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Devoted to Agriculture, Horticulture, and the Household Arts.

Agriculture is the nursing mother of the Arts. [XENOPHON.	Tillage and Pasturage are the two breasts of the State.—SULLY.

J. E. WILLIAMS, EDITOR. AUGUST & WILLIAMS, PROP'RS.

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Fertilizers.

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[*Abridged from Patent Office Report of* 1859, *and divided into three parts*—ED. SO. PLANTER.]

PART II.—LIME.

[CONTINUED FROM AUGUST NO.]

Next to manure, the most common fertilizer used throughout the United States, wherever it can be procured, is lime, either burnt from limestone or oyster shells, or in the state of a sulphate commonly called gypsum or plaster of Paris. It appears to have been used from remote antiquity, and there are few soils which are not benefited by its application. It does not seem to be of very great importance whether it be added to the soil in the shape of lime direct from the kiln, slaked, or in the form of carbonate, as it occurs in chalk, marble, or marl. The essential point is extreme fineness. The finer it is, the more easily it enters into combination and produces its effect. This purpose is always better attained by burnt lime, whatever it may be burnt from, whether limestone, marble, or shells. Lime has a great affinity for carbonic acid, which is one of the ever-present constituents of the atmosphere; so that, upon the exposure of caustic lime, it soon becomes carbonated. Caustic, or fresh-burned lime, when put in contact with organic matter, either animal or vegetable, causes immediate action and rapid decomposition. Corbonate of lime is less active; and although it has lost its caustic power by the absorption of carbonic acid, still it produces important changes in soils. As we have seen, soils are mixtures of salts and organic matter, containing air and water, in their pores. Here lime acts, decomposing the organic matter, and freeing carbonic acid. It again acts upon the alkaline and earthy salts, decomposing them, and enabling them to form such combinations as the plants require.

Chemistry has rendered important services to agriculture in many ways; none more than by analysis of soils; not by informing us of the difference between poor and rich soils, nor by pointing out the specific wants of the farmer, or the particular applications to each soil so hoped for by him; but by showing us that certain combinations exist in the soil; that a simple silicate of alumina is barren, experience proving that the mere application of manure to it will not give fertility; though, lime being added on common clay, a double silicate of alumina and lime will be found, which in the course of time, with manure, becomes fertile. Lime added to a clay soil destroys that sticky, waxen consistence that makes it so difficult to work, and prevents the baking and hardening so fatal to vegetable life. The addition of lime is not so beneficial from its mere presence in a soil, for generally there is enough for plant food; but its good effect is chiefly owing to the chemical changes it causes among the substances forming and existing in the soil.

It has been long known that a mixture of lime, earth, and rich organic matter, such as manure and decomposing vegetable substances, causes the production of nitric acid. Such a mixture is used in many parts of the world to produce saltpeter, which is a nitrate of potash. It is collected from the earthy mixture by dissolving it in water, which is evaporated, leaving the salt in crystals. The same thing takes place in the earth; when lime is added to it, nitric acid is formed, which combines with the alkalies and earths in the soil, forming nitrates. These are all excellent fertilizers.

The exact manner in which lime acts upon the soil is not entirely understood, but that it does produce a wonderful effect, and a very beneficial one, is well known. The limestone formations in the United States are of very great extent. Our best wheat soils overlie them. By analysis, we find no carbonate of lime in these limestone clays; yet it does not follow that lime is not there in some shape. Accordingly we discover it in the state of phosphate and silicate. Upon these limestone soils lime has been largely applied, and the result has been excellent. We owe much to Mr. Edmund Ruffin, of Virginia, for his practical application of lime, and for his publications in regard to it. By his efforts in this respect a revolution has been created in agriculture throughout the tide-water regions of Viriginia.

Some of the soils in the United States, overlying limestone rocks, contain carbonate of lime, while others are formed of a decomposing limestone, or, as it is called in Alabama, "rotten limestone." Here, of course, we have lime largely in the soil. This is not the case with soils overlying the blue limestone of New York, Pennsylvania, Maryland, and Virginia. The composition of these soils shows a different origin. The numerous and large springs throughout this region form a great source to the soil of carbonate of lime. This is insoluble; but the bi-carbonate, in which the lime has a double quantity of carbonic acid, is soluble and easily gives off a part of its carbonic acid, returning to a carbonate, and to an insoluble state. The springs bring up the lime in solution, in a state of bi-carbonate, which, upon exposure to the atmosphere, loses a portion of its carbonic acid, and is deposited in the earth in the shape of limestone. The most familiar example of this occurs in a tea-kettle, which soon becomes incrusted with limestone, if limestone water be used in it, from the cause we have mentioned above.

By far the largest portion of the soils east of the Alleghany and Blue Ridge are formed from the older and crystaline rocks, and consequently contain less lime than soils of a different origin, there being neither limestone nor springs from limestone rocks to impart it to them. All these soils, without exception, would be benefited by the application of lime. When using the word lime, we would not wish to be understood as meaning the result of burnt limestone or shells only, but in whatever shape it may be found, as marls, &c. Lime, added in small quantities annually, would seem, from experience, to have a better effect than when put on the land heavily at once. It is stated, on reliable authority, that so small an amount as a bushel to the acre has produced good effect. In some parts of the country it is customary to add burnt lime in great quantities, as high as two hundred and more bushels per acre. Utter sterility for sometime has been the result of such profusion. Prudence and economy would suggest smaller supplies. Some care should be used in selecting the limestone from which to make lime, as it is seldom pure, often containing large portions of magnesia and sand, and always more or less phosphate of lime. The magnesia, if not in too large quantities, can hardly be objectionable. The phosphate of lime is very desirable, and too much of it can scarcely be applied. The sand in limestone might be objectionable on the score of economy, otherwise its use on a stiff clay would be beneficial. Oyster shells might naturally be expected to contain phosphate of lime in considerable quantity, and these are, perhaps, the best materials from which to make lime for the farm.

It must be borne in mind that lime of itself will not give fertility to soil. The materials upon which it can act must be present, or its greatest effect will be lost. There must be organic matter in the soil, either as decomposing manure or as vegetable mold, upon which it can operate. Lime brings into play the constituents of the soil, and enables the plant to feed on them, while, as a salt, it forms the food of plants, yet its great effect is upon the different parts of the soil itself. The richer this may be, the better will prove the effect of lime; the poorer the soil, the slower and worse the effect. It is owing to this cause that lime has been condemned in many cases, it having been put upon poor soils, where there was nothing for it to operate upon. The effect of lime, it will be observed from what we have said above, is long continued. Its benefits can be seen for crop after crop. As long as there is organic matter in the soil, it slowly decomposes it, forming new combinations and fresh food. Those results which we produce in the laboratory, fall far short of the endless changes going on in the earth. He who undertakes to explain every operation of Nature will fail most lamentably. There are causes at work we but little understand. Who can explain vitality? It has much to do with the marvelous actions and reactions going on in the earth. By it inert matter becomes part of life, fulfils its functions, decays, forms new life, and thus runs on in an eternal round.

MARL.

Next to lime, marl has the most extensive use, as a fertilizer, in the eastern part of the United States. It has been found from New York, along the coast, to the Gulf of Mexico. We have heard of none between the Rocky and Alleghany mountains, unless it might be on the Gulf of Mexico. The composition of marls is various, most of them abounding in carbonate of lime. To this they owe a great cause of their usefulness. The word marl has various significations in the United States. In New Jersey, the green sand is called marl, while on the Chesapeake the calcareous earth, so largely used there, bears the same name. In Europe, the word marl would appear to be applied to substances as often without lime as with it, and not by any means confined to a class of calcareous earths. The application of marl, or a variety of substances under that name, is of quite ancient date. Marling was practised by the Greeks and the Romans, and Pliny in his Natural History, evidently alludes to and mentions chalk, under the head of marl. He says the Gauls and Britons sunk shafts to the depth of a hundred feet for the extraction of white chalk. It was used to scour silver, and is the whiting of the present day. The same substance, on being put on land, produces fertilizing effects for eighty years. In England and on the continent, chalking and marling are synonymous terms; and it it is probable that substances of an unctuous, soapy feeling came into use because they were supposed to possess properties similar to chalk.

The pure green sand marl of New Jersey, according to the analysis of Mr. Henry Seybert, contains no lime. He obtained as follows:

Silica,	49.83
Alumina,	6.00
Magnesia,	1.83
Potassa,	10.12
Water,	9.80
Protoxyd of iron,	21.53
Loss,	0.89
	100.0

But the substance varies very materially, as is shown by the following analysis, copied from Prof. Cooke's Report on the Geology of New Jersey. We give the analysis with the decimals abridged from two figures to one:

	1	2	3	4	5	6
Protoxyd of iron,	8.3	16.8	21.3		14.9	
Alumina,	6.1	6.6	8.0			
Lime,	2.4	12.5	1.0			
Magnesia,	.4	2.6	2.0			
Potash,	2.5	4.9	7.1	7.1	4.3	3.37
Soluble silica,	20.2	31.2	45.9			
Insoluble silica and sand,	49.9	5.6	4.0			
Sulphuric acid,	.9	.6	.4			
Phosphoric acid,	1.4	1.1	1.3	.2	2.6	6.9
Carbonic acid,	.2	9.3				
Water,	7.1	8.9	8.1			
Soluble in water,	1.9	1.4	1.1	1.1	1.9	4.7

Marl from the State of Delaware, according to Mr. Booth, does not differ very much from that of New Jersey. But in Delaware there are two varieties, proximate one to the other, and one of which contains as high as 25 per cent. of carbonate of lime. Mons. P. Berthier, professor of Docimacie, in the royal school of mines, of France, has analyzed several varieties, which are more or less analogous in composition to the green sand of New Jersey. The bluffs called Cape La Hève, near Havre, in France, are mainly formed of carbonate of lime, through which are interspersed nodules and grains of a dark-greenish substance, which yielded:

Silica,	50.00
Protoxyd of iron,	21.00
Magnesia,	7.00
Alumina,	11.00
Potassa,	10.00
	99.00

The grains of chlorite are found isolated and distinct in the limestone at Havre. Analysis represents the composition of those grains free from the mass in which they occur. The analysis of Mr. Seybert exhibits, as I have understood, the average of the deposit as it came from the ground. If it be otherwise, and the particles of chlorite were selected previous to analysis, the green sand of New Jersey would be infinitely less valuable as a fertilizer than is indicated by the above analysis. In other parts of the United States, other substances of an entirely different composition have received the name of marl, and been applied to the soil with marked advantage. Such a substance is found in the environs of Pendleton, in South Carolina, where it has attracted attention. It is a variety of kaolin, or decomposed feldspar, one of the constituents of granite, containing little or no lime, but sometimes as high as 17 per cent. of potassa. At Fort Hill, the residence of the late J. C. Calhoun, this substance was found in digging a well. It was used in dressing the lawn in front of the dwelling, where its fertilizing effects are manifest to this day in a luxuriant sward, contrasting vividly with the surrounding vegetation on which the application was not made. In 1837, some years after the experiment, it was pointed out by Mr. Calhoun as an illustration of the adaptability of that country to produce luxuriant grass, if the soil were properly treated.

We speak of marl as always containing the calcareous principle, in which sand, clay, or carbonate of lime may predominate, it accordingly receiving the appellation of sandy or clay marl, as either principle may be in excess. Few marls are free from admixture with the above named substances, and sometimes others are found, such as oxyd of iron, sulphuret of iron, manganese, sulphate of lime, &c. The majority of our soils east of the mountains, originate from the old granitic schistose and sandstone rocks, which are wanting in the proper proportions of lime to make them as fertile as those soils having a different origin. Animals fed on the grass grown upon limestone land, or those artificially limed, thrive much better than when pastured upon lands of a different character. It is also known that wheat weighs heavier, has a much better appearance, and is invariably preferred by millers when grown upon calcareous soils. It is, then, of importance to the agriculturist that he should possess a knowledge of the presence or absence of lime in his soil, and how to make examinations, both qualitative and quantitative, for that substance or minerals supposed to contain carbonate of lime.

No mineral varies more in its physical character than marl. It occurs of all colours, from black to white; and frequently in the same bed you have a variety of tones, as there may be present more or less oxyd of iron; or according to the state of oxydation of that metal, you may have the red, yellow, brown, blue, and the different shades which a mixture of these would create when variously mixed with white, black, &c. Sometimes it is smooth and without grit; at others it has a coarse grain, with crystals of other mineral substances disseminated, such as sulphate of lime and quartz. Chalk is a marl, through which nodules of flint occur, sometimes in large quantities, and sometimes the carbonate of lime disappears altogether, and is replaced by silicious matter. Very often the bed may be wholly composed of shells, broken or entire, or even visible to the naked eye, but revealing through the microscope the remains of minute organisms forming the complete mass. It is sometimes soft and unctuous to the touch, friable, or hard. But it has one general property, of falling into powder when exposed to the air, or forming pasty mud when saturated with water, and acts very like lime in the process of slaking, without giving off heat.

A marl is valuable in proportion to the amount of carbonate of lime that it contains. Take a piece of the substance suspected to contain the carbonate, large as an acorn, throw it into a tumbler or wine-glass, and cover in with water; after the air has escaped from the interstices, add a few drops of any acid, say nitric or muriatic, or either of these being wanting, strong vinegar may suffice; then, if there should be a disengagement of gas, or effervescence, it is pretty sure evidence of the presence of carbonate of lime. * * * * *

In deposits of marl there are frequently different layers, varying in appearance, thickness, and composition. The lower strata are often richer in lime than the upper. An agrillaceous layer sometimes overlies one that is sandy or stiff. Sea-sands are, in many cases, applied to the soil with great advantage, and it is not surprizing, for they are frequently composed of minute fragments of shells, comminuted corals, and the remains of minute organisms, which are fuond inhabiting the ocean—Nature's great reservoir of life.

But the action of marl cannot be entirely owing to the carbonate of lime. There are effects due to other causes, and it would be strange indeed, considering the origin of these fertilizers, if they did not contain some of the more evanescent principles of organic life. Mr. Payen and Boussingault, both celebrated chemists, instituted a series of inquiries into the composition of marls, from different localities, and found nitrogen in all. "It were therefore very proper, in analyzing marls, chalk, &c., to have an eye to their organic, or azotic, as well as to their mineral constituents. There can be very little question of the azotized elements being at the bottom of the really wonderful fertilizing influences of the marls of certain districts."—(*Boussingault, Rural Economy.*)

It would be still more surprising if a substance less ephemeral in its nature, and not less important, should not be found more constantly in limestones and marls than former analysis has shown. Phosphoric acid at all times complicates analysis, is difficult to appreciate correctly, and has doubtless been largely overlooked. But there is higher evidence of its almost universal presence than chemical tests, for wherever organic remains are found, it is a sure indication of that singularly interesting substance, phosphorus, to which we attach as important a role, if not a higher one, than that atributed to nitrogen, by the celebrated authorities mentioned above.

Marl, after extraction from the pit, should be exposed as long as possible to the action of the atmospheric agents. A summer's heat and a winter's cold, previous to spreading, making its immediate action manifest; but its durability is dependent upon its contents and the quantity applied. According to Mr. Parvis, who has written an interesting and useful paper upon marl, the quantity to be applied depends upon the quantity of lime already existing in the soil and the richness of the marl in lime. He says that any soil which contains less than nine to ten per cent. of lime may receive a dose, or successive doses, until they are brought up to that point. Lord Kames mentions a particular instance of the continued beneficial effects of calcareous manure for one hundred and twenty years, and Johnson quotes the words of an intelligent and experienced farmer, that certain lands in Scotland "would never forget an application of forty to sixty bushels of lime to the acre."

Lime appears to change the inert organic matter in the soil, and give durability to their action far beyond what would have been the case without the presence of that mineral. It also changes the relations between the other mineral constituents of the soil, and is an essential element of plant food; but there are other substances quite as necessary to healthy vegetation. It follows, then, that whoever may expect to harvest large crops immediately from the addition of lime to poor land will surely be deceived. The proportion of marl or lime to be added to a soil should be in accordance with the amount of organic matter already existing in it, or that may be contributed; in other werds, the lime should progress *pari passu;* and by following such a course, the land may be brought to a state of permanent fertility, to which it never could be carried by farm-yard manure alone. What would be an over-dose of lime to one field would be a light dressing for another. An over-dose of marl or lime may altogether prevent the appearance of vegetation, or cause a sickly growth. Mr. Ruffin says that manure is a remedy for such effects.' Interesting and important as the subject certainly is to the farmer, the nature of this article will not permit us to extend our observations further, and the reader is once more referred to Mr. Ruffin's work on calcareous manures, in which will be found much detail not written elsewhere.

