indigo, tobacco, cotton, rice, indian corn, sweet potatoes, and, in some parts, of wheat, rye, oats, etc.; and the prairies afford excellent pastures all the year round.

Mexico.

Soil. The low plains on the coast are fertile, and have a luxuriant vegetation. Much of the central table land is dry and sterile ; but in those parts which are well watered, the vegetation is remarkably vigorous. In the northwest and northeast are extensive tracts of rich soil.

Although the inhabitants are nourished by the soil, yet agriculture is by no means in a flourishing condition. The variety of soil and climate, however, furnishes a corresponding diversity of cultivated as well as indigenous vegetation. The temperate regions are favorable to the cereal grasses, and all the culinary vegetables and fruit trees of Europe thrive. The cultivation of sugar-cane, indigo, cotton, vanilla, cocoa, and tobacco, has been successfully prosecuted. The banana grows in the warm and humid valleys; and its fruit, which is ten or eleven inches in circumference and seven or eight in length, is an important article of food. Manioc, the root of which also furnishes a nutritive flour called cassava, likewise grows in the hot regions. The magney, or American agave, yields a refreshing drink, called pulque, resembling cider. The dahlias, whose many-colored blossoms give such a splendor to our flower gardens, at the season when the approach of winter renders them doubly valuable, are natives of the hilly parts of Mexico. The sugar-cane, cochineal, etc. are among the productions of the Mexican States.

Peru.

Generally speaking, agriculture is in a wretched state. So languid and backward is it on the coast, that Lima and many other towns along shore depend on Chili for their provisions. This has been ever since the great earthquake in 1793, which was followed by such sterility of the vallies of Lower Peru, that the people in many places ceased to cultivate them. The country has since in a measure recovered its fertility; but till some alteration is made in the mode of cultivation, and greater facilities of communication between the interior and coast are introduced, there is no hope of any great progress in agriculture.

Cotton is found in a wild state, in great abundance, in the Montana Real, on the Guallaga, and on the banks of the Maranon. Flax is common; but the indians leave the stems to perish, and make a kind of beer of the seeds. A species of cochineal, and coffee of an indifferent quality, abound in some districts. The Peruvian pimento is excessively strong; and there is some cinnamon stronger than that of Ceylon, though not so valuable. The cedar, the olive, the wild orange, the palm, the willow, and many other trees are found there. On the coast and western slopes of the Andes, are produced the cabbage-palm, cocoa-nut, chocolate-nut, and cotton-shrub; the pine-apple, turmeric, plantain, and sugar-cane. The large-flowered jessamine, and the *Datura arborea*, diffuse their evening fragrance around the vicinity of Lima. No less than twenty-four species of pepper, and five or six of capsicum, are considered natives of Peru. Tobacco and jalap abound in the groves at the foot of the Andes. The chief shrubs of the uplands are the different species of cinchona, or the salutary peruvian bark. The *caoutchouc* (indian rubber) is procured from the inspissated juice of a variety of different vegetables.

Chili.

The soil of Chili is extremely favorable to the growth of maize, wheat, barley and rye. Hemp also grows well. The sugar-cane, the cotton-tree, the banana, the sweet potato, and numerous other plants are cultivated. The vine yields abundantly, and the olive likewise attains great perfection. Forests of apples, peach and quince trees, in some places, extend for leagues. Oranges, citrons and lemons, are produced of an excellent quality.

There are some sterile tracts, but in general the soil is remarkably fruitful, and the products are rich and varied. The maritime tracts are less productive than the midland, and these again yield to the vallies of the Andes. Numerous plants are peculiar to the country. The uncultivated parts present the utmost profusion of vegetable riches. The plains, vallies and mountains are covered with a variety of beautiful trees, many of which preserve their foliage throughout the year. Medicinal, dyeing and aromatic plants also abound, and the fruits introduced by Europeans grow in greater perfection than in their native soil.

Buenos-Ayres.

As almost every soil and climate is to be found within the limits of this country, so every vegetable production would grow by proper cultivation. Indian corn, cocoa, olives, sugar-cane, grapes, oranges, lemons, citrons and figs attain great perfection. Wheat is cultivated with success, and apples, pears, plums, cherries and other fruits are plentiful. Abundance of tobacco is produced in some parts. The soil, like the climate, varies in this extensive country. The forests abound with straight and lofty cedars, which are excellently adapted for ship-building. There are numerous and beautiful species of palm. The manioc, the magney, bacoba, banana and pine-apple are found in profusion.

Climate. The climate is various, but generally healthy. The atmosphere is very humid ; and during summer, rains are frequent, and are commonly acompanied by the most dreadful thunder and lightning. Fogs, snow and hail are seldom experienced, except on the summits of the mountains. In Cayo, on the frontiers of Chili, the winters are excessively cold ; while in summer the heats are intense.

Guiana.

The soil of Guiana is surprisingly fertile, and a most luxuriant vegetation almost everywhere overspreads the country, which abounds with the finest woods, fruits and plants. Many of the trees grow to the height of 100 feet. The most delicious fruits are met with. The guava and aviago pear are found in great abundance, and the pine-apples and other fruits are of the finest quality.

The country is subject to heavy and frequent rains, and, from the great prevalence of moisture and heat, is unhealthy.

The cultivated tracts are covered with sugar, cotton, coffee and indigo plantations. In some places the soil is so exuberant, that thirty crops of rice may be made in succession.

Brazil.

In a large portion of this country the soil is very fertile. The forests produce trees of a great variety, and of a remarkable size, suited for ship-building and other purposes. They are of a remarkably rapid growth. There are, besides, lighter species of wood, similar to fir; not to speak of logwood, mahogany, an infinity of ornamental and dyeing woods. There are three kinds of *brazil-wood*, which is an important article of export. Melons, bananas, lemons, guavas and oranges grow along the coast ; and aromatic and medicinal plants are very abundant. The forests of Brazil are noted for the gigantic growth and great variety of the trees ; the profusion and beauty of the flowering shrubs, hanging under a load of blossoms ; the strange shapes and enormous strength and size of the creepers and parasitic plants, and the clouds of gaily colored birds and splendid insects that everywhere abound. The *jacaranda*, so well known, and so extensively employed as an ornamental material for furniture under the name of *rosewood*, attracts the eye by the lightness of its doubly feathered leaves and its large golden colored flowers. The cocoa (*theobroma*), or chocolate-tree, from the kernel of which chocolate is made, seems to be an aboriginal native of Brazil, although it is extensively cultivated in other countries.

The *Bertholletia excelsa*, producing the delicious brazil nut, from 15 to 20 kernels of which are enclosed in a thick outer rind ; the *copaifera*, yielding the balsam copaiva ; the annatta (*Bixa orellata*), much used in this country, under the name of *otter*, for coloring cheese, are a few of the natives of the Brazil fruits. The *Capsicum annuum*, yielding the cayenne pepper ; the *Quassia amara*, furnishing a valuable drug ; the pungent and odoriferous vanilla ; the ipecacuanha, whose root is an invaluable drug ; the tonqua bean, much prized for its delicate aromatic seed ; the sarsaparilla, noted for its various virtues, are among the economical plants.

Face of the country. Viewed from the sea, the country appears rugged and mountainous ; but on a nearer approach, its appearance is highly beautiful and picturesque, clothed as it is with the most luxuriant vegetation, its hills covered with thick woods, and its vallies with a verdure which never fades. Towards the interior, the land rises by gentle gradations to the height of 6000 feet above the level of the sea. A large part of the interior is overspread with an impenetrable forest.

Agriculture. In no country would agriculture yield greater returns to the industrious cultivator, but, unhappily, in no country is it more generally neglected. A passion for seeking gold and diamonds has nearly destroyed all relish for every other labor. Maize, beans and cassava root are raised in considerable quantities. In many parts wheat and other European grains are reared. Coffee and sugar are cultivated to a great extent, as well as tobacco and cotton. Vanilla and sarsaparilla are obtained in abundance.

SOMETHING ABOUT MANURE AND ITS APPLICATION.

BY JESSE RYDER.

Almost all the farmers of this country are obliged to depend on the resources of their own farms for the supply of animal and vegetable manures which they can command. Mineral manures are more generally purchasable ; but as stimulants and absorbents, they can only operate in conjunction with the vegetable matter of the soil (the humus or mould), the principal supply of which to cultivated land, is obtained from our cattle yards, and is returned to the earth again from whence it came.

It seems to be self-evident to me, that the earth must receive something in return for her productions, or become bankrupt. Either a portion of her produce must be left with her, or an equivalent returned, otherwise she becomes barren and unfruitful.

If I recollect right, Liebig says that perhaps five-sixths of the nourishment of plants is derived from the atmosphere, and all chemists I believe admit a greater or less proportion; but one thing is certain, that a part of their nourishment is derived from the soil in which they grow, the one sixth if you please; and that the richer and better the soil, other circumstances being the same, the better the crop. The roots of plants must be abundantly supplied with their specific food, in that state of preparation which admits of its being appropriated by them, or the plants cannot be fully developed.

I, for one, do not believe that chemists ever will be able to show that the remaining one sixth of their support can also be got from the atmosphere, and that the only use of earth to them would be as a house or home to live in, to keep the plants from travelling about or falling over. If such should ever be the case, production would become too easy to agree with the declaration that "by the sweat of thy face shalt thou eat bread."

It behoves us then to increase the fertility of the soil we cultivate, until it is capable of affording to plants all the nourishment they require of it, in order to develope them fully.

There is great encouragement in the thought that plants derive a part of their food and nourishment from the atmosphere. If it was all derived from the earth, then would it require all the produce of the farm to be restored to it, in order to preserve its fertility. Neither could we afford to lose any thing by the washings of rains, or by solar evaporation, unless there is some natural operation going on, to create soil upon the earth's surface, independent of aid from the atmosphere. Neither could we enrich our soil from its own resources; that is, by returning to it all its produce as manure, without extraneous aid of some kind. But experimental proofs are not wanting to show that a large part of the food of plants *is derived from the atmosphere.*

It must be within the knowledge of almost all good farmers, that their farms have become more and more productive by restoring to them only a part of the produce of the same in the form of manure, aided by judicious management in its application, and a proper rotation of crops. Now a very important question arises, and it is this : Ought we not to increase the fertility of our farms very fast, when it is considered that the larger part of the nutriment of plants is derived from the atmosphere ? That for every pound of food they use of our furnishing, they restore to us three, four, or five pounds more derived from another source, would call for an affirmative answer. As it is well determined that our gain is great, it remains for us to discover the cause of loss, and the preventive too, for lose we certainly must, else : for every load of manure we feed to plants, we ought at the period of its exhaustion to have six times as much on hand, provided the produce is all made use of on the farm, and five-sixths is the amount gained.

I am satisfied that a great deal more than half the support of plants is derived from some other source than the product of decayed vegetable matter in the soil itself, from the fact that grain farms are often made to improve rapidly, from the resources of the farm which are left after selling off the grain, which is the most valuable portion for manure, and after losing a great part of the strength of the manure which is made on the farm by the escape of its gases and salts, for the want, in part, of some substances to combine and retain them for the use of plants.

Again, meadow land can be cropped, and not manured save and except with plaster, and the soil improve meantime (and I even think the same result may be experienced without the use of plaster, but in a less degree of rapidity), as I have shown in a former article. I know that such has been the result where plaster was used. In an improvement of a soil almost destitute of mould, in this way, admitting that it is to be attributed to the use of plaster, there is a great increase of mould, which I suppose is principally carbon ; but the plaster did not contain carbon. It must operate then by promoting the growth of vegetation that does, which must derive it from the atmosphere ; and the operation of the plaster must be by its sulphuric acid combining the ammonia of the atmosphere. I am aware that Dr. Dana attributed its good effects to another cause, viz. the sulphuric acid of the plaster dissolving the silex or gritty matter of the soil, and thus setting free the alkalies contained therein; which in turn dissolve more silex, and thus set free another portion of alkali, and so on. But, in my view, the great effects produced from the use of a little plaster must be attributed to another cause.

I should think the growing crop would naturally appropriate to itself the alkalies, so as to prevent in a great measure the action and reaction spoken of.

If this theory be correct, then ought plaster to operate as beneficially in the vicinity of the sea as elsewhere. The effect produced by the lime of the plaster must necessarily be small; a bushel or two to the acre would not avail much, where forty is not enough.

I adopt Liebig's theory of the action of plaster as being most natural, which is, that it fixes the ammonia which is brought down by rain. I suppose it to be in perfect accordance with the law of chemical affinity, if the sulphuric acid of the plaster has a greater affinity for ammonia than it has for lime.

As a practical proof of the correctness of Liebig's theory, I would state that I have, in experimenting with plaster, applied it to a field of corn, except a spot of three rods square, by first rolling the seed in plaster, and then applying it to the hill after it came up; the result was, a difference so great in the growth and yield, as to convince me, knowing the capabilities of the soil, that the non-plastered portion of the corn was a great deal poorer than it would have been had there been no plaster applied to any of the adjacent parts of the field; consequently the non-plastered portion had been robbed by the plaster of the surrounding corn, of some substance derived from the atmosphere. Hence the usual mode of testing the effects of plaster by comparing parts adjacent, is not fair; the apparent effect being greater than the real. I am sustained in this opinion by a very intelligent farmer of my acquaintance, who came to the same conclusion for himself.

May it not be true, that those farmers who do not use plaster are a little worse off than if their neighbors did not use it. I was told by a farmer who lives near Long Island Sound, that they esteem plaster of very little use, unless it is sowed in the summer, immediately after a shower from the westward.

Liebig says that ammonia is brought down by rainwater, and that in the summer time, when rains are less frequent, a greater portion is brought down at one time. Is the air from the land better charged with ammonia than that from the sea? Does the sea-water absorb it?

When once it is conceded that the soil of a farm can be made to grow rich by the use of manure, made from a great deal less than its own produce, it must also be conceded that the same farm ought to be enriched faster and faster as the amount of its productions increase; and if the majority of farmers barely maintain their soil in a given state of fertility by present management, it follows that any increased effect obtained from a given source of fertility already in common use, must result in a general improvement of the soil, and advance the wealth and prosperity of the country. That such a result would be developed very rapidly, could the manure we make on our farms be made to produce double the effect which it now does, no one can doubt.

I do not believe that the manure which is applied to hoed crops in this country, reproduces itself to the farmer, as a general thing, notwithstanding its auxiliary help from the atmosphere. This is a serious consideration, if we believe that by securing all its valuable properties, it ought to be instrumental in producing five or six times as much. Take a field and apply to it for indian corn the amount of manure made from its own produce for five preceding years, then raise three grain crops in succession, say corn, oats and wheat or rye; and at the end of that time, I am well assured, that the soil will have lost more strength than was imparted to it by the manure of five years. Let it then be laid down to grass for two years, and at the end of that time it will have recovered the elements of fertility, so as to be, generally speaking, about as good as it was before the manure was applied five years previous; the formation of sod being a rejuvenating process.

To be more particular, I should say that the soil of land which is dry and good for grain, would be somewhat improved at the end of the five years, if the grass seed took well; and heavy clayey soils, which are decidedly uncertain for grain without manure, will be decidedly poorer. I consider the grass crop to be a mending crop, and ever and anon tributary to the grain crop. Meadowland sustaining itself by the vegetable matter of decayed roots, would go to show that the crop derived but a small part of its support from the vegetable matter of the soil.

With hoed crops it appears to me that the roots are not numerous enough, and the leaves too few to appropriate and secure any great proportion of the virtues of the manure, which otherwise leach away or evaporate.

I once buried by the plough, in the spring of the year, about sixty ox cart-loads of manure on four acres of sod ground, ploughed the usual depth, five or six inches, soil stiff and heavy ; and for aught I have ever seen of its effects, there might as well have been a funeral ceremony at the time of the burying. The season was somewhat wet. What became of the salts of the manure ? Planted with potatoes which were poor, then sowed with rye which was poor, and the grass which followed was not as good as it grew before the ploughing. Ploughing in manure on dry land may do better ; but I doubt whether one-fourth is ever realized from it that ought to be, if plants derive any considerable part of their support from the atmosphere. I once put about five bushels of strong horse manure in one heap on a timothy meadow, and spread the surrounding parts with like manure, ten two-horse loads to the acre. The manure heap made the grass but little heavier on its borders than it was elsewhere, the ten loads to the acre having brought the land near to its maximum of production (three and a half tons to the acre). Three years after, the grass was little or no heavier where the manure heap was, than on the parts adjacent. Nineteen twentieths of the manure, then, was lost ; which is proof positive to my mind, that it is necessary to secure its valuable properties very soon, or they are lost.

Here the farmer requires chemical aid ; and great would be the obligations of the people to that man who could discover, and would make known some cheap and practical way of combining and securing for the use of plants, the fertilizing properties of manure. A free use of plaster would, no doubt, effect much by taking up the ammonia as it formed : if so, it ought to be sprinkled over the yards frequently, and mixed with the manure heap ; and then when it was applied to the land, would it not leach away into the earth the same as any other salts ?

In a practical way, and without asking the chemists any thing about it, I think farmers may double the value of their manure by taking my advice in its application, where the supply is limited. I presume the supply on most farms does not equal one load per acre yearly, for the land in grass and grain ; that of the land ploughed, only a portion of it gets a sprinkling in a round of crops ; and that if the corn ground is covered, there is none left for wheat. I know that most theoretical and many practical farmers recommend the application of all the manure of the farm to the hoed crops ; and thus wear it out, as I think, without securing such a return from it as will leave the land better than it found it.

Our primitive soil is generally rather poor and difficult, and soon reduced by bad management. In many cases, if we do not enrich and improve it, we had best forsake it and go to better land. That system which enriches poor land in the least time, must be good for rich land too. That which enables a poor man to grow rich, must enable the rich man to grow richer.

Experience has taught us here, that to enrich our land, we must apply the manure for our plough land at the time of sowing winter grain, spread it on the furrow, and harrow it in with the grain, which leaves it just where we want it, near the surface ; or harrow the ground first, then spread the manure, and plough in the manure and grain together with light furrows.

Now here is the difference between the two systems : If we put all the manure on for corn, on land rather poor and easily worked down, the result is pretty good corn and oats, and poor winter grain and grass succeeding, there being no manure to spare for those crops. When the sod is again turned over for corn, it being poor, the corn again requires barn-yard manure ; and thus the land is kept poor, the grass being light, and the manure not increasing in quantity. But let the disposition of the manure be changed : apply it to the winter grain, and then we have good wheat or rye succeeded by good grass, plenty of fodder, an increased quantity of manure, and a sod formed, which, when the land is again ploughed for corn, will enable it to grow as luxuriantly as it did under previous management with the manure applied directly to it. The manure is now left for the winter grain again : there is more of it, and the land grows better very fast.

Suppose the corn on the good sod, as good as it would have been on the poor sod with the manure, what then ? Why it was more cheaply fed : there was no volatile salts to escape ; none to leach away, that I know of. The difference is like fattening cattle on wheat instead of indian corn or roots ; only the one is a loss direct, the other a loss entailed ; one like paying direct taxes which we know, the other like indirect taxes which we feel and do not know exactly what the matter is.

With the manure for winter grain, it prevents it from freezing out in the winter and spring ; also saves the young timothy, and in many instances lightens the soil so as to preserve the clover roots of the year following. Grass being a mending crop, the land can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spare its luxuriant burthen and not be poorer, and the land is improved by the amount of the manure, a luxuriant sod being as it were its representative.

Such, in my view, is a practical way of increasing the effects of manure, and securing for the earth a store of vegetable food derived from the atmosphere.

INSECTS INJURIOUS TO VEGETATION.—No. 3.

BY ASA FITCH, M. D.

THE WHEAT-FLY.

Although several facts in the habits and economy of the wheat-fly had occurred to my notice at sundry times since its appearance in this vicinity, yet as my leisure for studies of this nature was wholly engrossed in other departments of the science of entomology, these facts had been observed in too cursory a manner to be of material value in preparing an account for the public eye. It has not been until the present year, that I have made this and its allied species my particular study. And as some few interesting points still remain undetermined, ere a perfectly complete history of this insect can be given, I should be inclined still to defer preparing a paper upon this subject, but that I deem some of the observations already made of too much importance to be longer withheld, and am moreover very well aware that if no writer ventured to appear before the public until his investigations were so complete in every particular that he could *exhaust* the subject on which he wrote, very little would be published, and the world would have but a small fraction of that amount of information which it now possesses.

It is necessary for me farther to premise, that although we have two distinct species of wheat-flies, as will be fully shown in the sequel of this paper, to wit, the *clear-winged wheat-fly* (Cecidomyia tritici *of Kirby*) and the *spotted-winged wheat-fly*, which has hitherto remained a nondescript ; yet as nothing is yet known of the habits and transformations of one of these as distinct from the other, through the body of this article the common name "wheat-fly" will be employed for convenience as referring to both these species.

Future researches, however, may detect dissimilarities in their habits, and show that portions of the following account are true only with regard to one of these.

Its foreign history.

The first distinct and unequivocal account of the wheat-fly, of which I am aware, is that given by Mr. Christopher Gullet, in 1771, and published in the Philosophical Transactions of the Royal Society the following year.* From this it would appear that the effects

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* So long ago as the year 1768, Col. Langdon Carter, of Virginia, transmitted to the American Philosophical Society a paper entitled "Observations concerning the fly-weevil that destroys the wheat;" which was published in the first volume of the Society's Transactions, 2d edition, pages 274 – 287. The account here given, is in nearly all its particulars so strikingly applicable to the wheat-fly, that so much of it as relates to the insect itself merits an introduction in this place. He rather quaintly remarks, "In a pleasant evening, after the sun was down, and every thing serenely calm, I found the rascals extremely busy amongst my ears, and really very numerous. I immediately inclosed some of them in a light loose handkerchief; and by the magnifiers of my telescope, I took occasion minutely to examine them. They are a pale brownish moth, with little trunks or bodies, some trifle shorter than their wings; and as some of their little bodies appeared bulging as if loaded, I applied the pressure of a fine straw upon them, and saw them squirt out, one after another, a number of little things which I took to be eggs, some more, some less: some emitted fifteen or twenty of them; and others appeared extremely lank in their little trunks, which I could not make discharge anything like an egg. Whether they had done this in the field before, or were of the male kind, I could not tell; but from this discovery I concluded that there need not be above two or three flies to an ear of corn, to lay eggs enough to destroy the greatest crop. * * * It is with much propriety called a weevil, as it destroys the wheat even in our granaries; though it is not of the kind termed by naturalists the *curculio*, of which they have given a very long list; for it is not like a bug; it carries no cases for its wings; neither has it any feelers, with which the curculio is always distinguished; and perhaps (as I fancy it will turn out in the course of this letter that they never attack grain when hard) they really have no occasion for such feelers. For from the make of it, to my judgment it appears an impossibility that it should ever perforate into a hard grain, being furnished with nothing in nature, from the most minute examination by glasses, that could make such a perforation; and seems indeed a fly itself, consisting of nothing sensible to the slightest touch with the finger, nor to the eye assisted with glasses, leaving only a little dry pale brown glossy dust on being squeezed."

I doubt not but that on perusing this extract, almost every reader who is conversant with our wheat-fly will feel confident that it is the same insect to which Col. Carter alludes. Yet if his account be more particularly observed, we gather from it some characters which assure us that it was not the wheat-fly which he examined. Although he uses the terms *moth* and *fly* as synonymous, and nowhere tells us whether his specimens had four or only two wings, yet he could scarcely have spoken of the lively orange color of our wheat-fly as "pale brownish;" and what is yet more conclusive, produced by the wheat-fly had been known for some time to the farmers of England, though imputed by them to a wrong cause. He says, "What the farmers call the yellows in wheat, and which they consider as a kind of mildew, is, in fact, occasioned by a small yellow fly, with blue wings, about the size of a gnat. This blows in the ear of the corn, and produces a worm, almost invisible to the naked eye; but, being seen through a pocket microscope, it appears a large yellow maggot, of the color and gloss of amber, and is so prolific that I distinctly counted forty-one living yellow maggots in the husk of one single grain of wheat, a number sufficient to eat up and destroy the corn in a whole ear. One of these yellow flies laid at least eight or ten eggs, of an oblong shape, on my thumb, only while carrying by the wing across three or four ridges." (*Harris's Mass. Report*, p. 437.)

It was several years subsequent to this date, that the accounts of the appalling ravages of the hessian fly among the wheat crops of America reached Europe; and as this fly was universally believed to have been derived from the old world, extensive and careful examinations of the grain fields there were made, to detect it, that its habits might be learned, and means devised for preventing its becoming such a scourge as it was to this country. These investigations, conducted often at the public expense, and by men whose acquirements peculiarly fitted them for such a work, resulted in a confident announcement, which received general credence for a long series of years, that the hessian fly did not exist in Europe; yet in their course, several other species of insects injurious to the cultivated grains of that continent were discovered, and the wheat-fly received a particular examination. Mr. Curtis, generally so accurate in his statements, says that it was first discovered at this time; but

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this insect, on being pressed between the fingers, left "a little dry pale brown glossy dust;" whereas the wheat-fly leaves no mark upon the fingers, unless it be actually crushed, in which case its fluid juices produce a yellow stain, without any glossiness. Every one accustomed to the handling of insects, will at once recognize the character in question as applying admirably to some small species of moth; and the "Committee on Husbandry" of the Society, in their remarks at the close of Col. Carter's paper, are doubtless correct in their statement, that these insects "appear to be of the same kind with those that do the like mischief in Europe, which a gentleman of Angumois describes to Mr. Duhamel," and which have since become so well known as the "Angumois grain-moth," described by the naturalist Olivier under the technical name of *Alucita cerealella.*

the account already given from Mr. Gullet, shows that it was known in England at least twenty-five years earlier than Mr. C. supposes, and anterior even to the date when the hessian fly was first observed in America.

In 1795, as we are informed by Mr. Marsham, in a paper read before the Linnæan Society, London, and published in their Transactions, vol. iii. p. 142, towards the end of July, Mr. Long had observed an insect that threatened to do much mischief to the wheat crops; attacking one or more of the grains in an ear, and causing the chaff of these grains to become yellow or ripe, whilst the remainder of the head was still green. Mr. Marsham, on opening the chaff of these grains, found an orange-colored powder, and in many of them one or two very minute yellowish-white or deep yellow larvæ, the grain itself appearing to be a little shrunk. Mr. Markwick of Sussex also observed the same larvæ in his wheat, the forepar of August, but was confident they had done no injury to it. The same larvæ were also noticed by Mr. Kirby, this year, in Suffolk

In a subsequent paper from Mr. Marsham (*Trans. Lin. Soc* vol. iv. p. 224), we are informed that Mr. Markwich, July 12, 1797 saw the flies themselves, at rest upon the heads of the wheat, an also a few of the larvæ within the flowers; and that awhile later i the season the fly appeared reduced in numbers, whilst the larv had become much more abundant. From heads of the wheat en closed in a flowerpot, he reared the fly, and also its parasite; th fly thus obtained having "spotted wings," a fact which we sha revert to hereafter.

Following this account is an excellent article (p. 230) by the Re William Kirby, who has since become so well known by his variou writings upon entomology. Mr. Kirby here gives a scientific descrip tion of the wheat-fly, bestowing upon it the specific name *tritici*, b which it has been definitely distinguished by all subsequent writer and correctly referring it to the genus *Tipula* of Linnæus, a genu which, in consequence of the vast number of species afterward discovered to be comprised under it, naturalists have since found necessary to subdivide; and the species in question at this day fal within that group to which the name *Cecidomyia* was given by La treille, an arrangement concurred in by Mr. Kirby himself in h communication in Loudon's Magazine of Natural History, vol. p. 227; and which I note thus particularly, as by most writers i our agricultural papers it is still spoken of as solely the *Tipula tritici* of Mr. Kirby.

In this article, and another presented about a year afterwards (*Trans. Lin. Soc.* vol. v. p. 96), Mr. Kirby gives a large number of most interesting and valuable observations upon this insect, the correctness of which, generally, more recent investigations have fully attested. With regard to its abundance at that time, he says he could scarcely pass through a wheatfield, in which some florets of every ear were not inhabited by the larvæ ; and in a field of fifteen acres, which he carefully examined, he calculated that the havoc done by them would amount to five combs (twenty bushels).

From this time, we have met with no notices of the wheat-fly, except occasional references to the articles above mentioned, until the year 1828, when, and for a few of the following years, it again appeared in such numbers and with such havoc in several of the counties of England and Scotland, as to elicit communications in the magazines from several writers. In some districts of Scotland, its devastations would seem to have approached in severity what has been experienced upon this side of the Atlantic ; for "Mr. Gorrie estimates the loss sustained by the farming interest in the Carse of Gowrie (the rich alluvial district along the Isla and its tributaries in Perth and Forfarshire) by the wheat-fly alone, at 20,000*l.* in 1827, at 30,000*l.* in 1828, and at 36,000*l.* in 1829" (*Encyc. of Agric.* 3d Lond. ed. p. 820. § 5066). And Mr. Bell, writing from Perthshire, June 24, 1830, says, "We are anxious to have the present cold weather continue for another ten days, to prevent the eggs from hatching, until the wheat be sufficiently hardened and beyond the state which affords nourishment to the maggot. Another year or two of the wheat-fly will make two thirds of the farmers here bankrupts" (*Gardener's Magazine*, vol. vi. p. 495). Mr. Gorrie, in a letter dated at Aunat Gardens, Errol, Perthshire, Sept. 1828 (*Loudon's Mag. of Nat. Hist.* vol. ii. p. 292), solicits information "on the nature and mode of propagation of a fly which has this year destroyed about one third of the late sown wheat all over this country." He describes a small yellow caterpillar, one eighth of an inch long, as numerous in the young ears of wheat, completely devouring the young milky grain, becoming torpid in about twelve days, and in six days more changing to a small black fly. In a subsequent communication, Aug. 1829 (p. 323), he corrects the latter part of the above statement, and says, "At that time I did not know that a yellow fly had deposited the eggs within the glume, which became maggots. Observing numbers of black flies on the ears of wheat, I believed they had been the produce of the caterpillar. I have this season, however, observed the yellow fly (described by Rev. W. Kirby) deposit its eggs in the wheat-ear," etc. I notice this more particularly, because the farmers in this vicinity, with scarcely an exception, have fallen into the same error, and to this day suppose a small black fly, of the family *Muscidæ*, which occurs abundantly in wheat-fields, to be the real wheat-fly.

Mr. Patrick Shirreff, of East-Lothian, gives, in the same volume of Loudon's Magazine, pages 448 – 451, an excellent and very accurate summary of the habits and transformations of the same insect, the result chiefly of his own observations. For a concise account, this is not surpassed by any that has fallen under my notice.

Still more recently, this subject has been investigated by Prof. Henslow, from whom a communication appears in the Journal of the Royal Agricultural Society of England, vol. ii. p. 26; and in the same journal for the present year (vol. vi. p. 131. plate M.) an admirable production is inserted from the pen and graver of that accomplished naturalist, John Curtis, F.L.S., giving much more accurate and precise descriptions and delineations of the wheat-fly, in the different stages of its existence, than any that had previously appeared. To it I am particularly indebted for such characters as enable me to say without a doubt, that the clear-winged wheat-fly of America is identical with the English *Cecidomyia tritici.*

In closing this summary of the notices of the wheat-fly abroad, I would allude to what has occurred to me as perhaps true in the history of this insect, to wit, that it has somewhat *regular periods of recurring* in such numbers as to become a pest to the agriculturist. Thus, it would appear from Mr. Gullet's account, that it had been common for a few years previous to 1771. After an interval of twenty-five years, it is again observed plentifully for three or four years, and in different districts, by Messrs. Kirby, Markwick and Long. Again it ceases to elicit attention, until a period but a little longer elapses, when, in 1828 and the following years, it forces itself once more and still more prominently into notice. All that I design, is, to direct attention to this point: the facts are as yet too few and too vague to justify anything more than a suggestion. The observations of Mr. Kirby, reaching now over half a century, could probably shed some light upon this most interesting topic.

As respects the *extent of its range abroad*, it has been noticed in most of the southern and eastern counties of England, from Cornwal to Norfolk, and also in Shropshire ; in Perthshire and the Lothians, and probably in other districts of Scotland ; and in the north of Ireland. Whether it occurs upon the continent of Europe, we are not positively informed. It is not noticed by Macquart, either in his Diptera of the North of France, or his Natural History of Dipterous Insects (for a perusal of which I am indebted to the courtesy of Dr. T. W. Harris of Harvard University) ; and we can scarcely believe that if it existed in his district, it could have been overlooked by so assiduous a naturalist. M. Herpin, however (as we are told by Mr. Curtis), is of opinion that it is an inhabitant of France, and the statement which he makes strongly supports this opinion. He says, "I have also found in ears of corn, at the time of flowering, many little yellow larvæ, very lively, from two to three millimetres long, lodged between the chaff of the grain : these larvæ nibble and destroy the generative organs of the plant, and the germen where they are found are sterile. These larvæ appear to me to have a very great analogy with those which have been described in the Linnæan Transactions, under the name of *Tipula tritici* : it is probably a *Cecidomyia*." M. Herpin placed several ears of diseased barley and wheat in bottles, and in these bottles a number of cecidomyia flies were afterwards found. Meigen—a copy of whose noted work upon the Diptera of Europe I regret that I have been unable to meet with — as I learn from Mr. Curtis's paper, gives descriptions and figures of the wheat-fly. Were his specimens collected in Germany, or received from England ?

Its domestic history.

It will be unnecessary to particularly specify the various notices of this insect, that have appeared in the different agricultural papers of the Northern States during the last twelve years. The more important and valuable of these may be found in the several volumes of the Cultivator and of the New-England Farmer. An excellent summary of the history and habits of the wheat-fly, both in this country and abroad, is also given in Dr. Harris's Report on the Insects of Massachusetts, p. 437 – 444. Mr. Gaylord's paper on injurious insects briefly notices this species (*Trans. N. Y. State Agric. Society*, 1843, vol. iii. p. 145 – 147.)

With the prominent facts that have been laid before the public by our agricultural periodicals, every intelligent farmer is already familiar. The great difficulty experienced by persons but little conversant with zoological science, in determining what this wheat-worm really was, forms a striking feature in the earlier notices that appeared respecting it. Thus, by some it was for a time regarded as an animalcule of the *vibrio* genus, analogous to the "eels" generated in vinegar and paste. By others, and quite extensively, it was pronounced to be a *weevil*, and this very improper name is to this day often applied to it. Others, still, deemed it to be "Monsieur Tonson come again," considering it as a return of the *hessian-fly* to a section of the country from which it had long been absent. It would be easy to point out how erroneous each of these opinions are ; but I deem it wholly unnecessary, as the public mind is now no longer distracted upon this subject ; and the correct view, that this insect is a fly, peculiar in its habits, and differing from any of those previously known in this country, universally prevails.

It is not improbable but that one or both of the species of the wheat-fly may have been present in this country, in limited numbers, many years before it was distinctly noticed. In truth, common as this insect still is in this district, if our farmers, guided by the knowledge they have acquired of it, were not zealously searching for it in every field, I much doubt whether it would be at all observed here at the present day. And often too when a careful examination of the growing grain leads to a belief that the crop is scarcely infested, an inspection of the threshing-floor, or of the screenings of the fanning-mill, will frequently demonstrate that it was present in much greater abundance than was surmised. These facts plainly show, that this insect *might* lurk a long time in our country wholly unobserved.

Mr. Jewett says the wheat-fly first appeared in western Vermont in the year 1820 (*New-Eng. Farmer*, vol. xix. p. 301). It was not, however, till the years 1828 and 1829 that it became so numerous as to attract the attention of community ; the same years, be it observed, when its ravages were so annoying in Scotland. It was in the northern part of Vermont, bordering upon the line of Lower Canada, where it became so excessively multiplied at this time ; and from that, as a central point, it seems to have extended in nearly all directions. In this vicinity, one hundred and twenty-five or fifty miles south of the locality above indicated, it was certainly observed in 1830 ; and in 1832 the wheat crops were so completely destroyed by it, as to lead to a general abandonment of the cultivation of this grain. Having spread east over Vermont and New-Hampshire, it in 1834 appeared in the State of Maine, and continued to advance in that direction, it is said, at the rate of twenty or thirty miles a year. Westward its progress would seem to have been less rapid, and along the Mohawk river by no means so generally destructive. It is not till within a year or two past, that it has appeared in the Black river country east of Lake Ontario, as I am informed by an intelligent gentleman resident there ; nor until the present season that it has been so injurious as to induce in some instances a premature mowing of the crop, and preserving it for hay. Rumor states that farther west, in the wheat-noted Genesee country, it has been detected for the first time the present year.