Limestone is one of the principal rocks which forms the solid crust of the globe. It has a large development, and is intercalated with the primitive rocks. It occurs there in a saccharoidal form of different colours—grey, blue, red, &c., but never black. A notable fact is, that no fossils of any description have ever been discovered in primitive limestone. It is often found schistose in its structure, from a mixture with other rocks, particularly mica schists. As we rise in the geological series, the limestones preponderate, and become by far the most important of rocks. Instead of being subordinate and alternating with others, they now form independent developments, of vast extent, constituting mountain ranges. The character of the rock is also changed. It occurs of all colours, from black through every shade to white. The mixture of foreign minerals is less notable; but there the first appearance of organic remains is a most significant and interesting fact. At times, no fossils are to be found; and one may travel for miles without meeting with a single specimen; when, all at once, they occur in prodigious quantities. The fossils of this formation are all characteristic; and without giving a detailed list, I will mention Orthoceratites, Spiriferes, Encrinites, and Trilobites. In the secondary formation, the carbonate of lime may be said to constitute the almost entire series of superpositions. The secondary formations are divided into several series known by different names in various parts of the world. The lowest of these formations immediately overlying the intermediary is called Zechstein by the Germans, and occurs compact of a greyish black colour, sometimes bituminous, and gives off a fetid odour when rubbed or receiving the shock of the hammer. It is characterized by certain fossils, and is separated from the formations immediately underlying, as those overlying, by arenaceous sandstones of a peculiar nature. The red marl or great mushelkalk limestone is the next series as we travel up. In general this stone is found less highly coloured, and contains fossils, all of which differ from the Zechstein, and occur in much greater abundance. In travelling over Germany we have often spent hours in studying this interesting rock through its fossils, which would show themselves at different localities on our journey. There is one in particular, the Encrinites Liliformis, of singular beauty. They are rarely found entire, but when they do so occur they cannot fail to excite the admiration of the observer. Rarely as the entire plant is found in one specimen, so common are parts of it, that the rock at times would appear to be formed of them.

A third deposit now occurs, and is known in England by the name of Lias, also characterized by particular fossils; and here, for the first time, we see Belemnites, and Ammonites, and a large number of shells, peculiar to that formation. Another deposit, which is known as the Jura limestone in France, oolite and coral rag in England, and which subdivides again, is, with its antedivisions, distinguished, the one from the other, by the fossil remains found in them. In the upper part of this division we have certain varieties of marl, such as that at Havre, in which the chloritic grains occur, as analyzed by M. Berthier; and in England, at Purbeck and Portland, are found marls, where fresh water shells show themselves for the first time. The fifth deposit of the secondary series, separated from the last described by iron sands, is the chalk formation, which may be divided into green sand and true chalk. These formations contain fossils which are characteristic and such as are found nowhere else.

The next in order, and superimposed upon the preceding, is the tertiary formation, so interesting for the number and character of its organic remains. Around the city of Paris, the student has an opportunity of studying this formation perhaps better than at any other locality. Montmartre, so celebrated for its geology and paleontology, as well as for other reasons, in really classic ground. The remains of extinct animals, buried from incalculable time, were frequently extracted by the workmen engaged in quarrying out material for construction. From the study of such remains the genius of Cuvier opened a new creation. Fragments of bones of extinct animals, that were gazed upon by the curious, and received no other explanation than "*lusus naturæ*," were classified, each bone to its proper place; and each animal according to its habits, which were pointed out by its teeth or its osteology, was assigned its appropriate position in the gradation of animated nature. Though extinct, their general habits are known as certainly as if they were domesticated under man, and belonged to the present time. Science has placed a wreath around the brow of Cuvier, that will endure to his honour so long as civilization shall be in the ascendant.

The first plaster of Paris used in America for fertilization came from the hill of Montmartre, and was imported under the auspices of Franklin. Above the tertiary formations are others of a much more recent date, and now forming under our eyes. Many of these are mainly composed of limestone, made up from the destruction of other calcareous rocks. Along our sea coast such rocks are forming, and even furnish building material. Tufaceous deposits are making in our valleys, by the deposition of carbonate of lime from water issuing from limestone rocks. Immense beds of shells, such as are living in our waters, are found along our coast. In Prince George's county, Maryland, the marl-beds are well known, and the celebrated lands of that region owe their fertility to these remains of a former life. Among these fragments, bones and teeth of animals are not uncommon; and whole skeletons have been disinterred and set up to be wondered at. The remains of the mastodon, (an animal of the elephant tribe, but much more gigantic,) are frequently met with, and an almost entire specimen was taken up in the interior of the State of New York. Sharks' teeth are also common, sometimes of enormous size. We have one in our possession, taken from a bed in Prince George's county, that measures about four inches in breadth at its base, and nearly five inches in length. It is in perfect condition, its cutting edges as finely and sharply serrated as if just taken from the monster's mouth.

Nor is the limestone formation of our continent confined to the recent deposits of which we have spoken. The blue limestone formation, so celebrated for its excellent wheat lands in Pennsylvania, Maryland and Virginia, continues through Georgia, comes to the surface near Clarksville, in Habersham county, and extends to the Island of Cuba, where we have traced it again for miles.

The limestone lands of the State of New York are celebrated for their fertility, and the magnesian limestone of the great West has prodigious extension.

In closing our observations upon lime, we will remark that of all mineral substances it is among the most extensively diffused, so much so that it would be impossible to find a soil without it. An amateur asked us if we had ever found lime in the soil on which we lived; he thought it absent. We answered that, even if we had failed to detect it with the aid of reagents, there was higher evidence of its presence, which could not be contradicted, namely: the bones of the animals reared upon the place, the eggs of our hens, and the houses which snales carry upon their backs.

Those who desire details upon the green sand marl of New Jersey and Delaware, will do well to consult the reports of Messrs. Rogers and Booth; the former was charged with the geological survey of New Jersey, the latter with that of Delaware.

PLASTER, OR GYPSUM.

It is probable that the "marl" of the ancients was plaster of Paris, or gypsum, but it was not until near the close of the last century that its incontestible utility became known; since that period it has become almost a necessity; nor is it surprising that such should be the case, when we consider its efficacy on certain crops, the small amount required to produce a great increase, and the facility with which it can be procured and prepared. The first authentic experiments of which we have record were made by a German clergyman, named Meyer. These were repeated in France, when it soon grew into extensive use. Sulphate of lime, as its name indicates, is composed of sulphuric acid, lime and water.

Sulphuric acid,	46	=100
Lime,	33	
Water,	21	

It is usually soft, and may be scratched with the finger nail. When pure, it is generally of a whitish colour, but according as it is found mixed with foreign matter its colour varies. It assumes a variety of forms, compact, granular, fibrous, pulverulent, crystaline, &c. Its crystals are sometimes perfectly limpid. Gypsum is plentifully and widely dissiminated throughout the crust of the globe, and is confined to no age or particular formation. In some cases it would appear to owe its existence to the decomposition of the sulphuret of iron in contact with limestone or, again, to the action of sulphurous vapours upon that rock. It is not often fossiliferous; but that which is found at Montmartre, in the environs of Paris, is an exception. At that locality the remains of mammiferous animals, of birds, and reptiles, are very common. In certain formations the sulphate of lime is usually found accompanying common salt. It is also a constituent of the marls, which occur along our sea-coast, but only to a limited amount, comparatively. In the State of New York it is found in large quantities, and also in Nova Scotia, whence it is imported into the United States, forming by far the greater portion of that which is used by the farmers of the Atlantic shore.

Notwithstanding all the experiments that have been made, and all that has been written upon the subject, our knowledge of the action of gypsum is limited and very unsatisfactory.

Sir Humphrey Davy analyzed the ashes of clover, and concluded, from the presence of sulphate of lime, that the application of gypsum acted as direct food. But subsequent investigations show that the amount of sulphate of lime in the ash of clover, grown upon gypsumed land, was not greater than the quantity of the same salt, found in the ash of clover, grown on ungypsumed land.

Professor Liebig explains the action of gypsum, as a means through which ammonia is presented to the plant. It is known that ammonia and nitric acid are found in the atmosphere, and that salt and carbonate of ammonia are brought down by rains. That fact may be easily verified by evaporating snow, or rain water, to which a few drops of muriatic acid have been added; crystals of muriate of ammonia will be found. Indeed, without consulting the agency of electricity for the formation of ammonia, it is a natural consequence of the decomposition of animal matters, which is ever progressing upon the surface of the globe, and many plants emit pungent odors, apparently containing more or less of that alkali. According to the eminent professor, the action of gypsum would be confined to the absorbtion of that gas, to be held in readiness, according to the wants of the plant. But his ingenious theory is no less satisfactory, for it is stated that gypsum has no action whatever on the natural gases, which are stimulated by organic manures. Nor does it appear, from careful experiments made by M. Boussingault, that gypsum has the least action upon wheat, oats or rye, upon which it is known that nitrogenous manures act most favorably. Rigaud de Lisle, in a paper read before the Paris Society of Agriculture, in 1843, maintained that gypsum only operates upon vegetation grown upon soils without a sufficient amount of carbonate of lime, and his declaration is borne out by the practice in Flanders of applying slaked lime, instead of gypsum, with equally good results. We have heard the same opinion expressed by practical farmers, who knew nothing of the discussion. Having limed their lands to the full requirement, they would look upon the application of plaster as a useless expense.

SULPHATE OF BARYTES.

Another assertion, which has its advantages, gives the entire credit of the action of gypsum to the sulphuric acid which it contains; and this appears to be supported by the fact that the addition of the sulphate of barytes is followed by as strongly marked results as those that are derived from the application of the sulphate of lime. Experiments were made some years since in Rockbridge county, Virginia, by Dr. Barton, upon whose farm a deposit of the sulphate of barytes was found. It was ground and applied. We are informed by an intelligent observer that the effect was manifest five years after. A paper was written at the time, and published in one of the agricultural periodicals of Virginia. We have not had access to the article, but Dr. Barton received the award of a gold medal for his investigations. Should the usefulness of sulphate of barytes be confirmed, it will be a notable and important addition to the list of fertilizers. It is sometimes called *heavy spar*, owing to its specific gravity, which is almost double that of gypsum or the sulphate of lime; the first being 4.7, and the latter 2.72. Generally it is found white, or reddish, yellowish white, grey, and even black, compact, granular, crystaline, &c. Insoluble in water, and when decomposed, as may be done by calcining together powdered charcoal, or sugar, starch, resine, &c., with sulphate of barytes, the barytes will dissolve in nitric or muriatic acid, from which it will always be precipitated by the addition of sulphuric acid. It will be recollected that the sulphate of lime is sensibly soluble in water, more so than lime, for when sulphuric acid is added to limewater no precipitate is thrown; whereas, when a few drops of sulphuric acid are added to a solution of the nitrate, muriate, or to the oxyd of barytes in solution, a white precipitate never fails to fall. The carbonate of barytes may be easily distinguished from the sulphate by its effervescing; as it does slowly on the application of nitric acrid. It is composed of—

Sulphuric acid,	34.37	} = 100
Barytes,	65.63	

It is, however, often found mixed with different substances, such as sulphate of strontian, sulphate and carbonate of lime, silex, oxyd of iron, and alumine. It occurs in veins in the primitive and secondary rocks, and is most always found in veins of lead, copper, silver, and mercury; in the metalliferous regions of Europe, in the Hartz, Saxony, Hungary, Almaden, in Spain; in the United States, in New York, Connecticut, New Jersey, Pennsylvania, Maryland, Virginia, Missouri, &c.

Owing to the great analogy that exists between the characters of the salts of strontian and those of barytes, it would be surprising if the fertilizing properties attributed to the one were not common to both, particularly if the acid were found to be the active fertilizing principle as well in the sulphate of lime as that of barytes; other sulphates, such as the sulphate of iron, (green vitriol,) when much diluted with water, without the presence of lime, have extraordinarily advanced the growth of plants, including beans, potatoes, rye, Indian corn, carrots, &c. Weak sulphuric acid has also a favorable effect when applied to clover, but in both cases it may be argued that the sulphate of iron, (which is soluble,) and the sulphuric acid come in contact with lime in the soil, and sulphate of lime is then formed, and may act in that state upon crops; or the acid, in one case or the other, may combine with ammonia, already existing in and combined with the earth, and form sulphate of ammonia, which is a valuable and well-known fertilizer. But we will here remark that, in our laboratories, the sulphates of barytes is found to be one of the most stable of salts, and its combination is in no instance decomposed by lime or ammonia. Nor does barytes form a constituent of any vegetable or animal organism within our knowledge. A small quantity of the nitrate of barytes will destroy vegetable life very quickly; yet nitric acid is a strong fertilizer, and one of the principal furnishers of nitrogen to plants.

(*To be Continued.*)

Sleep.

There is no fact more clearly established in the physiology of man than this, that the brain expends its energies and itself during the hours of wakefulness, and that these are recuperated during sleep; if the recuperation does not equal the expenditure, the brain withers—this is insanity.

Thus it is that, in early English history, persons who were condemned to death by being prevented from sleeping always died raving maniacs; thus it is, also, that those who are starved to death become insane; the brain is not nourished, and they cannot sleep. The practical inferences are these:

First. Those who think most, who do most brainwork, require most sleep.

Second. That time saved from necessary sleep is infallibly destructive to mind, body, and estate.

Third. Give yourself, your children, your servants—give all that are under you the fullest amount of sleep they will take, by compelling them to go to bed at some regular early hour, and to rise in the morning the moment they awake; and, within a fortnight, nature, with almost the regularity of the rising sun, will unloose the bonds of sleep the moment enough repose has been secured for the wants of the system.

This is the only safe and sufficient rule—and as to the question how much sleep any one requires, each must be a rule for himself—great nature will never fail to write it out to the observer under the regulations just given.—*Dr. Spicer.*

For the Southern Planter.

Notes of the Cane-Brake Lands—or the Cretaceous Calcereous Region of Alabama.

BY EDMUND RUFFIN.

(*Concluded from the August Number.*)

The contrast of the constitution of these soils, with nearly all of those of the natural soils of the Atlantic tide-water region is very great. In the latter, there would be no carbonate of lime—rarely (even in the richer soils) more than 5 per cent. of vegetable matter—or 20 per cent. of pure clay, (of which the larger portion is silex in combination)—and usually from 75 to 85 per cent. (and sometimes more than 90) of pure sand, and much of it coarse.*

One of the remarkable agricultural conditions of this region, is caused by the immense number of crayfishes, and their operations. These little animals, in lower Virginia, are sometimes inhabitants of the water, for months together, in springs and the deeper water of rivers; and at other times, or seasons, are, as here, solitary inhabitants of

*I will here add such analyses of the "rotten lime-stone" or marl of this region, as are given in Prof. Tuomey's Reports. The first one seems to be stated as an average ordinary sample of the calcareous cretaceous rock, or marl: (1st Report, p. 135.)

"Carbonate of lime,	42.25
Silica,	23.00
Alumina and oxide of iron,	31.00
Phosphate of iron,	.05
	99.30"

Prof. Tuomey had previously said: "The most striking feature in the rocks under consideration is the extraordinary uniformity of their mineral composition. I have traced them over a distance of 150 miles, and the only important change that I can discover in the calcareous beds, is the occasional predominance of lime in some of them over others."

The next analyses of specimens of lower or firm marl, from Macon county, are stated in 2nd Report, pp. 136, 137, and 187:

	1ST.	2ND.	3RD.	4TH.
Carbonate of lime,	53.66	46.96	88.82	51.92
Carbonate of magnesia,	.97	1.19	2.18	.61
Alumina,	.27	.78	} .94	1.60
Per-oxide of iron,	.22	.26		
Phosphoric acid,			.23	
Insoluble matter. (silicious sand and clay, scales of mica,)	44.60	50.61	7.20	45.71
	99.72	99.80	99.37	99.84

The next three are of the "rotten lime-stone" or upper and lighter colored marl—analysed by Prof. J. W. Mallet for Prof. Tuomey. Second Report, pp. 187—190.

	LOCALITIES.		
	Demopolis.	Cahawba.	Jones' Bluff. Greene Co.
"100 *parts consisted of:* (*Soluble in muriatic acid.*)			
Carbonate of lime,	75.07	64.37	80.48
Carbonate of magnesia,	.72	.79	.53
Per-oxide of iron,	1.44	2.19	1.24
Alumina,	.79	.75	.98
Phosphate of lime,	.4035	.5432	.3710
Silica,	.14	.059	.194
Insoluble in muriatic acid.			
Silica,	11.99	19.58	9.04
Alumina,	3.38	3.97	2.19
Per-oxide of iron,	1.84	2.49	1.55
Lime,	1.47	.78	1.01
Magnesia,		trace.	
Potash,	.0945	.0410	.1135
Water,	2.49	3.58	2.22
	99·83	99.14	99.92"

excavations made in wet low-ground, or other ground having spring water at the depth of a few feet below the surface, and rarely on high, and never in dry soils. With us they are harmless—(except to newly constructed covered drains, which they endanger, for a short time, by opening entrances for rain water from the surface—) and their borings, with the elevated dome-like coverings to their habitations, are very useful indications to the drainer, as they are certain evidences that injurious water is below, and usually at no great depth, and that the ground needs under-draining, no matter how steep it may be, or how dry at the surface it may appear.* In Marengo, these animals are numerous almost everywhere, and even on parts of the highest and dryest surfaces of the black or calcareous lands. They cause much annoyance, and sometimes much loss on small spaces, by cutting down the young plants, especially of cotton. But, altogether, their workings and depredations are not of much importance. Their great number, and their inaccessible positions render their destruction hopeless, on ground suitable to their habits. The crayfish digs a cylindrical and nearly perpendicular hole, of such diameter as best suits the then size of the constructor, and for easy passage—and brings up all the excavated earth to the surface, where it is dropped around the orifice of the hole. Here, where the surface is high, and not liable to be overflowed by rain water, or otherwise, the excavated earth would be of no use, and it is scattered around in the numerous pellets which were separately brought up. But in Virginia, on all such localities, as I have before seen, these structures, liable to temporary overflow, the instinct of the cray fish directs it to build up the excavated mud around the orifice of its dwelling, in the shape of an elevated hollow cone, the passage through which is afterwards closed at the top by the solitary occupant, when it no longer needs to go out. These coverings are very close and hard after drying, perfectly impervious to rain, and would even keep out overflowing water, if it did not find easier entrance through the natural earth below. Different as might seem to be the habits of these animals, and their preferred places of residence, in the different and distant localities named, they are directed by the same wants and instincts. The amphibious nature of the crayfish enables it to live for considerable lengths of time either under or above and out of water. But it needs a dwelling that always affords the choice. Here, the crayfish digs down to, and a little into, the compact lime-rock; and at the lowest depth, the excavation is enlarged to a spherical cavity of a few inches in diameter. This cavity receives and retains a little "seeping" rain water, which comes in laterally from the surrounding earth, or loose marl, immediately above the firmer blue rock. That supply of water, and the reservoir containing it, are necessary to the existence of the crayfish; and should the water fail, the animal must soon perish, if unable to move to some other more suitable locality. But even when the earth at the surface is parched with drought, the bottoms of the cray-fish holes therein contain water, though it is sometimes at 10 feet or more of depth to the firm rock. This fact is well known, and may be easily tested, by any observer, by dropping in a small pebble, and then, with the ear applied to the orifice, hearing the splash in the water at the bottom. As the borings of crayfishes in Virginia indicate where under-draining is necessary—and their long continuance on ditched ground will inform the drainer that his work has been imperfectly executed, and is not effective—so in these cane-brake lands these animals offered other instructions in regard to water, which was still more important to the early settlers. Before cisterns (for rain water) were in common use, and when artesian wells were as yet unknown, the early residents found in any unusually great number of crayfish holes, in particular spaces, true indications of the surest places to excavate "seep-wells," and to obtain the most permanent supplies of water. The tillage of the land, though continually interrupting or frustrating the labors of these industrious little animals, does not seem to lessen their numbers materially. Though they are greatly complained of by the planters, I did not learn that they commit any considerable depredations, except on very limited spaces, and where they are most numerous—and

* There are some rare cases, however, in Virginia, where, on the eminences of high and even hilly land, and where there is below only rain water, that crayfishes dig and live. But such places are of very close and stiff subsoil, with an impervious under-bed, and in which the physical conditions of earth and water are like those common in the lime lands of Alabama.

only on cotton plants, or other vegetables, during their young and tender growth. They are so numerous, and inaccessible in their dwellings, that it would be a hopeless attempt to destroy them. The thorough drainage of the under stratum, (if that were possible,) would be the only sure means to cause their total disappearance.

The crayfish is a solitary inhabitant of its hole. At night only, they come out and assemble in numbers on the surface of the land. But it is supposed that one only inhabits each hole, except when the numerous young of this one are hatched, and before they separate. The new borings are seen usually, and in great numbers, only in the latter part of winter and thence forward into the early part of summer. In the remainder of the year, there are no signs of the crayfishes; and it would seem that they then lie dormant in their holes—or elsewhere, perhaps resort to deeper water, where that is accessible.

A very general and also important effect of the borings of the crayfishes, continued through past ages, has been to marl, more or less, the surface of the earth, or to mix the marl from below with the upper earth, by bringing up the calcareous bottom and depositing it on the surface. This operation, continued so long, and probably over the much larger space of the general surface, must have had very general and great effect. On the land where the lime rock approached near to the surface, there must have been much of equalizing intermixture thus produced. Still more for beneficial and needed manuring, though to less extent, was this operation on the various covering but thin patches of what was formerly entirely non-calcareous earth and soil, (the different varieties of "post oak" and "sandy" lands,) which, without these labors of crayfishes, would have remained unsupplied with lime, and therefore would all have been as poor, as the best of them are now fertile.

By these operations of these little animals the thin layers of poor "post oak" or sandy earth, lying upon marl within reach of the crayfish, would be rendered neutral, or calcareous, and so enabled to become, in time, either rich "post oak" land—or, by longer continued supplies of lime thus brought up from below, might be made highly calcareous; and therefore it would lose its former character of "post oak" soil. Such soils, so changed in constitution and character in past ages, would not now be known as "post oak" land. It is the opinion of the residents that on the land known by this name, there are no crayfishes. I infer that in such situations the calcareous rock lies too low beneath, for the crayfishes to dig to permanent water; and wherever not too low, they had dug, and have there changed the character of the soil, and so have caused it to be designated differently.

It is unfortunate for the cultivators that the crayfish is solitary in its labors, and that each dwelling is separate from all others. If they had been generally connected, each with the neighbouring holes, by deep lateral borings, or horizontal galleries, the whole connected net-work, in this peculiarly stiff and close soil and under-beds, would have effected a general and permanent system of under-draining, the most perfect that can be conceived—and more effectual than all that the science, skill and labor of man have ever been able to construct elsewhere—or possibly can effect here, at any amount of expense.

As has been stated, with the exception of the level bottom lands bordering on the creeks, usually dry, the whole surface of this country is high and undulating throughout. It is rare that a space of as much as two acres in extent of level high land is seen—and as rare that any slope is too steep for easy tillage, and to be secure from very injurious washing, where proper guard or graduated ditches are used, to convey away the superfluous or dangerous rain-water. More of original forest growth has been cleared off, and a larger proportion of the whole surface of the country is now under tillage, (and unfortunately also under unremitting tillage,) than there is of cleared land in any portion of eastern or middle Virginia. This condition opens a broad expanse every where to the eye—and the landscape is generally beautiful, both in the natural and artificial features. It is only where very injudicious as well as incessant tillage has already produced its certain results, of impoverished soil and washed and gullied slopes, that there is deformity, or anything displeasing in the view. If under rotation culture such, in general character, as is now used on the improved or improving lands of lower Virginia, with broad-cast grain crops, and grass, or broad-cast pea-manuring crops alternating with the tilled crops of cotton and corn, this fine soil would scarcely be damaged by washing, even under flush or flat culture, and without guard ditches. But as the chief crop here is necessarily cotton—and that (though not necessarily,) is repeated on the same land year after year—and as that crop (like tobacco) requires the most perfect tilth or pulverization, and cleanness of the soil—it has followed every where that the soil has been greatly washed off, and enough so to have been as destitute of fertility as formerly in middle Virginia and recently in middle Georgia, if there had not been much greater depth of fertile soil here to be so wasted, as well as much greater power of resistance in the composition of the soil. Still, bad as have been these effects, the peculiar constitution and qualities of the calcareous soil strongly resist washing; and if cotton was not the great crop of the country, I believe that even the safeguard of graduated ditches might be dispensed with, without more loss than benefit being thus induced.

It has been long and generally asserted by many residents, and still is by some, that the fertility of the "cane-brake" land, is inexhaustible by continued cultivation. The grounds assumed for this opinion were the great depth of the soil and its extreme richness. If the very large proportion of vegetable matter stated to be in the twelve specimens of soils of Lowndes, are common in the calcareous or black soils generally, then there was a still better ground for this opinion than its advocates knew. But it is useless to argue against this doctrine, or with such reasoners as those who maintain it. There can be no land that is not exhaustible by continual tillage and cropping, unless it receives, to replace the waste, new supplies of fertilizing matters, either from natural sources, or from artificial manuring of some kind. The valley of the Nile, and many other alluvial bottoms, possess inexhaustible fertility, because the rich soil is added to, or renewed, by every flood. And all rich and well constituted soils require but little manure, in addition to what the atmosphere furnishes, to maintain forever their early productiveness. But however small, this aid is absolutely essential for the continued production of the land without diminution. The richest cane-brake lands possibly may yield successive crops for twenty or forty years without perceptible decrease—or for sixty, or possibly more than one hundred years without very considerable decrease. But, however long postponed, such exhaustion must come at some future time—and in a much longer time, utter sterility, if no rest, or no return of fertilizing material, is afforded. And whenever this shall occur on these excessively calcareous lands, (for reasons that I formerly urged,) their sterility will be the most complete, irremediable, and hopeless.

It would have been both useless, and a foolish waste of means, to give either rest or alimentary manures to this land during its early and most exuberent productiveness, and as long as no diminution of productiveness had been induced. But, as a general proposition, I maintain that it is cheaper, and more profitable, on any land, for the proprietor to preserve than to diminish or exhaust its productive power. And such preservation is especially easy to effect on these lands. From some of the more judicious planters, who admit that actual and considerable exhaustion of some of the best lands has already been realized, I heard it stated that any putrescent manure, (as cotton-seed, or stable manure,) produced very remarkable and unusual benefit, when applied, even in small quantities, to the reduced or partially impoverished ground, such as of the former bald prairies. Yet very little attention has been given to preserving and properly applying even such amount of putrescent manures as must necessarily be made on every plantation. And such small supplies have made almost the only exception to the general rule and usage of unremitting exhausting tillage. With but small aid of manure, (and mostly of that which might be furnished in the growth of the land, or in manuring crops,) and of rest, and with the alternation of crops (which will be recommended for another object,) these highly favored lands might indeed deserve that character, which is now falsely claimed for them, of their being inexhaustible in fertility and production.

Putrescent manure is only needed on these best lands where the original abundant stock of vegetable (or organic) matter has been much exhausted by cropping. But there are other great defects in the soils, which so far as rare circumstances may permit, it would be very advantageous to remedy. Besides the want of draining in many cases, (elsewhere adverted to,) there is a general excess of lime, an universal excess of clay, and an universal and great deficiency of sand. The evils of excess of lime and of clay can only be counteracted by maintaining counterbalancing supplies of other parts, as vegetable matter and sand. The latter material can not be available in many cases, or to much extent. But where poor sandy land borders on the calcareous, as occurs in numerous cases, it would be highly beneficial to both, to cart the earth from each of these different soils, to be placed as the most needed manure on the other. And even where, instead of sandy soil, there are only the ordinary patches of clay "post oak" and non-calcareous soil, interspersed among the calcareous, the exchange of calcareous and non-calcareous earth between these, would generally be both cheaply effected, and highly profitable. Where the bottoms or remains of old brick kilns, or any useless half-burned bricks, or their fragments, are to be had. this material would be good manure for any of this land. Clay, by being burnt, is converted to artificial stone, gravel, or sand, and will serve as well to improve the texture of soils superabounding in clay.

The original first growth still remaining is beautiful, and of the same general appearance as of forests on the rich limestone lands of upper Virginia. On the soils designated as "post oak lands," and the more as these are the more fertile, that particular tree (*quercus abtusiloba*) is the most abundant. Red and other kinds of oaks are much more common on the poorer lands of this kind and name. On the black (or highly calcareous) land, the forest growth is more generally of black walnut, ash, cotton-wood, shell-bark hickory, and other trees that indicate the richest neutral or calcareous soils. Very little of such land now remains uncleared. On all such forest land there is usually very little under-wood, or shrubbery of any kind; and the bodies of the trees are straight, and bare of limbs to a considerable height, so that even where the trees stand thickly, the view extends very far beneath the close cover of the united mass of branches and foliage. There the many kinds of trees, each with a different yet vivid tint of foliage, offer to the eye a variety of beauty which I have not seen equalled except in forests on some steep sides of lime-stone mountains. The dwellings of the planters are mostly on the highest, yet but slight elevations of the surface, or broad knolls. There has generally been enough of good taste to leave standing around, or near to the mansions, a portion of the original forest, making groves more beautiful than any that taste and art could subsequently produce, and nurse to their greatest perfection.

On every plantation that has been settled for twenty years or more, there has already been as much land cleared for tillage as will leave barely enough of forest for fuel and fencing timber. And of the cleared land, nearly all is under the two crops of cotton and corn, in the usual proportions, of each property, of about two acres of cotton to one of corn. The small remainder is not at rest; but is under various crops, usually of small culture, sweet potatoes, oats, wheat, rye, barley—and, as yet, on but few plantations, red clover. It is at all times presumptuous in a stranger, to condemn the generally established usages of a newly seen agricultural region. Still more, it would be deemed as foolish as it would be a hopeless attempt to recommend for any cultivators, the designed diminution of their great product, and present usual amount of crop, for sale and for profit. Nevertheless I will dare to say that the great extent of surface kept under cotton, year after year, though it is the great source of income, is the great evil, and sin, of agriculture in this region, and also in all the cotton-growing country. I would not offer, with any hope of its being adopted, such unpalatable advice (however good) as to lessen the general *production* of cotton on each plantation—but only the *space planted* and tilled in cotton, to diminish which would sometimes increase the gross product—and always serve to increase the acreable production, and still more the net profit of each acre. So precarious has become the production of cotton, on lands long under this culture—so numerous have become the insect depredators, and so many the diseases of cotton, caused by those seen, or other unseen causes—and, consequently, so few full crops are obtained, (or such as the field can *sometimes* and rarely produce,) compared to the greater number of short crops in any term of years—that, if alternation or rotation of crops *would* serve to remedy this general evil, it may perhaps be more profitable to omit one cotton crop of two, or at least one of three, by substituting some very different and improving crop—and so make as much cotton, and more profit, from partial than by the present general culture. If the insects and diseases of cotton were thus prevented, or much lessened, and thereby more healthy and productive crops were obtained, it might well happen that two such crops would yield more net product and profit than three under the former and present practice—or even one more than two under unremitting tillage. I have long entertained the opinion, and have often attempted to urge its importance, especially to cotton-planters, that the chief one of the well established general benefits of a judicious *rotation of crops*, is obtained in the destruction of insects, (invisible as well as visible,) caused by the entire changes of growth, and of other conditions of the land. Having argued this subject at length elsewhere, I will here merely enunciate the proposition in extended and clear terms. I maintain that every different kind of plant has its peculiar parasites, or insect depredators. These cannot thrive, even if able to live, on other and very different kinds of plants—and scarcely can be expected to exist under much changed conditions of soil, exposure to sun, air, &c., as well as of the only suitable material for food. The longer that one particular crop is grown on the same land, the more (other circumstances being alike) must the insect parasites of that plant be there increased. If the conditions of the earth, air, exposure or shelter, &c., caused by the tillage of that crop are also the most suitable to the habits and propagation of these parasites, they will increase from year to year, and without limits, except that the irregular occurrence of weather, or unusual temperature, unfavorable to their existence, may sometimes destroy many, and for a time greatly lessen their ill effects. Further, if the winter climate is not cold enough to kill the eggs, or nearly all of the parent insects, then there will be still greater facilities for their continued and progressive increase of numbers. Now all these encouragements for such evils are afforded by continued cotton-culture in this mild climate. There are many visible and known insect depredators peculiar to the cotton plant, and which, most probably, can feed on that only—or on some nearly allied plant. There may be hundreds of other kinds of parasitic and injurious insects, or invisible animalcules, whose presence is not known, or even suspected,—but which, by their immense numbers, operate unseen to produce most of the many unaccountable diseases to which cotton is subject. For all the ills and diseases of plants, except the obvious effects of poverty of soil, (or want of food,) or too much moisture, or the want of it, or of excesses of heat or cold, I ascribe to the attacks of depredating insects, or animalcules. Now, on these grounds, it is easy to see that the longer that cotton (or any other one crop,) is continued on the same field, the more it must be infested by parasites, visible or invisible, the more it must be subject to different diseases—and the more uncertain must be the production, and the more frequent and considerable the partial failures of the crop—and this reduction of product will be independent of all caused by any possible reduction of the fertility of the soil, and its ability to produce other crops. Then, under these circumstances, if some crop, as different as possible in all its conditions, were made to intervene with cotton, and had entire possession of the field for a whole graining season, the insects that could live on cotton only must perish, or abandon the field, if able to migrate. Such a complete change of conditions would be produced by interposing a growth and cover of the southern field pea, between two cotton crops. No two of our cultivated plants are more different. The condition of the ground, and its exposure, would also be greatly changed. And it may be inferred that no insect that infests and feeds upon cotton could live upon and through the growth, or under the cover of a thick growth of pea-vines. It is believed, from such few cases as I have heard stated, that cotton will grow well after peas—that is, that there is nothing in the preceding growth of a pea crop, or the accompanying condition of the land, to injure the growth, or impede the tillage, of cotton for the next year. Further—the soil and climate of this part of Alabama are admirably suited to the pea crop—which both for manuring and rotation, would be here of very far more value than it is now known to be in lower Virginia, where this crop is thus grown, and very profitably, though under the great disadvantage of a more northern latitude, and unfriendly climate. Yet the pea crop is scarcely grown at all in this part of Alabama—and nowhere to much extent, or for its best uses. It is objected to on the lime lands because the production of grain, or seed, is small—and also because hogs are killed by eating them. The value that I would seek is in the production of vines and leaves, and not of seeds only—and for the crop to feed and improve the land and its future products, and not to fatten grazing animals. The value and uses of the seed are indeed important incidental benefits, which I estimate highly. But if there was no such product here, there would be sufficient profits in planting or sowing peas for a rotation or manuring crop. The proper use of this crop, (which is universally too much neglected,) would be of incalculable value throughout all the cotton states.