The history of its career, appears to be quite uniform in most of the districts hitherto visited by it. About two or three years after its first arrival at a particular locality, it becomes most excessively multiplied, and the devastations which it now commits are almost incredible. Though I believe that through unduly excited fears, or a hope of thereby destroying hosts of this marauder, a mowing of the crop whilst yet green, and a curing of it for hay, has often been resorted to, when, had it been harvested as usual, a less sacrifice would have been made ; yet many cases have occurred, in which diligent search by different persons has failed to discover a single kernel of grain in any of the heads of an entire field !

This havoc, so extreme and general, though not universal (for some fields even now escape with comparatively little injury), lasts but one or two years. The numbers of the pest, and its consequent ravages, soon become sensibly diminished ; and after the lapse of a few seasons, the cultivation of the wheat crop is again found to be comparatively safe, and its yield only in isolated instances materially lessened by the continued presence of the fly, which has now become probably a permanent inhabitant.

It is commonly supposed that this rapid diminution in the numbers of the wheat-fly has been produced by the general abandonment of the cultivation of wheat in this section of the country ; that thus the insect, having no place to deposit its eggs where its young could be nourished, has become measurably "starved out." But that this opinion is erroneous, is I think evident from one or two facts. During this entire period, since notice was first attracted to the wheat-fly, there are some farmers who have every year continued the cultivation of wheat with very fair success, their crops having been in no one of these years so severely injured as to dishearten them; and their respective situations are so dissimilar, that this immunity can with no plausibility be attributed to any peculiarity in the locations of their farms. Now if the swarms of these insects which for a time pervaded every neighborhood through this entire section of country, and which possess a power of wing capable of bearing them from twenty to fifty miles in a single season, had been in the "starving" condition supposed, how have the fields alluded to escaped destruction? Certainly these myriads of tiny creatures could not have been reduced to such straits for want of the appropriate repository for their eggs, until after these crops had been utterly consumed. And, with the insect not exterminated, but still everywhere common, now that the culture of wheat has been gradually returned to with such success that it has again become general, why has not the fly again increased? Why have the considerable crops of the past and the abundant ones of the present year in this (Washington) county, been so little injured? I am firmly persuaded, therefore, that the speedy diminution in the numbers of the wheat-fly, which soon follows a season in which it has been extremely annoying, can not be truly assigned to the cause above stated; but that it is rather to be attributed to that beautiful provision of nature, long since observed, and additional instances of the truth of which are brought to light by the investigations of every year, to wit, that an undue increase in any of the species of the animal or vegetable world never takes place, without being speedily succeeded by a corresponding increase of the natural enemies and destroyers of that species, whereby it again becomes reduced to its appropriate bounds.

Whenever once introduced, it is probable the wheat-fly will ever after continue in limited numbers, laying the wheat crop annually under a moderate contribution for its support. Isolated fields will occur where its devastations will be quite serious, whilst the crop of the district generally will suffer but little, and many fields none at all. Such has appeared to be its history in this vicinity for several years past. Seasons favorable for its multiplication will doubtless occur, when its injuries will be much augmented ; as well as seasons of a reverse character, when its presence will scarcely be known. It is, therefore, very important that the entire history and habits of this insect should be accurately traced out. For only with a full knowledge of these, can we be able to resort intelligently to such measures as will keep its numbers constantly limited, or sweep it from those fields that will probably at times be excessively infested by it.

Its habits.

Relying upon the correctness of the published statements, that it was not till "towards the last of June" that the fly infests the wheat-fields, and that "the principal deposite of eggs is made in the first half of July," I had not commenced searching for it, when on the 16th of June I was informed by a neighbor, that it had been present for some days in large numbers, in a field of thrifty winter wheat of his. Upon repairing to this field, a small black fly, about one third of the size and much resembling the common house-fly, was pointed out as the dreaded enemy ; and so universally has this doubtless harmless species been for years regarded as the true wheat fly by the farmers throughout this whole section of the "infected district," merely from the circumstance of its occurring abundantly in wheatfields simultaneously with the wheat-worm, that my companion was much surprised, and disposed to be incredulous of my assertion that *that* was not the wheat-fly. On opening the flowers of the wheat, however, the eggs of the real marauder were found in abundance ; and a sweeping, with the small gauze fly-net in common use by entomologists, between the stalks of grain towards their roots, immediately caught within it a number of the winged insects. My comrade was little less surprised on my pointing the real fly out to him, being scarcely able to conceive that such a tiny fragile atom, seemingly a mere moat floating before his eye, could be that potent enemy that had spread such desolation over our land. Several of the specimens thus caught, were of the spotted-winged species. These I conjectured, until I afterwards came to examine them attentively with the microscope, were only a variety of the common or clear-winged species, else I should not have failed to have regarded them more particularly.

All parts of this field of four acres were found to be infested more or less with the wheat-fly, but they occurred most abundantly along one of its sides, in the field adjoining which, wheat had been grown the preceding year, which had been considerably injured by this insect. Such a host of destroyers as were here found, and the profusion of eggs that had been already deposited, strongly indicated that it must have commenced appearing in its winged state many days previous to this time.

The wheat-fly may be met with daily, from the fore part of June until so late at least as the middle of August. Although it congregates in swarms about fields of wheat at the time they are in blossom, it also occurs in a great variety of other situations. It ofter enters houses, upon the windows of which it may be observec dancing along the panes of glass, sometimes in numbers. It ma also be taken among the grass of pastures, and of alluvial meadow that have never been turned up by the plough. It is sometime found in shady places, particularly along the margin of streams associated with other minute species of *Tipulidæ* in those dance in which swarms of these insects so often engage. One specime was met with on weeds, in the margin of an extensive and dens forest, through which it must have made its way, or over an adjoir ing lake a half mile broad, on the opposite side of which was th nearest cultivated ground.

The fly, during the sunshine of day, moves about but little, re maining mostly at rest, or lurking about in the shade furnishe towards the roots of the growing grain. In the twilight of evening becomes active, and continues so perhaps during the entire night; fc before the morning sunrise it may be seen abundantly upon the win though less agile than in the evening, as though it had now becom somewhat wearied, or was rendered sluggish by the coolness an dampness of the night air. Upon cloudy days, also, it resorts bı little to its accustomed retreats. But it is during the evenings whic succeed hot days of sunshine that it appears to be most busy an full of life. If a field infested with them be visited with a lanter at this time, such hosts as were little imagined to exist, will be foun busily hovering about the grain, the most of them with wings an legs extended, dancing, as it were, slowly up and down along th ears, intently engaged in selecting the most suitable spot where to deposit their eggs. This being found, the insect alights, and standing upon the outer glume or chaff of the kernel, curves its abdomen so as to bring the tip in contact at right angles with the surface of the glume. It now toils industriously to insinuate its ovipositor through the scale, which is not accomplished till after a considerable exertion. Sometimes even, the scale having probably acquired too much maturity and hardness to be pierced by the tiny stinger which the fly protrudes, it is foiled in its efforts, and, as if vexed at its ill success, spitefully jerks apart its wings and darts away. This occurrence, however, is rare. And having penetrated with its ovipositor into contact with the germ of the future grain, through this tube one egg after another is passed in at short intervals until several are deposited. The usual number of eggs thus deposited, appeared to be from six to ten ; and as thrice or four times as many larvæ can sometimes be met with on a single germ, it is probable that three or four insects sometimes successively puncture the same floret. Very frequently two, four or six flies may be seen at the same time on different florets of the same ear, depositing their eggs ; and Mr. Shirreff says, " Upon one occasion I numbered thirty-five flies on a single ear, and, after carrying it a distance of a quarter of a mile, six of them still continued to deposit eggs." This work being done, another laborious task for the tiny creature remains, that of withdrawing the ovipositor ; and to accomplish this, the energies of the insect are sometimes inadequate, and it remains, Prometheus-like, chained to an immovable mountain, until it expires. This curious fact, first observed by Mr. Kirby, I have seen fully verified, meeting in several instances with the dead insect still remaining thus suspended.

Although the flowers of the wheat are the favorite resort of this insect for depositing its eggs, yet it is not limited solely to this plant. It is currently reported to have been occasionally met with in rye and oats in this country. Mr. Shirreff and Mr. Gorrie both found the wheat-worm in ears of the quack or couch grass (*Triticum repens*, Linn. ; *Agropyron repens*, Pal. de Beauvois) ; and the latter gentleman hereupon rather naively remarks, "The fly has not known that modern botanists no longer ranged the couch grass among the wheat tribe ; but, like myself, it is most attached to the Linnæan names and system." Mr. Markwick also found the same worms in the wild bearded oats (*Avena festuca*, Linn.).

The *eggs* are of an oblong, cylindrical form, with rounded ends. They are pellucid and nearly colorless at first, but acquire a yellowish tinge ere they are hatched, which is in rather over a week after they are deposited.

The *larva* has two distinct stages in its existence : an *active* or growing state, which is passed through in about a month ; and a *dormant* state, which then supervenes, and continues through the winter. This latter has been generally but incorrectly regarded as its pupa state by writers.

When it comes from the egg, the larva is a minute oblong soft worm, without feet or hairs, and transparent or of a whitish tinge at first, but soon changing to a bright amber or orange yellow. It moves but slowly, and with difficulty, by a wriggling motion of its body. It remains within the particular floret in which it is hatched, until it attains its full growth. Mr. Kirby says it feeds upon the pollen of the anthers ; and perhaps it does so at first, but certainly whilst they are yet quite small, all the worms within the floret cluster upon the sides of the germ, and generally towards its base (Plate 5, fig. *a*). I apprehend they chiefly subsist and attain their growth there, upon the fluids destined for the nourishment of the germ, and which, for want of these fluids, becomes shrivelled to a greater or less degree, and does not attain that plump form on which the value of this grain so much depends. The amount of injury received by the individual kernel of grain varies according to the number of worms that have been nourished in the chaff in contact with it. If mature worms grow from all the eggs deposited by the fly at a single puncture, the kernel is doubtless rendered worthless ; but a single worm, as is occasionally found, would scarcely produce a perceptible effect.

Having attained its growth, and in its dormant state, it does not differ sensibly, as I have been able to discover, from its previous appearance ; and the only reason for marking this as a distinct stage, is, that the insect now remains for a long period (probably two-thirds of its entire term of existence) without increasing in size or undergoing any other perceptible change. The texture of its body seems to have acquired rather more firmness than it possessed while it was growing, and its motions are more sluggish. It is less than the tenth of an inch long : a measurement of several specimens gives 0.07 as their average length. It is of a rich orange color, and of an oblong-oval form (Plate 5, fig. *b*), being broadest in the middle and rounded at each end : it is slightly depressed, the under side being considerably flattened ; thus in form considerably resembling the leech when contracted. Its joints are indicated by slight transverse impressed lines, by which it is divided into twelve segments of about equal length. Sometimes a brownish cloud is perceptible near the middle of the body on its under side, which is probably caused by alimentary matter. If these worms are placed for some days on a plate in a dry room, the outer skin of the body becomes so dry and indurated that the worm is incapable of making the slightest motion ; but on covering them with a wetted cloth, the surface again in a short time becomes pliant and yielding ; and if pressed with a needle, the animal writhes, and sometimes turns itself over to escape from the annoyance. I doubt whether it ever moults, or casts off its skin, between its egg and its pupa state ; but my observations have not been sufficiently exact and prolonged, to speak positively upon this point.

This is the form in which the insect passes the autumn and winter. The accounts of writers disagree as to where the worm remains during this period ; in fact few of them speak distinctly upon this particular point. Mr. Kirby, however, describes the worm as still continuing in the heads of the wheat ; but as a considerable portion of them are missing, he thinks these have been destroyed by parasitic enemies. He says, " I have seen more than once, seven or eight florets in an ear inhabited by the (active) larvæ, and as many as thirty in a single floret, seldom less than eight or nine, and yet I have scarcely found more than one pupa (dormant larva) in an ear, and had to examine several to meet with that." Mr. Gorrie, on the other hand, asserts that the maggots quit the ears of the wheat by the first of August, and enter into the ground, where they remain through the winter. Mr. Shirreff, also, from finding the fly much more abundant in fields where wheat had been grown the preceding year than it was in other fields, entertains the same opinion. Now the truth is, Mr. Kirby and Mr. Gorrie are both right. A portion of the larvæ leave the grain before it is harvested, and descend to the ground, where I have found them, under mouldy fragments of straw on the surface, or buried a half inch or less within the soil. I thus found them, common in the field already spoken of as examined on the 16th of June, a few days after the grain was harvested ; and also early in March, in a field in which wheat was grown the preceding year, that had been somewhat injured by the fly. Another portion of these larvæ remain in the heads of the wheat, and are carried into the barn, where they may readily be observed upon the threshing-floor, and found in quantities among the screenings of the fanning-mill, a considerable portion of which sometimes consists of these worms. Thence our farmers *kindly* empty them out at the door of the barn, where most of them doubtless find among the litter of the yard a bed equally as comfortable and secure as that in which their brethren in the field are at this time reposing.

Whence does this singular diversity in the habits of these larvæ arise? Why do one part of them leave the wheat, and enter the ground ere the harvest; and another portion remain within the ears, to be carried into the barn when the grain is housed? for all the worms are undoubtedly fully matured before the grain becomes ripe and hard. Two well attested observations I think shed much light upon this subject; and if the inference that they have led me to be correct, this point will be regarded as one of the most interesting that occurs in the economy of this insect. Mr. Harris informs us, that "after a shower of rain, they (the larvæ) have been seen in such countless numbers *on the beards of the wheat*, as to give *a yellow color to the whole field;*" and he refers to the New-England Farmer, vol. xii. p. 60, in confirmation of this statement, a volume which I have not at hand. For an analogous but still more instructive fact, I am indebted to Gen. M'Naughton, a practical farmer of this town, the accuracy of whose statements no one acquainted with him will doubt. In 1832, his wheat, in which the fly had made sad havoc, was cradled and lying in the swath, when a moderate rain came on, followed by a damp cloudy afternoon. At this time, with his hired help, he repaired to the harvest-field to bind up the grain. They here found not only the heads, but also *the straw in its entire length sprinkled over with these worms.* On my observing to him, that I could scarcely believe it possible for a footless worm to crawl along the straw when it was lying horizontally, he stated that he was particularly positive with regard to that fact; for he distinctly recollected that it was impossible for him to draw the band around a bundle and tie it (in which process the heads of the grain are not touched), without having at least a half dozen of these worms adhering to his hands.

From these facts, I infer that the worm does not crawl out of the chaff and "drop" itself to the ground, as has been stated by some writers; but that having attained its growth, it lies dormant within the chaff, awaiting a favorable state of the weather in which to make its descent, to wit, a rain which is not immediately followed by a clear sky and warm sun that would soon dry the straw. Hence it is doubtless almost invariably by night that this journey of the worm is performed, and that it has therefore never been seen. The straw itself being wet, and the body of the worm rendered supple by the moisture surrounding it, it leaves its abode in the head of the wheat, and adhering to the wet straw by the glutinousness of the surface of its body, gradually works its way downwards by the wriggling motion to which it so often resorts when disturbed, until it reaches the ground. That there is such a glutinous secretion upon the surface of the worm as would enable it to adhere to the wet straw in the manner supposed, I might adduce a number of facts to prove. I was desirous of taking a drawing of the larvæ which I found among wheat-stubble last March; but particles of earth adhered to them so firmly, that I could not separate them with the point of a needle without also mutilating the worms. A few weeks since, on visiting a neighbor's threshing-floor, I gathered a number of larvæ by moistening the end of my finger and touching it to the worm, which, thus adhering, was scraped off upon the edge of a tin box. The box is now before me, with each of the worms alive, but firmly glued to its sides, and many of them to each other; and on forcibly removing some of them, the outer dried and hardened case of the worm is fractured in the operation.

It would thus appear, that those worms which are matured, leave the grain at the close of a shower, and crawl down the wet straw to the earth. It may be, also, that a heavy night-dew sometimes furnishes a sufficient degree of moisture to enable them to do this. But, on the other hand, those worms which are later in arriving at maturity, in awaiting suitable weather for making the same descent, are, ere such weather arrives, carried with the grain into the barn.

As illustrating the strong tenacity of life possessed by these larvæ, I may in this connexion state, that the few specimens gathered in March as already stated, were placed with a little earth in a vial, and a piece of gauze tied over its mouth, for the purpose of ascertaining the transformations of the insect, if any, from its then condition to that of a winged fly. Other avocations diverted my attention, and this vial was forgotten for a fortnight; by which time the earth within had become so completely dried, that not doubting but the worms had all perished, no farther attention was paid to it, and it remained in a dry room over three months, until the middle of June, when, on examining it, half the specimens put into the vial were found to have completed their transformations; a corresponding number of dead wheat-flies being found attached to a straw in the upper part of the vial. Prof. Henslow thinks that it is only those larvæ that are punctured by ichneumons, that leave the wheat-ears and enter the ground; but the facts now stated, show that this opinion is erroneous.

On removing the earth from the vial above alluded to, the cases of the *pupæ* from which the flies had proceeded, were found very perfect. These conclusively showed that the real pupa is not formed until in the spring, and that it is then altogether different in form from what has been described by writers as its pupa.* It corresponds identically in its appearance (perhaps with the exception of color) with that of the *Cecidomyia salicis*, as exhibited in the first volume of this Journal, Plate 2, fig. 1. It also closely resembles the figure of the pupa of *Cecidomyia pini*? as given from De Geer in Westwood's Introduction to the Modern Classification of Insects, vol. ii. p. 518. fig. 125. no. 7.† Its length is slightly less than that of the dormant larva. The antennæ, legs and wings, are each enclosed in separate sheaths, which lay externally to the integument in which the body is enveloped. The three pairs of legs all lay parallel and in contact with each other upon the breast, reaching far down past the tips of the wings; the inner pair being shortest, and the outer pair longest. Judging from the analogy afforded by the *Cecidomyia salicis*, I presume the wheat-fly only remains in its pupa state three or four weeks in the latter part of May and the fore part of June.

* Since making this discovery, I have strongly suspected that the pupa of the hessian fly has never been as yet detected; and that its "flaxseed state," which has all along been regarded as its pupa, is only the same state which I have described as the dormant larvæ of the wheat-fly.

† I cannot but regard the figure here referred to as inaccurate, in representing the wings as enclosed in one common case, *over which* the legs are laid. The tips of the wings should probably be rounded, instead of being brought to a point.

Its natural enemies.

One of the most effective natural destroyers of the wheat-fly, is undoubtedly our common yellow-bird (*Fringilla tristis*, Lin.) Fields much infested by the insect, have been for many years recognized even by passers on the highway contiguous to them, by the rough and ragged aspect of the heads of the grain (Plate 5, fig. *c*). I am not aware that the cause of this peculiar appearance has ever been stated in any of the communications that have appeared in our agricultural papers. It results from the operations of this bird. Alighting, it adroitly grasps the wheat-stalk just below the ear, and clinging fearlessly to it, even when swayed to and fro by the wind, it with its bill parts down the chaff from the grain, and one after another of the worms to which it thus gains access are rapidly picked off and devoured. Thus several heads are generally freed from the worms, ere its repast is completed. That it is the worms and not the grain that it is in pursuit of, is readily ascertained by an inspection of the heads after the bird has left them : many of the kernels, not being sufficiently loosened to drop to the ground by the operation, will be found remaining, the maggots that were upon them only having been removed ; whilst those kernels of the head which are not infested by the worm, are passed over untouched. It is curious that this little creature, by a tap with its horny bill, or some other process, is enabled to distinguish those scales of chaff which conceal so minute a worm, from those which do not ; a knowledge which we only arrive at when we have parted down the chaff. A flock, numbering about fifty, embracing both male and female birds, appeared to make the field which I examined on the 16th of June their constant resort, for a period of three weeks or more, where they could be seen busily occupied almost constantly every day. The number of worms consumed by them during this time must have been immense ; and I cannot but believe that this lovely bird will henceforward be esteemed for its utility, as much as it has heretofore been for its beauty.

I have as yet found but one insect parasite, which I am well assured subsists upon and destroys the worm of the wheat-fly. It is a hymenopter of the family *Chalcididæ;* but my acquaintance with the details of its history is as yet too limited to attempt an account of it. I shall be much disappointed if I do not meet with still other species which prey upon the wheat-fly; and as all these parasites upon the Cecidomyiæ are more or less closely related to each other, they can probably be most advantageously presented in a separate article devoted exclusively to that subject.

Four or more species are known abroad, which destroy the wheat-worm. One of these, it is stated in the first volume of the Edinburgh Quarterly Journal of Agriculture, deposits an egg beside an egg of the wheat-fly, the worm from which devours the wheat-worm soon after it hatches, and thus effectually saves the wheat. The observations of Mr. Shirreff upon another of these, cannot but interest the reader. He says, "Upon presenting four larvæ (of the wheat-fly) to an ichneumon, it soon stung, or, according to Mr. Kirby, deposited an egg in each of their bodies, and stung one of them a second time. The maggot writhed in seeming agony, and straggled upon my thumb-nail, where it was again stung three times by the same fly; and in a second struggle, both fell to the ground.

Artificial means for arresting its ravages.

These may be divided into two classes, as they refer to the protection of the grain from the fly when in its winged form and depositing its eggs; or as they are directed to the destruction of the fly itself, in the previous stages of its existence.

Several measures have been proposed, and some of them with much confidence and plausibility of reasoning, for protecting the wheat crop from this insect during the period of its blossoming. The more prominent of these I will advert to.

The smoke of a number of smouldering fires, or of brimstone matches, in different parts, and particularly upon the windward side of an infested field, has been recommended. The known efficacy of smoke in repelling the musketoe renders it probable that this remedy would be of signal utility, were it not for the discouraging amount of labor that is required to make so thorough and protracted a use of it as would be necessary.

It has been suggested that the anal follicles of the skunk (*Mephitis americana*, Desm.) might be extracted, and that yarn impregnated with the fluid contained in them, and suspended through wheat-fields, would, by its intolerable odor, banish the wheat-fly. I imagine that in carrying this suggestion into practice, the operator would be *the greatest sufferer* — "unless *my nose* deceives me."

Sowing the field with lime at the time the wheat is in blossom, has been repeatedly, and by some with much confidence, urged. This remedy has been much resorted to, and very conflicting statements with regard to its efficacy have been laid before the public. A simple experiment, directly to the point, is of more value than a thousand cases that *tend to support* any particular opinion ; and such an experiment I am prepared to narrate. Jarvis Martin, Esq., the owner of the infested field repeatedly alluded to, at my suggestion, repaired to it one evening, and sprinkled several of the heads with tolerably fresh air-slaked lime, until they were white with the powder adhering to them ; thus applying it far more profusely and effectually than can be accomplished by any "sowing" of this substance. With the light of a lantern, these heads were now closely watched, and the flies were observed to hover around and alight upon them as freely, and insert their ovipositors with the same readines that they did upon the contiguous heads that were not thus treated. I deem this experiment sufficient to put to rest the much mooted question with regard to the utility of lime as a shield against the wheat-fly.

A yet more prominent, and much more plausible mode of enabling the wheat to escape injury from the fly, is, sowing the seed at such times as will prevent its being in blossom at the period when the insect appears. With this view, it is recommended to sow winter wheat much earlier than was ordinarily done, that it may be so far matured the following season at the time of the appearance of the fly, as to be invulnerable to it ; and spring wheat, so late as not to be in blossom until the fly has finished depositing its eggs. This plan has been much relied upon, on both sides of the Atlantic, and I have been heretofore disposed to regard it as probably the most feasible of any — though by avoiding Scylla we were in danger of Charybdis — for early sown winter wheat invites a return of the hessian-fly, and late sown spring wheat is almost certain in this vicinity to be attacked by "the rust" (*Puccinia graminis*). Numerous instances, moreover, can be adduced which tend much to support the utility of this measure. One of these, as strong as any that has come to my knowledge, I may here state. In a field of spring wheat of my own, raised in 1843, every kernel in the top of almost every head was entirely destroyed, whilst the lower two-thirds or three-fourths of the ears were wholly uninjured. I could account for this only by supposing that these heads were just beginning to be protruded from their sheaths as the operations of the fly were closing for that year; and hence confidently inferred that if that wheat had been sowed a few days later, it would have escaped entirely, or a few days earlier, it would have been entirely destroyed. By a reference to my Farm Book, I find this crop was sowed April 26th, and cradled August 10th, but no note was taken of the time when it was in blossom. I must confess, however, that my observations the present season have greatly diminished my confidence in the time of sowing as securing the crop from injury. Though I did not see the fly abroad until the 16th of June, it was then present in such swarms, and had already deposited its eggs so profusely, that I think it must have commenced appearing quite early in that month. It, moreover, continued to be abundant, until about the middle of July, and specimens were occasionally met with a month longer. Certainly if it is usual for it to be spread out over such an extent of time, it will be vain to rely upon the time of sowing, to insure a crop against its ravages. Some observations in the foreign accounts also throw light upon this subject. Mr. Shirreff says, in 1829 the fly appeared June 21st; "and from the vast numbers of them then seen, it is probable a few of them may have been in existence some days previous." Their eggs were seen June 23d, and must therefore have been deposited on the evening of the 22d. "The flies were observed depositing eggs on the 28th, and finally disappeared on the 30th of July, thus having existed through a period of thirty-nine days," and depositing eggs during thirty-seven of these days. I know not how Mr. S. could be certain that the fly had disappeared for the season on the 30th of July, for his account is dated the first day of August. For a few days only after their first appearance, he tells us, they frequented the couch-grass as well as the wheat. Was not this because there was not at that time a sufficient quantity of wheat in bloom to accommodate the number of insects that were then out? And Mr. Markwick distinctly states that it was after the grain had been harvested, that he found the larvæ in the wild oats. Were not the parent flies then obliged to resort to this plant, because all the wheat had become mature ere they had completed depositing their eggs? These facts certainly make it appear as though the fly is often abroad before the wheat commences blossoming, and continues till after it becomes mature.

Is there, then, no mode by which the flowering grain can be shielded from the ravages of the fly? This is a subject on which I have bestowed much thought; and I am not now prepared to tell the reader what *he must do*, but I will briefly inform him what *I shall do*, upon the first occasion that calls for it. A method is sometimes resorted to abroad, for saving grain fields from the depredations of certain insects of peculiar habits. A rope is drawn along over the grain, by two men walking at a brisk pace; which rope thus knocking against the heads of the grain, causes the depredators to drop themselves instantly to the ground, and it is a slow and tedious task for them to get up to the heads of the grain again. A similar process, but with a different apparatus, I contemplate employing against the wheat-fly. This apparatus is a light net made of gauze, three or four feet deep and one or two rods long; its mouth reaching the entire length of the net, and opening to a width of about eighteen inches. A small rope is to be stitched to the upper and another to the lower side of the mouth, reaching slightly beyond the net at each end, which is to be carried by two persons holding the ends of these ropes. If on closely examining the wheat-fields of my vicinity, from the time that the heads begin to protrude from their sheaths, the fly is found to be gathering in swarms in any one of them, I intend repairing to that field in the evening, when the insects will be hovering in such myriads about the heads of the grain, and, with an assistant, carrying the net so that the lower cord will strike a few inches below the heads of the grain, the upper one being held nearly a foot in advance of it, and about the same distance above the tops of the heads, by keeping the cords tense and walking at a uniformly rapid pace from side to side of the field, until the whole is swept over, I shall be much disappointed if *countless millions* are not gathered into the net, which is to be instantly closed whenever a pause is made, by bringing the cords together. It is now to be folded or rolled together into a smaller compass, and then pressed by the hands or otherwise so as to crush the vermin contained within it. This measure has been suggested to me, by observing the perfect facility with which the small entomological fly-net becomes *filled* with these flies, on sweeping it to and fro a few times among the heads of infested wheat in the evening. Of course this operation should be resorted to on the first appearance of the fly in numbers, and before its eggs have been deposited so profusely as will occur in the course of a few days. I feel strongly confident, that by sweeping over a field a very few times in the manner above described, the fly may be so completely thinned out and destroyed, as to be incapable of injuring the crop perceptibly.

With regard to destroying the fly in the earlier stages of its existence, only a few words will require to be said. Whoever has read the preceding account of the habits of this insect, must have been struck with a consciousness of the perfect facility with which that portion of the worms that are brought into our barns may be exterminated. It would seem as though Divine Providence had expressly designed to place a part of every generation of these insects directly in the hands of man, that he might destroy them or not, at his option. And Uncle Toby is so extremely benevolent, that he has uniformly carried them to the door, and said "Go away, little flies, go away; the world is wide enough for you and me both." Now it is scarcely necessary for me to say, that the screenings of the fanning-mill should invariably be closely examined, and if the minute yellow wheat-worms are numerous in them, the person should consider it a sacred duty which he owes to himself and his neighbors, to consign these screenings at once to the flames. If there are but occasional worms among them, let them be emptied into the hog-trough; but never empty them upon the ground, or among the straw of the barn-yard, unless they appear to be entirely free from these vermin. And now, if that portion of the worms which remain in the fields can also be destroyed, it becomes certain that we are at once and forever relieved from all farther solicitude with regard to future injuries which this insect can inflict upon us. But can this be done? It has been proposed to burn the stubble of wheat-fields after the harvest; and if this measure be resorted to at a very dry time in the autumn, probably some of the worms would be destroyed by it. But, so far as I have observed, they uniformly lie here in situations where they are surrounded with some degree of moisture, under damp and mouldy clusters of straw and stubble, or slightly within the surface of the ground. It would, therefore, only be those straggling individuals that were not in their usual haunts, that the transient heat caused by such a burning would reach. Would a turning over of the field with the plow bury them to such a depth, that they would fail of finding their way to the surface again? This is an important inquiry. It is very probable that the larva can work its way to the surface, from a greater depth than what the pupa can. Direct experiment only can determine accurately at what depth the insect, in both these stages, must be buried in order to destroy it. No information of any value can, therefore, be given upon this point, until such experiments are made.

Description of the clear-winged wheat-fly.

The importance of full and accurate descriptions of every one of the several parts of a natural object, in order that it may be identified with certainty, is strikingly illustrated in the present species. For some years it has been *supposed* to be identical with the English wheat-fly; but those who are aware of the large number of both plants and animals in Europe, that have analogous representatives in this country so closely resembling them as to have been in many instances for a long time considered identical even by accurate and experienced observers, could not but entertain doubts upon this point; and with the fifteen or twenty characters of this insect which could be gathered from different sources, I could still only say that our wheat-fly was *probably* the *tritici* of Mr. Kirby, some of its prominent peculiarities seeming even to conflict with the descriptions given of that species. For instance, all that we could gather respecting the form of the joints of the antennæ, was, that they were "*moniliform*"; and Messrs. Kirby and Spence, in their "Introduction to Entomology," define this term to mean "oval or globular joints, like a necklace of beads." Now the joints of the antennæ in our insect are oblong, and each has a marked contraction in its middle, thus approaching to an hourglass shape, a form the very reverse of "oval" or "globular." It was not until I saw the excellent figures and descriptions of Mr. Curtis, that I became well assured that our species was identical with the European.

The common reader will get the most clear and definite idea of the appearance of the wheat-fly, by being told that it looks almost exactly like the wheat-worm with wings and legs added to it. These members, however, are so very small as to be scarcely recognized by the naked eye, except when they are fixed intently upon the object.

The HEAD of the *female* Cecidomyia tritici (Plate 5, fig. 1) is of an orbiculate or flattened-globular form, with the *eyes* forming its periphery. These are large, occupying full two-thirds of the entire head. They are of a deep black color, and are separated from each other on the top of the head only by a slight and almost imperceptible cleft, so that when viewed in front they appear like a continuous broad black band surrounding the head, and interrupted only below at the mouth, thus resembling a horseshoe in their figure. The *face* is pale yellow. In its centre, and contiguous to each other, are two pale yellow tubercles or spherical eminences, more or less conspicuous, on which the antennæ are inserted, and which are by some regarded as forming a joint of these organs, in addition to the number commonly stated. The *antennæ* are of a deep brown or black color, less intense than the eyes. They are of about the same length as the body, and composed of twelve joints. Each joint (Plate 5, fig. *e*) is commonly oblong, with a marked contraction in its middle, a shape which is sometimes designated as 'coarctiform,' and is surrounded with a whirl or row of hairs near its base, and another near its apex.* The joints are ordinarily about thrice as long as they are broad, their diameter being but little less than that of the legs. They are connected together by a slender thread intervening between each joint, and about a fourth as long as the joints themselves. The two *palpi* are pale yellow, and clothed with shortish hairs : each is composed of four oval joints ; the terminal one being longer, but of the same diameter with the preceding.

The THORAX is of a pale yellow color ; its upper side commonly tinged with fulvous brown, which sometimes, though rarely, forms three vittæ or longitudinal spots forward of the middle. It is of an ovate form, its greatest breadth being immediately back of the wing sockets. Its vertical diameter much exceeds the transverse, as is common in most species of *Tipulidæ*, the breast jutting down far below the level of the head and abdomen. The *poisers* are oval,

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* Not unfrequently, however, singular anomalies occur in these joints. Thus in some the contraction will be so considerable as to cause the segment to appear like two globular joints slightly but distinctly separated from each other ; whilst other segments *of the same series* are abbreviated and dilated, the usual contraction thus becoming obsolete, and the joint taking on a short cylindrical form. It would thus seem as though we, in the female, met with the twenty-four joints of the male antennæ in a modified or imperfectly developed condition ; that what appears as a single oblong coarctiform joint, is in reality two joints united. This would give but a single whirl of hairs to each joint, as is common in most of the species of this genus.

honey-yellow, their pedicels with a strong notch in the middle of their anterior sides.

The ABDOMEN throughout is of an orange color, more inclining to red than to yellow. Its broadest part scarcely equals the thorax in diameter. It is of an ovate form, attenuated towards its tip, whence the two valvular sheaths of the ovipositor are often seen more or less exserted, and sometimes the apex of the ovipositor itself projecting between them like a fine slender thread. According to Mr. Curtis, by a slight pressure on the abdomen of the living insect, the ovipositor (Plate 5, fig. *f*) can be made to protrude, and may then be drawn out to nearly thrice the length of the body.

The WINGS are hyaline and colorless, appearing like thin plates of glass or mica, but reflecting the tints of the rainbow, particularly the violet, when viewed in certain directions. Their margins are densely ciliated with longish hairs, and their surface is covered with minute pubescence. The mediastinal or *submarginal nerve* is but slightly distant from the costal (marginal), and becomes confluent with it rather forward of the middle of the exterior margin. From its middle, it sends a small connecting nerve backward to the postcostal. The *postcostal*, which is the most conspicuous nervure of the wing, runs direct, or with but an insensible curve, to the tip of the wing. The *medial* is straight, and attains the inner margin at about three-fourths of the distance from the base to the apex of the wing. The *anal* runs nearly parallel with the inner margin, and, with a very sudden curve from its direct course, joins the margin near its middle. It gives off an obscure branch at its angle, which curves outwards and backwards, joining the medial, or rather, seeming (if the wing be moved so as to give a slightly different incidence to the light) to be continued onward, parallel with and contiguous to the medial nerve, till it attains the margin of the wing. The medial and anal nerves are very slender, and are often invisible, except in a particular reflection of the light. The former, especially, can seldom be distinctly traced, except towards its termination. These details of the neuration of the wing apply equally well to all the species of Cecidomyia that have fallen under my observation, save only that they are more distinstly traced in the others, particularly the larger species. At rest (Plate 5, fig. 6), the wings are laid one upon the other, reposing horizontally upon the back of the abdomen, and reaching about a fourth of their length beyond it.

The LEGS are whitish or very pale yellow, long and slender, of a cylindrical form, and of nearly the same diameter through their entire length. The coxæ (small joints by which the femurs are connected with the sternum), as they are directed more or less backwards, vary the point from which the legs seem to arise in different specimens when viewed from above. The femurs, tibiæ, and second joint of the tarsi, are all of about the same length. The third, fourth, and fifth joints of the tarsi (Plate 5, fig. *g*), are successively shorter; whilst the basal joint is the shortest of all, its length little exceeding its diameter.

All parts of the body and limbs are clothed with minute, slender, longish hairs.

The MALE differs so remarkably in its aspect from the female, and is moreover so rare an insect, that it has generally escaped the researches of observers. It would appear from Mr. Curtis's paper, that Meigen is the only one who has identified and given a description of this sex; and I should distrust my having any specimens of it, but that one of the flies hatched from the larvæ already spoken of as gathered in a wheat-field early in the spring, is a male (Plate 5, fig. 4); and a few of my other specimens manifestly coincide with this. In these the *antennæ* are at least double the length of the body, and composed of twenty-four joints of a very exact globular form (Plate 5, fig. *e*); each joint encircled with a single row of hairs, and separated widely from its fellows, the thread between being of about twice the length of the joint itself. The *abdomen*, instead of being of an ovate form, as in the female, is broadest at the base, and thence tapers gradually, though slightly, towards the apex; the terminal segment, however, being broader than the one or two preceding it, and of a reniform shape, with the lobes directed backwards. The male is also somewhat smaller in size: in all its other marks, it appears to correspond with the female.

Among the hosts of specimens of the female that may be met with, there will occur considerable variations in size, color, and some minor particulars. The common length, to the tip of the abdomen, is the twelfth of an inch, or slightly under this; yet I have measured recent specimens from the wheat-field, that were but half this size. The color seems to be more uniform in specimens taken from the wheat-field, than in those procured in other situations. It is of a lively orange-red, particularly upon the abdomen, where the color is most observed; but varies from that to amber or honey-yellow, lemon-yellow, and even to a cream-color. The specimens already spoken of as having been rasied in dried earth, are all quite pale; and it would hence appear as though these lighter colored varieties were caused by unfavorable circumstances in which the insect had been placed when in its larva state.

THE SPOTTED-WINGED WHEAT-FLY.

Another species of *Cecidomyia* (Plate 5, fig. 2), as the reader has been already informed, is frequently met with, associated with the *tritici* in fields of wheat. It is closely allied to the *tritici* in form and coloring, having like it an orange-red body, hyaline wings, pale yellowish-white legs, and twelve joints to the antennæ, identical with those of the *tritici* in their details. It is, however, readily distinguished from the *tritici*, as well as from all the other species of this genus, with only two or three exceptions, by having spots upon its wings. These spots are so conspicuous as to be recognized by the naked eye, even when the insect is flying. They are of a pale black or smoky color, and seven in number on each wing. Two, and these the most conspicuous from being commonly of a deeper tint, are placed upon the outer margin: one being at the tip of the submarginal nerve, where it unites with the costal; the other, half way between this and the apex of the wing. Both these spots reach across the costal cell, and often slightly into the externo-medial. Another spot occupies the apex of the wing, at the tip of the post-costal nerve. Three others are based upon the inner margin, respectively at the apex of the medial and anal nervures, and at the axillá or base of the anal cell. The seventh spot is upon the disk of the wing, mostly in the outer middle cell, and is sometimes confluent more or less with one or more of the marginal spots. The nerves, when traversing these spots, are of a deeper black color than in other parts of their course, as are also the hairs which proceed from them into the fringed border of the wing. These spots are formed by a pigment in the membrane of the wing, the fine pubescence upon the surface being no more dense here than upon the other parts. The species under consideration is farther distinguished from the *tritici*, by invariably having the base of the abdomen, on its upper side, of a brown or blackish color. The thorax is often of a darker fulvous brown ; and the breast is of the same color, instead of light yellow as in the *tritici.* The last joints of the feet, moreover, are commonly though not invariably black in this species, and there is often a broad black band at the base of the anterior tarsi.

The *males* have the antennæ composed of twenty-four joints, each encircled as usual with a row of hairs. These joints approach a globular form, but have, in common with those of the males of several other of our species, this striking peculiarity, namely, that through the whole series, though preserving the same diameter, they are alternately shorter and longer ; twelve being compressed-globular or double-convex, and between each of these a very short cylindrical joint with convex ends.

This species is closely related to the *ornata* of Say (*Appendix to Long's Expedition*, p. 357), but is readily distinguished from that by its blackish antennæ, the color of which contrasts strongly with that of the legs ; by the greater number of spots on its wings, and these spots not being "occasioned by the greater density of the hair of the surface in those parts." In the latter character it also differs from the *pictipennis* of Meigen, as described by Macquart ; as also in not having the spots forming bands across the wings. If any description of the *maculipennis* of Stephens, in his catalogue of British insects, has ever been published, I have not met with it. That this species, however, exists abroad, is highly probable, from the fact that the specimens reared from wheat-worms by Mr. Markwick had "spotted and transparent wings," as he describes them, or "obsolete clouds" as they were termed by Mr. Marsham. Mr. Curtis calls attention to this fact respecting these specimens, apparently from a suspicion thus excited that another species existed. He says, "I am particular in noticing this, because the wings of Mr. Kirby's *C. tritici* are not spotted, nor are any individuals that I have seen ; and excepting the *C. pictipennis*, which is larger, I know of no species of the genus with spotted wings."

The species under consideration, may appropriately be named and characterized as follows :

Cecidomyia caliptera. Orange-red ; base of the tergum blackish : wings hyaline, with seven dusky spots : legs whitish ; tarsi black at tips.

Length 0·05.

Var. α. Axillary spot of the wings wanting.*
β. Tips of tarsi whitish.

Specimens have been taken almost weekly, from the middle of June, till the fore part of September, in fields of flowering wheat, among the grass of plats contiguous to dwellings, and upon the windows of houses. I do not doubt but its habits are very similar and perhaps identical with those of the *tritici*, and that in proportion to its numbers it is equally destructive. The investigations of another year, may, I hope, enable me to furnish something more definite upon this most interesting subject.

Species resembling the wheat-flies.

We have what appear to be several species of cecidomyides, allied to our wheat-flies in size, in the number and form of the joints of the antennæ, and more or less in the colors of their bodies. Among objects so exceedingly minute, and so closely related to each other, a most patient and critical study of a large collection of specimens, both in their recent and their dried state, is indispensable, in order to trace out with accuracy and define with precision each of these species. Perplexity and confusion will be the inevitable result of a hasty or superficial performance of a work of this character. It is hence that I shall at present venture to name and characterize but two of these species, whose marks are so evident and distinct as to render their recognition comparatively easy, yet whose colors are so analogous to those of the clear-winged wheat-fly that they would be confounded with it by ordinary observers, unless aware of their distinctive marks. I am only acquainted with these species in their perfect state.

A few specimens occurred to my notice about the middle of the month of August, having the abdomen more tinged with red than in

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* On a careful re-examination of all my specimens while copying this paper for the press, and a reference to the dates and situations where each was collected, I discover that all those which have been gathered from wheat-fields are of this variety, having but six spots; and farther that the spot on the inner margin nearest to the base of the wing is situated *in the middle of the anal cell*, thus leaving the *space about the apex of the anal nervure* perfectly *hyaline*. Should the particulars here specified prove to be permanent and constant, as I believe they will, it must lead to a separation of this as a distinct species from the *caliptera;* in which event, the specific name *cerealis* might appropriately be bestowed upon the real wheat-fly having but six spots.

the wheat-flies, but commonly fading, when preserved, to a flesh-color or dull yellow; the thorax brown or blackish above, its sides dull yellow; legs blackish except at their bases, and poisers of the same hue; wings dusky, with their nervures more distinctly marked than in the wheat-flies. I would propose for this species a name alluding to the contrast between the color of the thorax and of the abdomen, in a dorsal view of the insect (Plate 5, fig. 3).

Cecidomyia thoracica. Red : thorax above blackish-brown : legs and poisers blackish : wings dusky.
Length 0·05.

A much more abundant species, and very closely related to the preceding, occurs from the last of July till the middle of September, and perhaps later. Its legs are dusky, but not of so deep a tint as those of the *thoracica*, from which, moreover, it is readily distinguished by having invariably a fulvous-brown or blackish spot at the base of the abdomen on its upper side. The base and sides of the thorax are of the same color with the abdomen, namely, red, or in old specimens dull pale yellow; the upper side, forward of the scutel, being brown. This species (Plate 5, fig. 5), may be named and characterized as follows :

Cecidomyia tergata. Red : thorax anteriorly and spot at base of tergum brown : wings, legs and poisers dusky.
Length about 0·06.

Both the preceding appear to be quite distinct from any of the European species that have been described.

In closing this paper, I have to apologize to the editors and patrons of the Journal for the delay which it has caused in the issue of the present number. I trust the paper itself may be found sufficiently acceptable to atone in some measure for this delay, its completion having required an amount of time far exceeding what I had anticipated.

NOTE. The insect, Plate 3, fig. 2, of the first volume, the name of which was omitted at that time, is the *Purpuricenus humeralis* of Fabricius.

SALEM, N. Y. October 8, 1845.

NEW PUBLICATIONS.

TRAVELS IN NORTH AMERICA, IN THE YEARS 1841 – 2; with Geological Observations on the United States, Canada and Nova Scotia: By CHARLES LYELL, Esq. F.R.S. In 2 vols. 12mo. Wiley & Putnam.

IT is rare, very rare, that a traveller, whose range of thought and previous philosophical preparation so eminently qualify him for the performance of a tour of scientific inquiry, as in the case of the author of these volumes, writes out for the public his sentiments and the results of his observations. Mr. Lyell, if we are rightly informed, was educated for the bar; but having a predilection for the more attractive and fascinating pursuits of the sciences, he has devoted himself with astonishing zeal to their cultivation. Bringing an acute and well regulated mind to bear upon them, he has not only made them popular, but useful: he has not only kept up with their advance himself, but has actually pushed them ahead.

We must say one thing more of the author: he has not been a mere fancy dealer in science, a sentimental versifier of its beauties; but has taken off his coat, and worked like a day laborer at twelve shillings a day and found. Not that he is at all insensible to the beauty, or indifferent to or unacquainted with the grandeur of his favorite pursuit, but truth to him has been of more value; and looking at the nature of the case, he wisely judged, that to attain his end, the only road to it was by the most patient and unwearied investigations in the field. Of all the sciences, geology has been Mr. Lyell's favorite department, and the study of others has only been made auxiliary to this. It was to prosecute this branch, that led him to visit us, and make the tour of this country. His work, however, appears in the form of travels; and in them we find Mr. Lyell's views of men and things, of people and institutions, intermixed with geological dissertations, the latter appearing rather as an incident than the main subject of discourse; yet in some parts of his book, he systematizes his observations, and they appear more in the light of a principal subject. The interstratification of his geological speculations with those upon our domestic and national institutions, gives a pleasing variety to his work. It contains a sufficient amount of personal incident to carry along our interest with the writer, while his good sense has ever kept him above the relation of those trifling or strange adventures, which many travellers are so very fond of retailing. Again, Mr. Lyell, we are pleased to say, has gratified every body by the frank expression of his opinions, which altogether are highly flattering to us as a people. To Americans, who have so frequently had to bear not a few cuffs and a great many sneers, some haughty and some subdued, this treatment seems so kind, that we are almost inclined to make a low bow to the author, and say 'God bless you sir.'

Mr. Lyell landed in Boston, August 2, 1841, after a short passage from Liverpool of twelve days and a half, and we will make a record of his first observations. " The heat here is intense ; the harbor and city beautiful ; the air clear, and entirely free from smoke, so that the shipping may be seen afar off at the end of many streets. The Tremont Hotel merits its reputation as one of the best in the world. Recollecting the contrast of every thing French, when I first crossed the Straits of Dover, I am astonished, after having traversed the wide ocean, at the resemblance of every thing. I see and hear things familiar at home. It has so often happened to me, in our own island, without travelling into those parts of Wales, Scotland or Ireland, where they talk a perfectly distinct language, to encounter provincial dialects which it is difficult to comprehend, that I *wonder at finding the people here so very English.*"

It will be impossible for us to trace Mr. Lyell's tour through the United States in a continuous line, or to give his views of the American people, and of the structure of the country at large. We are necessarily limited to a very meagre sketch, and can only give here and there, without much connection, a few of the results of his observations. We have, in a few instances, to dissent from his views.

Some may wonder how Mr. Lyell has been able to acquire so much geological information in so short a time. This we are able to explain, we believe, in a manner which will be satisfactory to our readers. The Geological Survey of New-York, and of several other States, was nearly completed at the time of his visit. The several gentlemen who had charge of them, were still upon the ground, and every locality of interest was well known to them. To those points, then, which yielded the most ready information, the author was conducted; and from their disclosures, and from information freely furnished by the geologists themselves, Mr. Lyell has been able to compile an interesting and correct account of our geology in a comparatively short time. These remarks, in explanation of his geology of this country, are due to the American geologists.

Mr. Lyell's first object, on landing upon our shores, was to compare the New-York rocks with the Silurian system, which had been so recently brought out by Mr. Murchison. In a few days, then, we find the author upon a tour across the State of New-York. This tour was designed to embrace an examination of the New-York system, up to the Coal measures of Pennsylvania. The line of route was by that of the canal to Niagara Falls, and thence by Genesee valley to Blossburgh. This tour gave him a full opportunity to see the entire series of rocks, from the Calciferous sandstone to the Coal measures, and it is gratifying to find him confirming step by step all the conclusions which had been previously obtained by the New-York geologists.

Mr. Lyell briefly refers to the New-York survey, in the following words (vol. i, p. 13): "The Legislature of New-York, four years ago, voted a considerable sum of money, more than 200,000 dollars, or 40,000 guineas, for exploring its natural history and mineral structure; and at the end of the first two years, several of the geological surveyors, of whom four principal ones were appointed, reported, among other results, their opinion that no coal would ever be discovered in their respective districts." "This result," observes Mr. L. in continuation, "occasioned no small disappointment, and even some complaint; yet it was really of great benefit to the people, in checking the rashness of private speculators. Large sums, for the last twenty years, had been expended or squandered in trials for coal in rocks below the Carboniferous series; and there can be no doubt," he adds, "that the advantage derived to the resources of the State, by a cessation of needless expenditure, is sufficient to indemnify the country on mere utilitarian grounds, for the sum so munificently expended by the government on geological investigations."

Another remark of Mr. Lyell, in this connection (vol. i. p. 15), will, we think, interest our readers. "In the course of this short tour, I became convinced that we must turn to the *new world*, if we wish to see in perfection the oldest monuments of the earth's history, so far at least as relates to its earliest inhabitants. Certainly in no other country are these ancient strata developed on a grander scale, or more plentifully charged with fossils; and, as they are nearly horizontal, the order of their relative position is always clear and unequivocal." Again (p. 17), "They who are accustomed to connect the romance of their travels in Europe or Asia, with historical recollections and the monuments of former glory, with the study of master pieces in the fine arts, or with grand and magnificent scenery, will hardly believe the romantic sensations which may be inspired by the aspect of this region, where few points of picturesque beauty meet the eye, and where the aboriginal forest has lost its charm of savage wildness by the intrusion of railways and canals. The foreign naturalist indeed sees novelty in every plant, bird and insect; and the remarkable resemblances of the rocks, at so great a distance from home, are to him a source of wonder and instruction. But there are other objects of intense interest, to enliven or excite the imagination of every traveller. Here, instead of dwelling on the past, and on the signs of pomp and grandeur which have vanished, the mind is filled with images of coming power and splendour. The vast stride of one generation in a brief moment of time, naturally disposes us to magnify and exaggerate the rapid rate of future improvement. The contemplation of so much prosperity, such entire absence of want and poverty, so many school-houses and churches rising everywhere in the woods, and such a desire for education, with a consciousness that a great continent lies beyond, which has still to be appropriated, fills the traveller with cheering thoughts and sanguine hopes."

Something of the spirit of Mr. Lyell's volumes may be gathered from these extracts. We can spare room to copy but few of the beautiful paragraphs with which they are every where interlarded, some on subjects of a purely scientific character, some on the passing events of the day, and many upon the institutions of our country. We cannot, however, refuse ourselves the pleasure of one more extract, which exhibits a candor and frankness on his part, such as stands in bold contrast with the character of other English and foreign travellers who have published journals of their tours through the United States. "Travellers must make up their minds in this as in other countries, to fall in now and then with free and easy people. I am bound, however, to say, that in the two most glaring instances of vulgar familiarity which we have experienced here, we found out that both the offenders had crossed the Atlantic only ten years before, and had risen rapidly from a humble station. Whatever good breeding exists here in the middle classes, is certainly not of foreign importation; and John Bull, in particular, when out of good humor with the manners of the Americans, is often *unconsciously beholding his own image in the mirror*, or comparing one class of society in the United States with another in his own country, which ought, from superior affluence and leisure, to exhibit a higher standard of refinement and intelligence."

A subject which Mr. Lyell has discussed, is that of the drift, or the comparatively recent formation which embraces those of the period coincident with that of the true drift, and of the deposits which were formed quietly and subsequently thereto. We shall give his remarks, inasmuch as the subject is especially interesting, and cannot be too thoroughly contemplated. It is proper to premise that the entire formation consists of sand, coarse gravel and loose rocks, and of fine argillaceous and siliceous sediments, which in some places contain fossils. These deposits rest upon the surface rock, the upper layer of which is scored and smoothed, and sometimes polished; the scores and grooves having a northerly and southerly direction, differing many degrees, however, sometimes westerly and sometimes easterly: the variation in most cases seems to be produced by an opposing barrier, as a range of mountains; but this is not always the case, for in some instances these grooves and scratches pass obliquely over steep mountains.

Mr. Lyell, in giving his views upon this formation, occupies an entire chapter, from which we extract the following: "This formation occupies the vallies of the St. Lawrence, Champlain and the Hudson: it rests every where upon a grooved surface, the direction of the grooves northeast and southwest; and it is remarked that the blocks or boulders have been transported southwards along the same lines as are marked out by the direction of the furrows. The inference, therefore, is, that there is a connection between the grooves on the solid rock, and the boulders found upon it; or, in other words, the agency by which boulders have been transported, and the grooves made, is one;" and that agency is attributed by

Mr. Lyell to floating ice, within which stones were fast frozen, that acted like gravers, and cut the rock as the iceberg floated along. Thus the grooving of the rocks, the transported beds of boulders, gravel and sand, and the fine clay connected therewith, are all the product of transport. This we infer especially from a remark on page 128 : " Nothing, however, is clearer, than that here, as well as in the valley of the St. Lawrence between Kingston and Quebec, the marine shells of recent species are referable to the same geological period as that to which the boulders belong." This period embraces all, beginning with that power which scored the rocks, and ending with the deposition of sand forming the upper part where the deposits have not been disturbed.

We, however, regard the matter thus : There was a force which moved the rocks, coarse and fine, and grooved the floor upon which they moved from north to south. This force we consider to have been *sui generis ;* that is, distinct from that which carried boulders subsequently, and which contained the then living animals that we now find in the clays and sands of the vallies named above. There is enough in this first movement, to entitle it to the character of a period, and to stand by itself. To this succeded a period of quiet, during which the clays and sands were deposited, as in most cases where the structure and character of the beds is the same ; for these are perfectly fine sediments, consisting of extremely fine layers of clay, alternating with extremely fine sand, the entire thickness of the whole amounting to over one hundred feet. This we say was the product of a period of perfect quiet, during which marine animals lived ; and so perfectly quiet was it, that the thin fragile shel of the *Terebratula psittacea* preserves both valves in contact, and still attached by the hinge : indeed, perfect tubes in the sand, lined with calcareous matter, and which are coeval with the time of deposit, remain to this day. We separate this quiet period from the preceding, which was one of turmoil and violence ; and, we think justly, because the two are so dissimilar in character. At some places, as at Port Kent and Chimney point, the fine sediment of clay rests upon the grooved surface of rock : at other places, there are beds of stones, boulders, gravel, sand, etc. upon the grooved surface and these are the masses that have been borne along with, and formed a part of, the drift current. But upon these very drift beds reposes a fine sediment of clay and sand alternating, in which it is rare to see a stone at all, and this is coincident in formation and time to the clays we have just spoken of: it was deposited in quiet tranquil waters. That these periods succeeded each other, there is no doubt; that they were short, is equally plain: still we say distinct, and forming two separate periods. Subsequent to the period of quiet, there seems to have been another period of disturbance, as admitted by Mr. L., during which the upper portions of the clays and sands have suffered denudation. The formation at Port Kent, where the fossils are found, is entire, and the same may be said of that at Beauport near Quebec.

Another point, to which allusion has been made already, is the power that was concerned in transporting the boulders, which, as they moved along, scored the rocks: this is all attributed to icebergs. To this view there is this objection, that the surfaces are polished, and it is highly probable that the bottom of an ocean where icebergs float is always covered by a thick mantle of debris; but more especially does the fact militate against the iceberg theory, that the entire soil has been moved forward *en masse* — shoved along in a body, from one formation, over an intermediate one, to another, as may be seen in the Helderberg range. We have, however, stated on several occasions long ago, that boulders were dropped apparently from icebergs during the period of quiet which we recognize; and these are the boulders we have seen in the deposit at Beauport, in the midst of shells all entire and perfect as they were when living. However, the subject of drift is one of great difficulty, and we are not disposed to trouble our readers farther with it.

We recommend a perusal of these volumes to our friends, especially those who wish to acquire geological information, and who at the same time would like to know what are Mr. Lyell's views of this country.

TRANSACTIONS OF THE NEW-YORK STATE AGRICULTURAL SOCIETY.*

In the last number of this Journal, we published a review of this work, in which we avoided pointing out what we considered as

* We perhaps owe an apology to our readers for bringing these volumes again before them, which we hope they will find in the following. In the September number of the

faults, because we did not wish to bring pointedly before the public the errors of individuals, but hoped that what we did say might lead the readers of those volumes to examine cautiously what they contained, and sift for themselves the true from the false. We looked upon our article with no small degree of satisfaction, as one which gave sufficient praise, and found as little fault as possible. We fondly thought that no one could object to our review. But, alas! for our hopes, a writer in the Cultivator for September censures us because we did not expose what we thought wrong more pointedly. Since we are called upon thus publicly to give our views plainly, we feel that it would be injustice both to ourselves and the public to refuse. Our intention, then, in taking up these volumes again, is to answer the call of the writer in the Cultivator, and to state plainly some of those things which we found fault with before; and also to point out some of the contents of the work, "which had better been left out, because it has no connection with agriculture; and some which had better never been written, for it is full of error."

But before entering upon this, we cannot refrain from expressing our surprise at the bold charge of the writer referred to, that, in speaking of the men who had been selected to deliver the annual addresses at the Fairs, we alluded particularly to Mr. Bancroft. If the writer had carefully read what we did write, he would be troubled to find in what we said any thing which could by any possibility allude to any individual. We admire Mr. Bancroft as much as any

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Cultivator, appeared a paper signed "Senex," taking us severely to task for our mild review of the "Transactions." As soon as we received it, we directed a note to the editor of that paper, requesting him to reserve room for us, in the October number of his Journal, to reply. We wished to answer the writer in the paper he had chosen to bring us before the public in, so that the readers of his unprovoked article might have the opportunity of reading our defence. To our letter we received the following reply:

ALBANY, September 25, 1845.

DEAR SIR — I have just now, for the first time, seen your note of the twelfth instant. It was probably laid on my desk when first received, where it has laid till this time with a mass of other papers waiting my examination It appears to me that your own Journal would be the more suitable place to sustain the criticisms therein made upon the Transactions. I cannot conceive that you have any just claims upon the Cultivator, so long as the work in which the controversy commenced is under your own control; and I must, therefore, respectfully decline the publication of your proposed reply to Senex. Respectfully yours, LUTHER TUCKER.

Now *our* readers will judge of the necessity of using our own columns for this purpose. As to "controversy," we admit nothing of the kind into this Journal; but when we are challenged to duty, we are always ready.

man who knows him only through his works; and we said no word which could be considered, even by implication, as disparaging his address. Why then are we made to appear before the public as at variance with him? This question can best be answered by the writer who has chosen to place us in this position. We do not believe that Mr. Bancroft considered himself personally alluded to, if he ever gave himself the trouble to read our review. We regret sincerely that such a charge should so causelessly be made against us, and we regret as sincerely the necessity which is laid upon us to answer the call to expose the errors of the volumes published under the auspices of the State Agricultural Society; and in doing this, we may do even more than we merely hinted at before.

1. What are the "Transactions" of a Society? We had always supposed that in this word were included simply the doings of such a body; its business; reports of its meetings; papers read before it, relating to the objects of its labors; correspondence, etc. But what have we in the "Transactions of the New-York State Agricultural Society"? Not only these, and others that might be considered as the property of the Society; but we find also in these volumes papers, which, we will presume to say the Society as such never knew the existence of till they found them here. If we were surprised at them, how much more must the members of the "New-York State Agricultural Society" have been surprised when they they saw the "Transactions" assuming the form of a volume of *six hundred and seventy-one pages*. Let no one sneer at this, and call it picking for straws. We are aware that some one, in imitation of "Senex," may ask us for our instances of such papers in these volumes; and we are ready to produce our instances: but whilst we select them, let not the authors believe that we are finding fault with them. We are only saying that their articles had mistaken their place, or some one for them, when they got into the volumes before us. To the point, then, since it must be so; and we will not go back farther than the year 1843, inasmuch as the volumes previous to that year are so modestly small as to tempt us but lightly to the search. We take then the two last years' "Transactions," 1843 and 1844, which have been politely furnished us by the Secretary. One fact, however, must here be stated, before we produce these instances of what ought not to be here, and that fact is this: From these volumes have been rejected many papers which did form a

very important part of the "Transactions." Such are the Reports of certain Committees, at the State Fairs. These reports had been prepared with great labor and care, and yet were thrown out to make room for other matter which had no proper place in these volumes; and these reports we regard — ignorantly perhaps — as essential portions of the Transactions of this Society.

We ask the reader to turn to the following articles, as we specify them from a mere hasty examination of these books.

In the volume for 1843, page 241, we find a paper occupying 86 pages, with this title: "The Geological Survey of New-York, its influence upon the productive pursuits of the community." We shall speak more at large of this paper under another head. We only introduce it here as belonging to this head also; for we have the best of reasons for saying, that till this paper was seen in this volume, it was a stranger to the Transactions of the Society. We shall give Mr. O'Reilly's apology for this article farther on.

In the volume for 1844, page 61, is found an article entitled "Analysis of Soils," by Willis Gaylord; and page 118, one entitled "Rotation versus Summer Fallowing," by the late Willis Gaylord.

Now let not Senex charge us with slandering the dead, as he charged us with attacking Mr. Bancroft. We are saying nothing now of the late Mr. Gaylord, although we might find fault with some things in his papers; but it is with the book containing his articles, we have now to do. The compilers of the book say, in a note to the first article, "This paper was one of the last productions of the late Willis Gaylord, and was found on his table immediately after his death, which occurred on the 27th of March, 1844," etc., and then it is engrafted on the Transactions of N. Y. S. Ag. Soc. Now why are they here? Is it replied, that although they did not belong to the society, yet they may be useful to the farmer, and are therefore published here? The same excuse might be applied in the case of Loudon's Encyclopedias, or Liebig's works, or Johnston's, or Boussingault's, or any of the writers on agriculture, including the Cultivator, the Agriculturist and the American Quarterly Journal of Agriculture and Science, particularly the latter. But still farther:

On pages 210, 243, 255, are long extracts from the transactions of the agricultural meetings held during the preceding winter in the city of Albany. Why not give some from the Farmer's Club in

New-York, and similar institutions throughout the country? We know not.

On page 343, "Chemical Examination of the Rice Plant and Rice Soil of South Carolina. By Charles U. Shepard, M. D. &c." This same article was published in this Journal, in the month of January, 1844, as an extract from the Southern Agriculturist, in which paper it first appeared; and was reported as part of the Transactions of the Agricultural Society of Winyaw and All-Saints, in South-Carolina. Now by some means it becomes, without one word as to its source, part of the Transactions of N. Y. S. Ag. Soc.

But we notice, also, a very important part of the Transactions wanting. We refer to the action taken by the Society in reference to the introduction of agricultural studies into the common schools. There is some mistake here, something wrong. We think it would have been as well to have left out some things that do not belong there, and supply their place with some that do. This subject is only incidentally noticed in the volume; whereas, considering the amount of interest which has been for some time past felt in it, we think more notice should have been taken of it.

2. We have occupied more space than we proposed, in considering the foregoing point. We shall be more brief in the rest. In giving our opinion of so large a work, it cannot be expected that we should point out all that is wrong. If we give prominent examples, it must be sufficient. We are complained of, then, because we said there were portions of these books which "had better been left out." We recur to page 241 of the volume for 1843, "The Geological Survey of New-York," &c. Do not let us be understood as questioning the use of geological knowledge to the farmer; but it is only a particular kind, however, which can benefit him, and that not of fossils. Of what importance to him are these 86 pages of palæontology? Besides, the figures of these fossils had been already given by the State three times, and once in Silliman's Journal. There is nothing, in the whole character of the article, in the least agricultural. The subject is only referred to twice, and that only incidentally.

But the Secretary for that year makes an apology for the article being introduced, as follows: "It is due to Prof. Hall, to state that this paper was drawn up by him, by request, for the State Agricultural Society; less time being allowed him than is justly required for the preparation of an essay of this important character," etc. But the executive committee thought best to publish it, although having no bearing upon the objects of their association. As well might they have published a paper on volcanoes and earthquakes. We do, indeed, wish that our farmers were better informed in those branches of geology which are calculated to advance their prosperity, and we observe with pleasure that there is yearly an increase among them of this kind of knowledge; but they will be puzzled to see the connection between pictures of fossil shells, and their noblest of pursuits. An article on agricultural geology might be written, which would deserve a place in such a work as the "Transactions," but we do not find it here.

3. We said "some had better never been written," because in point of science it was false. And not to weary our readers, who, we fear, are already tired of this discussion, we will examine but one article, commencing on page 425 of the volume for 1843.

In discussing the question, where the food and clothing for the "countless myriads" of the human family must come from, it is said:

"The atmosphere, and not the earth, is the great storehouse for vegetable and animal food, designed for immediate use." Page 427.

From this and what follows, we conclude that Mr. L. has read Liebig, and adopted his theory without question, as regards vegetable nutrition; but this is taking but a one-sided view of the question. If it had been said that the atmosphere is the great storehouse of *carbon*, this might be true, and it might not; for although they undoubtedly derive much of this substance from that source, they as unquestionably do also draw much from the soil they grow in. Else why does the farmer add, year after year, organic matters to the soil? It can not for a moment be believed that all the use of manures is to restore the salts of which the earth has been deprived. If this be true, would not the proper course be to apply them to the surface, when the gases would be immediately dissipated through the air, to be taken up by the leaves of plants? But this is not the proper course. They are buried, and the gases, as they are produced, are absorbed by the porous earth, ready to be carried to the roots, or taken up by them as they find them in their progress. That these gases are absorbed in this way, is evident from one fact, that when the carcase of any animal is covered with a slight quantity of earth, none of the putrifying odor is perceived, which is so powerful when this process takes place above ground. And is all this amount of vegetable food of no use till it escapes and mingles with the atmosphere ? We can not believe it. That a seed will germinate and grow in a soil utterly destitute of organic matter, experiments prove beyond a question ; but will they attain perfection ? On the contrary, they soon die, and no soil is productive which does not contain a considerable proportion of organic matter.

Do plants obtain their other organic constituents from the atmosphere ? The same reasoning will hold good in respect to these, as in the case of carbon. But our space will not allow us to go into a lengthy discussion of these points. The reader is referred to the various works on these subjects. How the atmosphere is the great storehouse of *animal food*, we confess ourself utterly at a loss to understand. Any thing stored up there, we apprehend, would be light food for man or beast, unless the line be true we wot of when a boy about the chameleon :

"I saw it eat the air for food."

Our author carries out the same idea farther, on the same page, where he says that "about 97 per cent of the solid structure of all cultivated plants, and animals, except their bones, is derived from air and water." In this he includes the carbon, which constitutes from 40 to 50 per cent of plants. But setting this aside, as, to say the least, a doubtful matter, we must reject also the water which escapes whilst plants are drying ; and, what is the fact ? Johnston says the ash of vegetable productions varies from 1 to 12 per cent of their weight ; and according to Sprengel, 100 lbs. of the following plants, when dried in the air, left of ash,

Turnip - - -	7·05 lbs.	Lucerne - - - -	9·55 lbs.
Carrot - - -	5·09	Red clover - - -	7·48
Leaf of do. - -	10·42	White do. - - -	9·13
Parsnip - - -	19·76	Rye grass - - -	5·30
Cabbage - - -	7·55		

"About 97 per cent" ought to have a wide range, to include these and numbers of other vegetable products. Mr. L. unfortunately includes *animals* in both of the above extracts. With regard to them, the fact is by no means evident, and we think is without foundation. That there is an abundant supply of carbon in the air for the purposes of vegetable nutrition, is true, but is it used as he thinks ?

But he proceeds to show how this carbon, floating in the atmosphere, may be seized and converted into "wheat, butter, cheese and pork."

"Gentlemen, I have in this glass water taken from a well near my residence in this city, such as is used by my family and others. You see it is quite clear, though I suppose it holds in solution, among other earthy ingredients, a portion of lime. I will now breathe into this water, and see what, if any, effect will be produced. You see the water is changed into a milky whiteness." Page 428.

When we first read this, we could hardly believe our eyes. It is a common experiment to dissolve quicklime in water, and breathe through it, to show the production of carbonate of lime by the union of the carbonic acid of the breath with the dissolved lime; but that the water of wells ever contains a solution of *pure lime*, we were ignorant. The water of wells and springs often contains the muriate, sulphate and carbonate of lime, constituting what is called hard water, but the breath could not have any effect upon these to produce the "milky whiteness." Whence then came the lime in this well? We can not believe for a moment that Mr. Lee was practising a piece of jugglery upon his audience, nor can we account for the source of the lime, having never seen nor heard of a case of the kind. But he accounts for it, by saying, that when in the state of a carbonate, it was decomposed by the action of the living and growing plant (page 429), and dissolved by rain water, and then carried down through the earth to the well from whence it was taken. Yet he says more, that after this decomposition, "the free lime whose carbon has gone to build up a vegetable, takes up another, and still another portion of carbonic acid." Of course, when it reaches the well it will be a carbonate, or some higher compound of lime. As to this decomposition, and the appropriation of the carbon to the nourishment of plants, we can only say it is a new theory to us of the action of lime.

"At night, plants consume no food, or very little, but digest what they imbibe during the day" (page 429). We had always understood the fact to be directly the opposite, that the light of the sun was the great agent in carrying on, or at least assisting the digestive functions of plants. During the day, they absorb carbonic acid and give off oxygen, the carbon being separated by the chemical action of light; at night, the carbonic acid is given off unchanged. The same is found to be the case when plants are excluded from the light in the process of blanching. A still stronger argument is to be derived from the fact, that in extreme northern latitudes, during the summer, which is all day, plants grow with great vigor and rapidity. How do they contrive to do this without any night to digest their food in ?

Our author comes, on this same page, to the consideration of ammonia, and its absorption by water, and says, "It is the ammonia in rain water, that imparts to it its peculiar softness in washing the hands or clothes." Then cold water should be softer than hot water; for although water when cold will absorb a large quantity of ammonia, it will lose it when boiled ; but we have stated above, that the hardness of water is caused by the presence of salts of lime ; when these are absent, as they are in rain water, it will be soft.

Again, "It is the ammonia that escapes from putrifying substances, that causes their offensive smell. But who does not know the difference between the bracing, agreeable smell of *hartshorn*, and the loathsome, sickening odor of a putrifying animal carcase ? Ammonia is produced during the decomposition of animal matter ; but this putrid smell arises from the compounds of carbon, phosphorus and sulphur, which are also generated. Again, "It is the ammonia in rain water, which causes it to putrify in some degree." The only three substances there are oxygen, hydrogen and nitrogen ; but no combination of these will give the smell of putrefaction.

Mr. L. recommends the use of charcoal, and explains its action thus : "It will absorb 90 times its bulk of ammonia, and will give it out slowly to the vital attraction of the roots of plants." What is meant by this "vital attraction ?" Suppose a piece of charcoal in the ground, saturated with ammonia ; if the root of a plant come in contact with it, how far will this "vital attraction" act ? We do not believe it will act at all beyond the mere point of contact, and that is on the outside where there is no ammonia. How then does the charcoal act, is the question. The answer is, if buried in the ground, it will be of little or no use ; but if applied to the surface, where it is exposed to the air and heat of the sun, but where the roots of plants can not reach it, it will act thus : During dry weather it will absorb ammonia from the atmosphere, which ammonia will be washed out and carried down to the roots of plants by the first rain that falls upon it, for water has a much stronger attraction for it than the charcoal has ; again being dried by the sun, it goes through the same process. This we conceive to be the true action of this substance; but as to its being a very active manure, under any circumstances, we have no conclusive evidence. The result of experiments, as far as we have noticed, is not decisive.

We pass over a number of other points which we had designed to notice, as well as the portion of the address which treats of wool-growing. On the latter subject we only hazard one recommendation. Mr. L. advises, as one means of increasing the growth of wool, to keep "the animal warm in winter," etc., and "stimulate, with the elements of wool, the organs which secrete this valuable covering of the sheep" (page 432).

These, we have long been aware, are favorite ideas of our author. But is it according to the analogy of nature, to keep any animal warm, in order to produce an increased length or fineness of covering? Those which occupy the colder regions of the earth have uniformly the finest covering, and the most abundant, and it also strikes us that these degenerate when they are brought into warmer latitudes. We merely give this as our individual opinion, drawn from the fact above stated. And as Providence ever provides for the circumstances in which his creatures live, to give them a covering according to their need, we infer that sheep would have a longer and a finer fleece exposed to constant cold, than if kept warm through the winter. We know of no facts in the way of experiments tried to determine this point; nor, we presume, does Mr. L.

But we forbear. We think enough has been said to confirm our formerly expressed opinion, "that much had better been left out, because it has no connection with agriculture; and some which had better never been written, for it is full of errors."