The above-mentioned benefit of a change of crops, though the most important, is not by any means the only one. But as I am not discussing the subject of rotation of crops, I will say no more on these points. There is, however, still another and general reason for lessening the present extent of cotton tillage on every plantation, which I will briefly state.

By force of different circumstances,—and mainly that of having the most favorable climate, and using slave labor—the southern states of this confederation have almost the virtual monopoly of the production and supply of cotton for the world. But a few years ago (as late as 1851,) the supply of cotton had for some time exceeded the demand of the world, and consequently the prices had been very low. Recently, and now, the supply has not quite equalled the demand; and there has been great anxiety abroad lest the supply should fall still lower, and regularly—and prices have been double those of some former times. These facts, and all statistical reports to the like purpose, will show that a small surplus of production beyond the demand for cotton may reduce the price greatly—while it would be advanced as much, by as small a diminution of the general crop, or by its falling short of the world's demand. Therefore it may well happen that a general crop, on the average of years together, which fell short by 10 per cent. of the amount of the general demand for consumption, would sell for much more money than a general product that exceeded the full demand by 10 per cent. Therefore, if every cotton planter would so much lessen his surface under cotton as merely to raise all his supplies of meat, leather, wool, horses and mules, and everything else now bought from the northern and western states, that could be well made at home, there would be two very great benefits thereby obtained. First, a diminished production of cotton would increase the price, and probably enough so for the reduced crop to sell for more than the greatest possible crop. Secondly, the important benefit would be effected of cutting down the profits of our worst enemies, the abolition "sister" states, by exerting our power to oppose and control their malignant hostility. But as it is impossible for such a general change, however beneficial for the whole south, to be produced by individuals, acting separately, without concert, or means for combination, I would have the ends in view sought by means of the legislatures of all the southern states adopting stringent license laws, which would tax heavily the sale of all commodities produced in the abolition states and commonly sold in the southern states. It may be true that the products of particular states, by name or designation, could not legally be so taxed, and the like products of all southern states be exempted. But it is entirely legal and constitutional for any state to so tax, and to any amount, any particular commodity coming from any or all the other states, and to exempt its own like production. And this would, in practice, operate just as well for the southern states. If heavy license taxes were imposed in each of all the southern states on all such imported and specified commodities as cotton and woollen cloth, shoes, hay, brooms, ploughs, wooden and iron ware, cattle, hogs, horses and mules, or those among these commodities which come only from abolition states, the taxes (or prohibitions) would operate not on any southern state, (or to no important extent,) because no one is an exporter (to any important extent,) of such commodities to another—but entirely on the now producing northern and north-western states. All these commodities could be produced at home, and much more profitably for the whole south, if looking to public and political as well as private interests; and especially to our greatest interests, which are involved, the maintaining the price of cotton, and the retaining the possession and value of our slaves.

The good policy of this system, by which the southern states may at the same time help themselves and retaliate upon and control their enemies, can scarcely be denied. The legality and constitutional sanction of the policy have been affirmed by high legal authorities, and are seriously disputed by none. Every state in the union already has acted more or less on this policy of discrimination, and taxing foreign commodities by means of license laws. New York, going still farther, imposes such a tax on all foreign goods sold at auction; and thus all of the foreign goods so bought for the southern states, (and their principal supply,) pay this tax for the benefit of New York. As one of the numerous other cases, Alabama imposes a license tax of 50 cents on the sale of every pack of playing cards—all of which are imported from the north, and (by favor of a federal protecting duty) are of northern manufacture. A very proper tax this is, whether considered in its financial, moral, or political aspect and operation—or as a counterbalancing protection for home manufacture—and the legislature of Alabama had an unquestionable right to impose the tax for any of these objects. And every southern state has as good a right to impose a license tax of 10, 50 or 100 per cent. on the value of every commodity that is brought to the south exclusively from northern and north-western states. If this policy were resorted to, and fully carried into operation, the southern states would right themselves in a year—and defend themselves effectually from injustic and oppression for all future time.

The growth of clover on these calcareous lands has as yet extended to but few plantations—and except on a small proportion of these, it is as yet a novel culture, of which the great benefits are but little appreciated by the residents in general. Notwithstanding the undoubted obstacles to the growth presented in the warm climate, and in seasons of long and severe drought—and the difficulty sometimes of obtaining a stand of young plants from the seeding—it is yet true that the crop of clover seems more productive, valuable, and far more enduring, than I have ever known on the best lands in Virginia. This strange result is doubtless owing to the peculiar fitness of the soil for clover, in its large clayey and calcareous ingredients, and also to the presence of both sulphate and phosphate of lime, in small but sufficient quantities for clover, in addition to the very large amount of carbonate of lime in the black lands. As the whole bed of marl is the product of the disintegration of ancient marine shells, and as shells always contain a minute proportion of phosphate of lime (bone earth) so must the marl, and the soil impregnated so largely with the marl. Also there must be sulphate of lime, (gypsum,) because lumps of sulphuret of iron are found frequently in the blue compact marl; and this substance, when decomposing, as it does by exposure to air, and in contact with carbonate of lime, forms ultimately the new combination of sulphate of lime or gypsum. Besides the fact of this known source of sulphate of lime, I suppose that I frequently saw it exposed in visible but very small deposits of white powder, on the sides of ditches then dry, where the remains of the rain water, flowing from the surface of the land, had evaporated, and left the before dissolved gypsum. The quantity of this seen in any one place was too small to be collected for testing; but I have observed the same appearance elsewhere, which I knew to be of gypsum. Both these salts of lime are specific manures for clover, and the sulphate is one of wonderful benefit.

Clover is a biennial plant; and if suffered to ripen its seeds, will thereby fulfil its designed function, and complete its life, and then usually dies when two years old. In some cases, in lower Virginia, when mowing or grazing has prevented the ripening of the seeds, clover will live through the third year; and perhaps being added to by the later springing of plants from seeds, may even last longer, but with a rapidly decreasing number of plants. But usually and for useful purposes, the clover crop ends with the second year. In Marengo county there was clover in some few places as tall and luxuriant as is seen anywhere. More generally it was grazed, and then only exhibited a remarkably close, thick, and unmixed cover of clover plants, of great vigor, though kept grazed down to four or six inches of height. Such I saw over eighty acres of the plantation of A. B. Calhoun, Esq., and some of this he told me had been sown seven years before. I heard of, but did not see, good clover on the plantation of Col. Isaac Croom, in Greene county, that had been standing fourteen years, since the first and only seeding. Part of the clover which I saw on Mr. Calhoun's and Mr. Adams' plantations, in Marengo, grew on what had been "bald prairie," containing so much carbonate of lime, (probably fifty to sixty per cent.) and also had been so much further damaged by long continued former tillage, that, before being sown in clover, these places were not worth cultivating under cotton or corn. The clover on these poor spaces was indeed low, but stood thickly over the whole ground, appeared to be a strong and healthy growth, and a good and profitable cover, whether for grazing animals, or for enriching the poor land, so especially needing organic matter. These last results would direct to put under clover, for many years together, or as long as it will stand well, all the former "bald prairies" that are poor. This is the further needed, because if such land is left out of culture, without being laid down in clover, it will produce only worthless weeds, and nothing of any value for grazing. This I saw on several spots which had been left out of the enclosures for tillage lands.

But with these remarkable, and even unprecedented good returns from clover, compared to the best within my previous personal observation, still, to obtain the best profits of clover here, it will be necessary that it should remain long on a field, before being substituted by a tillage or other crop. It will not therefore serve (as in Virginia, and for what is so much wanting here,) as an ordinary or regular alternating or rotation crop. Even if it were not the case that economy requires its long continuance, clover, when ploughed under, might not serve well to be followed by corn, and would still less suit to precede cotton. Wheat is always the best crop to follow the ploughing under (in summer) of a clover sod—and that practice I would recommend here. But though the quality of the wheat made here is excellent—often weighing 64 lbs. to the bushel—still the crop is raised on but a small scale, and therefore would seem not to be deemed profitable. The great profit of the crop of clover will be found in its remarkable and rare power, only shown here, of keeping full possession of the land for a long time; and it should be used for manuring or grazing as long as it will cover the land and yield well. The great crop for rotation, and especially for preceding cotton, will be found in the southern or field pea—which here will be as much superior to its growth in lower Virginia (profitable as we find it there,) as the best clover of Alabama would be inferior to our best, if there was no superiority in the soil of Alabama, and with all the existing difference of climate.

In riding over these lands, I was all the time looking out for the very rare appearances of pine trees and of broom grass. Of pines, I saw not one on the truly calcareous soils—and but very few on the "post oak" lands. These few were all of the *pinus variabilis*, or short leaf timber pine of Virginia. I had been told that broom grass grew well on the calcareous lands. I saw it growing in several cases; but it was always confined to the "post oak," or non-calcareous lands, which were erroneously supposed by the residents to be calcareous. In one case, on such ground, exhausted, and therefore left uncultivated, and where broom grass grew vigorously, the growth ceased entirely where the soil changed to black and calcareous. Thus both these classes of facts, which, in exceptions (real or apparent) to the general rule, I had before heard adduced to oppose my doctrine of marl, or lime, being injurious to or destructive of these growths, when fully examined, served most strongly to sustain these long asserted opinions of mine. On the sandy lands bordering on the black and calcareous, pines grow generally, if not always. But in no case did I find pines on soil that was ever so slightly calcareous, except once. On the broad bottom land bordering on Chehatchee creek (Dallas county,) and which is very near the beginning of the main body of sandy and pine-covered high land; this flat, which is rarely overflowed by the highest freshes of the creek, is underlaid with the ordinary firm marl, or "rotten limestone," at 8 to 10 feet beneath the surface of the land. Among the large forest trees of usual low-land growth, there were thinly interspersed pines of three different species, loblolly, *p. tæda*, short-leaf, *p. variabalis, and* cedar pine, *p. inops*, and some of all these kinds, were large trees. There were of the cedar pine larger trees, with larger and straighter trunks than I had ever seen before anywhere,—and one of them was fully 3½ feet in diameter. This, and most of the other large pines had died, without any known cause. It was near one of these large pines that I took a specimen of soil for subsequent testing—and, to my surprise, found it to indicate a very small proportion of carbonate of lime—probably not exceeding two per cent. Elsewhere (in Virginia, and at Rocky Point, N. C.,) I have seen large pines of other species, standing on soil not calcareous, but the upper earth lying on rich dry marl at from four to six feet beneath the surface of the soil, and into which marl the main perpendicular roots of the trees certainly penetrated—though the more numerous horizontal roots were in the bed of non-calcareous earth above. I have also seen cases, (though they were rare,) of both young pines and broom grass growing vigorously on well marled surfaces, but of which the subsoil still remained, as the soils had been previously to the marling, non-calcareous and acid. It would seem, from such facts, that provided these plants have a sufficient layer of acid or non-calcareous earth from which to derive their specific aliment, they are not greatly damaged by striking other roots into a highly calcareous bed. But all such cases are but rare exceptions, and often but apparent and really deceptious exceptions, to the general rule, that a soil, throughout calcareous, or containing carbonate of lime, is inimical, and generally destructive, to the growth of the ordinary southern pines, and to broom-grass. Of these, as of all agricultural facts, we should reason and decide upon general rules, and not upon their exceptions.

Of the still more reliable indication of acid, on non-calcareous soils, sheep-sorrel, (*rumex acetosus*,) I did not see a single plant. Its growth here is probably forbidden by the warm climate, (as it is very rare even in lower South Carolina)—as it would certainly be prevented by this calcareous soil, even if the climate were entirely favorable to its growth. But there is such full proof, elsewhere, that this plant, even where most favored by climate, cannot grow on a calcareous soil, that he who requires more proof of that fact is either uninformed of the proofs, or incapable of being convinced of error, and past the hope of being instructed in truth, in cases where prejudice had obtained prior possession of his mind.

Grooming a Horse.

"What do you give your horses to keep them in such fine condition?" asked a young farmer of his neighbor, whose team of bays was the pride of their owner, and the admiration of the village. "Oats, carrots, and plenty of *brush*," was the reply. There is little need of insisting on the necessity of good food, and plenty of it, to have a horse remain vigorous. Every one knows that bone, and sinew, and muscle are manufactured from hay, oats, corn, etc., and that the raw material must be supplied to produce the strong limb, elastic step, and noble spirit, which make a fine horse the universal favorite he is. But the important part which the skin bears in the animal economy, and the necessity of properly cleansing and keeping it in healthy condition, are not fully appreciated. Rough staring coats, "grease" or "scratches," inflammations, and a whole catalogue of diseases find their origin in neglect of proper grooming.

The skin of the horse, like that of other animals, not only affords protection to the parts within, but by the pores affords an outlet to a large part of the waste of the body. In outdoor life, the natural state of the horse, this membrane becomes thickened and tough, capable of resisting changes of temperature; and by continual exercise, the pores are kept open, giving free exit to all the exhalations. But this alone will not give the smooth glossy coat which adds so greatly to the animal's beauty. Confining the horse to the stable, as is generally done for at least part of the year, renders his skin tender, especially when he is kept warmly blanketed. Expose him now to great change of temperature; take him out and drive him until heated, return to the stable, and let him stand uncared for over night, even for an hour, the sensitive skin is rapidly chilled by the evaportion of the sweat, the pores are suddenly closed, and often a cold, a rheumatic stiffness or other disorder results. Proper grooming prevents this, by toughening the skin, keeps it in healthy action, equalizing the circulation, removing obstruction from the pores, and what is of great importance, by rousing the action of the muscles at the surface, in some measure, compensates for the want of exercise consequent upon stable life.

Currying and brushing should not be done in the stable; the dust and scurf will be scattered in the manager to mix with the horse feed, besides keeping the stable uncleanly. Take the animal into the open air, tie him securely, and handle him so gently that he will enjoy, rather than dread, the application of the comb and brush. A sharp currycomb, roughly scraped over the tender skin, is anything but pleasant, as the shrinking and resisting animal will soon show. Apply this instrument lightly, and depend mainly upon the free use of the brush. Begin at the head, and pass the comb lightly up and down until the dandruff is all loosened, remove it with the brush. Be particular around the edges of the fore-top, and the mane. It is a good plan to sponge off the head and ears using but little water, smoothing the hair down to its natural position. In going over the back, quarters, loins, etc., use the comb in one hand and the brush in the other, working lightly and quickly. Take much pains where the skin lies in folds, as at the union of the legs with the body—let every part be made thorughly free from dandruff. Finish by rubbing down vigorusly with wisps of straw, until the hair "shines like a bottle"—an extra smoothing touch may be put on with a woollen cloth. Do not fear all this trouble; it will be more than repaid in the extra looks and spirit of the horse.—*Cor. Amer. Agricul.*

From the Ohio Valley Farmer.

Will it Pay to Build a Barn?

BY R. D. G.

This question is often asked among farmers, and we think it should be ascertained whether it will pay or not. We will give our experience, and some observations on the subject. Men, who have not a barn, will say: "We can get a Machine that will thresh our grain and clean it all at once; and our barn will be of but little use to us nine months of the year." Now, what does this lead to? Just as soon as harvest is over, every machine in the country is running over with business; threshing and hauling to mill is the order of the day; prices run down to the lowest point. Then, when they can't stand the price any longer, they coax the millers to take it in on receipt, for their grain is stacked out, and probably spoiling. It *must* be threshed out, and they have no barn to put it in.

The millers generally have a limited time set when they must sell their receipted wheat. Now the farmer who cannot see how they manage to keep the price down till the time expires that they have to sell their receipted wheat, is very far from being posted. And it is no advantage to the consumer to have the trade thrown so entirely into the hands of the miller.

Now we would say, never put a bushel of wheat in a mill on receipt—either sell, or keep it at home. You run the double risk of fire and the miller failing—in either case you could get nothing. Besides, we think this is not half of the loss; for when grain has to be stacked, it is often hauled out into the woods, where the straw will be out of the way; or, if not, it is stacked probably in the middle of the field, and, as soon as it is threshed, the straw is burnt.

Now, when a man has no barn it is difficult to convert his straw into manure, or use it for his stock in the winter, as he could do, if he had a barn. It is well known that where several hundred bushels of grain are threshed, and the straw all put in one pile, it will take several years for it rot, and even then it will scarcely make the ground rich that it was piled upon. It wastes about as fast as it rots.

I bought a place about ten years ago, myself, that had no barn on it. I put in but little small grain, because I had no place to put it. Five years since, I built a barn fifty-six by forty feet. One of my neighbors said I never could fill it. I told him, if I did not soon fill it I would leave the farm. The first year, I had six hundred bushels of wheat to put in it. Two years ago I had all the mows full, and piled enough on the barn floor to make two hundred bushels more.

Before I built my barn, I made a dozen or so loads of manure; now, I can manure from eight to ten acres every fall. I honestly believe that my barn has paid for itself, or that I have made enough more than I could have made without it, and in this way—by keeping grain when it was low priced, till it was higher; making more manure; saving fodder, etc. MANURING IS THE FOUNDATION OF A FARMER'S WEALTH.

Methods of Analysis.

BY PROF. S. W. JOHNSON, CHEMIST OF THE STATE AGR'L SOCIETY OF CONNECTICUT.

The general method of analysis for guanos, superphosphates, &c., whose commercial value lies almost exclusively in ammonia and posphoric acid, is as follows:

1. Of the well averaged and pulverized sample, a quantity of 2 grams is weighed off and dried at a temperature of 212 deg. until it ceases to lose weight; the loss is water. If loss of ammonia is feared, a known quantity of oxalic acid is added before drying.

2. The dried residue of 1, is gradually heated to low redness in a porcelain cup, and maintained at such a heat, until all organic matter is burned off. The loss is organic and volatile matter. Usually the

substance is directly heated to redness without separately estimating the water.

3. The residue of 2, is pulverized if need be, and digested for sometime with moderately concentrated hydrochloric acid. The diluted solution is filtered off and washed, the residue weighed as sand and insoluble matters.

4. The solution 3, is brought to the bulk of three or four liquid ounces mixed with rather more than its volume of strong alcohol and enough sulphuric acid to unite with all the lime which is thereby completely separated as sulphate. The liquid is filtered off, the sulphate of lime is washed with dilute alcohol, dried and weighed; from it is calculated the amount of lime.

5. The solution 4, is evaporated until the alcohol is removed, then without filtration, to it is added an excess of a liquid made by dissolving in 2 quarts of water, 30 grams of sulphate of magnesia, 41 grams of chlorid of ammonium, 37½ grams of tartaric acid, and 40 grams of carbonate of ammonia, (see W. Mayer, in Liebig's Annalen, Vol. 101, p. 168,) and finally excess of ammonia. After five to six hours, the precipitate of ammonia-phosphate of magnesia, usually mixed with some brown organic matters, is collected in a filter and washed three or four times with ammonia water; it is then dissolved from the filter by dilute hydrochloric acid, and again thrown down by ammonia, after addition of a little tartaric acid. It is now pure, and is finally washed and weighed as usual for the estimation of phosphoric acid.

6. 1 gram of the manure is burned in the usual way, with soda lime. The resulting ammonia is collected in 20 cubic centimeters of a fifth-solution of oxalic acid, (12.6 grams of pure oxalic acid to a liter of water,) and estimated by titrition with a dilute potash solution.

7. The soluble phosphoric acid of a manure is estimated by washing 2 grams of it with several ounces of water and treating the solution as in 4 and 5.

8. To determine actual ammonia, one or two grams are mixed in a flask, with a pint of water; a piece of caustic potash is added, and three-fourths of the water slowly distilled off through a Liebig's condenser into a standard oxalic acid. The ammonia is then estimated by titrition.

In complete ash-analysis of manures, or in examining organic bodies, e. g., cotton-seed cake, the usual and approved methods are employed.

Faults Pompey Couldn't Remember.

A clergyman, wishing to be rid of his horse, and try for a better one, directed the old negro man to sell his beast for what he would bring, or to exchange him for another, adding, at the same time, an anxious caution not to deceive the purchaser, and even enumerating the faults of the animal, lest one should be overlooked.

"Remember, Pompey, he has four faults."

"Oh, yes, Massa, I remember."

Pompey jogging along the road, and counting over the list to himself, as the old lady over her luggage, "Big box, little box, bandbox, bundle," was overtaken by a man on horseback, who entered into conversation, and among other topics, made some inquiries about the horse.

Pompey told his story, and that his master had charged him to tell the horse's faults to the purchaser without reservation.

"Well, what are they?" said the stranger, who had a mind to swap.

"Dere is four, Massa," said Pompey, "and I don't remember them all very well just now, but—"

"Well, tell me those you do remember."

"Well, sar, one is that the horse is white, and de white hairs get he Massa's coat, and dat don't look well for a clergyman."

"And the next?"

"I don't anyhow remember de oders," said Pompey, peering into the clouds with one eye, reflectively.

The stranger concluded to strike a bargain, and exchange his own horse, which had not quite so gentle an air as the parson's, for this nearly perfect animal. It was not long before the clerical steed stumbled and threw his rider into a ditch. Picking himself up as well as he could, he examined his new purchase a little more closely, and discovered that the horse was entirely blind. Finding Pompey again, without much difficulty, his wrath burst forth in a torrent of reproaches:

"You black rascal, what does this mean? This horse is broken-kneed, and as blind as a mole!"

"Oh, yes, Massa," said Pompey, blandly, "dem's de oder faults dat I couldn't remember!"

Phosphorus--Source and Nature.

Phosphorus is but sparingly diffused as a component of minerals,—it is to the animal kingdom that we turn for our supplies—to bones and fluids of the body. These are our magazines of phosphorus, from which it is extracted in large quantities now required for matches and the other manufactures into which it enters.

The leading characteristic of phosphorus is its extreme combustability. Place a small fragment of it in a glass tube, apply heat and ignite it, when, on impelling a current of air through the tube, the phosphorus burns with great rapidity. The combustion having terminated, two different residues are produced, one a red coloured substance and the other a white one. The latter, or white, is an acid compound of phosphorus with oxygen. The former was long imagined to be a combination of phosphorus with oxygen also, but in a lesser ratio than necessary to constitute an acid. Within the last few years, however, M. Schrotter, of Vienna, demonstrated that the red compound in question was merely phosphorus. No combination has taken place to form this compound, but the phosphorus has assumed a second, or allotropic condition just as sulphur does under the operation of heat.

Common phosphorus has to be kept in water, for the purpose of guarding against spontaneous combustion; allotropic phosphorus, however, may be kept unchanged in atmospheric air; indeed it may be wrapped up in paper, and carried in the pocket even with impunity. Common phosphorus readily dissolves in the sulphuret of carbon, whereas allotropic phosphorus does not.

Phosphorus exists in all grains, and it forms a minute portion of every loaf of bread we eat. It exists in the human brain, but the greatest quantity of it is found combined with lime, in the bones of animals. The phosphate of lime sells at high prices, as a fertilizing agent, simply because it is a substance difficult to obtain large quantities of. Unlike sulphur and lime, which are obtained most abundantly from the mineral world, all our phosphorus is obtained from organic creation.

Scientific American.

Sister's Love.

Beautiful is the love of a sister; the kiss that hath no guile, and no passion; the touch is purity, and bringeth peace, satisfaction to the heart, and no fever to the pulse. Beautiful is the love of a sister; it is moonlight on our path—it hath light, but no heat; it is of heaven, and yet sheds its peace upon the earth.

English Women----Their Good Sense and Practicality.

The following extract from a recent letter of an English traveler, who has had the best opportunities for observation, may surprise some of our *fine ladies:*

"I can assure you that, having lived all my life about in the different castles and manor houses of Great Britain, and been accustomed to the industrious habits of Dutchesses and Countesses, I was utterly astonished at the *idleness* of American fine ladies. No English woman of rank, (with the exception of a few *parvenues,*) from the Queen downward, would remain for one half-hour unemployed, or sit in a rocking chair, unless seriously ill. They almost all (with hardly an exception) copy the letters of business of their husbands, fathers or brothers; attend minutely to the wants of the poor around them, and even take part in their amusements, and sympathise with their sorrows; visit and superintend the schools; work in their own gardens; see to their household concerns; think about their visitors; look over the weekly accounts, not only of domestic expenses, but often those of the farm and the estates.

"The late Marchioness of Lansdowne was so well acquainted with the cottagers in her neighborhood that she used to visit and look at the corpses of the dead, because she found that her doing so soothed and comforted the bereaved.

"I have known her to shut herself up with a mad woman in her poor dwelling, who used to lock the door, and could not be induced to admit any one else. Lady Lansdowne's only daughter used one hundred guineas (given her by her father-in-law, Lord Suffolk, to buy a bracelet,) to build pigsties, with his permission, at her husband's little country residence. She educates her own children without assistance, teaching the boys Latin and the girls all the usual branches of education.

"The late Duchess of Bedford, I accidentally discovered when on a visit to Woburn, had, for thirty years of her married life, risen at six o'clock, summer and winter, lit her own fire, made some tea for the Duke and herself, and then, as he wrote his own letters of business, she copied them, and came down to a large party of guests at ten o'clock, to dispense breakfast, without saying one word of their matutinary avocations; so that you might have been a visitor of the house without finding out that the Duke and Dutchess had transacted the necessary business of the day—before, perhaps, you had risen."

We add to the foregoing, the following from Col. Hiram Fuller's new work: "*Sparks from a Locomotive:*"

"THE ENGLISH WOMEN—It is very evident that a large foot is not considered a detriment to female beauty in England; as the ladies make no effort to diminish the size of their feet by wearing pinching slippers. On the contrary, they wear clumsy gaiters, with heavy soles, which make their steps anything but fairy-like. And in this they show their good sense. One half of the consumption cases among the American woman are owing to the wafer-soled shoes, which render walking both difficult and dangerous, and so they sit pining in satin chairs, in their overheated rooms, sucking cough candy and waiting for the doctor, and his shadow, the undertaker; while these buxom English beauties are tramping about in their water-proof boots, or darting through lanes and parks in their saddles. To appear delicate or lackadaisical, is no part of an English woman's ambition. Health and vigor of body are considered of primary importance, not only for comfort's sake, but as the most essential qualifications for satisfactorily and successfully performing the duties of wives and mothers. And they dress, and eat, and exercise accordingly. On calling on Lady ——, the other morning, one of the most beautiful and accomplished ladies in London, I found her dressed in a plain purple-colored woollen robe, made of cheap and coarse material, and yet so tastefully fitting her figure, that I was struck with the elegance and comfort of the *ensemble*. An ultra fashionable belle of the Fifth avenue would hardly 'come down' to her visitor in so simple a costume; or if she did, it would be with a confusion of apologetic words and blushes."—*Southern Cultivator.*

From the Spectator.

Stories about a Horse-Trader.

There are certain men who seem to be born for horse-traders. From their earliest childhood nothing engages their every thought so much as horses. To a horse everything in nature is subordinate in their eyes. It is even quite common to hear people born with this idiosyncracy exclaim, when they see a pretty woman, "She is almost as pretty as a thorough-bred mare." To this class belonged the famous Monsieur Gervais, of Norfolk, Va.

The French are not generally remarkable for skill in the science of live horse flesh—though, to do them justice, they are said to excel in preparing it for the table. Our hero, however, was a finished hand at jockeying. He had been keeper of a livery-stable in his youth for a regiment of cavalry quartered near Paris, and became afterwards riding-master to the same under the great Napoleon, the god of his idolatry. After his fall, the army was reduced and Gervais left to shift for himself. Disgusted with *les sacres chiens, les Bourbons*, he determined to come to America, and settled in Norfolk.

Many are the stories told of him there, where he was looked upon as the King of Horse-Traders. It is our purpose to rescue from oblivion a very few of the evidences of his genius, out of many which are told of him in his adopted city. It is said that no one was ever known to trade with the Frenchman without being deeply *bit*; yet, such were his talents, that it seemed that almost every day he did up some one *browner* than any of his victims who had suffered before. The first story we shall tell of Gervais will be the famous one of *Breakee de Buggee*. We must premise that our horse-trader understood our language perfectly, and when it served his purpose he spoke it very well; but when his object was to chisel any one, he always managed to employ broken English in such a way as most effectually to cheat his victim. Now for our story:

Mr. S. wished to purchase a horse for his buggy, and went to Gervais' livery-stable to buy one. Our hero had a few weeks before gotten for a small sum a very showy horse; but a vicious horse he was, and had been sold by his former owner because he had kicked his gig to pieces, and came near killing himself and wife. The eyes of Mr. S. were attracted by the first appearance of the animal, and enquired of Gervais how much he would take for him. The Frenchman expatiated on his fine points, exhibited them with gusto, and wound up by saying, "As he is ver fine horse, I charge you a hundred and seventy-five dollars for him, and he cheap as dirt at dat." Now this was an enormous price in those days for a horse intended for any other purpose than the turf. Mr. S. did not care about the price, if he could get a horse to suit his purpose. Before purchasing, however, he questioned Gervais as to his temper, and asked if he had been "broken to a buggy." The Frenchman answered, "Breakee de buggee? By gar, he breakee de buggee *fuss-rate*. He breakee de gig, breakee de cart, breakee eberyting you put him to—I answer for dat." He said these with a pronunciation quite unintelligible, but accompanied with a thousand gestures, conveying the impression that he was *praising* the temper of the horse. Mr. S. thinking more of his manner than of the words he made use of, paid him one hundred and seventy-five dollars, and ordered him to be sent up to his stable. That afternoon he had him hitched to his buggy, and his servant led him out into the street. Mr. S. got in; but so soon as he tried to start, the beast flung both heels into the front of the vehicle, stove it into shivers, broke the traces, and trotted off to Gervais' livery-stable. Luckily Mr. S. was not materially hurt, but his buggy was ruined. When Gervais saw the animal return with his trappings dangling about him, he understood at a glance what had happened. So, with consummate impudence, he wrote a note to Mr. S., in which he "wished he would confine his horse at the manger until he got used to his new lodgings." As he expected, in a few minutes Mr. S. was at his stables complaining about Gervais having so grievously cheated him in his steed. With the most imperturbable gravity Gervais replied, "I telled you de truth, sare. You ask me about de horse —I telled you he breakee de buggy, de gig, de carriage, de cart, eberyting; and you no right to complain now, for de horse do just as I telled you he would." Mr. S. saw how he had been sold. He threatened he would sue, but all to no purpose. Gervais had taken good pains to have witnesses at hand to prove the bargain, and to swear to his *very words*, which showed that the horse would break everything he was hitched to. Accordingly Mr. S. determined to make the best of a bad bargain, and sold the horse at the foot of the market for as much as he would bring. R.

Condensed Food for Cattle.

Mr. Lawes, of Rothamstead, has, it appears, attacked the condensed food for cattle, and evidently on the same principle that he attacked Liebig and others, viz., under the supposition that his knowledge of chemistry and natural law generally, was perfect and faultless. The present state of chemical knowledge is not such as to enable its professors to arrive at exact facts in relation to the value of food for cattle, and whatever may be the *short comings*, if any, of these new compounds, they at least are not proved to be valueless by the facts offered by Mr. Lawes. We therefore give place to the following communication, although we are not prepared to endorse the claims made by the proprietors of Thorley's Food for Cattle.—[*Ed. Working Farmer.*

From the Working Farmer.

DEAR SIR:—In the April number of the *Working Farmer*, I observed under the head of "Feeding Statistics," an article copied from the London *Farmer's Magazine*, written by J. B. Lawes, of Rothamsted, England, on the subject of alimentary and condimental compounds for the seasoning of the food of live stock, and wherein he says:

"Being largely interested in the feeding of stock for profit, and having devoted a great deal of time and money in inquiries to obtain fixed data relating to the feeding of animals, the conclusion to which I have arrived is, that no proof has yet been given that these new foods have any practical value whatever in an economical point of view. Nor does a knowledge of the composition of these foods add anything to what was previously known on the subject of feeding."

In reply to this, I have first to observe that the experiment is exceptional as to character, next, a failure, and lastly that one failure can never overthrow the ninety and nine successes that exist in favor of cattle food. The subject under this head is not one of chemistry; but in the ordinary business of farming, so that farmers are better judges than chemists and manure manufacturers, (to which class Mr. Lawes belongs) and farmers will readily perceive that a failure in the general management of Rothamsted pigs has extremely little, if ought to do, with the feeding and general management of their own horses, cattle and sheep. Are we, therefore, to regard Rothamsted experimentalism as an infallible rule? Are we to have Rothamsted infallibility? Your readers will excuse me for protesting against anything of the kind. Nothing can be more impudent or absurd, in a commercial point of view, than to hold up any individual as an infallible rule to others—even the most successful, for the most exemplary farmer is familiar with the fact, that his balance sheet differs widely, the one year with the other, the smallest fractional difference on the one side, producing a corresponding difference on the other—how much more absurd should it be, to lay down the unsuccessful example as the rule!

I must now examine the article under notice somewhat more closely. Are not the absurd rules the "FIXED DATA" to which Mr. Lawes refers in the second paragraph quoted, the "*facts connected with the subject of feeding which have been established by the results of my own experiments*" in the third paragraph? Is Mr. Lawes so innocent as not to perceive the amount of arrogant presumption which such statements exemplify? Is he not aware that his own balance sheet, in all his experiments, is but the balance sheets of Rothamsted experimentalism, and nothing more?

A member of the Royal Agricultural Society, of England, says, "that commercial conclusions deduced from commercial premises, can never establish 'fixed data' in physical science. In other words, you may affirm that all the laws of physical science are already established for the guidance of farmers by an infallible AUTHORITY who is jealous of His prerogative in this respect? Is Mr. Lawes so ignorant as not to know that the table he has given of the so-called 'feeding statistics,' does not belong to statistical science, but to the wildest, darkest, and most stormy regions of speculation, each of the twenty-five conclusions being deduced from blundering premises? Never did the pen of an agricultural writer attempt to pass current among farmers twenty-five absurdities so gross, for established facts in physical science, or even in statistical science, as the twenty-five Rothamsted 'fixed data' in question."

I would now wish to state that Mr. Lawes' experiments or observations cannot apply to Thorley's Food for Cattle, and that even if they did apply, his judgment is unworthy of credit, as his mode of calculating the value of cattle food is erroneous, and which must be placed amongst the false deductions made by him in relation to the doctrines of Liebig—that the proper use of my food leaves a clear profit of cent per cent to the purchaser, the food having a two-fold value—the one nutritive the other condimental—that Mr. Lawes' experiment is an exceptional one; a failure from mismanagement, and that the conclusion he draws from this Rothamsted blunder is absurd, and similar to the many hasty conclusions drawn from guano failures.