We must repeat here our former remark, that, as a whole, the volumes are highly creditable to our State Society. A little more care should be used to keep out error and false science, and to make the work strictly agricultural.

Let us repeat, and so as to be distinctly and correctly understood, that we have not alluded to any individual in our remarks, in regard to the orators at the annual fairs. If farmers need puffing to convince them that theirs is the highest and proudest of human pursuits, then let them have it. At the same time, we do know that they need information, and they love to hear that which expands their minds and ennobles their hearts, and teaches them how to make knowledge profitable.

THE BOTANICAL TEXT BOOK: By ASA GRAY, M. D., Fisher Professor of Natural History in Harvard University. Second edition, 1845.

THIS work is a volume of five hundred pages. The first edition was excellent, and the second is a great improvement. It is illustrated by more than one thousand *woodcuts*, which enable the student readily to apprehend the delicate points of structural and systematic botany. It maintains the doctrines of the Natural System, with great clearness, beauty and power.

It is ever interesting to trace the progress of science. That which has any just claims upon the regards of men, goes onward in its useful course. That which is fanciful, hypothetical, or useless, sinks away and is forgotten. Linnæus, who is regarded as the father of scientific botany, died in 1778. It was in 1751, that he published his *Philosophia Botanica*, which contained the principles of a *philosophic* study of the vegetable kingdom. The incorporation of this work in *Rose's Elements of Botany*, which was published in London in 1775, greatly extended these principles. This was an era for botany in England. In 1753, Linnæus published his *Species Plantarum*, being an "accurate and complete digest of botanical knowledge" at that time, containing more elegant and precise descriptions, under a greatly improved form, than had ever appeared, and embracing all the then known species, being between seven and eight thousand: at this hour, the number of described plants is estimated at one hundred thousand, and the genera near seven thousand; and the *Species Plantarum*, in the hands of the successors of Linnæus, has become a huge work of several volumes.

In 1807, Sir James Edward Smith, so long the distinguished President of the Linnæan Society in England, published his "Introduction to Physiological and Systematic Botany," a work which at once became the text book and standard authority of botany in that country. This work was republished, from its second edition, at Boston, in 1814, with Notes by J. Bigelow, M. D., who has for a long time been ardently engaged in the pursuits of botany in that part of our country. This republication was an era in our country in botanical science; and yet at what a vast remove from the philosophy of botany, as presented in the *Botanical Text Book*, is this work. It is read with interest at this time for its knowledge, but evidently belongs to another age, even to the *dark ages* of botany.

The Botanical Text Book is the *posting up* of the results of revolution and progress in the study of the vegetable kingdom. *Organic*, or structural botany, has been introduced within a few years, and now forms an essential part of the subject. It can never be removed from its place, even if it should receive modification and improvement. This has led to no inconsiderable change in the *technicalities* of botanical language, as well as in the consideration of the objects themselves.

The adoption of the *artificial method* by Linnæus, was the result of necessity. He had not a sufficient knowledge of plants, to bring them into their natural families, and to exhibit their affinities. It was the work of minds far inferior to his, to recognize these relations, when the multitude of plants had been examined, and the vegetables of all spheres and climates had been ascertained ; but even this work was begun by Linnæus himself, for no one better understood the proper course of botanical investigation. The *natural* orders were first arranged by him, for he distributed the known plants into sixty-five natural associations or orders. To depreciate the labors and results of Linnæus, is folly ; to rob him of his untarnished glories, is at this day impossible. Some have indeed sneered at his works, but the *paw of the lion* need not be lifted to annihilate such sciolists. The wonders of vegetable structure had not been unfolded by the microscope, and some of the more obvious forms of organization had not yet been appropriated to their legitimate use. The author of the Text Book has been placed on an eminence, and his vision greatly aided. Standing in this position, he has unfolded the scenes spread out before him with splendor to the eye that follows out the details. The mind is delighted with the objects, and rejoices in their richness and beauty, as compared with all the displays of even thirty years ago. The generation that then were actively engaged, have accomplished wonders.

The grand distinction of *Flowering* and *Flowerless* plants must stand, and the former be divided in *exogenous* and *endogenous*. The Exogens are divided by Dr. Gray into two great subdivisions : 1. *Angiosperms*, or plants bearing their seeds in a pericarp or covering ; and 2. *Gymnosperms*, whose seeds are truly naked. This is a great improvement on the previous classifications of authors. The Endogens are divided only into *orders*, and the distinction of *aglumaceous* and *glumaceous* is not regarded.

The *Flowerless* plants are classed in three divisions: 1. *Acrogens*, embracing ferns, clubmosses and rushes; 2. *Anophytes*, as the mosses; and 3. *Thallophytes*, the lichens, algæ and fungi. The former class of *Rhizantheæ* seems to have disappeared, and its wonderful *parasitic* forms fall into some other division. Thus, all plants fall into five classes, presented in a beautiful *Synoptical View* on p. 322.

The *artificial* subdivision of the Exogens into *Polypetalous*, *Monopetalous* and *Apetalous* (p. 323), is still followed, because no structural or organic element has been discovered, which marks the subdivisions which seem so important to render the study of these plants more easy and intelligible. Hence it is that the system is not made *natural* throughout; but very great progress has been made since the days of Linnæus. The study of the Natural Orders becomes the great object, as the natural affinities and relations of plants are designed to be here exhibited. If one is entirely ignorant of botany, it is not so easy perhaps to begin it on the natural system alone. 1. Because there is no one order which stands at the head of the whole, and from which there is a closely dependent chain of orders. 2. Because one is supposed not to know the affinities of vegetables, and in what part of the arrangement particular genera may be placed. 3. Because the characters of plants are not perfectly definite, and they require too careful study to be very easy and alluring to the beginner. As the adoption of the artificial method by Linnæus was a matter of necessity in the study of plants at that period, so the same necessity renders some knowledge and application of it important still, till the principles of the natural system shall be more disseminated. This is happily effected in Wood's Botany, a notice of which was contained in the last number of this Journal. But the time may come ere long, when the study of plants shall be pursued only on the natural system. The Botanical Text Book is fitted to hasten this time. After all the achievements of the artificial system, no one would more heartily rejoice than Linnæus himself, if he were to behold it, at the establishment of the science of botany on principles purely natural in all its parts.

The Botanical Text Book should be in the hands of all our intelligent agriculturalists. The structure, physiology, affinities and economical uses of plants, must interest and gratify the intellect and taste. The study of plants so far will no longer appear as a mere use of terms expressing the names of things, and having little relation to practical results beyond the names of plants. Botany now becomes an exhibition of nature in one kingdom of her most delightful productions. If the names of genera and species are desired, Wood's Botany happily enables one to carry out the principles of the Botanical Text Book to this desirable result. So rapidly as knowledge shall be diffused among the lovers of botany, will the study of the natural system displace all others. Least of all will there be a reliance on the artificial method. Y. C.

A Universal Pronouncing Gazetteer: Containing topographical, statistical, and other information, of all the more important places in the known world, from the most recent and authentic sources; with a map. By Thomas Baldwin, assisted by several other gentlemen. Philadelphia, Lindsay & Blackiston. 1845. pp. 550.

This Gazetteer is intended to fix a standard for the pronunciation of *names;* giving, at the same time, the geographical position of the places, with brief remarks on the commerce, population, and other interesting particulars.

The want of such a work has long been felt by the teachers of geography. To the different nations of Europe, and their descendants, the same letters often indicate different sounds. How then can a plain English scholar know how to pronounce them? Every reader of this class, who officiates even in the family circle, ought to have this volume before him: it should be in every school, and in every library.

The Introduction, which has been prepared with great care and labor, gives the rules for such pronunciation, so that the student may acquire the *theory*, while the body of the work illustrates it by *practice*. In many instances, the etymology of the name is given.

After the preceding remarks, it may scarcely appear necessary to say that this book is original, both in plan and execution. Prefixed to the Introduction, is a list of gentlemen who consented to lend their names as *authorities*, and amongst them may be found many of great eminence. George R. Gliddon, our late consul in Egypt; Horatio Hale, philologist to the late Exploring Expedition; Dr. Ruschenberger, of the United States Navy; and William B. Hodgson, the celebrated Turkish scholar, may be cited as instances; and to show that we do not overrate the volume, we subjoin the certificate of a man well qualified to form a correct opinion of its merits. S. S. RANDALL, superintendent of common schools, has also warmly recommended its introduction into all our seminaries. We are also advised that one of the most distinguished professors of the University of Pennsylvania was so fully convinced of its importance, and felt such interest in its success, that he gratuitously inspected every proofsheet.

CENTRAL HIGH SCHOOL,
Philadelphia, July 15, 1845.

I have examined, with some degree of care, the "*Universal Pronouncing Gazetteer*," by THOMAS BALDWIN and others, and am satisfied that it is a work of uncommon excellence and value. It is a book that has been very much needed, both in families and in schools. Its general introduction would greatly facilitate the study of geography, by preventing the present confusion in regard to the pronunciation of foreign names. It ought to be in the hands of every teacher, and of all pupils who can afford it. The principles of pronunciation adopted by the compilers seem to be judicious, and, so far as I have seen, are carefully applied to the details of the book. The work, in other respects, is also worthy of high commendation. It contains, in a small compass, a large amount of important geographical and statistical information, accurate in its character, judiciously selected, and well arranged. JOHN S. HART,

Principal of Philadelphia High School.

We are not disposed to withhold an expression of approbation of this work at this time. Scarcely a work has been issued from the press, so valuable and useful as this. The want of it had been felt for a long time; and now that it has appeared, it is extremely gratifying to find it better and more important than was anticipated. We believe that there is but one opinion of its value, and that is extremely flattering to the author of the work, of whom we should be glad to speak if we were permitted.

Editors Q. J. A. & S.

FARMERS' MISCELLANY.

HUSBANDRY OF CENTRAL NEW-YORK.

IN A SERIES OF LETTERS TO JOHN KOON, ESQ., OF ALBANY.

Letter I.

Utica, September 12, 1845.

My Dear Friend — As you was so kind as to express an interest in the matters communicated in my former letters, I am induced to resume my pen, and I have hopes that I may still maintain a favorable position in your estimation. Should I succeed, I shall feel some pride in my success ; inasmuch as I know that you are a judge of merit, and will neither suffer yourself to be deceived by appearances merely, nor bestow your approbation upon an unworthy object.

On recurring to my former letters, it will be seen that I took rather a wide range in the selection of subjects ; and as you have not intimated to me that this was an objectionable feature in them, I shall not now confine my observations to what might be considered a narrow compass. The structure of our hills and vallies, considered with reference to agriculture ; the different kinds of crops, soils and their adaptations ; cows, hogs and sheep, with many other similar subjects, are interesting matters for the consideration of farmers. The latter, in particular, interest me at the present time ; and as people are very apt to think that whatever interests themselves must also interest others, so I find that I am thinking that sheep too must be uppermost in your mind. I do not expect, however, that you will fall in with all of my views ; for you know that I am sometimes charged with heterodoxy, and especially do I know that you will be startled when I attempt to show that Saxon sheep do not wear fleeces of a finer kind than the merinoes. You will, without doubt, once more rub up the nap on your imperial saxony coat, I mean your sunday dress, to see if this can be so; and I expect you will be rather slow to believe that you have expended a shilling or two more per yard, in consequence of falling in with common opinions without sufficient examination. I must not, however, be understood as condemning the fine imperial saxony, for the reason that I am myself too poor to wear one. In truth I have not as yet been able to get above the black bombazet for a sunday coat in summer, and the three-quarter homemade woolen of a london-brown for winter. My native sheep's gray is, however, my favorite cloth, in which I am at home, and do not feel that disposition to stick out my arm at an angle of forty-five degrees when walking; nor do I fear that I shall split open the back, when I stoop to tie my shoestrings.

In my perambulations, I have been not a little surprised to see what a great uniformity there is in some sections of the country, both in the general features presented, and in the properties of the soil. Should you accompany me across the hills from Hudson river to Hoosic mountain, you would see that here is a belt which forms truly but one agricultural district, whose predominant character, when products are spoken of, is to produce the grasses and cereals in great perfection. This will be found to be true, whether you cross just above the Highlands, at Albany sixty or seventy miles north, or at Whitehall. You every where find the north and south hills with their gentle slopes, though they are really steepest upon their north-western sides. This is owing to the underlying rock; and no matter what the rock is—whether a slate, a limestone, or a quartz rock—its inclination is uniform, and the soft materials have nothing to do with the arrangement, further than that they are spread over the rocks whose inclined surfaces were previously determined.

There is a remarkable fact in regard to the highest grounds of this belt of country, and it is one which I have had more than twenty years experience in testing the truth of: it is that they never suffer extremely from drought. At the present time, when the corn-leaves at Albany and Newburgh are closely rolled up, in Berkshire they are green and bright, and the hills and furrows are bringing forth abundance of fruit. Showers occur here when they are denied every where else, and the consequence is that this region presents its green surface when the valley of the Hudson is parched with drought.

I may be a little more particular in my remarks upon this region, since I have incidentally brought up the subject. I have stated that the hills run nearly north and south, and generally preserve moderate slopes, though it is not uncommon to find them difficult to plough on their northwestern slopes. The more elevated of these hills are in the neighborhood of Williamstown and Adams, where the highest rises 3400 feet above tide, and the main valley of the Hoosic about 700. Corn does not come to maturity here when planted a thousand feet above the level of the valley, or fourteen or fifteen hundred feet above tide at Albany. The predominating rock in this belt, which is full forty miles wide, is slate. The first twenty miles east of the Hudson is principally slate ; then a comparatively thin deposit of sparry limestone ; then many a mountain of silvery gray slate, called the Taconic range ; then the Stockbridge limestone at the eastern base, and in the northern and southern vallies ; and finally a hard quartz rock, resting against the gneiss of Hoosic mountain. This whole belt is entirely covered over with drift, consisting of coarse earth, with pebbles and cobblestones sometimes curiously piled up, as at the base of the Hoosic mountain. We find, however, the loose materials often apparently ploughed out, or rounded excavations formed, in which peaty bogs are not unfrequent.

The Hudson river seems to divide regions which are somewhat dissimilar, or which, though lying in close proximity, yet differ in the age of their respective formations. The remains of the mammoth have not yet been found east of the feeble barrier of this river ; and it would seem, if a wider expanse of water had not existed in the era of the mastodons, that they too would have lived eastward of the Hudson, and their remains ere this have been discovered there.

I subscribe myself yours.

Letter II.

NEW-YORK STATE AGRICULTURAL FAIR,

Held at Utica, on the 15 - 16 - 17 *September*, 1845.

My Dear Friend — I promised, at my last interview with you, to give you an account of the State Fair. Had I known, however, at the time, the difficulties I should meet with in fulfilling this promise, I should by no means have made it to you : but as it is, I will say a few words, trusting that your good nature will excuse me from attempting a task so great and perplexing, as a full report of the proceedings of this great body, with all their traps, from a threshing machine down to a corkscrew. The first thing in regard to this great affair, and which made the strongest impression upon my mind, was great multitude of folks which congregated at this place upon this occasion. Of course it is impossible for me to tell how many were present, but you can perhaps get some faint idea of their numbers, when I state that the fair was held in a ten-acre lot, and that by nine o'clock A. M. the people began to pour into it through a twelve-foot gateway, until it was filled to overflowing. By eleven o'clock, an equal flood of humanity began to pour out at another place; and so they continued in a ceaseless flood until about five o'clock P. M., when the field appeared to be considerably thinned out, and by six o'clock was emptied of all but a few cattle and their keepers. The number and show of cattle was great. Of fourfooted beasts, there were nearly 700; which may be classed into horn cattle 274, horses 114, sheep 257, swine 34. These were arranged in circles on the outside of the field, with a carriage space between it and the fence, in which gentlemen and ladies were favored with an opportunity of seeing without damage to their persons. Several temporary buildings were erected near the entrance gate, for the accommodation of household apparatus, mechanical inventions, products of the farm, fancy articles, flowers (of which there were many of great beauty and value), etc. etc. These buildings were tastefully decorated, especially the temple erected to Ceres, which was designed by Mr. J. R. Walker, one of the Floral Committee. A fine hall, for the display of fruits and flowers, was designed by our mutual friend, Dr. Thompson, of Aurora. The ladies also were provided with a hall, which was appropriated for the exhibition of domestic fabrics. Indeed I cannot speak of all the designs for the display of the beauties of nature, of art, and of utility. Both Pomona and Flora were remembered, and had their dedicated temples; but far above all the representatives of classic fable, were the living ones, the wives and daughters of the farmers. I write for them.

The trial of plows, on Tuesday, I did not attend. The show of horses was very good. The Durham cattle I could not see, but the sleek ayrshires I was much pleased with, and Mr. Sotham's herefords were excellent. There were many good sheep on the ground.

The poultry show was quite extensive and beautiful; who it all belonged to, I cannot now say.

I was pleased that so many strangers were present from distant parts of the Union. Among them were several gentlemen from the South. The assemblage of men from different parts of the State, and of the Union, I consider as the great thing. It is necessary that some show should be got up, in order to get men together; and is it not strange that some men will go farther to see a Durham bull, than to see a clever likely man, a being endowed with reason and intelligence? So it is: but anything to induce our farmers to assemble together; to form an acquaintance, and make themselves known to their fellow-men.

In my next, I propose to give you some account of Onondaga county, and of the farm management of a few of our friends there.

I subscribe myself yours.

Letter III.

Camillus, September 20, 1845.

My Dear Friend — I proposed, in my last letter, to give some account of my travels and acquaintances in Onondaga county; and now having set myself down to fulfil this promise, I feel at some loss what to say, and what subjects will interest you most. But it appears to me that the first thing which is inquired after, on going into a county, is, what is its soil and productions? So I shall, in the first place, take up these subjects for consideration. Now Onondaga county is in the heart of the State, and I have sometimes heard her called the empire county, but on this point I have not made up my mind. I do know, however, that there are many productive and profitable farms there; and the county is especially favored with some geological formations and deposits, which the eastern, northern and southern counties are destitute of, and which certainly confer many and great advantages. The limestone ranges formed of the Onondaga and Manlius waterlimes, are of great importance: they are in contact here, and form a distinct belt through the county from east to west. This belt borders the Erie canal, and rises in many places directly from it in the form of a terrace or table. But the most important formation is the limestone shale, below these water-limestones, and which also form a lower and parallel belt. These shales are remarkable for having at one time contained crystals of salt; and even now, in consequence of the rapid decomposition, they form various saline bodies, and it is interesting to see how the springs are charged with saline matter according to the level from which they issue. Thus the lowest layers, including the hopper-formed cavities and the gypsum beds, furnish springs highly charged with saline matter, sulphate of soda, magnesia and lime. Above, and in the next tier of strata, they are highly charged with carbonate of lime, and from these immense deposits of tufa are formed. Even the springs are petrifying, and wood immersed in them becomes stone, or stony matter takes the place of the wood. The higher shales, though they do not furnish soft water, yet it answers well for drinking and cooking. I omitted to mention the fact, that the lower layers of this limestone shale furnish, in a few instances, a water which chars vegetable matter; and I find, on examination, that it is a weak sulphuric acid.

The limestone shale is the rock, or formation, which is specially adapted to the production of wheat and corn. It has been stated by most writers, and repeated by most farmers, that it is the limestone above which gives character to the soil of this and some other counties, and especially renders them wheat-growing; but this is not true. Even the late esteemed Mr. GAYLORD seemed to have selected a farm because it was based on limestone; but it is the shaly mass below, which imparts so much excellence to the whole belt of country, and this runs through the middle of Onondaga, or a little to the north of the middle. A black shale succeeds the Onondaga limestone in the ascending order; and this gradually passes into gray or greenish siliceous shales and sandstones, still higher up. Very little limestone is found south of the first belt of limestone which I have mentioned above.

We have, then, in Onondaga county, two shaly formations, with a thick mass of nearly pure limestone between; and they form terraces which rise one above the other, commencing on the level with Oneida lake, and ascending step by step up to the hills of Pompey. These several terraces differ much in their agricultural relations. The new uncleared land on the lowest terrace, just above the Cicero swamp, is worth 10 – 12 dollars per acre; the next terrace, if dry and rolling, is worth 50 – 60 dollars per acre; and the high land of the black or Marcellus shales, is worth from 35 – 40 dollars per acre. Many value their lands much higher ; but the prices at which they are now estimated, are those which they would sell for at a forced sale. I am sensible I have not given you a very scientific account of the geology of this county ; but to supply those parts in which I am deficient, I will refer you to the geological map, which is very generally distributed, and is the most accurate one that has been published in this country.

I assure you that I remain yours most sincerely.

Letter IV.

Camillus, September 23, 1845.

My Dear Friend — What I have said of the geology of Onondaga county, was designed as preparatory to some statements in regard to its productions, an account of which I now propose to give you. On referring to my former letter, you will perceive that I gave preference to a belt of country running through the county on the canal, or that terrace which is entirely above the low marshy grounds forming the swamps of Cicero. It passes, for example, through Camillus, and a very good sample of it may be seen at Mr. Geddes's farm. It is from one and a half to three miles wide, and is based directly upon the green gypseous shales, or upon the Onondaga salt group. It would be exceedingly interesting to know in what respects, if any, the wheat grown upon these shales differs from that upon the black shales : it would be difficult, probably, to make a comparison between the products of these shales and the limestones immediately above, inasmuch as the soil of the shales has been transported south so as to intermix with that of the pure limestone ; but the higher portion, at least of the black shales, is nearly all derived from their own decomposition. There is a recognized difference, I believe, aside from any change which can be effected by climate. To show the excellence of some of this land, I will state what was told me by a person who may be relied upon. A certain field has been under cultivation for the last thirty years, and has produced a crop of wheat every alternate year, without a particle of manure, and its yield has averaged twenty bushels to the acre.

It is the soil of the gypseous shales, and not of the limestone, which has been supposed to form the basis of the wheat soil of the western counties. The opinion of farmers on this point, is founded upon the distribution of the calcareous gravel. As far south, for instance, as they find the limestone pebbles, they calculate upon getting good crops of wheat, especially in the vallies ; but when the limestone disappears, they do not expect to get but two or three crops of wheat. Now the reliance upon the limestone pebbles is very well as an indication for wheat land ; nevertheless it is not the presence of limestone that makes these lands thus productive in wheat, but the product of the shales below, which has been carried as far south as these very limestone pebbles of which we are speaking. The gypseous rocks continue from year to year to disintegrate and decompose, and hence are continually furnishing fit matter for the growth of wheat. But again, this soil is also very productive and superior for indian corn, which grows large, and forms sound grains, from the great abundance of magnesia which, I have no doubt, the soil contains.

The soil of Onondaga does not pack : it contains, in some places, many cobblestones from the Medina sandstone, interspersed with short broken fragments of the shale which are frequently brought up by the plow ; and thus the nature of the material is such that it does not form a decidedly stiff clay, but merely an argillaceous soil. In the lower vallies, a stream flows, which is more or less charged with tufa and marl, and this is frequently overlaid with peat. But the quantity of vegetable matter in the soil, in all the farms which have been worked several years, is extremely small.

There is a conclusion which I will state here, as it was derived from Mr. Geddes : it is this, that soil, which is ploughed and sowed for many years, finally becomes so compact below as to require draining. Mr. Geddes founds his opinion upon the fact, that if you have a space of 5000 feet which you wish to fill with earth, it will require 6000 feet of soil to fill it ; or the same thing is seen in filling post-holes, which receive not only all the earth thrown out, but also the post itself. Stirring the soil, then, makes it lie in less space, or more compactly ; and if there is a tendency originally to the accumulation of water, it will require drainage after a time, in order to be productive.

I shall proceed with this subject in my next.

Yours, &c.

Letter V.

Camillus, September 25, 1845.

My Dear Sir—I closed my last letter, in speaking of the effect of cultivation in increasing the compactness of soil; and undoubtedly the conclusion there expressed is true, aside from the main fact upon which Mr. Geddes founds his opinion. The same result had been witnessed by myself; but I had attributed it to the loss, first, of vegetable matter, which is always removed from a new soil in the course of a few years cultivation, unless indeed it is abundant as in that of the Western States; and, secondly, to the infiltration below of the calcareous salts. Both these causes operate to bring about the result we are speaking of; and when they are combined with the one above indicated by Mr. Geddes, a very decided change must inevitably be produced in the texture of the soil.

On a little reflection, it occurs to me that this one fact will explain, or at least will go far to explain, some others. We know, for instance, that in the early settlement of many parts of New-York and New England, several kinds of fruit were cultivated with success. Peaches, for example, grew well in Berkshire in Massachusetts; and I am informed, also, that even in Pompey and Niles and the towns in that range in this State, and farther south upon the Hamilton and Chemung shales, they grew in great perfection. Now, however, they are not and can not be raised, or at least not with the success that attended their first cultivation. This fact may stand connected with the very change above alluded to in the condition of the soil. It is in that state which is usually termed *cold:* it is so compact, that the water, though it by no means stands upon the surface, yet does not pass off with sufficient rapidity, but is retained so long, and so near the surface, that its evaporation keeps the temperature slightly below what it formerly was. If this theory is correct, a general deep draining will remedy the difficulty, and bring the soil back to the porous and warm condition it originally possessed.

This subject is one of great interest, and worthy of careful investigation. Against the opinion I have expressed in regard to the cause of those changes which now prevent the cultivation of the peach, it may be urged that the temperature is reduced by the clearing of the country; or rather that the destruction of the forests has opened it to the inroads of bleak and cold winds, or removed those trees which gave shelter to the more tender productions we are speaking of. All these are undoubtedly to be considered ; yet it seems to me that the first named is by far the most important. I should like to hear your opinion upon it. The fact is clearly established, and is known over a wide extent of country ; and if we can but get at the cause, it is possible we may also find a remedy.

I intended here to have spoken of Mr. GEDDES's farming operations, but I see that I had better delay it until my next, and so you will not object to my closing this with,

Yours, &c.

LETTER VI.

TYLER POST-OFFICE, September 27, 1845.

MY DEAR FRIEND — I write you from the residence of my friend Mr. GEDDES, who is a distinguished agriculturist ; and in looking about his place, I am well satisfied that plans of houses, of yards and barns, are of but little use, or perhaps I had better say they are only generally useful. Now the location, the exposure, the position of the farm-houses, barns, etc. must all be governed by circumstances ; and each farm has something *sui generis*, which must control the arrangements for its cultivation. Even the inside plan of the house may be essentially modified by the relations of the spot on which it stands. Leaving, however, this subject for conversation when we meet, I propose to speak in this letter of Mr. GEDDES's farm management.

The farm contains 300 acres : it lies on both sides of the great western turnpike leading from Syracuse to Auburn. The railway skirts it on the north, and it is about one mile south of the canal. Mr. G.'s management is this : He rents the greater part of the farm to two tenants, who cultivate different parts as they may agree ; but over the whole Mr. G. retains the entire power of directing, not only what crops are to be raised, but how the land shall be cultivated. By this system, unity is preserved in the management, the land prevented from too close cultivation, and a system persevered in which keeps it in excellent condition. To the tenants a house is furnished, together with stables, garden, pasturing of cows, hogs and teams, and one half of the seed-grain and grass-seed, and a threshing machine. The tenants do all the work, and deliver one half to the landlord or in market.

Arrangements about the farm-house. It is impossible to give you a very correct idea of these arrangements, without a plan; but I may state that the house is situated upon and near the brow of the table land of the country, with a creek upon the south fifty-five feet below the level of the basement story of the dwelling. This makes a slope from the house to the creek, which is an unfailing stream. This position of things determines many of the arrangements about the premises. Along the brow of the slope to the creek, the barns and sheds for cattle, sheep and hogs, are placed. The position secures, in the first place, perfect drainage, which is indispensable to comfort and health; and yet it gives an opportunity to retain the water for rotting manure, where it is the most convenient; and the creek supplies an unfailing source of water for cattle and other purposes, both summer and winter.

As water is one of the most indispensable of all articles in husbandry, Mr. Geddes has availed himself of his position to supply himself in part from the creek. This is effected by means of the power of the waterfall, which sets and keeps in motion a water-wheel, which moves a double acting forcing pump, which drives the water through pipes to his house, for washing, bathing, etc; to the barn, for cattle, hogs, sheep and poultry, each kind being separate and in their proper places; and the waste water goes to the manure heap, for assisting in the decomposition of straw and refuse matter, which is received in an impervious basin upon the brow of the ravine. Besides this, there is a sufficiency of water for the two tenants, for which they pay him, and which really amounts to enough to cover the whole expense of the watering establishment. The water-wheel is a most excellent one, being ten feet in diameter, moving with a slow steady motion, every revolution of which forces to the top of the hill a gallon of water, which amounts to rather more than six gallons per minute night and day. A good well of water, near the stoop leading to the kitchen, supplies water for domestic purposes.

Mr. Geddes, in his buildings, acts upon a very sound and useful principle, one which combines economy and profit with convenience (if the distinction is proper), namely, that each department of husbandry shall have its house, where all that appertains to it shall be conveniently placed and arranged. I say *arranged*, because that is the true word, meaning that things are not only put in, but classified; so that if you please, you may go in the dark and put your hand upon any article that may be wanted. Thus there is the carriage house, with each harness upon its own peg; there is the tool-house, with each tool in the chest or upon its hook; the poultry being entirely excluded from these premises, which is not always the case in other establishments: the grain-barn, the hay-barn, the sheep, the cows, the hogs, etc. each occupying their own places. The poultry have suitable conveniences for laying and hatching. The milk-room, in particular, is worthy of especial notice: it is a beautiful little building, situated in a triangular place in the yard, leaving space for driving a team with wood or any other load to the door of the wood-house, and but a few feet from the entrance door of the kitchen. It is constructed of cobblestone laid up in mortar, is thirteen feet square, and the corners are of hewn stone: it is one story high on the side facing the kitchen, has a stone floor, with one room for milk, lighted with two windows, which can of course be darkened by blinds, so as to exclude the flies, and yet allow the room to be aired. Upon the south side, the descent gives room for an ash-house, with its door enclosed in stone. Immediately above the ash-room, which has an arched roof, is the smoke-house; the smoke being admitted from the ashery below, through openings in the arched roof. The hams, and other meat designed for smoking, are suspended on hooks on cross-pieces, which are then put in for smoking. The whole arrangement, as you may readily conceive, is such as to ensure perfect safety from fire, and to combine every convenience in each operation. The meat is suffered to remain in its place through the season, as the room is cool, excludes flies, etc. Some other conveniences are connected with this little but neat building, the whole cost of which was only one hundred and fifty dollars.

Mr. GEDDES has under culture, different crops, as follows: 80 acres of wheat, yielding upon an average 20 bushels to the acre = 1600 bushels; 40 do. oats, averaging 60 bushels to the acre = 2400; 19 do. barley, averaging 37 bushels to the acre = 703; 16 do. corn, averaging 50 bushels per acre = 800; with a crop of potatoes, amounting to about 800 bushels. Besides the above, I might specify the products of the dairy, the root crop, hay, etc.; but this is sufficient.

In closing this epistle, I may very properly remark, that the farm received the premium from the county society; and in addition to this, Mr. G. took the first premium for the best sheep and best bull, from the same society. It is proper to say, however, that Mr. G. did not enter his farm for the premium; but the committee gave an honorary one, which consists in placing it first on the list of farms.

I have omitted probably many things which would interest you in regard to the husbandry of Mr. G. You will, however, see, I believe, that his system is a profitable one, and that there is nothing that looks like fancy work. I assure you it wants only a few such farmers in the several counties, to make this business the most profitable and honorable in the sight of all — to make labor honorable with the gentry. I mean, by this, the holding of the plow and rake.

Accept of best wishes, and believe me yours, etc.

P. S. You will perhaps wonder that I never speak of the ladies who preside over the kitchens and parlors. I can only say, that on this subject, my gifts are very small. I leave all this to our friend J. S. of the Farmer's Library: he is the man who attends to these matters.

Letter VII.

Tyler Post-office, September 29, 1845.

My Dear Sir — In one of my former letters, I alluded to the wool of the saxon, and intimated to you that wool-growers and manufacturers had been deceived in its fineness; that it really is as coarse as the merino — certainly no better than the best merinoes; and hence inasmuch as it is short in its staple, and light in its fleece, must be the least profitable to the world, provided it costs as much to rear them. I propose now to take up this subject once more, for the purpose of giving more in full than I have yet done, some of the results of my examination. I shall confine my remarks, however, to those points which relate to the measurement of the fibre; and it is my purpose to give a comparative view of the measurements I have recently made, from fleeces which were exhibited at the late fair.

In the first place, I will premise, that the wool on different parts of the body varies in fineness: this is probably pretty well known.

Thus, the wool of the fore shoulder is invariably the finest ; that of about the middle of the trunk, the next ; and that of the flank the coarsest : the latter too contains a greater amount of coarser hairs, or there is a greater inequality of the fibres than elsewhere. From my theoretical views of this difference, I am inclined to think that wool of the evenest grade will be found upon wethers, though I have no facts to prove this, for I have not made examinations of their wool as yet.

Again : The diameter of the fibre of wool, referred to the French standard of measures, is equal to the one-hundredth of a millimetre, which is not far from the $\frac{1}{2500}$th part of an inch. This one-hundredth part of a millimetre, and the fibre of wool, are both exposed to the same magnifying power of the microscope ; and each division of the scale in fig. 1 represents this part of the inch when seen under the same power as the fibre of wool, so that you may have at a glance the comparative diameters of any two fibres under examination. So much is stated by way of preparation for the remarks which are to follow.

Fig. 1.

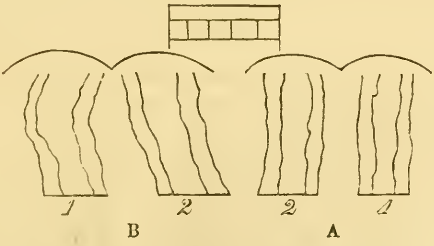

Figure 1, with the scale of measurement as the standard of comparison, exhibits the comparative diameters of the wool fibre of the two premium sheep. A 1, is the fibre of wool from the shoulder of the second premium sheep (Mr. Church's) ; 2, do. from the flank. B 1, fibre from the shoulder of the first premium sheep (Mr. Crocker's) ; 2, do. flank.

Fig. 2.

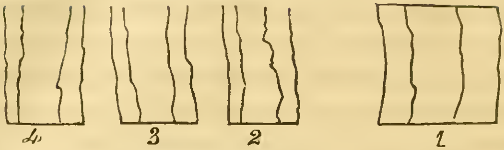

Fig. 2. No. 1, fibre of bakewell, magnified as above: it is about the average fineness of this kind of wool. No. 2, fibre from ewe belonging to Col. Sherwood, 3 years old (Blakesley sheep). No. 3, do. of Mr. Bailey's ewe. No. 4, do. Mr. Atwood's.

Fig. 3.

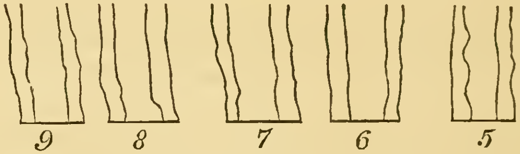

Fig. 3. No. 5, fibre of Mr. Ellis's ewe, fleece weighing 6lb. 13 oz. No. 6, do. Mr. Nettleton's yearling buck. No. 7, do. the imported 5 per cent South American wool, which you see is nearly as fine as the best of our flocks. No. 8, do. Col. Sherwood's 3 year old buck, sheared 8½ lb. wool. No. 9, do. finest Saxon wool in market.

Fig. 4.

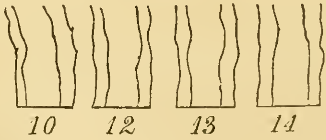

Fig. 4. No. 10, fine Ohio wool. No. 12, do. Saxon of the late Mr. Grove's excellent flock. No. 13, do. original imported Spanish wool, by Seth Adams. No. 14, do. Morrell's saxon.

The above measurements and drawings were made with great care. A great many fibres were measured: some were finer and some coarser than those given, and I selected in every case the average measurements. One measurement, which I think will interest the wool-grower, is that of the imported Spanish low duty wool. From examination, it seems to have been soiled purposely in order to give it the appearance of poor wool. Wool-growers should look to this matter, for undoubtedly an immense amount of fine wool has been smuggled into the country, and it seems impossible that its fineness should escape the notice of custom-house officers. I know not, however, how it is ; but I do know that unless each great interest looks out for itself, nobody else will, and certainly the manufacturer is the last one who will look after the interest of the wool-grower.

With these remarks, I close by subscribing, &c.

P. S. Since writing the above, I have been favored with some Saxon wool by the Hon. Senator BEEKMAN, from his flock, which I am much gratified to find is finer than any of the above : the finest specimen is nearly $\frac{1}{1300}$ of an inch in diameter. It is decidedly finer than that which I measured from the celebrated flock of the late Mr. GROVE. I find one thing peculiar to the fine saxon : the hollow part of the fibre is larger than in the coarser wool, which I believe gives it that silky lustre and soft feel. I designed to have given you the comparative strength of the above examples of wool ; but I find my time so much taken up with other matters, that it is impossible to enter upon experiments which require so much care and time in order to be of any value. I shall, however, in the next series, give you these results.