Mr. Lawes' feeding statistics are only hypothetical data deduced from very questionable premises, and that the table of twenty-five articles—cotton seed-cake, (of which Mr. Lawes, by the by, is a vendor) being at the top—consequently does not belong to the science of statistics, and therefore can be no safe guide to farmers. To talk of the manurial value of condiments, as he does, is ridiculously absurd; for the very use of condiments is to enable cattle to work up more of their food into carcase weight, and consequently to reduce the quantity of manure.

Ever since I knew anything about cattle, experience has satisfied me that health was the true index to profit; and this is equally true, whether the animal is a horse, a cow, a sheep, or a pig. The greater the degree of health, the stronger the horse, and the more work he returns for his food. The more healthy the cow, the greater the quantity of milk she yields, and the richer its quality. The better the health of the fattening, ox, sheep, or pig, the more rapid the increase of weight, and the finer the quality of the carcass.

Again, I have always found a cool, soft, sleek skin, and a bright eye, the best index to health and quality. I need not stop to prove the soundness of this proposition, as all my readers must be familiar with the importance which farmers, butchers, dealers, and others engaged in the management and commerce of cattle place upon "HANDLE." Were any amateur to place his fat beast in the scales, and to tell the butcher the weight, the practical man of business, who was purchasing for the purpose of serving his customers and realizing a fair profit, would naturally laugh at the ignorance of the novice and his scales, and proceed to judge from the index "*handle.*" My readers will readily believe me that the amount of handling in the markets is something considerable. There is no weighing in scales there, nor in any fat stock market where "*practice with science*" is brought to bear upon the subject. Much less does the intelligent farmer require scales and weights to know when his cattle are thriving, laying on fat evenly, and paying for their condiment and their food generally, all that he needs being *a handle.*

Mr. Lawes is wrong in respect to the price, as he does not take into consideration the medicinal and nutritive value of condimental food. I will, therefore, now offer a few extracts from a little work just published in England, viz., "Cattle Cookery,"* by William Burness, Esq., whose opinion I consider of more value than Mr. Lawes.

"The condiments for cattle now being manufactured, possess both nutritive and medicinal properties of value. They differ very much from each other in this respect, but they all have a common object in view—to improve the health of man and beast, and to economize the food of both—and therefore it necessarily follows that however different they may be, the principal value of each depends upon its own medicinal properties. Their nutritive values in money may be estimated according to some standard to which their analyses approximate. Let us suppose, for the sake of argument, that according to this standard their nutritive properties may be worth £11 per ton. Next their medicinal values should be estimated according to the effect produced by their medicinal properties. We must, therefore, quote an example for illustration. We shall take Dr. Brown's cow, whose daily yield of milk was increased from two quarts to four quarts, by its food being seasoned with three penny worth of Thorley's Condiment at £56 per ton. Now, estimating the milk at three pence per quart, a small sum for the rich milk of a small family cow, equal to London cream; but say only sixpence the two quarts, this would bring the medicinal value of Therley's Condiment to the enormous sum of £112, and its total value to £123; this being the sum of the nutritive and medicinal values when added together. Dr. Brown's profit would therefore be £67 per ton, according to his own experiment, thus proving that the nutritive and medicinal properties of a condiment determine its cheapness, and not its money price: in other words, the highest priced cattle food in the market, is the cheapest to the farmer and cow keeper."

Then again Mr. Burness says:

"As to objections, many have been advanced against *cattle foods;* but they are so groundless, as to render refutation almost superfluous. There appears to be, in not a few cases, a total misconception of what they really are, or the grand object for which they are manufactured; for some of them, although unfit to be given as food alone, have actually been so given to stock

* A copy of which I will give your readers free, on applying for same at 21 Broadway.

alone, and then, as a matter of course, condemned because they did not answer!"

And now I leave your readers to decide between Mr. Lawes and

Yours, truly,

J. THORLEY, per E. M. F.

New York, 1860.

Concrete Houses.

These houses, as our readers well know, are built of a mortar made of lime, gravel, and small stone or pebbles, laid up in one mass between moulds of board, so as to form one solid mass of concreted mortar when dried.

When a good foundation, unmovable by frost or undisturbed by water, can be found, these houses are very cheaply built, and in some sections are becoming quite abundant. We like, however, a new method of using this concrete for houses, patented not long ago by Samuel T. Fowler, of Brooklyn, N. Y. It is a combination of the wooden frame and concrete. The frame may be a light one; it is erected, and then imbedded in the concrete by plastering it up on all sides. We find an account of this mode of building in the last number of *Fowler's Life Illustrated*, from which we abridge the following.

This improvement consists in the introduction of a frame-work for holding the green mortar to its place, and to afford convenient and reliable hold for screws, with which to fasten the moulding planks securely and exactly in their places, plumb and level. This is done by erecting a row of timbers, (common joist would do,) of appropriate size and form in such manner as to secure them in their places, and by fastening a rib to the same on each side, at the top of each layer of mortar, for the purpose of tying the wall together, that an opening may be made therein by setting a short board or plank near the centre, between the timbers, and about one inch from the inner rib, and one or more inches from the outer ones, reaching to within two inches of the upright, and raising the same at each laying of the mortar.

The advantages of this plan are stated to be the following: The openings and timber in the wall answer as a cut-off to exclude the passage through the wall of heat, cold, and moisture, thereby securing the comfort of dry rooms, cool in summer, and warm in winter, without the expense of furring, lathing, and plastering; the openings also give ample facilities for ventilation and the distribution of heat. This plan also renders the walls fireproof by perfectly encasing the wood in the mortar, and by extending the same principle to the over-head walls and roof, (as he proposes to do,) they may also be rendered fireproof.

The following additional particulars are given by the writer:

The combination of the frame-work with the concrete body gives great strength, because the frame becomes to the concrete body a universal tie, and the concrete a universal brace to the frame.

The frame-work also facilitates the work, and gives security to the wall, by sustaining not only the weights necessary in the prosecution of the work; and the concrete protects the wood by excluding it from the atmosphere.

As this plan does away with the necessity of furring, lathing, and plastering, to obtain the comforts of a dry house, cool in summer, and warm in winter, and as it also furnishes the facilities for securely fastening the moulding planks or plates in any desired position, the walls may be cast with any desired finish, outside and in, including the ceiling, simply by the use of appropriate moulding plates, and the proper management of the mortar.

Thus a much harder and handsomer surface may be obtained without the use of the trowel than with it, and that of any devised form you choose to make the moulding plates, and to this may be added never-fading colours, as taste may dictate, by using a proper mineral base with suitable metalic or mineral pigment.

The comparative cheapness of this plan is very evident, as one half the mortar required by the ordinary mode will, in this way, make a wall twice as strong, while all the labour of lathing and plastering is avoided; the cost of ornamentation is but a trifle in comparison with the mode heretofore used, for, with suitable moulding plates and frescoe painting, the most beautiful effects can be produced.—*Maine Farmer*.

REMARKS.—We have no faith in the foregoing patent or plan of working concrete; our own experience having taught us a much cheaper and better method. Instead of this Dutch frame-work that Mr. Fowler proposes to imbed in the wall, we put up similar standards, both outside and in, for our intended wall, (usually using the joist and scantling intended for subsequent finishing,) and far enough apart to admit the curbing boards inside of them, and at the right distance apart for the thickness of the walls; thus we obtain a much better support for our curbing boards than when we have to screw or nail them on to studs inside of them. Our mould-boards are simply slipped up and down inside of these standards, which of course must be set by a line, both straight and plumb. Thus when our walls are up, we take these studs, or standards, away, and use them for rafters, or ordinary partition studs, &c. &c., and the mould-boards for sheeting the roof, and in that way loose no lumber in the operation.

Mr. Fowler's, on the other hand, however light his frame may be, will be found to require considerable material, and that costs money in the prairie country.

Then, the next advantage claimed in the way of a hollow wall, the saving of inside lath and plastering, outside finish, &c., is, according to our experience, all erroneous. If such a wall is made hollow, it must have a good deal of additional thickness to give it the requisite strength; and without which strength it is very apt to crack and shatter to pieces. The idea of laying it up smooth enough inside for a good house, is just about as practicable as to saw the lumber in a saw-mill smooth and good enough for window and door casings, without plaining and jointing—sheer absurdity of course. The same with the outside also; it can be made neither smooth enough to look well, nor solid enough to turn water perfectly without being troweled down at least; and to make either a good job, or a good looking one even, it should be hard-finished and blocked off like stone; and, better still, to be a right good job, it should be painted outside, although this last, if well hard-finished, may be omitted. The idea of moulding it into fresco, without great outlay in preparing moulds, is also impracticable, as every experienced builder knows. It is a pretty fancy and that is all.

The inside furring and lathing for plastering is a very small expense, and much the best way for a hollow wall. The less wood in the wall the better, as it weakens it where it divides it; and, besides, it is apt to shrink, and swell, and cause cracks.

We fill our concrete walls as we put them up as full as possible with rough, flat stones, such as abound in a shell state in many of the prairie knobs. These stones we imbed in very thin mortar, so close that they touch each other, if possible. We built a concrete and stone house in this way last season, of pretty good size, and it has stood perfectly well, not a crack in it that we know of. We laid the walls up from the cellar bottom in the same way, and to keep them from absorbing moisture where they came against the banks, we gave them two good coats of coal tar, up to the water table, before filling the earth in around them. The result is a perfectly water-proof wall and dry cellar. Such a coat all over a hard finished building would render it decidedly impervious to moisture, but its black colour would not be comely in appearance.

Our concrete house walls cost us only about one half the price of brick, and about one-third the price of rubble-dressed stone work; thus being a decided economy in first cost. But comparatively they are not so good as good brick or stone. Still, if they are well put up they are very good. But they are the last kind of a wall that a bungler should attempt—ten to one he will make both a fright and a failure of it. We see a great many silly things said about this kind of building, in our exchanges; usually by those who, obviously, know little or nothing about them. We seldom notice them, but thought we would not let this one pass in silence.

Ed. Wisconsin Farmer.

Grand Exhibition of Mowers.

On Monday afternoon, June 11th, about five hundred of the substantial farmers of the township of Lawrence, in Mercer county, assembled at Hutchinson's Mill, near Baker's Basin, to witness an exhibition of the relative working abilities of several mowing machines. The day was fine, and the assembly was composed of the substantial farmers of Lawrence township and from the adjoining townships.

Upon our arrival we found the following machines on the ground:

Dunham & Staats' Mower and Reaper.
Pennock's Iron Harvester.
Champion Mower and Reaper.
Buckeye do. do.
New Jersey do. do.
Kirby's American Harvester.

Each of these machines were constructed for mowing and reaping.

After the people had generally assembled, Dr. White called them to order.

Mr. Henry D. Phillips, of Lawrence, was appointed President of the meeting. On motion, E. F. Hendrickson, of Ewing, a committee of three was appointed to get the names of the machines on the ground, and arrange the order of their entry into the field.

The President appointed E. F. Hendrickson, Samuel Nicholson and John Phillips. Mr. Hendrickson withdrew and Mr. James A. Hutchinson was appointed.

The following gentlemen were appointed Judges: Jacob Taylor, A. T. Burroughs and Gideon Corwine.

All the preliminaries being now ready, the machines were unlimbered and hitched to good strong horses and prepared for action. They entered the field, (about three acres in size,) led off by the "New Jersey." This machine was less inviting in appearance and rather smaller in size than the others, but still it moved off with great effect, getting into the grass at a fine rate.

The other machines, all new and in excellent order, went into the field with effect, and cut away, right and left, turning over swarth after swarth. But soon it was discovered that there was a difference in the cutting, and especially in the facility of throwing off or distributing the grass. As the work progressed, the farmers began to look at another matter—the lightness of draft, the simplicity, durability and convenience in construction and operation. The test was made by two horses, then with one horse, and then with four men.

The opinions of the people acquainted with the subject, we found to be quite varied. The fact is, that all the machines were good, and performed their work well.

After the whole field had been cut down, the Judges got together and made up their decision as follows:

"All the machines on the ground are first-rate workers.

"We give the preference for draft and work to Kirby's American Harvester.

"We give our second preference for draft and work to the Buckeye."

The committee did not go farther in their expressions of preference, but concluded this to be sufficient.

The spectators were favorably impressed with the "Champion," and with Pennock's Iron Harvester, and some liked the New Jersey. The American Harvester, Buckeye and Champion, cut the grass very well, and spread it much better than either of the other three.

One thing was quite apparent, those machines driven by persons who make a business of it at every exhibition, had the best chance.

Take the whole affair together, it was a very pleasant meeting. The farmers enjoyed it greatly, and although a little out of our line of business, we confess we were highly gratified.—*New Jersey Farmer.*

From the British Farmer's Magazine.

Description of a Traction Engine, and of the Implements to be Worked Therewith, in the Application of Steam Power to Tillage and other Operations of Agriculture.

BY JOHN EWART, LAND SURVEYOR, AND AGRICULTURAL ENGINEER, NEWCASTLE-UPON-TYNE.

It is not less feasible, and certainly not less important, that steam-power should be applied to cultivation, than to the staple manufactures of the country, to steam navigation, and to railway communication. For some years past the attention of many mechanical engineers of eminence, and of practical agriculturists, has been directed to the application of steam-power to cultivation; but hitherto without that success which might have been expected in so important an object.

This failure of success has arisen not only from a defective application of the power itself, but also from a persistence in the use of implements, as a medium of the application of the power, which, from their action, are ill adapted to the purpose. On this subject, Mr. Hoskyns in his able article on "steam culture" in "Morton's Cyclopedia of Agriculture," published in 1855, remarks that "it is true that no demonstration has ever been attempted of any special inaptitude of steam power for the work of cultivation. The impediments it has had to encounter have been those of delay, rather than denial, or even mistrust, of its ultimate possibility; and the delay itself has been due rather, it would seem, to error than neglect—the error so long persisted in, of regarding the plough as the *sine quâ non* of field cultivation, and the necessary medium through which the steam-engine was to be applied to cultivation."

It will not, it is hoped, incur a charge of presumption in any individual, who, having given the subject of application of steam-power to cultivation long and attentive consideration, in offering a few suggestions by which so desirable an object as that in question may be promoted; nor will apology for craving space in the pages of your valuable miscellany with that view be required.

With the above-quoted remarks of Mr. Hoskyns, the writer of the present paper entirely concurs; and he might, if any doubt can exist of the truth of the action of the plough being inefficient in its purpose, especially in its not being "the necessary medium through which the steam-engine was to be applied to cultivation," quote the observations on the subject of steam culture, in a lecture to the Manchester Royal Institution, March, 1849, and contained in the article already adverted to; but the admirable text-book on all topics in any way relating to agriculture referred to, being, he supposes, in the possession of most persons interested in field culture, it will be unnecessary to trespass here by any further quotation from the article in question.

The principal cause of failure in the use hitherto of steam power to the purpose in question has been in the persistence in the use of implements, in which the action is simple traction through the soil. Although it is intended to reserve lengthened remarks on the implements to be used with the steam-engine in the tillage operations of agriculture until after having first treated of the *motor* for the purpose, yet it may be here remarked that the power of steam can never be applied to cultivation with complete success unless a considerable breadth of ground be efficiently operated upon at once, with the least amount of resistance from friction in the working of the implements. In this, simple traction must be superseded by a revolving action.

In considering the subject of the application of steam-power to tillage operations of agriculture, it will readily be perceived that there are two modes by which the steam-engine may be available for the purpose, viz.:—by traction of the implements to and fro, by means of chains or ropes, by stationary engines, but which are advanced at right angles to the line of traction, as the breadth of ground worked at once by the implements is operated upon; and by locomotive engines, to which the implements used in the operation are directly and immediately attached.

In the first of the above-mentioned modes of applying the steam-engine to cultivation, the pressure of the weight of the engine on the soil is confined only to a portion of the ground to be worked, that is, to the head-lands; but, on the other hand, such engines and their working gear are necessarily of a somewhat complicated construction; and a considerable amount of force of the moving power is absorbed in the strain required to produce motion in the implement—particularly in fields of considerable extent, in which the ropes used are of great length.

In the other mode, the principal defect consists in the pressure of the weight of the engine travelling on the ground to be worked; but this objection, if it cannot be entirely obviated, may be greatly mitigated, by distributing the whole weight on as many points of bearing and on as great a surface as possible. On the other hand, nearly the whole force of the engine is available to the working of the implements, from their being directly and immediately attached to the moving power. Under all circumstances, this principle of action in the engine is quite as favorable, if not to be preferred to the other, for the purpose of applying steam-power to tillage operations of agriculture; besides, which, it is not to tillage alone that such an engine may be applied, but also to drawing carriages on fields and on roads.

In designing an engine with a view to the successful and to the most extensive application of steam-power to tillage operations, whichever of the two principles already described may be adopted, the following are the most important matters for consideration:

1st That its construction should be as simple as possible, consistent with efficiency in its operation.

2nd. That its working parts should be as little as possible liable to derangement and requiring repair; and when repairs may be necessary, either from accident or from long use, such repairs may not be of an expensive nature.

3rd. That it should be easily managed by agricultural laborers of ordinary intelligence.