LETTER VIII.

SKANEATELES, September 30, 1845.

MY DEAR SIR — I left Mr. GEDDES to-day, and am now on the extreme western border of the county of Onondaga, at Skaneateles. I have just been looking over the farm of my friend FULLER, who makes quite a figure at farming, and is another example of the right sort of farmers. Mr. F.'s farm is about half a mile from Skaneateles, upon the eastern slope of a range of elevated ground on the western shore of the lake. The slope is gentle and uniform. The eastern side is probably based on the upper limestone of the Hydraulic series, but extends up so as to reach on the western side the Marcellus shales probably. The soil, however, is deep, and no rock crops out on the surface. The eastern side was low and wet, and in fact the whole slope has been found to require draining, or at least one half of the whole farm. It is a most interesting case, and presents also a triumph of skill in the draining and reclaiming of lands. A person passing over much of the surface, would hardly suspect that an inclined plane of that slope would require draining at all. There are several points at which springs make their appearance. More, it is plain, must be cut off, and conducted to the lower levels by a drain ; but very large surfaces appear, which require the same management, although the land is neither springy or apparently wet. Now Mr. FULLER says, that in making drains, he disagrees with our friend of Singsing, who favored us with a description of his method in our first number. Mr. FULLER dispenses entirely with flat stones, and uses those round hard-heads, or any other kind which he finds scattered about his field. The ditch itself is made in the usual way, and of sufficient dimensions to answer the purpose intended. Then two rows of round stones are laid, upon which a row of larger round ones completes the top, and the same kind are filled in to the desired height. The flat stones are not decidedly objectionable, but there is usually too much difficulty or expense in procuring them ; whereas the rounded stones of the field answer the purpose, to say the least, as well as any, and, besides, a good hand will lay them very fast, and diminish very considerably the expense of ditching.

I would recommend those farmers who wish to construct cheap drains, to consult Mr. FULLER, who probably has had more experience in these works than any man in the State. He is quite unwilling to admit that his system of draining has cost him more than ten cents per rod. I do not, however, now feel free to speak of all Mr. FULLER's operations in farming, and in draining ; but I would say, that if full barns are a good test of a man's success and skill in this business (and I do not see why they are not), then we need go no farther, for here the barns are full from top to bottom. I hope, in conclusion, that Mr. F. will give a full account of his method of draining, in the next number of the Journal. It is only by means of collecting the methods adopted by different farmers, that the practice of husbandry can be advanced in this country, and it is American farming that we want to know most about. I think you will agree with me in this sentiment ; and I think, too, you will be willing that I dismiss for a time this subject. Yours, &c.

Letter IX.

Albany, October 2, 1845.

My Dear Friend — You know very well, that in our intercourse with our friends, we sometimes misunderstand them even on subjecs devoid of all intricacy. At any rate, it so happened with me in my visit last summer to my venerable friend David Thomas. I will therefore devote one letter to the correction of one or two statements which I then made to you ; and at the same time take the opportunity to state a few more particulars in regard to the rearing of fruit trees, which I have just obtained from the same high authority.

First, in regard to Dearborn's seedling (see page 84, vol. 2, No. 1), I make my friend to say that it is the very best of pears. It appears, however, that he gives preference to the virgalieur. I ought probably to have said that Dearborn's seedling was one of the best summer pears.

Again (p. 84), in regard to the common locust. This grows well on calcareous soils, if not injured by the *borer :* it is the *Robinia hispida* which declines and perishes.

With these corrections, my friend gives me the following additional facts, which are undoubtedly the result of much experience and extensive observation. No tree appears to be more benefitted by animal manures, than the peach tree. We may often observe this when it grows near a barnyard, so as to reach the manure ; that the growth is greater, the leaves greener, and the fruit larger, than when it stands on sterile ground ; and even as a general rule, fruit of the same variety is flavored in proportion to its size : the larger, the finer. Urine may be very advantageously applied to this tree, especially while it is small, as well as to young apple trees. It not only hastens their growth, but, by its offensive odor, repels the *borer* from the latter, and the peach-worm (*Ægeria*) from the former. A small tree will bear a pint once a fortnight, and perhaps more and oftener ; for I have never injured any of my trees by this application, and consequently have not ascertained the amount which may be used upon them : certainly large trees will bear much more.

Having given you the above important corrections and additions of my friend, I close by observing that the village formerly called *Union-springs*, is now more frequently and more properly called *Springport,* and that *Aurora* is only the name of a village in the town of Ledyard. I remain yours, &c.

Letter from J. H. Estabrook, to one of the Editors.

Camden (Maine), August 26, 1845.

Dear Sir — I send you a short article for your useful agricultural periodical, should you deem it worthy of a place.

It must be a fact known to all, who are in the habit of observing, that old orchards scarcely have a tree that is not hollow, or, in other words, deprived of its heart growth. Apple trees have many enemies that tend to produce this effect. The *borer* penetrates to the heart and pith, generating disease and death in that part, while the new sap wood continues to grow and flourish. Cutting off a limb too closely to the trunk, will often cause *rot* to penetrate to the heart of the tree. Woodpeckers frequently make holes, which become inhabited by ants and lice, and at length disease and decay are propagated to the heart of the tree. A portion of bark is often accidentally removed, and the wood under it dies. This decay soon reaches the heart, while nature is depositing new layers of sap-wood. After a time, the external wound is healed, but the heart is gone never to return. These are some of the causes that operate to produce the effects visible in old orchards. We will now look at the change that this produces in its fruit-bearing powers. The fruit subsequently produced, will be deteriorated in size, flavor and fairness ; it will be incapable of reproducing from seed. Apples from this parentage, after being gathered and housed, decay prematurely. All scions cut from limbs of this description, will carry with them the imperfections of the parent stock.

The question now arises, Is there any remedy ? I answer yes : thin your old orchards, leaving nothing but limbs of three or four feet in length ; from these will spring out suckers. These suckers rise from the wood like in appearance to a wart ; they soon push through the bark, and grow most luxuriantly, so that in a year or two fruit is produced from them. Apples produced from scions of this description, will be equal in every respect to the best productions of the parent stock in its early growth ; and why ? The sucker thus produced, is in some measure a parasitic plant, finding root in the bark and wood of the old stock, which gives to it its peculiar character of fruit, but no farther. It has the means, within itself, of its own perfect organization, and has freed itself of its parent imperfections, viz. a want of *pith*, without which in the tree, no fruit can be perfect.

It will readily be perceived, that the above theory must have a decided influence on the art of engrafting. Whenever the pith is not brought in perfect apposition, and in contact with pith, the seeds of imperfection are sown, and the fruit will partake of the character of hollow-tree fruit. Whenever scions are taken from twigs, the true offspring of a diseased parent stock, the fruit will be imperfect. In taking scions for engrafting, select either from a young healthy tree, or from suckers such as I have described as parasitic in their character on old diseased stocks ; engraft by taking a twig of a young healthy tree or sucker as above described ; make an oblique incision with a sharp knife, cutting the twig entirely off, then bring to it the scion to be engrafted of exactly the same size, and cut smooth with the right bevel, so as to apply bark to bark, and pith to pith ; and if properly secured with suitable composition, there will scarcely be any stint of growth, and the fruit will appear in due time in all its original perfection. Formerly when I ate engrafted fruit, I supposed, as the seeds were almost uniformly blasted, that crossing stocks would produce the individual, but divest it of the power of procreation, as we notice in some species of the animal kingdom ; but further observation has fully convinced me of my error. It is ignorance on the part of the engrafter, of the necessity of preserving the power of the pith as well as the bark, that has led so extensively to a deterioration of engrafted fruit.

MR. PRENTISS'S FREE MARTIN.

In the first number of this Journal, Dr. Monell, of Newburgh, gave an article on Free Martins, in which he advanced the opinion that there are two varieties : the first, which is the most common, is a *hermaphrodite*, but has the masculine look, has no desire for the male, and of course never breeds ; the second resembles the cow, or female, externally, and exhibits the usual propensities : it may breed, or it may not. This seems to be a correct generalization, at least as much so as possible in deviations of the nature and character of those which exist in the animals under consideration ; for it will probably be found true, that no two individuals will exhibit precisely the same structure, configuration and arrangement of parts.

Irregularities of this kind will not be governed by a law; and we believe that at least minor deviations will be found on dissection, that were not suspected from the appearance of the animal while living. For a general account of free martins, we refer to page 65 of the first volume; and proceed here to describe Mr. Prentiss's animal, which was slaughtered September 2d, and which we were permitted to examine in company with Mr. Howard of the Cultivator.

Fig. 1.

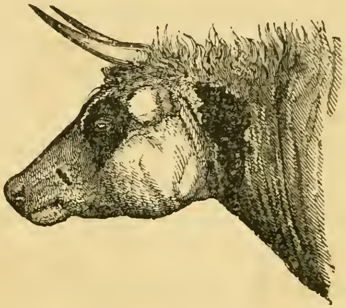

Figure 1, is a portrait of the head of the animal: it will be noticed that it resembles a steer of the same age.

Dissection. The parts disclosed on dissection, were about one fourth the ordinary size of those in the well-formed female. The ovaries were white and fatty: an incision exhibited imperfectly their glandular structure. Two small round bodies, similar to graafian vesicles, were seen in the body of the right ovary. We do not say that these were perfect graafian vesicles, but only that there were two round reddish bodies of the size of a small pea, and readily distinguishable from the enveloping tissue. In one side of the animal, the ovary was kidney-shaped, and an inch and a half in length; in the other side, there were two ovary-like bodies of about the same size and form. The fallopian tubes were obscure, and appeared more like ligamentous bodies than usual. The uterus did not appear to be one continuous body. At the point which answers to the fundus, or at the insertion of the horns of the uterus, were two oval or rather cylindrical bodies an inch and a half in length, which came in contact at the bifurcation: these were partially interrupted as they passed down to form the body of the uterus, but assumed their size and cylindrical shape again after about an inch, and passed down parallel with each other, thus forming the body of the organ. A septum passed across their termination, and formed what appeared to be two orifices into the uterus; but this septum finally terminated in the upper part of the vagina, and in fact only a minute orifice existed at what is termed the os uteri, an orifice which scarcely

Fig. 2. **Fig. 3.**

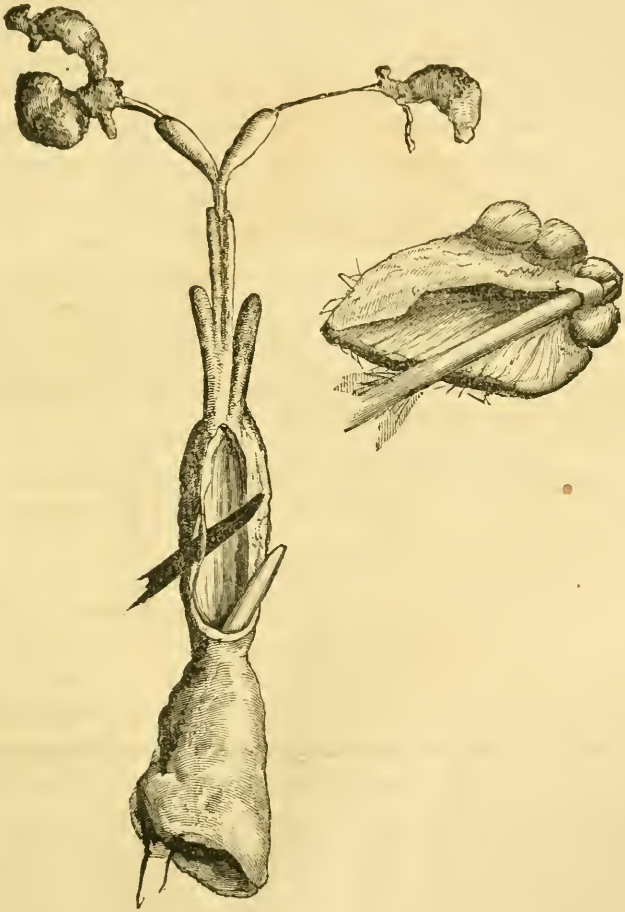

Fig. 2, represents the connections of the organs; the ovaries, fallopian tubes, vagina, much smaller than usual.

Fig. 3, represents the glandular bodies, with ducts opening into the vagina.

admitted a crowquill. An inch and a half below the os uteri, a thin fibrous membrane extended across the vagina, forming a complete *cul de sac;* the superior cavity diminishing from a diameter just admitting the finger, until it terminated in a point at the os uteri; while the lower division of the canal admitted the introduction of two fingers with ease, as far as the membranous partition. Near the termination of the vagina externally, there was a large mass of fatty cellular membrane, in which were enveloped four oval bodies of a glandular structure, which might possibly be called testicles: these were each supplied with a short straight tube, about three fourths of an inch in length and one fourth of an inch in diameter, which opened directly into the vagina. No such bodies are found in the cow in the normal state, and here we consider them analogous to testicles in the male, but undeveloped: this opinion rests on their glandular structure. From this dissection, the relation of the animal to its sex will be understood without comment.

The animal was three years old. It exhibited a remarkable disposition to fatten, as will be seen by its weight as stated below; especially when it is considered that it was kept during the past dry summer in ordinary pasture only, and unsupplied with any other food than the parched fields afforded.

Weight of the whole animal ------	824 lbs.
.. .. hide -------------	68
.. .. fat --------------	70
.. .. beef -------------	686
Total----	824 lbs.

MR. HOPKINS'S OPINION ON THE TRANSFORMATION OF WHEAT INTO CHESS.

We are obliged, in this case, to state from memory the substance of a communication in regard to the transformation of wheat; inasmuch as, during our absence, the letter containing the opinion of our highly respected friend was mislaid.

The case upon which Mr. Hopkins in part founds his opinion, may be stated as follows: The land was new; the bearing excellent, and the condition of the whole field was all that a good farmer could wish. The wheat was well cleaned, came up well, and promised something more than an ordinary crop. The snow disappeared in March, or early in the spring, leaving a thick mat of wheat. In April, however, or soon after, a heavy snow fell, covering the whole field evenly, which remained two or three weeks. Now comes the result : This field, which had been so promising up to the time of the snow, entirely reversed its promise. There appeared, over most of the surface, a mouldiness of an uncommon character, as if the ground had been heated by a thick covering of manure ; and the whole produce of the field, which had been sown with well cleaned wheat, without wild seed of any kind, was chess, a heavy crop of chess, instead of wheat.

This is undoubtedly a strong case, and is certainly extremely perplexing ; nevertheless there are many analogous cases on record, and in the observation of many. For instance, when a field has been burned over, especially among the New-England hills, a crop of fire-weed surely follows, if it is not otherwise occupied. So the common red cherry, as we have often witnessed, succeeds other growths of timber that have been destroyed.

We believe we have stated the case fairly, and we are probably driven to the adoption of one of two doctrines, either that wheat does change into chess, or else the seeds of chess are pretty abundant in the soil previous to its cultivation.

ON MANURES.

Of all substances used as manures, those consisting of the different parts of animals have always been considered as the most efficient as fertilizers. Whether we regard the quantity of nitrogen as the criterion, or the inorganic parts, will make little difference here. The truth is that both have their influence, and the presence of the former, producing a tendency to rapid decay, the effect of these substances is upon the present crop. Yet such parts as the hair, nails, feathers, wool, bones, etc., on account of their solidity of structure and the little water they contain, being slow to undergo decomposition, are among the richest and most permanent of manures. We know comparatively little of the value of some of these, practically; but the Chinese are said to preserve with the greatest care, even the parings of the nails, and the clippings of the beard, to be used as fertilizers of the soil.

Very little use is made in this country of the bodies of animals for this purpose. If one dies, its carcase is buried, or thrown out to the dogs or crows; and thus is wasted a quantity of most valuable matter, which, if made into a compost with swamp muck or peat, would serve to convert several tons into a most excellent manure; and this at very little trouble, and no expense that would not be repaid many fold to the farmer in his crop. How much better would it be to save such substances where they may be applied to benefit a particular portion of land, than to let them go to scatter a divided influence on the world?

Precisely similar is the case with the blood and offals of animals butchered for our markets. Thousands are killed every year, and yet we venture to say that by far the greater part is carelessly thrown away, where it will be of no use; or is carried away by the streams, to be diffused over all the world. There is by far too much generosity in this, and a little more economy might be practised with profit. There is an abundance of peat in every vicinity, and how easily might this blood and offals be used to convert it into a most active manure? How much of this is wasted in our large cities, where thousands of animals perish annually? Enough certainly to supply the grain that is devoured by a very large portion of the inhabitants.

We have lately seen a statement, that thirty thousand head of cattle are yearly slaughtered in the city of Troy, the greater part of whose blood and offals is thrown into the Hudson river.

And here we would ask the question of every householder who has a little garden or only a spot of ground where he raises, or perhaps we should rather say starves, a few stinted, scrawny vegetables, or perhaps nothing but a little patch of skeleton flowers, whose ancestors were the pride of their soil, but whose children, under the neglect of ignorance, are fast going to nothing; how much really valuable manure he sees wasted every year from his own house? Count the woolen rags; the sweepings of your carpets — a capital manure; the bones; better yet, the soapsuds, the waste of the kitchen, everything that has ever helped to constitute a plant or an animal, that is now thrown out to be a nuisance in our streets; and how much do you find? Why enough to make your scanty bit of ground a productive farm, compared with the desert it is now. It wants but a little economy and prudence to save all these, and making them into a compost even with a portion of the soil itself in some small corner, to make your gardens what they ought to be; and where now you grow vegetables which you can hardly find when you want them, you might raise as good as any one.

Bones are a very powerful fertilizer; but like the other parts of animals, are apt to be entirely wasted, in this country. The English can send over to this country, and pay a high price for them, and, after all the expense, make them profitable; but our farmers have not opened their eyes yet to their own interest, or they would not suffer this to be done. All that is necessary to prepare them for use, is to grind them or break them into small pieces, when they may be applied directly to the crop, or mixed with the compost heap till decomposition has commenced. They are sometimes applied whole about the roots of trees and vines, and with marked effect.

Recent bones contain a considerable quantity of animal matter, which is slowly taken from them by the action of the air and water. The benefit derived from these, must be ascribed to this as well as the earthy salts which constitute by far the greater part of them. But when bones are burned, the organic part is entirely consumed; and when applied in this way, the phosphate of lime contained, is probably the most efficient substance.

But in the liquid excrements of animals, we have a manure of no little value; indeed, far more valuable than the solid. In the former are found all the soluble salts which the animal system contains, together with the greater part of the substances producing nitrogen. The urine consists of the wastes of the body: this is continually, every instant, undergoing change. Portions of matter which help to form our bodies to-day, will be gone to-morrow; and in the course of a few years, the whole is renovated. Everything, except what is carried off by the lungs and skin, passes off with the urine.

The solid excrements consist only of those parts of the food which are not appropriated to, or fit for the nourishment of, the body, with a small quantity of the peculiar secretion of the intestines. Now, from these remarks, it will be seen that in the liquid and solid excrements, we have the means of replacing all that is taken from our fields in the form of crops. What is fed to the animal in the adult state, is immediately returned, if not in substance, at least in quantity ; for the full-grown animal, suffering no increase of body, requires only so much food as will compensate for the waste constantly taking place. In the young and growing animal, a little more is necessary, to assist in the construction of bones, muscles, etc.; whilst from the old animal, which is continually becoming smaller, more is given off than is consumed. Thus the action of crops in exhausting the land will readily appear, as also the use of the application of manures. What is taken off and fed to cattle or consumed by man, is so much of the inorganic matter of the soil taken away, which, if necessary to the production of one perfect crop, is as necessary for another ; and as the soil is deprived of these year by year, its capabilities will be diminished, till it becomes incapable of producing the same crop. In animal manures we restore all this, and thus are enabled, for any length of time, not only to keep up, but to increase its productiveness.

But, on no farm, can the amount of animal manure produced, be equal to the waste. Grain is carried to the distant market, as also fattened animals, and consumed there ; all of which is so much lost to the soil, and unless they are restored, will become so deficient as to leave the soil entirely exhausted. It becomes necessary, therefore, to resort to artificial manures to supply this loss, and the scientific farmer will use the greatest care to convert every convertible substance into food for his crops.

But as well known as it is at the present day that the liquid are of more value than the solid contents of the yard, it is matter of no little surprise that some men, in building their stables, select the very top of some hillock, for the express purpose, as it would seem, of draining off all the fluids that would otherwise collect about them, and in this way lose the greater and the better part of their manure. Wherever the yard is situated, it should be made lower in the centre than at the sides, and well paved with stones or a solid bed of clay. This will serve as a basin to hold all the drainings of the stables, and here they may be mixed with the solid manures : this will prevent the fermentation which they will undergo if collected in pools or tanks. If such are used, it should only be for the purpose of saving these liquids in order to restore them again to the dung heap. Much valuable manure is every year lost to the farmer, who is careless as to the preservation of them.

A number of methods have been recommended for preserving their active properties, where the substances themselves are not wasted. They are disposed to undergo a change in a few hours; and any one will be aware of this fact, who reflects upon the powerful odor of ammonia which is constantly rising in his stables. This is the result of the decomposition of the urine of all animals, which contains substances rich in nitrogen; and being very volatile, it escapes into the air and is lost, unless it is fixed by the application of some substance which will unite with it or absorb it. Gypsum has been recommended, to be sprinkled freely every day upon the floor of the stables. Others have advised that the floor should be sprinkled with a strong solution of common salt in water, which will act in a similar way. Saw-dust or chaff, or such substances, which will absorb the liquids, answer a very good purpose, as thus they may be carried out and mixed with the contents of the yard.

It does not answer, as was said before, to collect it in a mass by itself, but it should always be largely diluted with water, or absorbed by some substance which will fix it, either by forming a chemical compound, or by holding it in its pores, or should be mixed with substances which will absorb the gases as they are formed. Where charcoal can be procured in sufficient quantity, it will be found valuable for this purpose. This has the power of preventing its decay, and of holding a large quantity in its pores, till it can be spread upon the land to be washed out by the showers; or if it should undergo decomposition, still the charcoal may absorb a vast amount of the gases, and preserve them until they are required for use. When this can not be used, peat will be found an excellent substitute. But in any case these liquids should always be mixed with the solid manures, before applied, especially if they are collected in large quantities. They are too powerful to be used alone, unless very much diluted.

A preparation of urine, under the name of *urate*, has been made by mixing with it one-seventh of its weight of powdered gypsum, and, after it has stood for a few days, pouring off the liquid; but in this way, much of the useful matter is lost.

What immense quantities of this kind of manure are yearly suffered to waste! How few the farmers who make any effort to save it, or fix the least value upon it! In Flanders, the recent urine of one cow is valued at forty shillings a year (Johnston). What then will be the amount of waste, upon any moderate sized farm, let each owner calculate for himself. At very little expense the whole might be saved, and a large sum added to the gains of the farmer. Tanks should be constructed in the vicinity of the stables, with suitable conductors, which would receive it, whence it may be pumped out and applied to the compost heap, or even to the common mass of manure in the yard.

NEW BOOKS.

THE AMERICAN SHEPHERD. By L. A. MORRELL. 12mo. pp. 437. Harper & Brothers.

WE believe Mr. MORRELL's book to be an excellent treatise, embracing in its range the history of the sheep, the best and most approved modes of management in health and disease, their breeds and their relative value, etc. In illustration of his subject, Mr. M. has furnished portraits of the different breeds, and woodcuts showing the anatomy and structure of the most important organs of the animal. In an appendix, we find a series of letters from distinguished breeders and wool-growers, relating to the individual management of their flocks. To the reflecting mind these letters are quite important, coming as they do from experienced gentlemen located in different parts of the country: they furnish a great amount of useful and practical information, as well as hints and suggestions which may be acted upon and applied to the circumstances of each individual case.

The agricultural press has spoken, we believe, uniformly in commendation of this work. We have not ourselves had time to give it that thorough study which is required in order to point out what is most valuable in the book, or wherein it is defective. In reading it cursorily, we observed frequently words and phrases which we thought might be improved, so far as composition is concerned. The work evinces much labor and research, and indeed expense, as anyone may satisfy himself if he will but consider the amount of correspondence it must have required to procure all the facts necessary to be used in the compilation of a volume which gives satisfactory information upon so wide a range of inquiry as is embraced in the subject of sheep husbandry. The publishers have executed their share of the task in a beautiful manner: it is just such a book as we like to see, consisting of good white paper, and printed with a very neat and uniform type.

First Annual Report of the Geology of the State of Vermont. By C. B. Adams, State Geologist.

We are gratified in receiving the first Geological Report of Prof. Adams, just as our number was in press. On a hasty perusal, we find that Prof. A., with his assistants, have accomplished a very creditable amount of labor, during the season which has just terminated. The report contains an exposition of the economical geology of the State, embracing some of the results of examinations of the iron ore beds and veins, of those of manganese, and of the marbles and limestone clays and sandstones. In all of these materials, Vermont is rich. We have always believed that when carefully examined, it would be found far more productive in many of the most important substances, than has been expected; and that the survey will prove a most valuable means of developing, in a short period, the peculiar wealth of the State. We hope, however, that the survey may not be hurried to an end, and we are especially pleased to know that it is regarded with high favor by the most intelligent and influential men in the State. The people may well consider that the expenditures which will be incurred in this enterprize will be extremely small, in proportion to the benefits which will flow from its completion. There is an important consideration which is worthy of remark now, namely, that Vermont will soon have facilities to market for the many products of her mountains and vallies; that many of these products, which are now of but little value, will become important by the new means of communication with Boston and the larger cities of the State of New-York, which will soon be opened; and that enterprise and capital will be speedily doubled, by the discoveries of the survey, and the contemplated avenues to market. The farmer and mechanic, too, will feel at once the combined influence of these movements on their prosperity.

We agree, however, with President Hitchcock in his remarks in a letter to Prof. Adams (p. 67), that the chief use of the survey will consist in describing and arranging the substances already known, or only partially described and known; settling the characters of the rocks, so as to show what may and what may not be expected in them, and thus preventing useless expenditures; in making suggestions as to the substances only partially in use; and in awakening men, all over the State, in respect to the new things which may be considered as compatible with formations that exist within their territory.

EXTRACTS

FROM

FOREIGN AND DOMESTIC JOURNALS.

[From the London Athenæum.]

TRANSACTIONS OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

CHEMISTRY.

Experiments on the spheroidal state of bodies, and its application to steam-boilers ; and on the freezing of water in red hot vessels. By Prof. Boutigny.

Prof. B. proceeded to show, that a drop of water projected upon a red hot plate, does not touch it ; but that a repulsive action is exerted between the plate and fluid, which keeps the latter in a state of rapid vibration. At a white heat, this repulsive energy acts with the greatest force, but ceases or becomes nothing at a brown-red heat. The temperature of the water whilst in the spheroidal state, is found to be only 96°, and this temperature is maintained so long as the heat of the plate is kept up. To bring the water to a boiling point (212°), it is necessary to cool the plate. These phenomena are explained by Prof. Boutigny, on the supposition that the sphere of water has a perfect reflecting surface, and consequently that the heat of the incandescent plate is reflected back upon it ; and some experiments have been made which show that this is the case, the plate becoming visibly redder over those parts on which the vibrating globule played. Several experiments were made in proof of this necessary cooling, to produce ebullition. The red hot plate, with its spheroidal drop, was renewed from the spirit lamp, and after a minute or two, the water began to boil, and was rapidly dissipated in steam. Ammonia and ether were shown, although exceedingly volatile, to follow the same law. Iodine put upon the heated plate, became fluid, and revolved in the same manner as other fluids, no vapors escaping whilst the high temperature of the metal was maintained ; but when allowed to cool to the point of dull redness, it was immediately dissipated in violet vapors. The nitrate of ammonia fused on the glowing hot plate, and vibrated with great energy ; but on cooling of the plate, the salt entered into vivid combustion. The repulsive action was shown by plunging a lump of silver, glowing at a red heat, into water. As long as its bright redness remained, there was no ebullition; but as it slowly cooled, boiling took place. The application of these principles, involved in these phenomena that which appears in the tempering of steel. If a metal to be tempered is in a highly incandescent state, the necessary hardening will not take place on plunging into water. It is therefore necessary that a certain temperature should be observed. Experiments were made to show that the repulsive power of the spheroidal fluid existed not merely between it and the hot plate, but between it and other fluids. Ether and water thus repelled each other, and water rested on and rolled over turpentine.

The bursting of steam boilers came next under consideration, and it was shown that many serious explosions may be referred to the phenomena under consideration. In a great many cases explosions have occurred during the cooling of the boilers, after the fire was withdrawn. An experiment was shown in proof of the view of the Professor. A sphere of copper, fitted with a safety valve, was heated, and a little water put into it: it was securely corked, and withdrawn from the lamp. As long as the metal remained red, every thing was quiet; but on cooling, the cork was blown out with violence.

The concluding experiment excited great interest. The production of ice, in a vessel at a red heat, was so anomalous, that every one was desirous of witnessing the phenomenon. It was performed in the following manner: A deep platina capsule was brought to a glowing red heat, and at the same moment liquid sulphurous acid and some water were projected into the vessel; the rapid evaporation of the volatile sulphurous acid, which enters into ebullition at the freezing point, produced such a degree of cold, that a large lump of ice was immediately formed, and being thrown out of the red hot vessel, was handed round to the company.

On the chemical changes occurring in iron furnaces. By Dr. Lyon Playfair and Prof. Bunsen.

The object of the paper was to determine the gaseous products of hot-blast iron furnaces. It was found that the process of coking continued down in the furnace to the depth of 24 feet, but the distillation reached its maximum at the depth of 14 feet, and that the formation of tar took place at between 14 and 17 feet. A great diminution of oxygen is found to occur at those points where the gases become developed, and hence they pass away unconsumed or without undergoing combustion. It has been estimated that 91 per cent of the heating material is thus lost in the form of gaseous products. The authors suggest as a means of remedying these losses, to construct a canal just at the point where the gases are given off, for the purpose of conveying these products to other parts where their high heating and illuminating powers may be employed advantageously. These gases in combustion with a due supply of oxygen, would give a temperature higher than is necessary to smelt iron; and although the authors do not propose to employ them for this purpose, they however suggest the advantage of employing that waste material for heating steam apparatus, and many manufacturing purposes.

ZOOLOGY AND BOTANY.

The Rev. L. Jennings read a paper, on the Turf of the Cambridgeshire Fens. This turf was not formed of sphagnum, as most peat, but from various species of aquatic plants which had accumulated for a long series of years above the remains of forest trees, which lie buried at the bottom of the moor. There are two distinct kinds of turf, the *upper* and *lower;* the former is the more compact and heavy of the two; the latter consists entirely of the bark and wood of submerged trees. The turf is not now rapidly formed, on account of the improved systems of draining. Formerly it was supposed to grow about 20 inches in sixteen years.

Dr. Falconer said that he had observed in Cashmere, at the bottoms of the lakes, turf of a very similar kind to the lower bed just mentioned. It consisted of the remains of *Chara*, *Potamogeton*, *Utricularia* and *Nelumbium*. The inhabitants obtained it from the bottom of the ponds by means of rakes, and used it as fuel.

Mr. Babington stated that the character of the Scotch and Irish bogs was different from that of the fens of Cambridgeshire. He had seen peat procured from the bottoms of lakes, in the same way as described by Dr. Falconer in Cashmere.

Mr. H. E. Strickland had seen peat in Ireland converted into a substance as hard as jet, so that it might be used by the turner. The formation of peat threw much light on the formation of coal. There could be no doubt but that some of our coal beds were formed in bogs, whilst others were formed at the bottom of seas.

Mr. Selby had seen peat quite solid and yellow, like amber.

The Bishop of Norwich stated that the trees buried in the bogs of Lancashire, exhibited marks of being burnt, and many of them had on them the strokes of the axe.

Mr. Dowden pointed out the remarkable fact in Mr. Jenyns's observations, that the light turf was undermost.

Prof. Allman laid before the section a monstrosity, occurring in the *Saxifraga geum*. The three external verticels of the florets were normal; but between the stamens and pistil, there was developed a series of adventitious carpels, crowded upon the margin of the cup-like production which surrounds the lower half of the pistil. These adventitious carpels were characterized by their backs being turned towards the axis of the flower. The carpels bear the ovules on their margins, which acquired a very considerable degree of development, becoming completely anatropous like those in the normal ovary.

Prof. HENSLOW exhibited a specimen of the *Papaver orientalis*, in which the filaments of the stamens were converted into bodies bearing ovules.

On mineral manure. By Prof. LIEBIG.

Soils exist under varying conditions, being greatly influenced by geological and geographical conditions. They are improved by adapting to them those manures which these circumstances require. In a wet region, those mineral manures should be selected which are not immediately soluble, but which slowly decompose so as to meet the required exigency of the crop. This is proposed to be obtained by the manufacture of mineral manures under the guidance of this principle; and as each kind of grain requires in part different elements, or at least different proportions of the same elements, it is proposed to make manures specially adapted to each kind of grain. It was, in illustration of the above, pointed out that wheat, oats, leguminous plants and potatoes, each require a different kind of manure, to bring it to the highest state of perfection to which it is susceptible.

Coprolitic Nodules. From the paper of Prof. HENSLOW, we learn that these nodules abound in the Green sand, London clay and Red crag. It appears from analysis that these nodules abound in phosphate of lime, and may be used to advantage in Agriculture. They yield from 50 – 60 per cent of phosphate of lime. Equivalent formations exist in this country, and will probably yield the same substance.

Ashes of the Narcotic Plants. By F. C. WRIGHTSON.

It is maintained that the great problem of the chemistry of the present day, in its application to agriculture, is to determine the conditions necessary for a soil to produce the largest amount of any given crop for the sustenance of man or animals. The solution of this problem will be made, when it is determined what mineral conditions are essential to obtain vegetables in their full perfection. The analysis of our cultivated plants will not be sufficient for this purpose; but it will be necessary also to analize the weeds which spring up among them, and which are unfit for the sustenance of man, for these also rob the soil of much that is essential to the perfection of our cultivated plants. Besides robbing the soil of elements wanted for the valuable ones, they also injure it mechanically, shading and otherwise interfering with their growth.

ETHNOLOGY.

Dr. G. R. LATHAM, *on the ethnography of the American languages.*

He opened by explaining the extent of the Esquimaux tongues, by pointing out the character of their locality as being one that we should naturally expect to find transitional to the Fo language of America and Asia: he stated, however, that they had been cut off on both sides by broad lines of separation. These lines he considered exaggerated. Between them and the Athabascan, between the Athabascan and Cooloch, between the Cooloch and Oregon, between the Oregon and Californian, he could draw no definite lines. The Californian passed into the Mexican, the Mexican into those of South America. On the other hand, the Curile, Corean and Japanese tongues were akin to the Esquimaux, and so were the Siberian. He was satisfied that the commonplace view was the true one; viz. that the Esquimaux languages connected the old and new worlds. He further added that the glossorial affinities of the Polysynthetic tongues were as real as their grammatical analogies. The American Minister (Mr. Everett) remarked that the divisions of Dr. Latham did not agree with those recognized by American scholars. He observed that the languages of the United States were classed in eight divisions; that between these there was certainly a general affinity, such as between the more distant languages of the old world; that the difference between the American tongues was not so great as to make against the general unity of the human race; but that still it was so great as to render the processes by which the alliances were shown between *them*, convertible towards showing alliances between any other languages whatever. He did not see in what sense Dr. Latham gave the word *affinity*, and desired to see the details by which eight isolated classes were run into each other, and the particular facts by which the current divisions were broken down. The contrast between the grammatical analogy and the glossorial differences of the American tongues was generally recognized.

GEOLOGY.

Remarks of the DEAN of WESTMINSTER, *suggested by a lecture of* Mr. MURCHISON *on the geology of Russia.*

The Dean said, that it was not for him to eulogise the scientific merits of the address they had just heard. He might, however, be permitted to say, that it appeared to him that Mr. Murchison had, like a *soi-disant* old soldier, taken a rapid military glance over the wide extent of country, and caught, with singular felicity, its great and leading features; but in another view, all this was no military achievement. He had not, with purposes it might be hostile, surveyed that distant land, to discover its weak places for assault, to see where fire and sword and desolation could most easily be carried into the recesses of its national life: he had gone as a stranger, but as a friend, to tell the Czar what were the riches of his vast dominions; to the inhabitants of Russia, how they might best turn to account the natural blessings which a gracious Providence had stored around them. As this seemed to him to be closely connected with one special feature of this association, nothing in it had been pleasanter to him, and he doubted not to others, than the sight of so many foreigners, from every nation, gathered at this friendly meeting: they seemed to be the deputies from all the civilized world. And he was well convinced that there was great usefulness in this: the more the ties which bind society together are thus laced and interwoven, the better. The more men come to understand one another, the harder it is to divide and embitter them; and this on a smaller scale at home, as well as on a larger scale with foreigners and strangers, was the work of this association. Its very character was, for this very purpose, migratory, that it might be the means of bringing together the lovers of science in all the different centres of our widely scattered provincial life. In doing this, moreover, it achieved another good; for it thus tended to foster and nourish up many a scattered seed of philosophy, which, but for this care, would certainly have perished. Many who, from poverty, or want of acquaintance with the scientific, hardly dared to aspire to the cultivation of the science which they loved, were thus found out of their homes by somebody, had their tastes confirmed, their views enlarged, and their love of science fixed; as they heard the words and saw the sights which were now around them, and came to know the faces of these eminent philosophers, each one's heart kindled within him, and throbbed with secret consciousness that I too am a lover and follower of nature. And believing that these good results did follow from the existence of this asssociation, he (the Dean of Westminster) was ready to welcome it to his own neighbourhood, although he was not ignorant of the reproaches to which it had been subjected. He need only say, that if he believed those reproaches, it would receive no welcome from him. He, with all whom he saw before him, would rather, far, be ignorant utterly of every scientific fact or principle, than have the simplicity of his faith in that which was dearer to him far than life itself, assailed or shaken. But he denied the truth of those reproaches: here, happily, they had not been put forward. He indeed must be a rash man who should dare to whisper, here at Cambridge, that there was any hostility or opposition between science and religion. Here, where the mighty Newton walked, reasoned and discovered; here, where he, *qui ingenio genus humanum superavit*, yet bowed himself as a meek believer before the Lord his God; here at least such aspersions, we might trust, would not be heard. But vented they had been elsewhere; and they therefore deserved a passing word. Of those, then, who argued thus, if indeed they did so in a real and honest though mistaken fear that the truths of religion might suffer by these inquiries, he would speak with the utmost tenderness. Feelings such as these, where they did really exist, were so closely allied to all that was sacred, that they should receive no harsh or scornful word from him. But whilst he was thus tender to the men, he was bound to deal fairly with their argument, and this he must contend was utterly futile. Instead of such sensitive fear lest this or that discovery might seem to contradict revelation being a mark of faith, he would contend that it was a mark of the want of faith. True faith would say, "These are God's two voices : both *must* be true." He who had a secret lurking suspicion that possibly, at last, revelation was not certainly true, he might tremble when he heard this or that discovery, and shrink from the leading of science, lest it should shake his faith ; and thus, therefore, would he (the Dean of Westminster) deal with such honest fears : he would not admit them to be the marks of a strong faith, but he would treat tenderly, as weak believers, those whom they assailed ; and he would endeavor to show to these, their victims, how unreal they in truth were, for most unreal they are.

There is no opposition between science and religion. Rather, he would contend, was science the offspring of christianity : christianity had developed within man the powers he needed to pursue science truly : christianity, and that only, had given to man the patience, humility and courage which could make him truly a philosopher. Only the christian man could look nature calmly in the face, and reverently and yet boldly compel her to disclose to him her secret laws. The unbeliever might look at nature as a compound of conflicting powers, bent on capriciously, or with a deeper malice, vexing and tormenting him ; or, with the sneer of the cynic on his face, he might resolve all into a purposeless, lawless chance : but he only who knows of a designer, can trace out the design ; he only who has the interpretation given him by revelation can trace in the marred, altered, disfigured works around, the true and all-pervading laws of the one Supreme and Universal Cause. And if, as he admitted, there was a temptation to unbelief, which in one way beset such studies, still this was no argument against their use ; it did but show that, like all other high and noble things, they might be abused as well as used. But the unbeliever who called himself a philosopher, was an unbeliever, not because, but in spite, of his philosophy : just so far as he was truly a philosopher, a simple, humble follower of facts, a tracer of God's book of works ; just so far was he in the right temper of mind to be a believer and a tracer of God's other book of revelation. No ! there was no opposition between true science and revelation. This fear was nothing more than the unreal phantom, which, in former and darker times, had led men to try to put down all knowledge of nature, lest it should at any time deny their own traditions, which they fondly put instead of revelation. It was the very same fear as that which had troubled the life and embittered the end of Copernicus and Gallileo. Instead of yielding to it, let them, under the wise restraints on theorizing laid down for them the other night by Sir J. Herschell, pursue calmly, humbly and patiently, their researches into nature : let them feel here that He who made light to be, and fashioned the eye to receive it, did mean that it should receive it ; and that, in like manner, He who framed the mind of man, with its capacity for observation, and its deep longing to reduce all around him to some orderly arrangement and directing laws, and who stored the earth beneath him and the heavens above him with fit materials for observation and inquiry, did really intend that man should search them out, and read in all these revelations, and discover in these laws, the marks and evidence of His directing hand, who planned, created, and sustains them.

The British Parliament have made liberal appropriations, during its last session, to various scientific enterprizes. Among the objects provided for, are the following : £50,020 for rooms to be added to the British Museum ; £6217 for the purchase of certain collections ; £1500 for the National Gallery ; £8850 for the geological survey of the present year ; £5839 for the expenses of magnetic observatories at home and abroad ; and £1500 for the monuments to Lord de Saumarez, Lord Exmouth, and Sir Sidney Smith, intended for Greenwich Hospital.

The Report by Mr. Watt on the Iron Trade in Scotland, read before the British Association, contains the following particulars : At the present moment (July 1845), there are extensive new iron works erecting in Scotland, and important additions are being made to the old furnaces now at work. The increase in the annual quantity of pig iron smelted in that country, in April 1845, amounts to 37.4 per cent.

The following remarks were made by Mr. Porter, in regard to the iron trade, at the close of the Report :

The iron made at the beginning of the present century, amounted to .... 150,000 tons.

In 1806....	258,000
1823....	452,000
1825....	581,000
1828....	703,000
1835....	1,000,000
1836....	1,200,000
1840....	1,500,000

Mean height of the continents above the surface of the sea: By Baron von Humboldt.—Since immense and lofty chains of mountains occupy our imaginations, by presenting themselves as evidences of vast terrestrial revolutions, as the boundaries of climates, as great water-sheds, or as the bearers of different vegetable worlds; it becomes so much the more necessary to show, by a correct numerical estimate of their volume, how small the whole quantity of the elevated masses is in comparison with the area of entire countries. The mass of the Pyrenees, for example — a chain, the mean height of whose summits, and the superficial extent of whose base, are known by accurate measurements — would, if distributed over the area of France, increase the height of that country only 115 English feet. The mass of the eastern and western chains of the Alps would, in the same manner, raise the height of the flat country of Europe by only 21·3 English feet. By means of a laborious investigation, which, from its very nature, only gives the upper limit, i. e. a number which may be smaller, but can not be larger, I have ascertained that the centre of gravity of the volume of the land which rises above the present level of the sea, is situated at a height of 671 and 748 English feet in Europe and North America, and 1131·8 and 1151 English feet in Asia and South America.* These calculations indicate the lowness of the northern regions; the great steppes of the plains of Siberia are counterbalanced by the enormous swellings of the surface of Asia between lat. 28½° and 40°, between the Himalaya, the northern Thibetian Kuen-Lun, and the Sky mountains. We can, to a certain extent, determine, from the estimated amounts, where the plutonic force of the interior of the globe has operated with greatest power in elevating continental masses. The mean height of the non-mountainous portion of France does not exceed 512 English feet.

[From the New-York Tribune, October 18.]

AGRICULTURAL ITEMS.

The Farmers' Club held its regular semi-monthly meeting yesterday. The hour devoted to miscellaneous matters was fully occupied. An interesting paper on guano, and its application to plants, was read and commented on. It appears that the best method of using guano for horticultural purposes, is to dissolve one pint of it in four gallons of water, and use freely about the roots. A paper was next read, translated by Mr. Meigs, from the Paris Horticultural Review, on the palm and date tree, giving an account of the numerous varieties; and another paper by Mr. Renier, on the cultivation of the potato, with some interesting statements regarding the

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* The corresponding amount for the whole globe will consequently be somewhat less than 1000 feet.

cultivation of potatoes which he had imported from Madagascar. A letter from Brussels, addressed to the Club, was read, and contained an account of the annual meeting of the Agricultural and Floral Society of Brussels. Some statements were then made regarding the effect of galvanism on grape vines, which had been found to flourish wonderfully under its influence. A letter was then read from Lieut. Marshall, U. S. N., of U. S. Ship Portsmouth, dated at Rio Janeiro, detailing the results of his discoveries and investigations in regard to a new and valuable plant, the New-Zealand flax : he hopes to be able to send to the Institute a specimen of this plant. An invitation was received from the Westchester Horticultural Society, for a visit from the Farmers' Club, or a delegation from it, yesterday, and another from Flushing to-day : both were accepted, and delegates appointed to each. The subject of the preservation of fruit trees then came up, and was treated *de novo* in all its branches. The chairman, Col. Clark, having stated that coal tar had been found very efficacious employed about the roots of peach trees, suggested that this remedy be adopted and recommended by the Club. Dr. Underhill was afraid of doing so, as he knew that the coal tar, or residuum of bituminous coal, was a very powerful agent, and, in his opinion, must prove injurious if not positively destructive to the trees. In England it had been the practice many years to saturate fence posts in this bitumen, while hot, so as to render them impervious to moisture ; and in the operation, many persons contracted violent inflammations in their faces, by the mere exhalations which escaped from it. Col. Clark withdrew his suggestion, and thought it better that farther experiments should be made before the Club endorsed the coal tar. He, however, alluded to the residuum produced by the Gas Works in Centre-street, where anthracite coal was used, and the carburetted hydrogen disengaged by the agency of fluid rosin. The Gas Works in Eighteenth-street were carried on with bituminous coal : of the tar thus produced, he knew nothing. Later in the discussion, a gentleman mentioned that he had kept a large peach orchard of over two hundred trees perfectly free from the grub for seven or eight years, by the use of hard soap freely rubbed upon the body and limbs of each tree. A committee was then appointed to consider the project of publishing in a volume the proceedings of the Club for the past year.

The regular topic of discussion was then announced — the cultivation of corn ; and Dr. Field was called on. He stated that he had made close observations during the four or five years of his farming experience, and had become satisfied that the old system of cultivating corn was decidedly erroneous, although he would not deny that farmers were in the habit of producing very good crops in old times. During his first year he had followed the old system, and he did not obtain so much corn from ten acres as he now got from two. The old way was to begin by ploughing ; then to hoe ; then plough and then hoe again, and this sometimes done three times instead of twice. This, he was fully convinced, was a most injurious practice. In the first place, ploughing disturbed the manure buried with the turf which had been turned over, and permitted the volatile and nourishing gases, the essence as it were of the manure, to escape; and the process of hilling brought the roots too much exposed to the sun, and permitted too much moisture to gather round their extremities. In the next, ploughing cut off a great many of the little roots, which were all-important in the process of nutrition. His plan was to first prepare the ground *well;* manure it plentifully; plant the corn in hills about three feet apart, and six or eight seeds in each, not forgetting to manure the seed in each hill very powerfully. When it had fairly come up, he put in his cultivator, an excellent affair of his own invention; then hoed again; pulled out all but three or four stalks in each hill, and again applied the cultivator — sometimes a third time. He always cut his corn close to the ground.

Dr. Underhill agreed that the cultivator was much better than the plow: too much ploughing and hilling was very injurious. There was no danger of manuring corn too much. He stated that common bog swamp could be turned into excellent corn land, by first draining, cutting down the bogs, and then applying a light coat of four or five inches of sand; silex being a necessary constituent in the production of corn, especially in the stalk, enabling it to stand. From swamp land thus prepared, he had gathered eighty-five bushels of corn to the acre. As to cutting up corn at the roots, that had long been decided. Judge Buel had discovered, several years ago, that seven or eight per centum was gained in the grain by this, while the stalks were worth three times the money, six or seven tons of excellent fodder being produced from every acre.

Some farther remarks were made by different gentlemen, in regard to modes of cultivation, manure, preserving from crows, etc. etc.; and some fine pear grafts, inserted in the roots of the pear tree, and some Isabella grape cuttings, were exhibited by Mr. Kelsey. The subject for the next general discussion was then announced, the treatment of root crops for soiling; and the Club adjourned.

[From the Philadelphia Gazette.]

THE WEALTH OF A NATION.

We find the following excellent article on this subject in the Massillon (Ohio) Gazette of the 4th instant:

The wealth of a nation arises from the labor of its people, directed by intelligence: 19,000,000 of inhabitants in the United States, if they earn on an average 50 cents per day, obtain for 300 days an annual aggregate productive labor of 2,850 millions of dollars. Enormous as this sum may appear, it is not less the result of mere arithmetical computation; and in this we find the true secret of the

Wealth of Nations, and the true reason why misfortunes seemingly overwhelming are easily triumphed over by any nation whose industry has full and constant employment. If France, under Napoleon, wasted enormous sums in war; if her disasters in Spain, if her disasters in Russia, if the invasion of her territory by an innumerable host, and the tribute she paid to the allied armies, caused her an enormous loss of money, that loss was easily repaired by the masses of industry which the genius and the institutions of the same Napoleon had set in motion, and had rooted so deeply that not even such commotions could eradicate them, or destroy the daily exuberance of their fruits The 800,000,000 of dollars lost by the contribution to the evacuating armies were easily recreated by eighty days labor of 38,000,000 Frenchmen, at an average earning of thirty-three cents per day; and scarcely a trace either of her losses or of her misfortunes can now be found in *la belle France*, whose governing monarch (a banker, a trader, a merchant, and a thrifty man), having learned in the school of misfortune the value of productive industry, is incessantly occupied in giving to the French people productive occupation, by protecting their home industry, and by unfolding the resources of the whole country; by a well digested and extensive system of internal improvements, carrying out (with the more modern inventions) the vast plans designed for the public welfare, by the towering genius and the practised talent of the mighty mind of Napoleon.

Occupation, then, constant occupation is the true source of wealth. If, by any blunder of legislation, if by any neglect or oversight in using the gifts placed in our hands by a kind Providence, we throw into idleness for one-third of the year our 19,000,000 of people, it is a loss to the country of the product of their labor for one hundred days; and if their average earnings, when occupied, are 50 cents per day (equal to 9,500,000 for every day), it gives for 100 days of idleness a loss of 950,000,000 of dollars.

By productive labor, we not only mean the labor of him that tills the earth and of him that saws wood and works by the day, but we also mean the labor of all who in any vocation (whether as merchants, lawyers, shoemakers, schoolmasters, seamstresses, or in any other way), present something so useful and so acceptable to some in society, that money is voluntarily and freely paid for the service by them rendered.

What we have stated is true of nations, as it is of individuals: industrious nations, like industrious individuals, invariably thrive; while idle nations, like idle individuals, are a constant prey to poverty, and to what is even worse, namely, to the numerous vices which are the natural offspring of the want of occupation.

It is by such considerations that we are led to appreciate as an estimable blessing, the permission to carry freight on the New-York railroad from Buffalo to Albany in the winter. The permission was granted by a law passed May 7, 1844. This law unfetters the industry of the west from its icy chains. It has opened a new field;

it has made it the duty of every press, and of every lover of his country, to impel the whole community to unfold the sources of constant occupation which it has placed within our reach. It furnishes us new sources of occupation in the summer, and sources of constant occupation at the heretofore dead season. The Ohio canals as well as lake are open one month earlier, and are closed one month later than the Erie canal. Two months in the year are therefore at once added to the capacity of the productive industry of the West; and as soon as the West wills it, four months more will be added in every year by the construction of a railroad (via Toledo) to the Mississippi river, with a branch from Toledo to Detroit. We say "as soon as the West wills it;" because, when in her might she wills to bespeak this great work into existence, no power on earth can arrest the execution of that will. The reasons in favor of it are so strong that they cannot, in this enlightened age, be resisted, when clearly and boldly held up to public view.

Let us at once avail, to the utmost, of the two months in every year already added to our active existence, and let us also avail of all the means within our reach to make every one perceive each individual source of wealth thus created. Let us also wake up the whole nation to the necessity of a railroad from Buffalo to the Mississippi, and from Toledo to Detroit; to its advantage in this time of peace to carry the mail, and to fructify the labor of the whole country; to its almost superhuman uses as a tower of strength, for it will give warning to one of the most powerful nations on the earth, that if she were to provoke us by an unjust war, public sentiment would pour upon this railroad an overwhelming force against her Canadian possessions.

To enumerate the various articles and the various occupations which, in all times, in time of peace as well as in time of war, will be favorably affected by the new system, would be to enumerate every article which we of the great West import, and every product which our prolific soil is susceptible of bringing forth. It would be like attempting to enumerate every thing which the ingenuity of man can create. Suffice it to say, that the capacity acquired by the new system of getting our supplies every day as fast as wanted and no faster, and the capacity also created by the new system of converting into money at our pleasure on the sea board whatever we may produce at home, will give active efficiency to our capital, to an extent which will tenfold our capacity for acting in the various new sources of industry, placed within our reach by the new system.

Let then the great West be awakened to the new duties of her position, by every one who perceives the boundless sources of wealth, prosperity, and good morals, which a kind Providence offers to us, by giving us the capacity of constant occupation throughout all the seasons of the year.

SPIRIT OF THE MONTHLIES.

[From the (New-York) Farmers' Library.]

FALL PLOUGHING:

UNDER WHAT CIRCUMSTANCES TO BE RECOMMENDED.

ON THE ILL EFFECTS OF PLOUGHING LAND WHEN WET.

THERE are few points of husbandry, about which farmers differ more in practice, than about fall ploughing; and this difference, like most others, occurs from want of reflection on the *principles* that should govern the particular case; or rather, we might say, from want of knowledge of the principles, or *reasons* involved in every agricultural problem. You shall sometimes see a farmer turning his "glebe" at every odd time he can catch of open weather, in fall and winter; while another, his next neighbor, does not strike a furrow; and yet both may be right, for both may have been taught by experience that his system is the better one of the two. But were they to exchange estates, they would, too probably, each carry his practice along with him, because his action had been the result of habit rather than of investigation; and so they would proceed until after some years of costly experiment, each would find that in changing his land he should have changed habits also. The truth is, that whether land should be ploughed up in autumn and exposed for amelioration to the winter's frost, or whether left undisturbed under whatever coating it may be wearing, depends on various circumstances, and especially on the natural texture and composition of the soil. These circumstances are so well explained in the following essay, that we have concluded to preserve it in the Journal of Agriculture. The reader will find in it also observations that cannot be too well remembered, in reprobation of one of the grossest blunders that a farmer can commit, that of *plowing his land when wet*. We have long been so well satisfied, from personal observation as well as by the common-sense view of the case, of the very pernicious effect of stirring land when wet, not only on the succeeding crop, but on the land itself; effects from which it sometimes does not entirely recover for years, that we take the first occasion, in a sense of duty, to impress it upon the reader, by the following forcible remarks on it in connexion with winter plowing. The rationale in both cases is here made apparent:

How to afford the necessary supply of air to the roots of plants.

BY MR. J. MAINE, BROMPTON.

The breaking up, or turning the surface of cultivated land, either by the plow, spade, or hoe, for the reception of seeds or plants, is a process so universally practised and indispensable for the well-being of the crops intended to be raised thereon, that it may be deemed incredible that such a common and simple affair should not be universally understood. And yet it cannot be denied that many and frequent mistakes are committed in this matter, and these must proceed either from indolence or ignorance.

As the surface of the earth is the natural station for the generality of plants, and where they obtain the necessary elemental food requisite for their developement and maturation, certain conditions of the said surface are absolutely necessary. Humidity, heat, and air, in due proportions, are indispensable, both to the fibrous roots which are extended in the earth, and to the head which is expanded in the air. There is more danger, however, from an excess of moisture than from the extremes of either heat or air; because, when the soil is saturated with water, the access of the genial air and its gaseous properties is excluded, and the delicate fibres, imprisoned and choked, it may be said for want of breath, must, in such a case, necessarily languish. That a porous soil is requisite for the free growth of every plant is an axiom in cultivation, and on this axiom all our operations of ploughing, trenching, digging, etc. are founded; and, that no excess of water should at any time remain to chill, sodden, and consolidate the staple, draining in all its branches and modifications is had recourse to.

Soils are various in quality, and particularly in texture and consistency. The success of crops appears to depend as much on the texture of the land as upon any other property. For, where air and rain can permeate freely, a constant supply of both aqueous and gaseous nourishment is afforded, independently altogether of the richness of the soil, whether natural or artificial. While, on the other hand, if the soil be compact, baked hard by drouth, in consequence of its having been previously labored or stirred when too wet, no plant can possibly flourish. The conclusion, therefore, is, that the soil for any kind of crop should never be impervious to air from being saturated with water, nor impervious to both air and water from its dry adhesiveness.

Sandy soils, upon a gravelly or chalky sub-soil, are never liable to be drenched with water but only for a very short time after heavy rain, or sudden thaw when snow is on the ground. All the water absorbed by such a soil sinks deep into the sub-soil, and far below the roots of corn or any agricultural plant on the surface. Such a soil needs neither draining nor sub-soil plowing. Neither does it ever require to be exposed to the frosts of winter, or any kind of treatment by implements to produce amelioration. It is almost always in such an open friable state that it may be plowed and sown at any season, without risk of being plowed and harrowed into the condition of mud, or of being poached into the state of mortar by the horses' feet.

In some countries there are large tracts of such land, and on these farmers are generally fortunate men. The culture is easy, and executed at a moderate expense. The crops of turnips are heavy ; and if, besides the ordinary supplies of dung and tail dress, the farmers can manage to give their fields a liberal coat of marl or reducible clay every eighth or tenth year, the heart and fertility of the staple is maintained unimpaired for ages.

In such descriptions of land, however, it often happens that beds of clay lie alternately with those of sand at different depths beneath the surface. These beds of clay, if the general surface of the farm or field lies sloping, crop out at different distances below each other, and above each the surface staple will be either occasionally or constantly wet. If a pasture, rushes will appear accompanied by the worst grasses, and herbage produced that will certainly rot sheep, especially if introduced from drier pasturage. If the land be arable, the crops raised thereon will be unequal ; on the wet places, the corn will be either too rank and inferior, or fail altogether. In such cases, efficient under ground drainage is the remedy to get rid of the superfluous moisture, either by gently-falling, diagonal or direct channels. The proper direction of the drains depends on the depth, extent, and inclination of the beds of clay ; and it is well to have a professional man to stake them out, unless the tenant has a sufficient knowledge of geology himself. It is surprising to those who know but little of the nature of the various strata of the earth's surface, how easy it is in some cases to get rid of surface water. For instance, if there be wet and dry places on the same field, the owner may be assured that a bed of clay, or other kind of earth impervious to water, lies beneath the wet, and a porous sub-soil beneath the dry places. A drain of sufficient depth opened (and filled nearly to the surface with stones or loose gravel) from the wet to the dry places, will certainly render the whole dry. In my own practice, and acting on this principle, I have been in many cases very successful in laying arable fields dry. Two cases I may mention as examples : A field of eleven acres, of a fine loam, suitable for wheat, beans, or indeed any other crop, had a hollow near one of the ends, which was every winter filled with water, and ruinous to wheat or grass, very frequently to the extent of between two and three acres. This I resolved to drain. A neighboring farmer predicted that the attempt would be a failure ; because his father, when tenant, sunk a shaft to the depth of above seventy feet, in the lowest dip of the hollow, and filled it with stones, expecting that this would form a *swallow* for all the rain and melted snow retained by the hollow. But this expectation was not realized ; the water first filled the pit, and then flowed over the land as before. The cause was easily comprehended ; the pit did not reach to the chalk rock, nor did it pierce through any porous stratum : its loamy sides and bottom were perfectly water tight, so that little or none could escape.

My plan was different. I saw marks in an adjacent field of where chalk had been drawn at some former time ; thither I opened a stone-filled drain below the plowshare, from the lowest dip of the hollow ; and when the water had accumulated, it ran towards the old chalk pit, but totally disappeared long before arriving at the place, and thus was a valuable field laid dry. Another arable field contained a pond which very often overflowed its boundaries. Lower ground was at the distance of half a mile ; and the expense of forming so long a drain prevented all attempts to get rid of the annoyance. I advised the tenant to dig a deep drain from the pond up into a high bank of gravel, into which the water oozed away immediately ; and ever after carried off all excess. By this simple expedient a large piece of excellent land was reclaimed, and brought into a regular course of culture at a very trifling expense.

It is by such means that land, naturally friable and loose in texture, may be relieved of superabundant water, and give admittance to the necessary supplies of air at all times. I have already observed that sandy soils require no exposure for the purpose of reducing adhesiveness either by the action of frost or machinery ; and yet we often see such land carefully fallowed up in the autumn, and even laid in ridges, to receive the advantages supposed to be imparted to it by the contact of frosty air. That such an idea, namely, that arable land is benefitted by exposure to frosty air, has been long entertained, is evident from what has been written on the subject by old authors. Even our amiable poet, Thomson, in one of the flights of his pregnant imagination, says,

> "The frost-concocted glebe
> Draws in abundant vegetable soul,
> And gathers vigor for the coming year."—*Winter.*

Showing that the notion was held by philosophers as well as cultivators ; and, at the present time, there are many among the latter who mistake the disrupting, ameliorating effects of frost on tenacious soils for its enriching property, which they imagine is communicated to all soils. But this is a mistake : the less light sandy soils are exposed to the sun and air, the less are they exhausted of their humid riches. Their best qualities are as liable to be washed away by winter rains as dissipated by the summer sun ; and, therefore, they cannot be too close and level during winter, if it is intended that they should be cropped in the spring.

I have often noticed the mismanagement of a field of light soil by the following culture : It was fallowed, cleaned, dunged, ploughed, and sown with tankard turnips about the middle of June. The crop was abundant, and a flock of full-mouthed wethers was put on in the end of September. Within a month, the turnips were eaten off, and the field was ploughed into single 'bout ridges to lie for the winter. In April, the ridges were ploughed and harrowed down, and barley and seeds were sown. Both rose well; but, throughout the summer growth, the ridges were as visible in the crop as they were after the plow, the centres of the ridges bearing the finest and strongest plants of the crop. And the reason was obvious: the centres of the ridges came up fresh, moist, and mellow; while the intervals were filled with the bleached dry crests of the ridges, which, though more pulverized, were much less fertile and stimulating than the fresher portions of the surface. Hence it was quite evident that if the whole field had been permitted to lie undisturbed till the spring, the crop would have risen more equally and much more vigorously. I have seen fields of similar soil sown with oats after wheat; a bad custom, certainly, and as badly executed; the wheat stubble being ploughed in October, and the oats sown and harrowed in February; whereas, had the wheat-stubble been only scuffled off and harrowed to bring up a crop of seed weeds, and so rested till February or March, and then ploughed and sown, the crop of oats would have been much more abundant both in straw and corn than by the former method.

Here it is necessary to observe that, as I set out with showing how absolutely necessary an open porous soil is to all vegetation, and no measures being recommended in the above statements for that purpose, but rather the contrary, it is to be remembered that I have been treating of sandy land, which is at all times, except when too wet, sufficiently porous for the reception of air. But in other descriptions of soil, such as that whose particles are minute and have a tendency to adhere closely together, either by gravitating subsidence or by a flow of rain water; in such a case, every practicable means must be taken to alter and break this solidifying nature of the staple, in order to admit a free range of air and the gases it contains.

There are many intermediate descriptions of soil between sand and clay, and all of these, according as they approach to the one extreme or the other, require a peculiar management. But the grand object is to work the soil in such a manner that it shall always be pervious to air, rain, and all atmospheric influences; and this result is obtained by the *timely* application of the implements, rather than by the efficiency of the implements themselves. The soil is sometimes in a fit state to be worked, and very often is not. Under such circumstances, the judgment of the cultivator must be exercised. The condition of the land depends very much on the season and character of the weather; and on this account, seed time cannot always be commenced at the times which would be most convenient to the farmer. In such a case, he must wait until the land is in right order to be stirred; and that state is when it is neither too wet nor too dry. I am alluding to land which has either been thoroughly drained, or which needs no draining, and is only affected by the season, whether very wet or very dry. But as the exact time cannot always be hit upon, it is better that the arable surface be rather too dry than too wet when moved. Because, if too dry, it may be reduced to the necessary fineness by labor, and will then be in the best possible state for the reception of seeds ; the interstices between the particles of the soil being filled with air, amid which the imbedded seeds germinate in the greatest vigor. But if the soil be too wet when moved, and especially by the pressing or pushing action of the plow, it acquires from the excess of water, a state of fluidity, like mortar, and settles down again so compactly that no seed laid therein can be developed in a healthy condition, in consequence of the want of air.

That the contact of air to the roots of plants was always considered necessary, is evident from old writings ; but the fact has never been so generally noticed and acted upon as it is now. The first and most striking instance confirmatory of the opinion, was the fact of large full grown ornamental forest trees having been killed by their roots being too deeply covered up with earth when levelling lawns ; and planters and gardeners have been long aware of the injurious effects of planting as well as sowing too deep. The same individuals formerly fancied that their prepared composts, for exotic or favorite flowering plants, could not be too finely sifted for their reception, whether in pots, or in the open ground. But slovenly or careless management in these particulars showed that too much nicety of execution was not at all necessary. Sifting the composts was given up, and composts made up chiefly of nodules of turf, broken stone, brick rubbish, etc. are substituted with evident success ; and the cause is obvious : when the compost is sifted, it becomes a solid mass, especially after it is watered, and repulsive of all atmospheric influences ; whereas among the loose materials, a considerable body of air reposes, and in this the more active fibres extend themselves much more luxuriantly than they do in compact soil.

The gardener's improved practice is only another proof how much a porous soil and presence of air are necessary to the roots of plants ; and yet we often see the most luxuriant vegetation produced by soils which are apparently very close in texture, viz. alluvial soils and fertile clays. Both these descriptions of soil being composed of the finest atoms, become exceedingly close and compact if undisturbed ; but when ploughed, or otherwise moved periodically, the stirred portion attracts as much of the qualities of the air as suffices for the following crop. It is rather remarkable that, while oak thrives best on a clayey subsoil, it does not seem to affect rich alluvial land ; and this I imagine to be entirely owing to its closeness of texture preventing all access of air to the place of the roots.

Aquatic plants which live entirely submerged, although defended from external air, receive as much as they need from the surrounding water, which always contains a notable measure, besides nutritive bodies in solution, which form the pabulum of plants, whether aquatic or terrestrial.

Another tribe of plants are attached to earth, but so slightly that their system of roots is nothing compared with the bulky heads sustained ; and as these plants are mostly found on rocks, or on the driest tracts of country, it is evident that the greatest portion of their nutriment is drawn from the atmosphere. Another tribe of curious and beautiful flowering plants is called Epiphytes [or parasitical plants, as the Misletoe], because they attach themselves to the stems and branches of trees, not to sustain themselves by extracting their juices, but to be supported in the deep shade and moist air of thick tropical woods. Some of these are called *air plants*, and grow as well in a basket without earth, suspended in a warm, damp, shady place, as if they were in their native habitat.

Thus we see that air is particularly necessary to plants, and as much so to the roots as to the head and foliage ; and it is this fact, as already observed, that justifies all the means of cultivation which we have recourse to with a view of rendering the staple more loose, and consequently more permeable to all atmospheric influences.

There is one circumstance, however, which deserves to be noticed along with these general remarks : it is this, that all seeds require to be closely embedded in the soil. that is, they should be in close contact with the mould all round ; and, that this should be completely secured, some seeds require to be laid in *heavy*, as wheat for instance. Now we have only to consider that as the soil has been previously prepared, and more or less reduced to the finest practicable state, a considerable volume of air is incorporated therewith ; and that this air, according to its temperature and the moisture of the soil, facilitates the germination of the seed, and continues to assist the developement of the plant. To obtain this close embedding of the seed, it is the practice to tread it in ; a practice which is found of service to wheat, peas, beans, and almost all small seeds ; but which would be of no avail without the previous disruption and aeration of the soil.

All these matters premised, it only remains to conclude with a general declaration that, in all our practices and means employed for the amelioration of the land, every thing that can be added or taken away, every operation performed, and every implement used in the culture, should all have for their ultimate object, either directly or indirectly, the breaking up of the compact and impervious surface, so that copious and constant supplies of air may be freely admitted to the roots of the plants.

[From the Albany Cultivator.]

SPECIMENS OF SOILS FROM WISCONSIN.

The samples of soil alluded to in the following letter, were handed to Prof. Emmons, by whom they were subjected to an analysis, the results of which, with accompanying remarks, will be seen in the subjoined article. The Professor's remark that "it would be easier to make suggestions on the spot than at a distance," is obviously correct, and should always be borne in mind in soliciting information on such subjects.

Geneva (Wisconsin Territory), May 27, 1845.

Mr. Tucker — I take the liberty to send you a sample of marl found in this vicinity, and also a small quantity of the soil taken from my farm, both of which I wish to have analyzed.

My object is to ascertain, in the first place, the nature of my soil, that I may be able to apply such manures, if they are within my reach, as will be most likely to facilitate the growth of wheat; and I wish also to know whether this marl will probably be valuable as a manure on such soils as mine; and will charcoal be likely to increase the wheat crop here; and you will confer a great favor by suggesting any thing that would be of service in the cultivation of our great staple.

Such lands as mine in their present state, will yield about twenty-five bushels to the acre, with good cultivation, without manure; but I suppose the average is not over fifteen bushels, under our present poor management. I wish to see what can be done on our new lands in increasing our yield of wheat, and intend to make my experiments with care, and keep an exact account of expense, that I may determine how well we may cultivate our new lands and make it pay.

You will oblige me much by assisting me to obtain such information as will enable me to start right in this matter.

C. M. Goodsell.

To C. M. Goodsell — I hereby acknowledge the receipt of two specimens, one of soil, and the other what was supposed to be marl. I have analyzed both, and below I give you the results. The soil is extremely fine, and very different in this respect from any of the soils of New-York or of New-England; as the latter are always coarse, or at least when compared with that from your farm. It is of the color and appearance of ground emery; it will all pass through the finest sieve. When examined under the microscope, a few white grains of quartz may be seen, the largest of which are about the size of a mustard seed. If this is a sample which represents the soil of your farm, its fineness is its most characteristic property. It will lie too compactly after it has been cultivated for a few years longer, or when its vegetable matter is expended, and will require more strength of team to plough it than coarse soils. It is evidently silicious, and seems to be a fine sediment which was deposited far from land and in a deep sea.

Analysis — 100 grains gave the following result :

Water	5·00
Vegetable matter	9·50
Silex	80·21
Carbonate of lime	1·08
Phosphate of alumine and lime	0·50
Protoxide of iron and alumine	3·62
	99·83

The so called marl is really *tufa*, and is composed of 97 per cent of carbonate of lime. Some parts of it are entirely soluble in warm muriatic acid ; in others, there is a sediment of silicious matter. It is to all intents and purposes a pure carbonate of lime, and may be used for quicklime for mortar, water or agricultural purposes.

The questions which are put in your letter are not easy to answer, inasmuch as the composition of the soil is not defective. The way to improve it, as it appears to me, is to add coarser materials to it, that is, improve it mechanically — as fragments of old brick, pottery, plaster, broken stone, etc. ; also coarse charcoal, bones. A good plan would be to add the broken tufa without burning. I feel that it would be easier to make suggestions on the spot than at a distance ; for, after all, local circumstances must greatly modify the treatment in any given case. E. Emmons.

[From the same.]

GESTATION OF COWS.

Mr. Editor — While living on my farm, I found it not only useful, but very necessary, to keep a record of the time my cows were put to the bull, as well as the time of calving. By the means of keeping a record, I was enabled to make a calculation on the probable period parturition would take place, and be prepared for the event, and avoid accidents which might occur when no attention was paid to the subject.

The experiments and facts which I am about to state, may not be considered of much importance to farmers generally, but to the breeders of cattle, and the inquiring mind, they may, I trust, be interesting ; and some good may possibly result from their publicity.

Earl Spencer, in a paper communicated to the "Journal of the Royal Agricultural Society of England," says the shortest period of gestation, in which a live calf was produced, was 220 days, and the longest 313 days : difference 93 days.

M. Tessier, in a memoir read to the Royal Academy of Sciences at Paris, says that in 1131 cows, which he had the opportunity of observing, the shortest period of gestation was 240 days, and the longest 321 : difference 81 days.

Both of the foregoing statements differ from my experience. Among my cows, though numbering only 62, the shortest period of gestation was 213 days, and the longest period was 336 : difference 123 days. But as regards the shortest period of 213 days, I must confess I have had my doubts as to the correctness, though I kept the record myself, for in no other instance have they fallen below 260 days.

It would appear from the Earl's statements, that a calf produced at an earlier period than 260 days, must be considered decidedly premature ; and any calf produced at any period of gestation exceeding 300 days must also be considered irregular, but in this latter case the health of the produced is not affected.