4th. That it should be of as moderate cost to purchase as may be consistent with efficient working; of sufficient power with a moderate quantity of fuel for the purpose it may be required; and that it should be durable.

The foregoing remarks are general, rather than specially addressed to the subject of the present paper; but as they elicit the views of the writer on the subject of the application of steam-power to cultivation generally, such trespass on the present occasion may, it is hoped, be excused.

The special and direct object of the present paper is to submit to the consideration of mechanical engineers and the agricultural public a description of an engine for the application of steam-power to tillage and other operations of agriculture, which, perhaps, may be found to possess the properties noticed as being requisite in an engine for cultivation by steam-power.

From a previous remark it may perhaps be inferred, that the writer is in favor of the locomotive principle of action. After long and attentive consideration of the subject, and many discussions thereon with mechanical engineers of experience, the writer would decidedly recommend locomotive action for the purpose in question.

The locomotive action being assumed to be that adopted, the breadth of ground operated upon at once by the implements will limit the size and construction of the engine. For if the breadth of ground operated upon at once by the implement be less than the breadth of the engine, a portion of the ground will either be left uncultivated, or a portion of that cultivated will be injured by the pressure of the wheels on one side of the engine. In the latter-mentioned case also, the engine, from the wheels sinking deeper on one side than on the other, will be out of its transverse horizontal position; that is, it will be as if moving across the slope of an inclined plane, which would be a position of obvious disadvantage and inconvenience. Besides the size of the engine being thus limited, in order to obtain room and convenient arrangement of purchase gear, by which to multiply the power, a vertical boiler will be that to be adopted.

In the engine about to be described, the FRAMING will be best of I iron, and forming beams with hollow sides, 6 wide by 9 inches deep, and the thickness of the iron ½ inch. Such a beam will be sufficient to bear a much greater weight than that of the engine, but should additional stiffness be necessary, the hollows in the sides of the beams may be filled in with oak timber of a scantling of 8 inches by 2¾ inches, and secured in their places by through bolts at frequent intervals.

The WHEELS, it is proposed, should consist of a pair of driving wheels, 5 feet in diameter, placed in the mid-length of the framing, and a pair of steering wheels, 2 feet 6 inches in diameter, near each end; the last-mentioned wheels being so small in their diameter in order that they may lock completely under the platform of the machine. The whole of the wheels will be best made of malleable iron, felloes and arms being hollow, the latter cast into cast-iron bosses or naves, and the felloes made in segments; the tires should be hoops of malleable iron, 12 inches broad and ½ inch thick, which, being put on the felloes hot, will, by contraction, keep the several parts of the wheel firmly in their places, and the whole will be of great strength combined with lightness and durability. The axle of the driving wheels should be 3 inches in diameter, those of the steering wheels 2 inches in diameter, the whole made of the best forged scrap iron.

The arrangement of the position of the wheels should be such, that from the outside of one driving wheel to the outside of the other should be the extreme breadth of the machine; the hinder pair of steering wheels should be just clear of and within the track of the driving wheels; and the front steering wheels should have the same relative position to the hinder steering wheels that the latter have to the driving wheels. So that were the wheels all of the same diameter, and placed upon the same axle, they would form two cylindrical rollers, of three parts each, on the same axle, with an interval of a few inches, at mid-length of the axle, between them.

By such arrangement, the whole weight of the machine will be distributed over six wheels, each 12 inches in breadth, or an aggregate breadth of six feet, and none of the wheels following in any part of the track of the others, the pressure of the weight of the machine on the land will be reduced to a *minimum*.

The BOILER, as it has already been stated, is a vertical one. It is proposed that the height of the principal part or cylinder should be 8 feet, with a further height of about 1 foot 3 inches, and of 2 feet diameter, as additional steam chamber. Inside the main portion of the boiler is the fire box, 3 feet in height, having a hemispherical dome 3 feet in diameter, with a flue 1 foot in diameter, rising from the said dome, and passing through the steam chamber. As to the diameter of the boiler, it should be as follows, viz:—Fire box 3 feet; water space round the fire box 3 inches; thicknesses of the plates, ⅜ inch each, in the whole 1½ inch; making 3 feet 7½ inches as the outside diameter of the boiler. The outside shell, fire box, and so much of the flue as is within the boiler, should be made of the best Yorkshire or Derbyshire plates, ⅜ inch thick, and put together with ⅝ inch rivets, 2 inches apart, centre to centre. The chimney above the boiler need not exceed the thickness of No. 7, on the Birmingham wire gauge; and in the chimney there should be a damper, with the necessary means for opening and closing it, within the perfect command of the stoker. The boiler should be fitted with safety-valve loaded with Salter's spring balance, steam pressure gauge, glass water gauge, steam whistle float, blow-off and sludge cocks, and every other appliance for safety and convenience of the most approved construction. In order to bring the centre of gravity of the boiler as low as possible, and also to bring its top to a convenient height above the platform of the machine, the boiler should be slung from the sides of the frame by saddles or inverted brackets of plate-iron, 3 feet in length, riveted to the sides of the boiler, and bolted to the frame by 3 bolts at each side, so that the fire grate may be 2 feet below the level of the platform of the machine.

The ENGINE should consist of three vertical cylinders, the pistons of which may be each of them $4\frac{1}{2}$ inches in diameter, with a stroke of 12 inches. These, with their steam chests, should be firmly bolted to the boiler near to its top. The connecting rods will work three cranks at equal distances, or 120 degrees apart, by which only one crank would ever be on a dead point at one time, whilst both the others would always be on either the ascending or descending stroke, and by which a fly-wheel would be dispensed with. This arrangement may be looked upon as unscientific, not only in dispensing with an equalizer of the stroke, but also in increasing the friction. In answer to such objections, it may be remarked, that in the case in question a fly-wheel would be found most inconvenient, if not inadmissible, from the danger of its velocity; and its weight not only being a considerable addition to that of the machine, but also in increasing the height of the centre of gravity; besides which, the difficulty, or rather the impossibility of placing this great equalizer of the motion of the engine in its proper position, without sacrifice of convenience of arrangement of most of the other parts of the machine; and the additional friction of the three cylinders is trifling to the advantages which, in the particular case in question, would be derived from the arrangement of the engine as described. The engine should be fitted with a governor, and a feed pump.

An engine of so short a stroke as that just described, and supplied by the quantity of steam capable of being generated by the boiler previously recommended, will give at least 120 double strokes of the pistons per minute, which, if communicated directly to driving wheels of five feet in diameter, would produce a traveling velocity in the machine of more than 21 miles per hour, or more than six times that at which the machine need or ought to travel when working. Therefore to bring down the rate of traveling to the proper working speed, and thereby to obtain a six-fold force of traction, the crank shaft should have on it, beyond the cranks, pinions, say of nineteen teeth, working into spur-wheels having 37 teeth on an intermediate shaft; on this last-mentioned shaft, to the outsides of the spur-wheels, should be pinions of 19 teeth, working into spur-wheels having 59 teeth on a third shaft, which should extend beyond the outsides of the driving-wheels. The motion of the last-mentioned shaft should be communicated to the driving-wheel axle by means of an endless flat chain on each side of the machine, passed over sheaves on both shafts. The sheaves may either be round, with protuberances on their peripheries, to suit small links in the chain, or they may be canted, and the links of the chain so arranged as to hinge over the angles of such sheaves.

The STEERAGE of the machine, both before and behind, is proposed to be effected in the following manner, viz: by turn-tables like those used on the four-wheel axles of four-wheeled carriages, the lower circular plate of which to have spur teeth on half its periphery, into which the teeth of a pinion is to work. The proportion of the radius of the semi-circular toothed segment to that of the pinion, is proposed to be about three to one. On a spindle from the pinion in question, at a height of two to six inches above the level of the platform of the machine, it is proposed to have a horizontal tangent wheel and screw, in proportion of four to one; and on the axis of the screw a winch handle, the crank of which to be three times that of the diameter of the the barrel of the screw. The upper or fixed circular plates to have small friction rollers on their faces, to prevent the opposing surfaces of the plates rubbing against each other. A mitre-wheel on each of the pins or spindles passing through the centres of the fixed, from the lower or movable plates, working into another mitre-wheel on a short axle, carrying a small pulley, connected by a round band with another pulley of the same size, on a short axle, supported by a bearing on the framing of the tangent wheel and screw, will give motion to a pointer keyed on to the axle of the upper pulley, to indicate, on a semi-circular dial, the amount of steerage. Such steerage being at both ends, and worked in contrary directions, will bring the machine round nearly on its centre; and the great power of the gearing proposed for the purpose, will render but a very small force necessary in steering.

Between the fore-steering gear and boiler *longitudinally*, and between the purchase gear on each side of the machine *transversely*, it is proposed to have a cistern, to contain from four to five hours' supply of water for the boiler; and also to have five hours' supply of fuel (coke) piled on the platform of the machine behind the boiler.

A suitable machine for applying steam-power to field cultivation having now been described, in most of the principal points of its construction, with sufficient perspicuity, it is hoped, to be understood without the aid of diagrams for elucidation, it may not be out of place to offer some brief remarks on the economy of its use.

As to the dimensions of the machine:

	ft.	in.	ft.	in.
Its length is proposed to be - -			15	0
Its breadth is as follows, viz:				
Outside diameter of boiler,	3	7½		
Breadth of side beams of frame, 6 in. on each side,	1	0		
Intervals between driving-wheels and frame, 1 in. on each side, - -	0	2		
Breadth of driving-wheels, 1 foot each, - -	2	0		
Extreme breadth of machine,			6	9½

As to the weight of the machine—

Boiler, engine, and purchase gear, with water in boiler, and fuel in the fire box, - - -	41 cwt.
Frame, wheels, and water tank, -	22 "
Water in tank, - - -	10 "
Coke on platform, - - - -	3 "
Total weight of machine, - -	76 cwt.

The foregoing statement is fully the total weight of the machine, including a supply of water and fuel for half-a-day's consumption. The following comparison with a wheel carriage passing over the ground may convey an idea of the pressure on the soil by the weight of the machine. A single-horse Scotch cart with its load is seldom less than 24 cwt., that is, 9 cwt. for the cart, and 15 cwt. for the load. It may be said that a portion of this load is borne on the back of the horse; but in answer to such exception, it may be replied that the horse bears a much less portion of the load than his own weight, besides which, the trampling of the horse is more injurious to the tilth of the soil than the weight of the cart-wheels; and therefore, in the comparison about to be instituted, there need not be any deduction from the whole of the load of 24 cwt. being borne by the pair of wheels of the cart. Supposing the hoops of the wheels of a single-horse cart to be each 3 inches in breadth, there is a weight of 24 cwt. supported on a breadth of 6 inches; whilst in the engine there is a weight of 76 cwt. supported on a breadth of 72 inches. That is, in the cart 4 cwt. per inch of breadth of the wheels, against little more than 1 cwt. in the engine; or, in other words, the pressure of the engine is only about one-fourth of that of a loaded single-horse Scotch cart.

The engine described in the present paper, with a pressure of steam on the pistons of 40 lbs. per square inch, may be considered as six-horse nominal power; but by the purchase gear, the machine becomes equal to 36-horse power. Allowing 12-horse power to be absorbed in propelling the machine itself on tilled land, which must be allowed is an ample deduction for that purpose under the most unfavorable circumstances, there remains 24-horse power available for the traction of implements, which amount of force will scarcely ever be required in tillage operations, except when ascending planes of considerable inclination.

The machine being simple in its construction, may be easily managed by agricultural laborers; it is not, if well made, liable to be out of repair; and when, by accident or otherwise, repairs may be required, these may be readily effected at a moderate cost.

Besides the use of the machine for locomotive traction, by having the ends of the crank axle extended somewhat beyond the side framing, it may, on removal of the purchase gear, be used as a fixed engine, for driving fixed machinery up to, or even beyond, six-horse power.

Before proceeding to specify the construction of the implement to be used as a means of applying steam-power to cultivation by the engine previously described, it may be well to state the operations of tillage that it may be required to perform.

In the first place, a more or less frequent inversion of the soil, according to circumstances, is indispensable. In the second place, a complete comminution of the soil, so that the greatest number of particles may be acted upon by air and moisture, and, at the same time, a commixture of the particles with manuring substances, applied to maintain and increase fertility, must be thoroughly effected; and another most important end to be obtained by this means, is a complete removal of all weeds. And lastly, when the soil has been thoroughly underdrained, the subsoil may be broken up, and after having been fixed by the action of air and moisture or supporting vegetation, it may be mixed with the surface soil, by which the staple may be deepened, and thus enlarge the pasture of plants. It is for the purposes just mentioned that the implements about to be described are suggested for the consideration of the agricultural public.

It has already been stated, when treating of the motive power, that whatever implements may be employed in steam culture, simple traction should be superseded by a revolving action. The advantage of revolving action over simple traction is much the same as that of the action of a wheel over the action of a sledge. And it has also been stated, for the reasons given, that whatever implements may be used with a locomotive engine as the motive power in steam culture, the implement should operate at once on a greater breadth of ground than the extreme breadth of the engine.

For an invertion of the soil, the writer suggests a revolving implement of the following construction, viz.:—Let a circle be described of a certain radius, to which, at the extremities of two diameters intersecting each other at right angles, let tangents be drawn. Then with a certain radius from the points of contact of the tangents with the circle, describe arcs cutting the tangents; and these arcs will be the curves of the blades or spades.

The working part of the proposed implement should consist of a cast-iron nave, 12 inches in diameter, and 3 inches thick, into which should be sunk four tenon beds, arranged parallel to tangents to the axle, afterwards to be mentioned. These tenon beds should be 2 inches deep and 2 inches wide, and slightly dovetailed or tapering towards the circumference. From the naves just described four arms should protrude 12 inches beyond their circumferences, and which will be the limit of the depth to which the implement will work in the soil. These arms, to which the blades or spades are to be attached, should be nearly flat, about ¾ inch thick in the middle, with cutting edges of a concave form, and should have tenons to fit accurately into the tenon beds previously noticed, and the flat part of the arms should shoulder on the circumference of the naves. The blades or spades should be 12 inches in breadth, by 18 inches in length, and instead of being rectangular in their form, they should be rhomboidal, having their opposite acute angles 56 degrees; and, to keep the arms firmly in their places, circular cast iron plates, of the same diameter and 1 inch thick, should be bolted to the naves over the tenons of the arms. The naves, arms, and blades, should be keyed on to an axle of the best forge scrap iron 3 inches in diameter, so that the sides of the blades may touch each other, and so arranged that the obtuse angle of one blade may join the acute angle of the next, and the cutting edges of the mouths form a continuous diagonal line; and if seven of these blades form the working part of an implement, its length will be 7 feet, and form a horizontal spiral, about 3 feet in diameter, with a pitch of 14 feet or double the length of the implement. The blades, and also the concave cutting edges of the arms should be of steel.