There are some facts presented in my record, which differ from any statements which have fallen under my observation. For instance, in 1839 I had fourteen cows, three of which produced heifer calves ; and the period of gestation averaged 284 days, while the other seven produced males, and averaged 280 days. This, in regard to the time allowed for males and females, is contrary to the prevalent belief among farmers, and differs very materially from the result of the following year, 1840. I had that year thirteen cows, six of which produced heifer calves, whose period of gestation averaged 278 days ; and seven produced bull calves, averaging 299 days ; the shortest period of the heifer calves was 213 days, and the longest 336 days, being the greatest extremes of either year. The shortest period of the bulls was 278 days, and the longest period was 289 days. In this year the number of males and females were nearly balanced.

The next year, 1841, eleven cows produced eight heifer and three bull calves. The shortest period of gestation for the heifer calves was 277, and the longest 292 days, averaging 286 days. For the bull calves the shortest period of gestation was 284, and the longest 299 days, averaging 293 days.

In 1842, the order seemed to be reversed ; for out of thirteen cows, nine produced males, and four females. The shortest for the males was 281, and the longest 294, averaging 287 days. There was but very little difference in the time for the females ; the shortest period being 280, and the longest 286, averaging 284 days.

In 1843, the proportion of males to females, was, as in 1840, nearly balanced. From eleven cows, six male and five female calves were produced. The shortest period for the males was 277, and the longest 290, averaging 282 days ; and the shortest period for the females was 276, the longest 286, averaging 282 days.

In the five years, which embraced my experiments, sixty-two cows produced twenty-six females, and thirty-six male calves ; the period of gestation for the bull calves averaged 288 days, while the heifers averaged nearly 283 days.

In the experiments of Earl Spencer, of those cows whose period exceeded 286 days, the number of females was only 90, while the number of males was 150. Now, in my experiments, of those cows that exceeded 286 days, the number of females was 7, while that of the males was 12. The number of female calves produced under 283 days was 24, while that of the males was 31. In most cases, therefore, 283 or 288 days may be assumed as the usual period for gestation, and not 270 days, as stated in Youatt's work on cattle.

My experiments were not confined to any particular breed or variety of cattle : they consisted of durhams, devons, herefords, ayrshires, and grades ; and I think these results, though derived from the observations of one person only, will be found equally applicable ; at any rate, we should be pleased to hear the results of others.

C. N. Bement.

American Hotel, Albany, July, 1845.

[From the same.]

SELF-ACTING PUMP.

Luther Tucker, Esq. — It is with much pleasure that I comply with the request of a gentleman connected with your journal (Mr. Howard), in furnishing a few statements in regard to a new self-acting pump which I have lately set in operation, and which, I think, promises to be of some value to the public ; and to no portion of it more so than to agriculturists. Notwithstanding the multitude of ingenious contrivances which have hitherto been devised for obtaining water for economical and ornamental purposes, the most valuable is the old and simple plan of bringing it from some neighboring spring or water-course which flows upon a higher level than that on which the supply is needed. This method, although frequently attended with considerable expense, is almost universally adopted where it is practicable, in preference to the best constructed pumps for raising water from a lower level to a higher. The situations, however, where this plan can be adopted, are not numerous, except in mountainous regions. Buildings occupied as dwellings, or otherwise, except in such places, are generally located on high ground, where water cannot be procured by an aqueduct or conduit pipe. In such places it is universally obtained from wells situated on such high ground, and in innumerable instances in the immediate vicinity of ravines and small vallies deeper than those wells. In such cases it is obvious that a syphon might be led from the bottom of a well over into the low ground, the current through which syphon would afford a mechanical power, which, if it could be economically applied, would be sufficient to raise a steady and perpetual supply of water upon the elevated level where it was wanted.

These considerations induced me some months since to consider whether a syphon might not be so constructed as to discharge water at the summit of its curve, that is, at the highest point in the pipe of which it should be constructed. The idea at first appeared somewhat absurd, as those who are acquainted with the operation of the common syphon may suppose, inasmuch as in no point of a syphon is there so strong a resistance to any force tending to divert a portion of the enclosed fluid from the pipe than at the summit of the curve. The problem, however, is solved, and the contrivance which has accomplished the solution has been tested, and proved perfectly successful. The preponderance of the column of water in the longer leg of a syphon, which I have recently laid from a well fourteen feet deep, over into a neighboring ravine twenty-two feet deep, furnishes a sufficient mechanical power to deliver about one-third of all the water which enters the pipe at the bottom of the well, at the summit of the curve, two feet above the mouth of the well The length of the pipe which goes down into the ravine is about ten rods, more than half of which distance it is laid in ground nearly level. The shorter leg of the syphon descends perpendicularly into the well, and is constructed of lead pipe of an inch calibre. At the summit of this pipe, and connected also with the pipe which passes down the hill-side, is the apparatus for discharging the water, of such dimensions that it might be enclosed in a cubical box ten inches square. I have omitted to mention that the pipe which passes into the ravine is about three-fourths the calibre of that which descends into the well.

The amount of water discharged by the apparatus, two feet above the level of the ground at the mouth of the well, through a half-inch pipe with a free aperture, is a little more than a gallon per minute. If the pipe is laid upon the ground, and its adjutage contracted by a jet tube with an aperture of one-eighth of an inch in diameter, the jet rises seven feet and a half above the mouth of the well; with another jet tube of one-sixteenth of an inch in diameter, it rises thirteen feet; and with another of one-twentieth of an inch diameter of adjutage, between eighteen and nineteen feet. Indeed there is no definite limit to the altitude to which water might be raised by this method, if the size of the syphon be increased, and a sufficient supply of water obtained for working it.

It may appear incredible that a syphon can be so constructed that no definite amount of pressure shall be sufficient to restrain the escape of a portion of water from an opening in the summit of the curve, while in the ordinary syphon, a very small aperture at that point, communicating with the open air, destroys its action instantly; yet this apparatus demonstrates that it can be accomplished, by an extremely simple and compact contrivance, and on any scale that may be required, from a miniature model that will discharge its gill per minute, to an engine that will elevate a hogshead of water in the same space of time.

The apparatus is, moreover, so extremely durable, and so constant and certain in its operation, that it furnishes all the advantages of an aqueduct which brings water from an elevated level. The invention is capable of application to any good well or water-course, which admits of the operation of a syphon, even though such well or water-course should be a hundred rods, or more, distant from the lower level which should furnish the working power.

When applied to wells, I think it cannot fail to improve the quality of the water, as it is constantly changed and kept in motion.

Such an invention, if successful, places at the disposal of thousands of farmers, manufacturers, and gentlemen who appreciate matters of taste and luxury as highly as those of mere utility, a supply of water for use or for ornament, which it would be impossible for them to obtain in a more simple, cheap, or economical manner.

When my arrangements are completed for offering my invention to the public, I shall be happy, with your permission, to avail myself of your valuable journal, for the publication of a more minute description of this syphon, accompanied perhaps with a drawing. In the meantime, I shall take pleasure in showing the practical operation of the one which I have already constructed, to any of your numerous subscribers who may be sufficiently interested in the foregoing statements to call and see it.

I am, sir, most respectfully yours,

ERASTUS W. ELLSWORTH.

EAST-WINDSOR HILL (Connecticut), July 18, 1845.

[From the same.]

FOOT-ROT (SO CALLED) IN SHEEP.

LUTHER TUCKER, ESQ. — A late number of the Boston Cultivator contains an article on this subject from Mr. Jewett of Weybridge, Vermont, which induces me to send you this communication. The importance to the sheep-raising community of this whole continent, to understand the nature and causes of the many diseases to which sheep are liable, is incalculable ; and, when well understood, they will be surprised to find the ease with which they can be cured, and in most instances prevented. When Mr. Jewett is informed that I was born and raised a shepherd, and that the little information I possess is the result of long and attentive practice, he will, I am sure, readily give me credit for the true intention with which I write, namely, to set him and others right, as to the true cause of, and remedy for, this (so called) disease, and not to find fault with him, or enter into any controversy about it ; for I willingly admit that he gives evidence of some practice and observation, and that I believe it is only necessary to *direct* that observation to make him a valuable shepherd.

Properly speaking, there is no such *disease of itself*, as foot-rot.

It is invariably the result of the neglect of another disease, simple and easy to cure, or the result of accident by a bruise of the foot in some way, and always evinced by a slight but visible lameness in whichever foot is injured. It is *not contagious, neither can it be communicated by inoculation.* I saw the latter tested myself by the late Mr. Field, father of the present able veterinary surgeon, of London, on a visit to an extensive flock-master in Liecestershire ; and I think by the time you read this through, you will be convinced yourself as thoroughly as though you saw the experiment tried, of the impossibility of its being so communicated, inasmuch as foot-rot is not a disease of itself.

Sheep have a secretory outlet between the claws, peculiar to them, which is liable to become obstructed ; and when obstructed for a few days, the tender skin between the claws becomes red and inflamed, the sheep becomes lame on that foot, and more lame immediately after its first rising in the morning than at any other time of day ; the inflammation making greater headway while at rest during the night, than at any other period. The watchful and observant shepherd will see the lame sheep at once on putting his flock up in the morning, and will apply the remedy, which is simple. First clean the claw by running your finger or thumb up and down through it, wet with your spittle, if you have no water convenient ; then take out your bottle of spirits of turpentine, and wash it well with your finger with that ; let the sheep lie a few minutes until the claw is thoroughly dry (I shall afterwards describe the simple mode of securing a sheep so as that it cannot get off its side until loosened by the shepherd), and then rub between the claw a mixture of two parts tar and one part sheep's suet boiled together, well blended and let cool, which the shepherd should always have prepared and in a tin box to take out with him. This done, let the sheep go to pasture again, and repeat the same dressing every second day until the sheep becomes well of the lameness, or until the skin breaks, which it sometimes will do in spite of the dressing, and assumes the nature and appearance of the disease called a scald, when you must then apply the liquid dressing described below. The scald is a disease of itself, though sometimes produced by the stoppage of the secretory outlet of the claws in the manner described above, is generally produced by very heavy dews, or a long continued series of humid weather, which predisposes the foot to this injury. It is as the other disease, first discovered by the shepherd from lameness, but at a different hour of the day. When the flock are first put up in the morning, the dew is heavy, is cooling to the foot, and washes between the claws clean ; and though the scald has made its appearance, yet at that hour the moisture prevents the friction of the parts from hurting and causing lameness, and it is not discovered until towards noon, when the dew is all gone, and between the claws becomes dry, and the friction commences to hurt and irritate the parts, and then the lameness becomes apparent. When this is the case, the shepherd knows it is the scald. He collects his flock, catches the lame sheep, ropes them as it is termed, and lays them on their side. He then takes his wash, previously prepared, composed of two parts tar and one of oil of turpentine well mixed together, and then slowly added and stirred in; one part of muriatic acid (spirit of salt), with after that four parts blue vitriol, very finely powdered, to which add spirits of turpentine sufficient to make the whole, when well shaken up in a bottle, of a liquid consistency, so that the wash may be applied by dipping a feather into it, with which anoint the scalded parts with the feather. The bottle must be well shaken every time the feather is dipped in; and when the claws are dressed, the sheep must then lay tied until the wash is perfectly dried in, and a sort of incrustation is formed on the scalded parts: every second day is enough to dress. It sometimes occurs that notwithstanding every care, this scald turns to a *sore;* and then it is, that it is called the foot-rot The sore is produced generally by something getting in between the claws, such as a bit of gravel or hard clay, or struck by some substance that would produce extra irritation, proud flesh and slonghing. The treatment then is, if the sore extends either way to the horny substance, to pare it away to the healthy edge; then shake a little fine powdered loaf sugar on the part, which will entirely take away the proud flesh; and then after half an hour apply the wash, and, when dry, loose the sheep to pasture. Care should be taken never to wrap the foot with a cloth, unless when the horny substance is taken away and the part is left entirely bared to the ground, and then the one claw only should be bandaged; or if both are bared, *each claw should be separately bandaged*, to prevent greater friction of the parts, and to keep them the more cool. *Und-r this circumstance alone*, is a bandage on the foot of a sheep *ever admissible*, because it contains greater heat, and of course greater friction, by keeping the claws bound together and not allowing them to spread. In this stage of the disease, it is necessary to dress every day; and it must be noticed, that the cool of the morning is the best hour for dressing, because the sheep in hot weather is much oppressed by being tied down on its side for the length of time, sometimes an hour or more, that the proper application of the dressing requires. It not unfrequently happens that sheep show lameness, when you can neither see a scald, nor discover inflammation between the claws, from the stoppage of the secretory outlet; and then the shepherd must look for the cause by pressing and examining the hoof round, in the same way as the cause of lameness is sought for in the horse's hoof; and when discovered, the horny substance must be pared down to the part affected, and then the applications made as before described. In this case the lameness is produced from precisely the same causes as the lameness in a horse's foot, by a bruise or hurt, or by the prick of a nail, or the gradual working-in of some sharp gravelly substance, which, when discovered, and on opening, matter is found, it is immediately pronounced as foot-rot in the sheep; but who ever heard of foot-rot under similar circumstances in the horse, or who ever supposed that the matter, if applied to another horse by inoculation, would produce lameness and a similar sore, in the same region, the foot? On this I deem any other remark unnecessary. No other help than the shepherd and his dog is required; nor no other instrument than a strong, sharp and well pointed two-bladed knife, the large blade to pare down the hoof, the smaller one to cut out down to the part affected.

The way of tying down the sheep is as follows: Get a soft rope made of tow with three plies, each ply as thick as your middle finger, five feet long; then splice both ends together, and you have a double rope two feet six inches long. When you catch your sheep, turn him gently on his side; then raise him to a sitting posture, having his head bent over under your stomach; take your rope and put it over the *left* hind leg just above the hock, catching the sinew; then give your rope two or three twists, so as to confine the leg, and pass it along the belly and on the side of the chest close under the elbow of the *right* fore leg or shoulder, and pass the other end over his head on to his neck; lay him down on his side, and there he must remain secure until you choose to loose him. When you go to dress him or pare his hoofs, the easiest position for the sheep, and the handiest for the shepherd, is to place him in a sitting posture, the rope still left on until he is ready to be let out to pasture. The paring of the hoof can alone be well performed with a strong, sharp bladed knife, and is very simple: leave the bottom of the hoof as even as possible, so that the sheep may have an even and flat surface to stand upon, taking care of not cutting down to the quick; the toes should be left smooth and rounded, and no portion of the heel touched, unless some jaggy part is hanging.

The shepherd with his dog and crook, and twenty-four tow ropes on his shoulder, his knife and vials in his pocket, can go out and pen his sheep in any clean and convenient corner, catch the lame ones and rope them, let the rest of his flock out to pasture, and then in a very few hours dress his invalid sheep, and be prepared for his other work. Suppose the shepherd to have the charge of a flock of 1000 sheep, he must be very ignorant, or very careless, ever to require to use more than twelve or eighteen out of his twenty-four ropes on any one day: there is no business at which a man is engaged, that "a stitch in time is more certain to save nine," than in herding a flock of sheep.

With much respect, I remain, dear sir, your humble servant,

LOUISVILLE (Kentucky), July, 1845. GRAZIER.

[From the Ohio Cultivator.]

PLANTING STRAWBERRIES.

Every body loves strawberries, and the man who has a garden or a few yards of ground that can be appropriated to the purpose, and does not plant a good bed of strawberries, does not deserve to taste any thing better than "pork and dodger," during his mortal life! Don't you say so, boys, girls, ladies, *all?* Well, then, why don't you make a stir about it, and keep a stirring till the object is accomplished? Not quite yet, however; for the ground is too dry, and the sun too hot. But the latter part of September, or the fore part of October, as soon as the ground is well moistened through, and the heat of summer is over, is a first rate time to set out the plants. They will take root immediately, will bear considerably next spring, and abundantly the spring following.

If there is room for choice, select good deep loamy soil, rather inclining to sand than clay, and where it is well exposed to sun and air. Apply a heavy coat of rotted manure, from the stable or hog-pen, or both (mixed), and dig the ground deeply, burying the manure eight to ten inches deep; rake it smooth, and it is ready for planting.

Select plants from runners of this year's growth, and from beds that are young or in a healthy bearing state, otherwise many of them will be apt to prove barren and useless. As to the kinds, get any of the good sorts in cultivation that can be found in your town or neighborhood, and plant two or three kinds near together if you can get them, as they will assist in impregnating each other, and a larger crop will be obtained. If plants are to be obtained from a nurseryman, any of the following will be found excellent (the first named is finest of all, but should never be planted far separate from other kinds). Hovey's Seedling, Large Early Scarlet, Hudson's, Ross's, Phœnix, Keen's Seedling, Elton, Myatt's Seedlings; and for variety and late bearing, a few of the Red and White Alpine or Monthly.

In planting, set them in rows about two feet apart, and eighteen inches apart in the row. Or, if beds are desired, make the beds four feet wide, and set three rows on each; then leave an alley not less than two and a half feet wide between the beds. Keep clear of weeds, and if more plants are not desired, cut off the runners three or four times a year. A thin sprinkling of lettuce or radish seed may be sown on the beds the first year, but afterwards the strawberries will need all the space. It is a good plan to cover the surface between the rows with straw or hay at the time of fruiting in the spring, to keep the fruit clean, and partially to protect against drought.

[From the (New-York) American Agriculturist].

ROOT-GRAFTING.

After reading this article, every farmer can easily provide himself with an orchard of the choicest fruit, and without other cost than a little of his own labor ; for he has only to procure a few apple seeds and sow them, and then do his grafting in the winter evenings, when there is scarce anything else to occupy his attention.

Root-grafting is now more generally practised than tree-grafting, for the following reasons. 1. It is stronger than budding, and the scions have as straight and handsome a growth of trunk as seedlings. 2. A tree may be brought to bear from one to two years sooner by this method. 3. It can be done in the winter as well as the spring, a season when the nurserymen are least employed. 4. Three times the number of trees can be thus obtained from the same stock.

Preparing the seed. Take apple-pommace at the cider-mill, and transport it to any place near where it is desired to plant the seeds, and spread it on the ground ; then turn it over with a rake or pitch-fork, and gather the principal part of the straw from it, leaving the pommace in beds not more than one and a half to two feet thick. If left thicker, or much straw remains in it, the pommace heaps are liable to ferment and destroy the vitality of the seeds. Leave it in this state all winter, without covering. If the seed is to be obtained from any great distance, it must be washed clean, thoroughly dried, and then packed in a box for transportation.

Planting. The soil should be of reasonable fertility, and free from springs or standing water ; indeed, it is better to have it too dry than too wet. As soon as the frost is out of the ground, plow, harrow, and prepare the land where the apple seeds are to be planted, the same as for a good crop of corn. Now stretch a garden cord any length required ; take a hoe in hand ; as you walk forward, let it be drawn behind you, straight with the line, and about one inch deep in the ground. This makes a drill six inches wide, and deep enough for planting the seeds. Into this scatter the pommace an inch thick, and then cover it over with the hoe about an inch deep. The drills should be from three to four feet apart, according as one has more or less ground to spare. The latter distance is best, because it gives more room between the rows to work the plow or cultivator, to stir the earth and keep the weeds down. If the trees come up thicker in the rows than wheat or rye usually does after sowing, they should be thinned out by pulling up whatever is necessary, and thrown away, as they will hardly repay the trouble of transplanting.

After culture. This may be the same as with a crop of corn. It is very important to stir the earth, and keep it loose, for the better spreading of the apple tree roots ; also to check the weeds, otherwise they will choke the growth of the trees, and frequently overshadow and kill them.

Diseases and insects. Apple trees, the first and second years, are very subject to mildew, the attacks of lice, and a small green fly, which often do them great injury by checking their growth. For the destruction of the first, we recommend strewing lime and charcoal, mixed in equal quantities, along each side of the rows of the seedlings; and for the second, sprinkle snuff all over the leaves, or a mixture of sulphur, soot, and fish oil.

If in a good soil, and well taken care of, the trees will grow from two to three feet high the first season. Treat them the second year in the same way as the first.

Taking up and securing the trees. If the trees have had a good growth the first season, they will be large enough the following winter for grafting; if not, they must remain till the second fall. To prepare them for grafting, they should be taken up before the ground freezes. To do this with facility, run a plow down each side of the rows, turning away the soil from them, and then pull out the trees carefully by hand; or let two men go down on opposite sides of the row, and thrust their spades into the ground near it, loosening the soil and somewhat lifting it up, while a third person follows and pulls out the trees. After this, tie the trees together in moderate sized bundles, and put them into a glass-lighted cellar, or any place where they will be secure from frost or drying up of the roots. The cellar bottom must be of a dry soil. Here dig trenches, and place the roots of the trees in these, in bundles, and cover up till wanted. Or, if the roots can be kept moist by wrapping them in moss or any other way, it will answer, though covering them with earth is the safest and best method.

Grafting. As one has time during the winter, these bundles of trees may be taken from the trenches and grafted. From one to four roots may be cut from each tree, dependant entirely upon its growth, and still leave enough for the support of the stock taken up. This should be closely trimmed and cut off about two feet from the root, to be set out the following spring, to be budded in August. Now cut the grafts as wanted, and use ribands made in the following manner for bandages: Take common cotton cloth, and cut it crosswise into pieces six inches wide; on one side of these pieces, spread grafting wax, composed of 1 lb. beeswax, 1 lb. rosin, and 2 lbs. tallow: then cut these pieces parallel with their width, into ribands half an inch wide.

The most simple method of grafting, and as sure as any, when the roots are so small, is the splice or whip method. Some adopt cleft-grafting, and do not use wax or binding; but as the graft by this method is very apt to get displaced, we cannot recommend it.

After management. Take the trees after they are grafted, and put them into boxes of any convenient size six inches deep, and fill the same up with moist sand or light loam all around the roots, taking care to leave the top of the scion out a little above the earth. These boxes should now be taken to the green-house, and set in a shady place out of the way of the sun. Here let them remain till the graft gets well united to the root, which will take place in a week or fortnight, according to circumstances. After being united, place the boxes in the cellar, and let them remain there till ready to set out in the spring. During this time, keep the earth in the boxes moist. By giving the pieces an opportunity to unite, immediately after grafting, if it comes a dry time in the spring subsequent to setting them out, they are not so liable to die, and their growth is quicker and better. As few farmers have a green-house to start the grafts in, they may place the boxes containing them in a warm room during the day, and in the cellar during the night. Those who are not too busy in the spring, can do their root-grafting as soon as the frost is out of the ground, and set the trees out in rows as fast as done.

Transplanting. Early in the spring, transplant the grafted trees from the boxes into rows about four feet apart, and one foot apart in each row. Stir the earth occasionally, keep the weeds down between the rows, and let the trees grow till they are wanted to plant in an orchard. By this method, apples have been gathered three years after first saving the seed ; and if properly attended to, one may always calculate on a little fruit the sixth or seventh year.

[From the same.]

FENCES.

We cannot do without some fencing in America ; but to be *forced* to build *innumerable* lines of it in every direction, is a positive curse to the country, and a plague upon its morality and industry. It would be hardly possible for law or custom, in a free community, to invent and put in practice anything more burdensome, unjust, and tyrannical upon the agricultural class, than the present system of fencing. This may seem to our readers very strong language. It is so, and we mean it as such ; nevertheless, it is bitterly true, every word of it, as we shall endeavor to show. It is a long conviction of its truth, and a knowledge of the deep hold that the apparent necessity of fencing their land has upon the habits and minds of the people, which compel us to express ourselves so decidedly against an odious and tyrannical custom, that has been forced without proper reflection upon the cultivated portions of North America ever since its settlement.

On the continent of Europe, fences are scarcely known ; neither are they found in many parts of England, Scotland, or Ireland ; and where they now exist in these countries the people are fast lessening their number, and we fully believe that half a century hence such a thing will scarcely be in existence.

The following are our decided objections to fences :

1. They are the occasion of more angry words and brutal per-

sonal conflicts, sometimes ending with the death of one or both of the parties to it, law suits, and lasting ill-feelings among neighbors, than all other causes put together.

2. They cost immense sums of money.

3. They take up at least two to three acres out of every hundred of the land.

4. They harbor large numbers of vermin, and are a complete nursery for bushes and every noxious weed that grows.

5. They are much in the way of plowing, harrowing, and otherwise working the land; and unless a considerable number of gates are erected along their lines, they make it inconvenient getting to the fields; and by the circuits which have to be taken, greatly increase the distances in carting out manure, bringing home the crops, and driving the stock to and fro.

6 They have a sensible effect in delaying the warmth of spring, by occasioning snow-drifts and water puddles. Land, for a strip of several feet wide, on the north side of the fences, does not become dry and warm and fit for working so soon as in the open fields, by at least three to seven days. This is frequently highly vexatious to the farmer, and positively injurious in causing delay in his plowing and planting.

7. They totally mar the beauty of the landscape, and make the fields look as if they were all *imprisoned*. Strangers coming among us from an unfenced country, unquestionably at first sight think us and our cattle awfully vicious to require such ugly hedging in and around.

All the above objections to fences, must strike the reader as so plain and forcible, that they need but one elucidation, and that is as to their cost; and for a calculation of this, we will take New-York as an average example of one twentieth part of the Union.

This State is supposed to contain a surface of 30,000,000 acres. Deduct one half for unenclosed lands and water, and it leaves 15,000,000. We are of opinion that the average size of fields here is about 15 acres; but we will suppose, for fear of making too large a calculation, that they average 20 acres. To surround one of these, allowing a trifle for inequalities of surface, it would require 230 rods of fence. On account of numerous roads and lanes, all of this does not answer for division fences; instead, then, of throwing half of it off for this purpose, we will suppose 110 rods enough, and call the remainder (120 rods) sufficient on the average for each 20 acre field. Dividing 15,000,000 acres by 20, they make 750,000 fields: these multiplied by 120 rods, the length of fence requisite to enclose each field, make 90,000,000 rods. Farm fences cost, in this State, from 40 cents to 150 per rod. We will suppose, on an average, that the cost is 75 cents per rod; this would amount to the enormous sum of $67,500,000 for fencing New-York alone. Now, allowing this to be one twentieth the cost of all the fences in the United States, the result would be $1,350,000,000! These enclosures, including stone and wood, do not last, on an average, over 25 years; the cost, then, is $54,000,000 per annum, which, with $81,000,000 of interest at 6 per cent on the first cost, amounts to $135,000,000 annually expended in the republic for fences! It is absurd to suppose that so much fencing is necessary; and we now respectfully ask whether, in the outset of this article, we too strongly reprobated the law and custom compelling the farmers of this country to submit to so grinding and odious a tax upon their industry?

[From the same.]

THE SWINNY, OR DISEASE OF THE SHOULDER.

This is an affection not uncommon, but yet little understood. If of recent occurrence, it will be seen that the shoulder is *swelled;* if of long standing, that the shoulder is *diminished in size*, the muscles having shrunk away. The shoulder is frequently shrunk when there is no disease in it: this shrinking arises from disuse of the muscles. To retain its full volume, a muscle must have constant action. Now, disuse of the muscles of the shoulder may arise from two causes: 1st, lameness of the foot or leg; 2d, lameness of the shoulder. If it arise from the foot, no treatment is necessary for the shoulder. It may be easily known if it proceeds from the foot. In such case the horse, when he moves, lifts his foot *clear from the ground;* and when he points his foot forward, he places it flat on the ground. If the injury be in the shoulder, when he moves he *drags the toe of the foot along the ground*, seemingly unable to lift it clear; when he points his foot out, his *toe* only rests on the ground, not the sole of the foot. If the injury is in the shoulder, the horse reluctantly turns his head towards the opposite shoulder: this strains the muscles; but he will willingly turn his head toward the lame shoulder, as this relaxes the muscles.

The common causes of shrinking or swinny of the shoulder, when it arises from the foot or injury to the leg below the shoulder, are all the diseases of the foot and leg, which continue long enough to occasion such a disease of the muscles of the shoulder as to occasion their shrinking. Such diseases are foot-founder, contraction of the foot, strain of the navicular joint, ringbone, pumiced foot, sand-crack, quittor, gravel, any separation of the foot; in short, any of the various diseases of the foot which induce the horse to favor it, and thus use as little as possible the whole leg and shoulder.

The shrinking of the shoulder, where it arises from an injury in the shoulder itself, has but one ordinary cause, namely, a strain of the shoulder. When there is a strain of the shoulder, it is known at once. Within a few hours after its occurrence, the shoulder is swelled, perhaps in its whole length, but generally only at the lower end. The strain lies almost always in the muscles which attach the shoulder-blade to the body; yet the swelling is on the outside, but this arises from sympathy.

When the horse is observed to be lame, and it cannot at once be determined where the lameness is, let him be walked; and if *he drag his toe*, it is in the shoulder. Let the shoulder be examined in front; if the affection be of long standing, the shoulder will be seen to be less than the other. If, on feeling it, it be found to be free of heat, there will be no fever: the disease is then chronic. If, however, the shoulder be enlarged, it will be found, on feeling, to be hot: the injury is then recent and inflammatory. Where the disease is in the shoulder, and is chronic, it has gone through the inflammatory stage, and is of some considerable standing. The chronic state is rarely cured. It is not unlike rheumatism. For the *chronic state*, the best remedy is *active blistering*: this will rouse the vessels to activity. It may be necessary to blister repeatedly; and exercise should accompany the blistering, with good grooming and general care. Let the exercise commence as soon as the blister begins to diminish its discharge. This treatment, continued judiciously and energetically for some time, may cure *chronic* disease of the shoulder. When the strain is recent, and inflammation exists, the horse should be bled from the neck, and from the plate vein on the inside of the leg, as near the body as possible. Rest, cooling physic, both purgative and sedentary, should be given: no *blistering* should be allowed. Embrocations of a cooling nature should be applied. No *stimulants* should be applied externally, or given: they but add to the inflammation. When the inflammation is subdued, and the shoulder has fallen back to its natural size, the horse needs nothing but rest, with gentle exercise. Let him be turned out, if in the summer, to grass; in the winter, into a small yard in good weather, and a loose box at night in bad weather. It will take him some time to get over the effects, and be fit for work again.

When the shoulder is shrunk or swinnied from lameness in the foot or leg, below the shoulder, no attention should be paid to the shoulder. When both feet or legs are diseased, so that the horse seeks to relieve each alternately from pressure, both shoulders will be swinnied; they will be both shrunk, and the breast in front will be diminished and fall in. The treatment in these cases is to be addressed to the place of disease. If in the feet, cure them; if in the legs, cure them. Some diseases in the feet cannot be cured; and, of course, if there be swinny from such cause, it cannot be removed. When the feet and legs are cured, and the horse recovers thereby his wonted action, the muscles of the shoulder will, by exercise, recover their former size, and the swinny be gone.

Among the ignorant there is a variety of remedies for the swinny, as pegging (that is, thrusting a knife in the shoulder, and blowing in stimulating powders), swimming, setons, etc. A recent writer in the Southern Cultivator, says, "Introduce the small blade of a common pocket knife (the point of which must be sharp), into the thinnest part of the shoulder, which will be near the upper margin of the shoulder-blade, holding the knife as you would a pen when writing, and scratch up the membrane that covers the bone for a space the size of a silver dollar; the knife may be then withdrawn. The knife may then be introduced in one or two places below the first, and used in the same way, and the operation is over." Now, if the disease be in the shoulder, this method can only cure by rousing the vessels to action. Blistering will do this better, and is more humane and less dangerous. Wounded membranes frequently produce fatal inflammation. Blistering is never dangerous in chronic affections, and therefore is preferable on that score, and by general action does far better. It is done within two days. Scraping the membrane cannot be through its operation short of weeks.

BUFFALO, January, 1845. A. STEVENS.

[From the same.]

FATTING SWINE.

One of the most important duties demanding the farmer's attention this month, is the fattening of his swine. The practice of some at the north is, to commence one month later; but this is very bad economy, for all animals will fat much faster in mild weather than in cold. Besides, there is a good deal of stuff about the farm which is never so valuable as in this month; and if gathered up and cooked, is the best food which can be given for the commencement of the fatting process. We would name small potatoes and roots of all kinds, cabbages, turnips, pumpkins, apples, and unripened and imperfect ears of corn. After these have been fed a month or so, commence with a mixture of the different kinds of meal, or corn alone, and shove the animals as fast as posible, getting them ready for the market by the middle of November to the first of January. If delayed longer than this last mentioned period, however cheap food may be, or high the pork may sell, fatting swine will be a losing process.

The hogs should be allowed to exercise a little in the open air, and have charcoal and rottenwood to eat twice a week, and whatever water they may wish to drink. Some contend that they will not fat as fast for this, but that remains yet to be proved by careful experiment. At any rate, we know that the meat is much superior when fatting animals have a moderate degree of exercise, and plenty of fresh air and water. If closely confined they become feverish, and their meat is not only flabby and tasteless, but positively unhealthy.

Another thing. Sufficient attention is not paid to the cleanliness of swine. Depend upon it, no animal pays better for keeping him clean than the hog; and, after all, he is not half as dirty a beast as he is usually set down to be. No creature enjoys clean quarters better than he does; tempt him with a good bed of fresh straw, and see. The following experiment was recently tried in England : Six pigs of the Norfolk breed, and of nearly equal weight, were put to keeping at the same time, and treated the same as to food and litter for about seven weeks. Three of them were left to shift for themselves as to cleanliness ; the other three were kept as clean as possible, by a man employed for the purpose, with currycomb and brush. The last consumed in seven weeks fewer peas by five bushels than the other three, yet they weighed more when killed by seventy-two pounds.

Northern farmers may talk as they please, but they don't understand, or rather carry into effect anything like so good a system of fatting swine as those do at the west. There they commence feeding early in September, in a nice grass pasture, with plenty of shade trees, and a clear stream running through it. Here Master Porkibus daily bathes his sleek sides, eats luscious roasting ears to his fill, drinks and walks about, or sleeps at his pleasure ; and the way he contrives to extract the fat from the corn to cover his rotund ribs, *is quite charming*, completely distancing any other chemical process that the wit of man has yet invented. It is worth a journey of a thousand miles, any time, to take a look at a *small* field of corn of *five hundred acres*, crowning the rich bottoms of the west on one side of a fence, and a *little* herd of *two or three hundred* lusty grunters making away with it on the other. Indeed, we speak within bounds in saying, that we have seen thousands of acres of corn stretching along these valleys, seeming at a little distance like one continued field ; and we once counted 537 hogs in one herd. Talk about pork and corn in New-York ! Take a trip to the Sciota, the Miami, and the Wabash, and one will then get his eyes open, and know something about them.

[From the same.]

INCUBATION.

In an impregnated egg, previous to the commencement of incubation, a small spot is discernible upon the yolk, composed apparently of a membranous sac or bag, containing a fluid matter, in which swims the embryo of the future chick, and seemingly connected with other vesicles around it.

1st Day. In a few hours after exposure to the proper temperature, the microscope discovers that a humid matter has formed within the limits of the embryo. At the expiration of twelve or fourteen hours, this matter bears some resemblance to the shape of a little head : a number of new vesicles also successively appear, foreshadowing the different parts of the future body of the chick ; those first formed, and most easily distinguished, may afterwards be recognized as assuming the shape of the vertebral bones of the back.

2d Day. The eyes begin to make their appearance about the thirtieth hour ; and additional vessels, closely joined together, indicate the situation of the navel : the brain and spinal marrow, rudiments of the wings, and principal muscles, become observable ; the formation of the head is also evidently proceeding.

3d Day. The beating of the heart is perceptible, although no blood is visible : after a few hours, however, two vesicles, containing blood, make their appearance ; one forming the left ventricle, the other the great artery : the auricle of the heart is next seen, and, in the whole, pulsation is evident.

4th Day. The wings now assume a more defined shape ; and the increased size of the head renders the globules containing the brain, the beak, and the front and hind part of the head, distinctly visible.

5th Day. The liver makes its appearance ; and both auricles, now plainly seen, approach nearer the heart than before : that splendid phenomenon, the circulation of the blood, is now evident.

6th Day. The lungs and stomach are distinguishable, and the full gush of blood from the heart is distinctly apparent.

7th Day. The intestines, veins, and upper mandible become visible, and the brain begins to assume a distinct form.

8th Day. The beak for the first time opens, and the formation of flesh upon the breast commences.

9th Day. The deposition of matter forming the ribs takes place, and the gall-bladder is perceptible.

10th Day. The bile is distinguishable by its green color ; and the first voluntary motion of the body of the chick is seen, if separated from its integuments.

11th Day. The matter forming the skull now becomes cartilaginous, and the protrusion of feathers may be noticed.

12th Day. The orbits of sight are apparent, and the ribs are perfected.

13th Day. The spleen gradually approaches to its proper position near the stomach.

14th Day. The lungs become enclosed within the breast.

15th, 16th and 17th Days. During these days, the infinity of phenomena in this wonderful piece of vital mechanism elaborate it into more perfect form, and it presents an appearance closely approaching the mature state ; the yolk of the egg, however, from which it derives its nourishment, is still outside the body.

18th Day. On the eighteenth day, the outward and audible sign of developed life is apparent, by the faint piping of the chick being, for the first time, heard.

19th, 20th and 21st Days. Continually increasing in size and strength, the remainder of the yolk gradually becomes enclosed within its body ; then, with uncommon power for so small and frail a being, it liberates itself from its prison in a peculiar and curious manner, by repeated efforts made with its bill, seconded by muscular exertion with its limbs, and emerges into a new existence.

The position of the chicken in the shell, is such as to occupy the least possible space. The head, which is large and heavy in proportion to the rest of the body, is placed in front of the abdomen, with its beak under the right wing : the feet are gathered up like a bird trussed for the spit ; yet in this singular manner, and apparently uncomfortable position, it is by no means cramped or confined, but performs all the necessary motions and efforts required for its liberation with the most perfect ease, and that consummate skill which instinct renders almost infallible.

The chicken, at the time it breaks the shell, is *heavier* than the whole egg was at first.

An egg will not hatch *in vacuo.*

The infinite wisdom of the Great Architect of the animal frame is remarkably manifested in its providing the chick with a sharp and hard substance on the tip of the bill, by means of which it is enabled to fracture the shell to liberate itself from its imprisonment. Its own bill is too soft to enable it to break the shell therewith ; and in two days or less, this hard and pointed substance disappears, the young bird no longer requiring to use it.

Equally extraordinary and wonderful is the fact that the germ of the chick is provided with the ability to keep itself always on the top of the yolk of the egg, to the end that it may take the heat from the parent bird when setting to produce incubation.

[From the (Chicago) Prairie Farmer.]

BREEDS OF CATTLE FOR THE WEST.

Those who advocate the adoption of any *one* particular breed of cattle for our climate and soil, seem to proceed on the supposition that a breed once established will always retain its peculiarities under every variety of situation and circumstance. Never was a greater mistake made than this. A breed of animals will most infallibly adapt itself to its food and treatment. Durham cattle, for instance, can never long be made, on the hills of New-England, to retain their size. How is it at present with Berkshire swine ? It would not be out of the way to say that there will soon be an endless number of varieties, all springing from this breed, having as little resemblance to each other as to other breeds. Let us ask the question how the present distinct breeds of cattle, swine, and sheep were produced. It was by *uniform* courses of feed, treatment, and propagation. So well fixed in the breeds are certain peculiarities, by this treatment, continued for a long time, that they will resist, *for a while,* changes of circumstances ; but they cannot continue to do it. For instance, let cattle from the cold hills of Scotland be placed upon warm rich prairies, and bred in their own line for twenty generations, and then be compared with those fresh from their native region, and who does not believe that very evident changes would be produced? The mistakes which our farmers are continually making in stock breeding, grow out of incorrect ideas in this matter. For instance, a fine breed of cattle or swine is introduced. A farmer thinks if he can only get some of that stock once on his farm, he will be made. He pays a high price for a pair of calves whose ancestors have been accustomed to a fixed course of tender treatment; having been stabled much, and fed with great care on the best of food. He turns out his calves to get what they can catch, without shelter or salt, or any thing else which this breed has been accustomed to, and he wonders that their blood does not show itself omnipotently against all these disadvantages. He notices, perhaps, that they do not thrive as well as his scrubs. The fact is, the shock of the transition is too great. Many have inferred, in this way, that the short-horns would never answer for our farms, because they cannot endure rough treatment. The short-horns have undoubtedly been more petted and tenderly treated than any other breed; but if the transition from tender to rough treatment be properly conducted, they will probably endure it as well as any other. If a man gets an animal which has been stabled all his days, and suckled till a year old; and turns him out to shirk, the animal will run down. But we are told by stock-growers that the short-horns, if once accustomed to rough treatment and coarse feed, will endure it as well as other cattle. This may be so; but they will not continue to retain the *peculiarities of short-horns*. This belief the fire will not melt out of us. To produce a uniform race of cattle, there must be uniform treatment, as well as correct breeding. An animal's body *is made of what he eats and drinks.*

Hence the great disappointment of those swine-breeders in the Southern States, who rushed into the Berkshire growing, without any reference to their mode of keeping hogs. They are accustomed much in the South to let their swine range, and get their own living by eating roots, snakes, acorns, and corn in the field. An animal, to do this, must have legs and wind. The berkshire had neither, and of course soon fell in the rear. He was as much out of his element as a horse in a singing school: he had not "the hang of that schoolhouse." He might be kept till he got it, perhaps; when he could get his living as well as others. But he would cease to be a berkshire — he would become a sharkshire. A berkshire's place is a snug clover lot in summer; a pen in winter, with good food brought to him. With these, he is himself; without them, somebody else.

Our readers will easily see the conclusion to which we come. The men who say "Give us the durhams for the West," or "Give us the ayrshires," or "the devons," without any reference to what use they are intended for, or what treatment they are to receive, have none of our sympathies.

We have but room here to notice another error, which is, in breeding. The individuals of a breed differ much. Some short-horns are no better than some no-horns or no-names. What propriety is there, then, in supposing that superior stock will be obtained from such a source. True, a poor thorough-bred animal will be more likely to produce good stock than one not thorough-bred, because the excellence of some ancestor may appear in his issue; but it is great folly to breed from a poor animal of any blood. We hear people complain that Berkshire hogs are no better than others; while others prefer them to every thing else, and with reason on both sides.

[From the Maine Cultivator.]

SOAP-SUDS — COMPOST.

This is, perhaps, one of the most powerfully fertilizing articles produced on a farm. It contains the food of plants in a state of almost perfect solution, and consequently in a condition the most easy to be appropriated and assimilated when applied as a stimulant to vegetable life. In order to avail himself of this important source of wealth, the farmer should provide himself with a tank of a size sufficient not only to contain the suds made in the family, but a large quantity of other materials, such as sods, turf, bones, ashes, straw and muck; in short any substance not actually and necessarily prejudicial to vegetation, and which may, partly by imbibing the liquid, and partly by chemical action, become an ingredient in the food of plants. The tank or cistern provided for this purpose, should be proportioned to the size of the family, and so situated as to admit of an easy approach with the cart. It should also be so constructed as to be exposed as little as possible either to the washing of heavy rains, or the influence of the sun and air. We have often been surprised, on visiting the premises and farm yards of some who have enjoyed an honorable reputation for economy in other matters, to find them cluttered and encumbered with useless rubbish, which a little time, properly devoted, would have reduced to a healthy and valuable assistant in the fertilization of a perhaps unfertile and unproductive farm. Bones, shells, chips, are all excellent ingredients in the compost heap, and will well reward any person for the trouble and expense of gathering them up. It is often the case that soil in low places by the road side, which receives the wash from the highway, may be converted into a valuable stimulant simply by throwing it into heaps. This, however, should be done in the fall, as the wash during the summer adds greatly to its stimulant powers, and the operation of the frost in winter conduces greatly to its improvement, by thoroughly breaking up and disintegrating the earthy particles composing the mass. Such soil, or indeed any other, moderately indued with fertilizing properties, and the powers of imbibing and retaining moisture, may be greatly increased in value by being placed in a situation where it will remain open to the action of rain and the elastic gases.

[From the (Philadelphia) Farmer's Cabinet.]

MANAGEMENT OF HENS.

From the statement of James L. Child:

My hens laid nearly as well during the winter as in the warm weather. Their habitation was warm, and so constructed as to bring them to the ground, where they found at all times a good supply of old plastering, ashes, pulverized oyster shells, charcoal, fresh water, beef liver once or twice a week, or some other kind of meat. I feed chiefly upon baked or boiled potatoes, giving their food to them warm in the morning and at night, occasionally dealing to them a little corn or oats, and giving them all the crumbs, and skins, and fragments of the cooked vegetables. To prevent their being infested with lice, about once a fortnight I mixed in dough, so as to discolor it, a quantity of flour of brimstone, which is a sure preventive as well as remedy, and may be safely given in small quantities to young chickens for the same purpose.

It will be seen from my mode of keeping my hens, which average about twenty-five and three roosters, through the winter, that I can not give the precise cost of keeping; but I am satisfied that potatoes may be given as a general food, and fowls kept cheaper in this mode than in any other, and they will always be ready for the spit, if not stinted in quantity. I find my fowls fat at all seasons.

I estimate that my hens afford me from their eggs, without regard to their meat, a clear profit of 50 per cent. I confine them to their yard, hen-house, and barn cellar, during gardening, and to their house and cellar in the winter; and think, with that degree of confinement, they lay better than they do when allowed to wander at large. Hen-houses and roosts should be kept neat, and often white-washed; and their nests should always have half an inch or more of ashes or lime on the bottom, under the hay. Broken or rotten eggs should never be allowed to remain in the nests. Dirty water should not be given them. To do well, they require pure water, and all their food fresh and uninjured from taint or fermentation. I estimate that during the year (deducting the time of their moulting, and inclination to set), I have got daily one half as many eggs as I have had laying hens.

Every family can, with a very little trouble, with their flock of a dozen hens, have fresh eggs in plenty during the whole year, say in all 2000, and 100 full grown chickens; and of all the animals domesticated for the use of man — if such be the fact — the hen is capable of yielding the greatest profit to the owner. It is a pleasant recreation to feed and tend a bevy of laying hens.

Care should be taken to change roosters often, as otherwise the best variety in the world will run out, and cease to be profitable from breeding in and in; and I feel great confidence that much improvement may be made by due attention to crossing, and in this way some of the evils from breeding be averted. I have stated that

I give my fowls meat: this is indispensable, if they are not allowed to go at large. If corn is fed out, it should be soaked, and fifteen bushels is a fair yearly allowance for twelve hens and a rooster. But they should always have food by them, and after they have become habituated to find enough at all times in the trough, they take but a few kernels at a time, except just before retiring to roost, when they will take nearly a spoonful into their crops; but if they are scantily or irregularly fed, they will greedily snatch up a whole crop full at a time, and stop laying, and not unfequently engender some fatal disease.

[From the same.]

PREPARATION OF SEED.

Mr. Editor — I do not know any subject in the whole range of agricultural pursuits, upon which labor can be so profitably bestowed as in the preparation of seed. It is lamentable to observe the immense loss which is continually sustained in consequence of indifference and carelessness on this point; and it is really to be feared that every species of grain will continue to degenerate in quality and diminish in quantity, unless the farmer is awakened to a proper sense of the importance which he should attach to this part of his business. It has been the observation of almost every man, that those products of the farm which are less valuable, and which, therefore, the farmer is more indifferent about, are annually growing worse in quality. Oats are lighter in the grain and upon the ground than they were formerly; and rye is becoming so exceedingly bad in quality, and so uncertain a crop, as to be scarcely worth committing to the ground. Farmers are heard constantly to express their wonder why the product of the rye crop is not as it was formerly, and that they can not raise as much oats to the acre as they used to do; but they will cease to wonder, if they will but reflect how exceedingly indifferent they have been with regard to the quality of the seed which they have used. The importance and value of the wheat and corn crops, have sometimes induced them to make an exertion to procure better seed than their own; but who ever takes the trouble to go beyond his own granaries, to seek for seed rye or oats? Or who ever takes more pains in its preparation, than to measure it into his bags from the pile, as it comes from the barn floor? To this alone is attributable the fact that these crops make but a scanty return for the labour bestowed upon them. I do not urge the recollection of these things for the sake of these crops, for I do not deem them essential to the farming interest, beyond the small amount of them which the farmer may be supposed to require for his own immediate consumption; but the same reasons and principles precisely are applicable to wheat and corn, to which we attach so much importance. If, in the preparation of seed wheat, we take the grain as it is prepared for grinding, and run it through the wind-mill at a speed which will blow one-fourth or one-third of it out, and with this, nearly all the weed and grass-seeds ; then run it through the rolling screen, and thus separate any cockle, weed, or cheat seed, which may remain ; then wash it, and if there has been any smut in it, wash it again in salt water, and spread it upon the barn floor and sift lime upon it and mix it, I will venture to assert, that in any soil, the product will be increased from 15 to 20 per cent over what it would have been, if the wheat had been sown without this preparation. If this be so, what labor and pains so profitably spent ? And that it is so, is not only constantly taught us by experience, but is perfectly consistent with those reasons which are so familiar to us all. Cheat, cockle, rag-weed and smut, are principally what infest the wheat field. Where weeds grow, they occupy the place of wheat, and take that nourishment from the ground which the wheat should have ; and I need not use any argument to prove that they will not grow unless the seed is in the ground, and that it will not be there — at least in such quantities — unless it be put there. Indeed I know from experience, that in the course of a few years these weeds will be wholly exterminated by that strict attention to the cleansing of seed which is here recommended. Smut is but an infectious disease of the grain, and is common to wheat, corn and oats ; but no one need have it in either, if he will but take the trouble to cleanse his seed. For several successive years have I made the experiment of cleansing smutted wheat, by washing a small portion of it in salt water and putting lime upon it, and venture the assertion that it will never fail to purify it. I have also taken pure wheat and mixed smut with it, and thus communicated the disease, and it will never fail to produce smutted wheat. The same remark may be made with regard to oats and corn ; for the blighted head of oats, and the large black excrescence which sometimes grows upon corn, although different in appearance, are essentially the same thing.

It is a very common impression that wheat is improved by changing it from one kind of soil to another. It may be so ; and if "what every body says must be true," it is so : but I may be permitted to doubt it, if it be only for the purpose of inducing thought and observation on this point. Each one of your readers is prepared to say, "I know this from experience ; but, notwithstanding, it is still worth the inquiry, whether his experience is not this, that when he went from home after seed, he went after *good* seed, better than his own, which he sowed in the next field, and cultivated in the same way, and upon which his observation induced him to come to the conclusion, that the seed he got from the slate land produced better than his own ? I am not prepared to enlist myself upon the one or the other side of this question.

Seed corn should be selected while it is upon the stalk ; it can not be so well done afterwards. Every one has observed how much sooner some ears of corn in the same field ripen than others, and that some stalks bear two and some three ears, while others have but one. All analogies and experience teach the advantages which are derived from the selection of those ears which possess these advantages. The same reason which would induce us to select a good breed of hogs, is equally applicable to our corn and wheat. The farmer who will turn his attention to a proper selection and preparation of his seed, will be much suprised how little labour will produce a great result. W.

Carlisle, March 17, 1845.

[From the same.]

TO MAKE GOOD BUTTER.

Mr. Editor — There is nothing requires more care than the making of good butter, and nothing is more wholesome when it is good. Aware of this, I found that strict attention, care and perseverance on my part, were ultimately crowned with success. Good butter ought to be made in winter, as at any other time. The heat of summer is as hard to contend with as the cold of winter ; and this convinced me that there was a certain degree of heat more favorable than another : this, after many trials with the thermometer, I thought to be about 60°. I will relate to you some of my discoveries and observations, which no doubt will seem rather stale among so many good butter-makers ; but let me premise that these were in my own dairy, and under peculiar circumstances.

First objection : The milk was often left too long standing in the bucket, before strained and put away. I think the sooner it is put away the better, and should not be disturbed while the cream is rising.

Second objection : The milk pans, of stone ware, were never warmed, but frequently taken from the shelf out of door, and the milk, already cooled by standing, strained into the almost freezing pans ; the consequence was, the too chilled milk would stand a long time without casting its cream ; and being skimmed at regular intervals, we fell short of the proper quantity of that necessary article, and of butter.

Third objection : The skimming process was not carefully done ; too much milk, and in the summer too much " clobber," clopper, or " clabbaugh," or whatever it may be called, is thrown in with the cream, which, in summer, gave a rancidity to the churning, creating a difficulty, and sometimes entirely preventing the gathering of the butter, and in the winter filling the churn to no purpose.

Fourth objection : Inattention while churning ; leaving the churn after having commenced ; stopping, as they would say, to rest ; not regular enough in turning : we use a barrel churn. All these things tend to prevent the coming of the butter in a proper time, and long churning tends to deteriorate the quality. I found, too, that after the butter *had* come, instead of moving the paddles slower to allow it to gather, they continued the same quick movement, keeping up and even raising the temperature till it melted, or went back, as one of my women told me. Hence you perceive the necessity of close attention in churning. Beginning with a good velocity, and continuing the same motion till a little pressure is felt on the handle, which signifies the approach to butter; and then decrease the motion gradually till the butter begins to gather or break, when a few turns backward and foward will end the process. Now if the cream was good and sweet, churned properly, and has come in 15 or 20 minutes, I will warrant good butter so far. But it is as often spoiled after taken from the churn, as before.

The best temperature for the *whole* process of the dairy is, as I have before stated, between 50 and 65°; the latter, perhaps, the best. This winter I brought my milk to the house, and appropriated a closet to it in a room where I have kept the temperature to an average rate of 60°. The past winter, however, has been very mild, and during some of the warm days I observed the milk turned within twenty-four hours; during which time I leave the milk to cream. My observations after taking the butter from the churn, and objections, were these:

First objection: They would leave the butter too long after churning, in the butter-milk. I think, as soon as the vessels for working it can be made ready, it is best to take it out and rinse it off in strained water, and then commence the working: do not let the vessels be too warm — nay cool.

Second objection: Working by hand, the short scoop paddle being the neatest and the best. Working does not mean paddling it over and over, but means pressure; and when carefully done, two or three times working over by small parcels, will be quite sufficient; the best evidence of a sufficient working, however, is the purity of the water with which it is washed: when it runs clear as a bell, then stop. Salt to the taste next, is a safe recommendation; but I put in half an ounce to every pound, which seems to be best suited to the taste of *my* customers The common Liverpool salt, free from motes and rolled very fine, is the kind I use. I would recommend *now* a sufficient paddling over to mix the salt well; and after standing an hour or half hour, cut it in half pound prints, and observe if it be streaky, which is occasioned I think by the salt abstracting the coloring matter of the butter: work over each print by itself, and then if the butter is not fit for any table, I'll give up.

Yours truly. F. H.

BALTIMORE, March 28, 1845.

[From the Boston Cultivator.]

ON THE RAISING OF PEACHES.

PROCURING HARDY VARIETIES.

Last week we made some general remarks on raising peaches, in New England. This can only be done with success by a choice collection adapted to this climate. The first thing is to get good seed, whether you intend to raise natural fruit, or raise selected kinds by budding. The most hardy and durable trees are those raised from seed, without budding. Select seed from hardy trees and good bearers, that produce good sized handsome fruit of an excellent quality: prefer those from natural trees, that is, such as have never been budded or grafted. Then you will generally get the same excellent fruit as that from which the seed is taken; and if you bud, it is but to get hardy stocks. It may be well to plant seed from some highly valuable budded varieties, in order to get new kinds.

In almost every section of the country, where any attention has been paid to the cultivation of this fruit, excellent kinds of natural growth can be obtained. We collected seeds from a number of superior varieties last fall, from which we now have trees. We found five excellent sorts of natural fruit, in the distance of seven or eight miles.

By all means avoid southern trees, seeds, and buds for grafting; as a large list of highly valuable varieties can be found in this northern region, which have been acclimated, and, with a judicious selection, may be found free from disease, constitutional or incidental. We have long recommended the use of northern seeds either for trees or stocks, and have refused southern peach stones when offered as a gift, and paid a high price for those grown in the north. Too many trees grown in this section are from southern fruit; hence, in a measure, the destruction of trees by cold winters.

One cultivator who has had much experience, informs us that he used to save carefully every peach tree that came up under his trees of excellent budded fruit; but he found such stocks soft, short-lived, and liable to be winter-killed: he now digs up such trees as he would a weed, and late in the fall, he looks out for some peaches from old, long-lived, natural trees, and from these he takes seeds to form stocks, and though they may not grow so rapidly, they will be firm, hard and durable. This is what we advised some years ago, as we had learned from experience and observation.

In getting trees or seeds from the south, besides the disadvantages we have named, we are liable to introduce the yellows and other diseases. We have seen some peach trees, of natural growth, that were over thirty years old, and yet produced good fruit. The seeds of such old standards that have braved the blasts of many winters, are highly valuable.

After obtaining the stones, it is not material whether they be immediately buried, or continue dry a few months; but before the ground freezes, bury them ten or twelve inches in sandy soil, and there let them remain till spring, and the ground is dry, ploughed, and prepared; then carefully crack the stones, and plant the seed about as deep as you would corn, and they are about as sure to grow.

[From the same.]

PROPAGATION OF FRUIT TREES.

Messrs. Editors — Being considerably engaged in the cultivation of fruit trees, it may not be uninteresting to the readers of your valuable paper to become acquainted with the different modes of management in the rearing of nurseries. In the commencement of a nursery, too much care cannot be taken in the choice of seed; no seed should be sown, except those procured from large matured fruit. Such selected seed seldom fail of producing thrifty plants. Apple and pear seeds should not be sown till spring; as in autumn sowing, the soil becomes so hard as to cause the plants to come up in a crooked, deformed state. The following mode I have practised for several years with the greatest success. Seed should be sown in beds after the mode of common garden seed. When they are of sufficient size to engraft, they may be taken from the seed bed, their tap roots shortened, and transplanted into a rich loamy soil, in rows four feet apart, and twelve or eighteen inches distant from each other. When this is properly done, they may be grafted close to the ground, after the mode of whip or splice grafting. This mode is practised mostly on small stocks, and succeeds best when the scion and stock are of an equal size.

The scion, which consists of the young wood of the former year's growth, is cut to the length of about four inches. This and the stock are each to be cut in a sloping manner for an inch and a half, and tongued. Tonguing consists in cutting a transverse slit in the middle of the slope of the stock downward, and a corresponding slope in the scion upwards. Both are now to be nicely put together, so that one of the sides at least, if not both, shall exactly meet; and to be carefully bound together with a string of cotton wick yarn, previously dipped into a composition of soft, melted, grafting wax. As soon as the scion and stock are firmly united, the string should be carefully removed to prevent girdling.

The scion to be applied should contain three buds, which will throw out as many small shoots or branches the first season. When the two lower branches are of sufficient length, they may be trained in such a manner as to form two perfect and natural trees, while the top branch forms another tree upon the stock. This mode consists in bending down the two lower branches in the form of a knee or layer, four inches below the soil, leaving the extreme ends out of the ground in a perpendicular position. The knee or bend must be so short as to always crack the bark just below an eye. By this process roots will soon form from the bended part, which will in a few months be sufficient to support the trees. They may then be severed from the parent scion, and transplanted to any other part of the nursery. This mode of proceeding supersedes the necessity of grafting ever afterwards, except when any other varieties are wanted, in which case grafting may be done on trees produced in this way. Trees propagated by layers are much more durable, and are not so liable to defect as grafted ones. S. S. Dimond.

Meriden (New-Hampshire), February 2, 1845.

[From the same.]

CULTIVATION OF CRANBERRIES.

In answer to the inquiries of a subscriber on this subject, we will remark as we have often before, that the cultivation of this plant is not yet reduced to any regular system. They come into some lands and disappear in others unexpectedly and unaccountably, unless it be owing to a rotation of crops by nature, as oaks succeed pines, and the reverse.

If the land be not naturally wet, it is best to prepare for flowing, and there is sometimes an advantage in flowing very wet lands. The water is a protection against severe cold in winter; and by flowing late in the spring, the blossoming may be retarded until the frosty season has passed; and if flowing can be effected rapidly, it may be done any time in summer, when there are indications of a frost.

As to the preparation of the soil, if it be naturally too dry, mud will improve its texture, by rendering it more retentive of moisture; and if the land be naturally wet, and the soil composed mostly of mud or peat, sand will be a good manure. When land has been long in grass, and cranberries have not grown, the cranberry plants would be likely to displace the grasses, aided by the tendency of nature to rotation; but if the ground has been in cranberry vines, and they have disappeared, the land should be ploughed, or in some way inverted, burying the grass completely, and tolerably deep.

In transplanting, take up shovelfuls of the soil at places about four feet apart; and place in the holes shovelfuls of earth taken from a cranberry bog, with the vines therein, and they will soon run and occupy the whole ground.

MISCELLANIES.

THE ZEUGLODON CETOIDES (Owen).

In our July number, we figured and described the teeth of the *Zeuglodon cetoides* of Owen, with the intention of proceeding with the descriptions of other parts as we have prepared them, or as we have disclosed them by the removal of the matrix. Our space is now entirely occupied with other matters, and we therefore transfer that subject to our first number for 1846. We, however, take this opportunity to notice Mr. Koch's specimen, which has been put up in New-York. It is undoubtedly made up in part, and put up erroneously. Thus the paddles are the cast of a chambered shell. A portion of the skeleton, placed for the head, is probably a part of the pelvis, and the lower jaw is extremely defective ; and to ensure a wonderful animal, parts of two or more skeletons seem to have been put together. It is called a Sea-serpent ; but every part of the skeleton shows that it is not a serpent or a lizard, as both these families have vertebræ with a ball and socket joint. The paddles which are affixed show that the owner has but a scanty knowledge of comparative anatomy, inasmuch as they have not the slightest analogy to those structures as they are found in nature.

Our skeleton has the base of the lower jaw ; the anterior terminal portions of both jaws, with teeth ; a portion of a scapula, with the heads of the humerus ; an entire humerus ; a perfect femur ; a distinct portion of a forearm, radius and ulna ; a portion of a pelvis, with about seventy feet of vertebra, which were found in a line together, and numbered as they were removed from the rock. The neck is evidently long, and comparatively slender and serpentine ; yet the jaw and other bones prove it a mammiferous animal.

We informed Mr. Koch that his paddles were parts of a chambered shell ; and that the bone which he called the head, was a part of the pelvis. We make these remarks, not with a view of diminishing the value of Mr. K.'s specimen : what we wish, is that this remarkable relic should be properly put up, and every thing removed which does not belong to it.

AMMONIA DESTRUCTIVE TO INSECTS.

Mr. Jordan, of Brooklyn, having a fine large peach tree decaying, tried unsuccessfully various means, till at last it occurred to him that carbonate of ammonia might prove useful. He immediately inserted small pieces of this substance in the holes made by the insects in the trunk of the tree. The result was the destruction of the insects, and the entire resuscitation of the tree, so that it bare a remarkable quantity of fine fruit this season. The remedy is perfectly rational, and we have no doubt it will prove invaluable.

NATIVE LAMELLAR IRON.

We have in our possession a mass of native lamellar iron, which is quite remarkable. The laminæ are about $\frac{1}{30}$th of an inch thick, and columnar. Sp. gr. 6·58, from one trial of a thin plate. At first we supposed it an artificial production, but we were soon satisfied this opinion was incorrect. It dissolves rapidly and perfectly in warm sulphuric or muriatic acid, disengaging hydrogen. Ammonia precipitates the peroxide. It is attracted strongly by the magnet : streak and lustre metallic. But its laminæ are only slightly flexible, and it is entirely destitute of malleability. On being heated, it is converted into the black oxide ; and we were entirely unable to flatten it under the hammer when red hot, although it is apparently pure iron. We submitted a specimen to the examination of Dr. Beck, with the results we had previously obtained. We hope he will give it a thorough examination, for we consider it one of the most curious and interesting varieties of iron that has ever fallen under our notice.

OXIDE OF COPPER.

Fine octahedral oxide of copper, associated with native copper, has been put into our hands by Dr. Eights : it was taken from one of the Lake Superior mines. This variety is rare, we understand, in the copper region.

VEINS OF HEMATITE.

We discovered, last July, in Adams (Massachusetts), veins of this substance in the granular quartz. They are in connection with that curious mass of quartz breccia which lies adjacent to the base of the Green mountains. It has been an interesting inquiry, how the granular quartz was broken into those sharp angular pieces. It now appears to us that the sudden application of heat may have shivered entire strata, accompanied by an ejection of melted oxide which flowed into the broken mass and cemented it together. Whether so or not, we were much gratified with having discovered that the hematite of the Taconic system exists in veins in connection with the breccia spoken of above.

CONGLOMERATE OF THE GRANULAR QUARTZ.

Beds of conglomerate exist also at the base and upon the tops of the Green mountain range, which may be traced within a few feet of granitic beds. Thus upon the top of Oak hill, two miles and a half northeast of Williams College, this interesting mass is well developed. This fact establishes what we have long contended for, namely, that the granular quartz should be separated from the Gneiss and Mica slate systems, or from the Primary system.

[From the Edinburgh Journal.]

A FARM CULTIVATED BY THE INSANE.

In our former notices of the systems employed in France for the amelioration and cure of insanity, we pointed out that the occupation of the patient in various useful employments was amongst the most successful modes of treatment. When the increase of patients in the two asylums, the Bicêtre and the Salpétrière at Paris, demanded further accommodation, the unfortunate inmates were employed to assist in the new buildings; and with results extremely favorable to themselves. When these works were finished, the medical directors of the hospital dreaded the effects of a relapse into inactivity on their patients, and employed them in the fields and grounds adjoining the two edifices. So active were the laborers, and so delighted with their work, that they did everything which could be done in a very short time, and want of work was again threatened. To avert it altogether, M. Ferrus, one of the physicians of the Bicêtre, conceived the idea of obtaining a farm for the permanent employment of his willing laborers. With this view he applied to the government; but as there were no funds at the disposal of the ministry, which could be applied to the commencement of such an undertaking, and as every acre of cultivated ground near Paris was of course occupied, his scheme seemed at first hopeless. Still the benevolent projector was not to be daunted, and as he could not find a cultivated spot of ground fit for his purpose, he looked out for a barren one.

After many inquiries and surveys, M. Ferrus fixed upon an estate situated about two miles from Bicêtre, near the *Barrière de la santé*. It was the most wretched piece of ground imaginable. So entirely was it covered with stones, that there was not an acre in the whole tract which seemed capable of being successfully cultivated; and though formerly occupied by enterprising farmers, it had long been abandoned. A homestead which they had built was in ruins, and the barns and sheds in the last stage of decay. Upon this unpromising farm M. Ferrus fixed; and by the end of 1832, several of the Bicêtre patients were set to work to enclose about ten acres of the least barren portion. This enclosure was levelled with such success, that its first year's produce was sold for about £57, nearly ten pounds more than the annual rent of the entire farm. Encouraged by this result, M. Ferrus applied to the *admistration des hospiteaux* to have the patients transferred from the Bicêtre altogether, that they might live entirely on the farm. The ruined house, and the want of funds at head-quarters applicable to its repair, seemed at first powerful objections to this measure; but M. Ferrus, having good workmen at his command, overcame them. He got the government to supply tools, as it had previously done for the farming operations; the homestead was soon put in a habitable state by those for whose occupation it was designed, and, in 1835, was tenanted by a number of the insane The farm is now regularly organized; an experienced agriculturist, M. Beguin, was engaged to direct and superintend the operations of the laborers; the whole land belonging to the estate was taken into the original enclosure, and each succeeding year has been crowned with not only an increase of agricultural produce, but with an increase in the list of cures amongst the patients. The only inconvenience the managers of the farm have to contend with, arises from an accidental want of employment which may happen. So anxious are the majority of the unfortunates for work, that they become troublesome when they do not obtain it. This was most felt in the winter, when farming operations are for a time suspended; but to fill up this blank space, the farmers at St. Anne are annually set to bleach the whole of the linen used in the two hospitals; a task which they perform cheerfully and well, saving to those establishments upwards of four hundred pounds per annum.

Besides the excellent effects which have been produced on those patients employed and residing on the St. Anne farm, it has been found of the utmost benefit to less convalescent inmates of the insane hospitals. By allowing them at first to see the others at work, they soon get a desire to join in it, which, when the medical officers deem them well enough, they are allowed to do. In short the effects of such healthful employment as that necessary to the culture of land, has been found of the utmost benefit to all classes of insane patients. The success of the French farm will, we trust, encourage the directors of our native lunatic asylums to adopt similar methods of cure; which, properly managed, appear to be as profitable as they are efficacious.

THE YOUNG PHILOSOPHER.

Children, says Professor Olmsted of Yale College, in the preface to his Rudiments of Natural Philosophy and Astronomy, are naturally fond of inquiring into the cause of things. We may even go farther, and say that they begin from infancy to interrogate nature in the only true and successful mode — that of experiment and observation. With the taper, which first fixes the gaze of the infant eye, the child commences his observations on heat and light. With throwing from him his playthings, to the great perplexity of his nurse, he begins his experiments in mechanics, and pursues them successively as he advances in age, studying the laws of projectiles and of rotary motion in the arrow and the hoop, of hydrostatics in the dam and the water-wheel, pneumatics in the windmill and the kite. I have in my possession an amusing and well executed engraving representing a family scene, where a young urchin had cut open the bellows to find the wind. His little brother is looking over his shoulder with innocent and intense curiosity, while the angry mother stands behind with uplifted rod, and a countenance which bespeaks the woe that impends over the young philosopher. A more judicious parent would have gently reproved the error ; a more enlightend parent might have hailed the omen as indicating a Newton in disguise.

MORAL POWER OF A KIND SPIRIT.

One of the most pleasing acquirements that adorn mankind, is affability. This one virtue calls into action many others, which, were it not for its influence, would probably be dormant. But of itself in its own intrinsic worth, it assuredly is the certain avenue of success in gaining the esteem and respect of others. Man's chief aim through this transitory life is happiness ; and the safest and shortest method to obtain this blessing, is by the strict cultivation of amiability of manners and softness of temper. How frequently do we hear the morose and sullen acknowledge that in their intercourse with man, an impression exists that they had dealt with a gentleman, because he was amiable and gentle ; and yet it does not follow that every one who shows forth this amiableness is a gentleman, but he can be no gentleman who does not possess it. In all walks of society, this gentleness of temper and of conduct sheds its beloved influence upon those with whom it comes in contact ; for the truth of Holy Writ assures us that a " soft answer turneth away wrath :" and where, I would ask, is that being, young or old, that hath not experienced this truth ? And does not this gentleness of temper ensure to their heart calmness of mind, and with it does it not command the respect of others ? This is undeniable ; for, gentle reader, have you not heard the remark of the ungoverned, " I could not say another angry word to him, he was so mild, so gentle in his speech and manners." Oh how insignificant does such an acknowledgment make the morose appear in comparison with this heaven-like ascendancy over our faults !

[From the New-York Express.]

THE FREED BIRD.

Among the superstitions of the Senecas, is one which, for its singular beauty, is already well known. When a maiden dies, they imprison a young bird until it first begins to try its powers of song; and then loading it with kisses and caresses, they loose its bonds over the grave, in the belief that it will not fold its wing or close its eye until it has flown to the spirit land, and delivered its precious burden of affection to the "loved and lost." It is not unfrequent, says the Indian history, "to see twenty or thirty birds loosened at once over one grave."

We find the following beautiful stanzas, founded on this legend, in an exchange paper. It is true poetry, and for such we have always a welcome and a corner.

Speed away! Speed on the errand of light!
There's a young heart awaiting thy coming to-night:
She will fondle thee close; she will ask for the loved,
Who pine upon earth since the "Day-Star" has roved:
She will ask if we miss her — so long is her stay.
Speed away! speed away!

Wilt thou tell her, bright songster, the old chief is alone;
That he sits all the day by his cheerless hearthstone;
That his tomahawk lies all unnoted the while,
And his thin lips wreathe ever in one sunless smile:
That the old chieftain mourns her, and why will he stay?
Speed away! speed away!

And, oh! wilt thou tell her, blest bird on the wing,
That her mother hath never a song to sing;
That she standeth alone in the still quiet night,
And her fond heart goes forth for the being of light
Who had slept in her bosom, but would not stay.
Speed away! speed away!

Go, bird of the silver wing, fetterless now:
Stoop not thy bright pinion on yon mountain's brow;
But hie thee away, o'er rock, river and glen,
And find our young "Day-Star" ere night close again.
Up! onward! let nothing thy mission delay!
Speed away! speed away!

INDEX.

DESCRIPTION OF THE PLATES.

PLATE IV.

Exhibits the osteology of the Mastodon entire, with the tusks as found on the same skeleton.

PLATE V.

WHEAT INSECTS, AND THEIR ANATOMY.

Fig. *a.* Kernel of wheat, with its husks, and the worms feeding upon its pulp.

Fig. *b.* Pupa greatly magnified.

Fig. *c.* Wheat-head, with the chaff bent down by the yellow-bird, in getting at the worms leaving the grain, as at * * *.

Fig. *e.* Male antenna.

Fig. *f.* Ovipositor when drawn out, with three segments of the abdomen.

Fig. *g.* Leg of the insect, showing its joints, greatly magnified.

Fig. *h.* Female antenna magnified.

Fig. *i.* Insect in its natural size.

Fig. 1. Clear-winged wheat-fly.

Fig. 2. Spotted-winged wheat-fly.

Fig. 3. *Cecidomyia tergata.*

Fig. 4. Male of the Clear-winged wheat-fly.

Fig. 5. *Cecidomyia thoracica.*

Fig. 6. Insect at rest, with its wings in their natural position.