The working part of the implement described above, should be mounted on an iron travelling frame, having a pair of wheels towards the back, and a pair of leading wheels on swivels in front; and provision should be supplied for raising the working part out of the soil when turning, or travelling out of action, and for regulating the depth at which the implement may be required to be worked in the soil. The last mentioned provision may be effected by means of a pinion working into a toothed sector, with the axle of the working part bearing in a radial arm or bar opposite to a bisection of the arc; and such purchase should be further assisted by screws working into wheels on the pinion axle, to which motion should be given by a winch handle on each side.*

A complete invertion of the soil being obtained, whenever it may be required, by the implement above described, the comminution and aëration of the soil, and, at the same time, the thorough removal of weeds, may then be effected by the revolving cultivator as made by Mr. Matthew Gibson, of Newcastle-upon-Tyne, which, for being work-

* The idea of this implement was taken from a paper on "New Processes. Rotary Forking and Digging," read at the Central Farmers' Club, London. by Mr. Clarke, and which appeared in the *Mark Lane Express*, February 15th, 1858. The writer of the present article has had a model made of the working part of the implement suggested, by which he finds it will efficiently perform the purpose required.

ed by steam-power, may be described as follows, viz.:—It consists of a number of cast iron discs or naves, 12 inches in diameter and 3 inches thick, with a further thickness on each side of ¾ inch and 4 inches in diameter, revolving independently of each other on a round iron axle 3 inches in diameter. On the periphery of each disc are fixed, alternately on each side, ten strong iron curved teeth, of a length to penetrate vertically 12 inches into the soil, with points of a diamond form and steeled; and between each disc is a bar of flat iron, with the edge downwards, and curved with a convexity towards the teeth as they emerge from the soil, to keep the teeth clear of weeds grubbed out of the soil, and, at the same time, to break any clods of soil that may be lifted by the teeth. The last-mentioned bars, for their support, and also to prevent soil from entering and shearing the axle, should embrace the discs at their joints with each other, and their other ends supported by bars, extending across from the lifting sector on one side to that on the other. In order that the implement may cover a greater breadth of ground at one operation than the breadth of the engine, the number of the discs on the working part should not be less than twenty. The implement now being described will work to any depth in the soil that may be desired, not exceeding 12 inches below the surface; the depth being regulated, and the working part being removed from the soil when turning, or travelling when out of action, by the same means as has been previously described for the purpose, when treating of the implement for inverting the soil.*

The most important application of steam-power to cultivation would be in the operation of subsoiling or breaking the under-soil without bringing it in its crude state to the surface, preparatory to deepening the staple at a future time. In this, three operations are required to be simultaneously performed. Opening a trench or furrow in the surface soil; breaking or forking the sub-soil; and filling the trench or furrow in the surface soil as the work proceeds. To effect these operations of the same breadth at once, which has been recommended to be done in the other operations of tillage, previously treated of, would require a much heavier implement than would be manageable; and besides which, the nature of the operation does not necessitate the implement being wider than the engine, without taking into consideration the much greater force required in working an implement for the purpose in question. Perhaps 3 feet at once would be as great a breadth as an implement for the purpose could be easily managed. In conformity to the recommendation of a revolving action in the implement, its construction may be described as follows, viz.: Three cast iron cylinders of 2 feet in diameter, 1 foot in length, and 2 inches in thickness, formed in the manner of wheels, with arms of malleable iron in pairs, cast into a nave in the centre and into the cylinder. In the periphery of the cylinder should be 12 rows of mortices across the length of the cylinder, three in each row, and tapering slightly towards the inside. The size of these holes to be 2 inches by 1 inch, the larger dimension to be in the direction of the circumference of the cylinder. In the mortices should be slightly curved teeth, the points of which to be diamond shaped and steeled, and project fully 12 inches beyond the circumference of the cylinders. These teeth should be 1 inch thick, 3 inches wide at the shoulders, tapering to 1 inch wide at the points, and keyed through slots in the tenons within the cylinders. This portion of the implement is intended to roll in the bottom of a trench in the surface soil, formed by another portion of the implement, presently to be described; and from what has already been said, its action will be readily understood to be precisely that of three pronged forks. The arrangement of the cylinders just now described, is one in the centre and in front, and two behind, one on each side, mounted on a suitable frame, with apparatus for raising and lowering a pair of travelling wheels, by which to raise the cylinders from the soil when being turned, or travelling when out of action; and to give power to such action there should be a swivel wheel in front to act as a fulcrum in

* This is the revolving cultivator as first made by Mr. Matthew Gibson, of Newcastle-upon-Tyne, in 1853. Revolving implements for tillage were suggested by the writer of the present article in the *Farmer's Magazine* for October, 1848. The implement as made by Gibson is most efficient for its purpose; but owing to the great horse-power required to work it, it never came extensively into use; but if used by a steam-engine as the tractive force, the same objection to its use will not exist, and it would be found to be the most valuable implement for its purpose that has probably ever been invented.

lifting the implement. In front of the leading cylinder, should be a double-mouldboard plough-head, to open a furrow 12 inches wide, and lay the surface soil to each side, and furnished with a lifting screw to regulate the depth it may be required to be worked. Then in front of each of the other cylinders should be cylinders 12 inches long and 6 inches in diameter, on which should be spirals, slightly curved forward, to take up and deposit the surface soil into the furrows formed by the double-mouldboard plough-head. The *helices* on the last-mentioned cylinders should be 9 inches deep, and those portions of the implement should be furnished with lifting screws to regulate their working to any less depth that may be required. These last-mentioned cylinders must have their revolving motion in the contrary direction to that of the larger or subsoil cylinders, which may be effected by means of cross bands, from pulleys on the nave of the leading subsoil cylinder to sheaves on the axles of the two small cylinders behind.*

When the under soil may be of clay, free from stones, steam-power may be applied to draining; and with some modifications in the means to obtain a proper action, no implement appears better suited to the purpose than that described, and of which a side elevation is given in "Morton's Cyclopedia of Agriculture," vol. i. p. 707, invented by Mr. Paul, of Thorpe Abbots, near Scole, Norfolk.

Before dismissing the topics treated of in the foregoing remarks, the writer has distinctly to disclaim any original invention on his part, as there is not anything he has suggested in the present paper that is new in principle, and that has not been applied to the same purposes by the power of horse labour. With the exception of the last mentioned implement, the sources from which the different implements for the various purposes have been derived have been acknowledged in foot-notes to the text in which the description of each occurs; and the merit, if any, in the present instance is confined to designs for adapting previously well-known principles as the means of the application of steam-power to the cultivation of the soil.

If steam-power were efficiently applied to the tillage operations of agriculture, and the power and means obtained at a moderate cost in their purchase, great indeed would be the advantages, not only to those immediately concerned, but to the public at large. For not only would a cheapening of production of the fruits of the soil be a valuable result in a national point of view; but even a still more important object would be obtained from despatch, by which it would be in the power of the husbandman to choose his time for his tillage operations, which under the present system of field culture can seldom be done, as the stock of working cattle is never greater than can be fully and constantly employed all the year round; and it frequently occurs that operations commenced under favourable circumstances, as to the state of the soil, have to be continued and finished under adverse conditions, from not having an opportunity of waiting for a proper condition of the soil, without clashing with others of equal, or perhaps greater, importance.

It may be urged that the application of steam-power to the cultivation of the soil will ever be limited by particular circumstances, such as tillage farms of great extent, and flat ground. But if steam culture were successfully introduced, might not it become a profitable business to let the power and means for hire to the tenants of farms of moderate, and even small extent, as is now very commonly the practice in many districts with portable steam thrashing machines? And might not flat grounds be rendered so much the more productive, by improved cultivation, that the steeper grounds, whereon the difficulty of applying steam cultivation may be insurmountable, be applied to pastures? And if even a small portion of the horses now employed in agriculture could be dispensed with, by their

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* The principal working portion of the implement described in the text was the invention of one Robert Hall, a shoemaker, at Prudhoe, on the south bank of the Tyne, in Northumberland, in 1822; and although but little known, it is nevertheless the best implement ever invented for the purpose. The writer has seen it worked 12 inches deep in a tilly sub-soil, below a furrow made by a common plough in the surface soil 6 inches deep, by three horses, two going in the furrow in length, and one on the unploughed ground abreast the hindermost horse in the furrow, with the most perfect effect. In returning, the common plough opens another furrow to be subsoiled, and covers with surface soil a furrow which had previously been subsoiled. So great is the effect of the operation, that the volume of the broken or forked sub-soil is so increased as nearly to fill the furrow, 6 or 7 inches deep, in the surface soil.

labour being superseded by steam-power, might not a considerable amount of produce, now consumed by working stock, be available to the sustenance of man? These are questions of great importance, and deserving the consideration of all classes of the community—to the landowner, in maintaining the revenue from his estates: to the tenant farmer, in increasing his profit; to the labourer in husbandry, in increasing the comforts of life; and to all other classes of society, in the cheapening the production of the fruits of the soil. All classes of society are more or less directly interested in the promotion of the application of steam-power to the tillage and other operations of agriculture.

In conclusion, the writer has to remark that he has not been actuated in giving publicity to the foregoing suggestions from any expectation of any particular benefit to himself; but a conviction of the feasibility of his suggestions, at a cost of power and means, much less than any hitherto brought before the public, and the great national interest of so important a matter, have prompted him to publish, through the medium of the columns of a serial of such widely-extended circulation as the *Farmer's Magazine*, in the hope that by doing it may induce others more competent to the task than himself to stimulate the attention of the ingenious and enterprising to bring to perfection an object which, notwithstanding its great national importance, has hitherto made such slow progress. It is matter to excite wonder, in this age of invention and improvement in every other department of the industry of the nation, that to that of the very first importance, steam-power should still remain so imperfect in application, especially when the advantages to be derived thereform are so obvious, and so important to all classes of society. Should any reader, into whose hands this paper may come, desire any further information or explanation on the subjects treated of, the writer will be most happy, on application to the under-written address, to afford any that he may possess or can obtain.

51, *Newgate Street, Newcastle-upon-Tyne, August* 1, 1859.

The Keeping of Cattle: How to Save Most in the Operation.

Mr. Alderman Mechi, of Tiptree Hall, England, who has for some time filled so large a place in the public eye, at least in that of the agriculturists, has adopted and earnestly recommends for the keeping of farm stock, when confined or shut up, a peculiar form of floor, which has been variously named the "*boarded*," "*spaced*," or "*sparred*" floor, along with certain appurtenances to be named. The plan he credits to a certain Mr. Huxtable; but a writer in the *Stock Journal* declares that it was known to be in use in the west of England some thirty-five years ago, before the time of Mr. H., and that he has seen it in use for hogs in our Western States.

Mr. Mechi has first of all prepared below each of his floors, a vault that will contain the droppings of the animals on it, together with needful absorbents, as muck or charcoal, until the proper time for removing the manure. He makes his floors for cattle, of 3x4 inch bars, with $1\frac{3}{4}$ inch intervals; for calves, 2x3, with $1\frac{3}{8}$ inch spaces; for grown sheep and hogs, $1\frac{1}{2}$x3, with $1\frac{1}{4}$ inch spaces; and less for lambs and pigs. The wood he employs is hard and well-seasoned, and the strips run lengthwise of the stall. It has been suggested that the manure being removed twice in each winter, a total depth below the floor of about four feet would be needed for the vault, the floor for convenience to be a foot or more above ground; and that, in case of the droppings freezing between the strips, a hoe with a wide blade for cleaning on the strips, and a narrow one for working between them, would be desirable.

It is claimed that spaced floors are sufficiently clean without litter, and, indeed, that with any kind of litter they are more damp and uncomfortable. For warmth, reliance is placed in excluding currents of air from below, making the vault tight on all sides. As it is the animal that furnishes the heat to be desired, and heated air rises, a colder body of air in the vault will *rest* there, and not rise about the animal. To economize heat still more, Mr. Mechi stalls his oxen or cows in pairs. The ardent advocates of the new plan estimate that, by means of the saving secured in feed and in litter, *twenty-five per cent.* more stock can be wintered well on the same stores now consumed; some say even *fifty per cent.* more.

The advantages as summed up in the *Stock Journal* are these: 1st, One-fourth more stock wintered; 2d, With this increase of animals, and the same feed, forty to fifty per cent. of *effective* manure; 3d, A great saving of labor in cleaning the stalls; 4th, From the increase of manure, twenty-five per cent. more of farm produce; 5th, and finally, All these gains equivalent to a corresponding increase of land or of working capital.

Having thus presented the plan of spaced floors, and the arguments in their favor, we feel compelled to suggest, or to repeat, as the case may be, some very strong points against their adoption. In Mr. Mechi's plan, the contents of the vaults find their way into a tank, in which they are liquified, and from this the liquid manure is distributed through pipes to the fields. This furnishes a means of realizing the total value of the manure accumulated, which American farmers must long fail to possess.

But besides this, any plan that interferes seriously with the comfort of the animals must, we believe, prevent their thriving in the highest degree; any cause that affects their healthfulness unfavorably, must certainly do so. If, then, this mode of keeping is unhealthful or very uncomfortable, the condition of the stock must be lowered, and while their progeny would suffer accordingly, the creatures themselves must be less fit for service. If they are thus kept for milk, or for slaughtering, the actual wholesomeness of the milk and flesh must be lost in greater or less degree, no matter how plump and fair the animals may appear. But that the new floor makes the animals both uncomfortable and unhealthy is a conclusion easily established.

In one word, the plan is the very antipodes of the *natural* condition of the animals. The leaves, earth or grass on which they always choose to lie, are soft, and better retain their warmth; these slats are rigid, unyielding, and conduct away more of their heat. On these, too, they are in the midst of a larger space that their bodies must lose heat to; for if the cold air under them will not rise, still their bodies radiate heat into it, which they are not likely to recover. If we depend on fermentation and warmth of the manure under them for heat, this cause must also keep up about them an atmosphere loaded with vapors, and gases arising from the decaying mass. This air, instead of their rightful allowance of pure out-door atmosphere, they must perforce inhale, and that, to prevent the entrance of too much cold, over and over again! In fact, if we aim to prevent such charging of the stall with offensive vapors, how, except in mild weather, or in weather that would freeze the contents of the vault, is our preventon to be sufficient? What absorbents are likely to be used that will successfully prevent the animals from continually inhaling poisonous exhalations; safe, of course, in weather that allows a free circulation of the out-door air through the stalls.

But again, the slats would not remain clean. If they did, what use of the hoe? Liquid manure will run from them; but the semi-solid will only coat over them. Who would for a moment think of *resting* and *refreshing* his over-driven favorite trotter or coach horse in this way? What keeper of a livery-stable will on this plan attempt to recruit his jaded spans for the morrow's labor? Not one, we are confident. And this brings us to another objection—the most vital of all. This plan does not even contemplate a natural condition for the animals. It is not devised for any such purpose or object. It does not seek to recruit or to restore and invigorate the animals perpetually, so much as it seeks to restrain and hamper them, to repress their natural desire movement, and so to convert them into mere *machines* by which a crafty greed of gain fancies it can bring about the laying-on of so much more flesh from a given weight of food, and the heaping-up of a certain sum of manure. The animals do not like to walk about on these floors set with crevices. They slip or catch their feet, get hurt, and reluctantly find it discreet to give up trying, to lie and chew their cud and snore. Their natural evacuations are somewhat checked for want of exercise. The lungs, the skin, fail to perform their functions; the kidneys and intestines may do a little more than duty. But the tissues are not duly changed by exercise, and so, the total excrement is imperfect, as well as too small; the blood is not purified; more flesh, or rather fat, and juices accumulate, but they cannot be healthy; and of course such animals become sources of impurity and disease to the blood of the person that feeds on them. This cardinal principle of keeping the animal quiet, seems, during the present discussion, to be kept in the background. But it must be considered, and it ought to have great weight against the new mode, unless it can be explained away or obviated.

It is for the reason last stated, also, that we believe the practice of *soiling* cattle—confining in stalls or yard in summer, and feeding with cut green crops—may easily be carried to a hurtful excess. We wonder not a little that the clear head of Miss Martineau could bring itself to see this kind of confinement to be for the subjects of it quite as well as a free range over a good pasturage! In behalf of the soiling system, it is claimed that it will effect a great saving in the need of fences; so utilizing much land on which fences now are; that it gives an improvement in the growth of stock, more gentle cows and more uniform supply of milk, and the saving and increase of good manure. The practice of soiling, however, must have its limits, or entail losses in the long run. Animals that have three or four hours run daily, will bear it better; and this may, perhaps, suffice for perfect health; but with less than this, their case is doubtful. Again, there are seasons at which soiling is for the animal a decided gain. This is so in the spring, "between hay and grass," and in midsummer, if the fields get dry, or whenever the pasture is too short. For these seasons, the farmer will gain greatly by having a patch of early corn, or other green crop that can be put in at the earliest moment, and will yield soonest. This can be sowed, or better, drilled; and its due use will save the condition and strength of animals; increase the supply of milk, diminish the cost of subsequent keeping, and so on. Later in the season, sorghum, or corn put in later, the hungarian grass, clover, turnips, &c., will come admirably in place. But in all our plans for economy and profit through the raising and management of animals, let us remember that they are not like plants, fixtures to any spot; that nature has fitted their functions to a state of locomotion and activity, and endowed them with feelings also of comfort or pain, through which their well-being must be affected; and that just so far, therefore, as we aim entirely to shut them up and reduce them to the vegetative condition, we must impair their stamina and damage, for our own purposes, the product of food, for which a large share of them are intended.—*United States Stock Journal.*

Meeting of the Agricultural Society of Virginia, June 18th, 1818.

The President, JOHN TAYLOR, ESQ., [Author of Arator,] *delivered an address, of which the following is the concluding part:*

ADDRESS.

* * * * * * As every country must acquire Agricultural knowledge by its own exertions, or remain ignorant, it ought to consider whether ingenious discoveries or skilful experiments will not be generally lost by changes of property, or buried in the tombs to which their authors are devoted, unless they are recorded and circulated by the same means which have saved science from oblivion, and spread civilization wherever it exists. Is there a man who would wish to carry out of the world, a useful discovery he has made in it, or who would not feel pleasure from the reflection that he may be doing good to mankind after he is dead? He who shrinks from publishing whatever may have this effect, commits an act he abhors and loses the satisfaction arising from disinterested benevolence.

No censure of the genius of our country is intended by the observation, that it does not appear with much splendor in the science of Agriculture; since the mind of man is not constructed for the comprehension of abstruse subjects, without study, nor for the attainment of skill without practice. An incitement to exercise its powers, must precede a display of its talents. The human mind is enfeebled by idleness and rendered vigorous by exertion. By compositions concerning Agriculture, the writer will improve his own knowledge, awaken the understanding of others, and cultivate the only mode by which perfection is attainable. Without them, whatever may be the genius of Virginians for the acquisition of accomplishments by which they are adorned, it will become dormant as those by which they must live.

The study of Agriculture, and a habit of writing upon the subject, will bestow upon the wealthy farmers no small portion of pleasure, by furnishing them with the means of escaping from the irksomeness of too much leisure, and from the regret of having wasted time in unprofitable employments. Those placed above the necessity of bodily labour, must recompense themselves by mental, or sink into a state of apathy, unfriendly to health, happiness and virtue. What subject can be better fitted for substituting activity for langour than one which can gratify self-interest, provide for the exercise of benevolence, and awaken the love of our country?

The strongest reason which invites us to become attentive to the encouragement of Agricultural publications, remains to be noticed. Agriculture, commerce and manufactures are the three great objects of individual interest, and national solicitude. To preserve them, each ought to understand its own rights; to lose them, ignorance will suffice for either. Though Agriculture may need no charter, require no bounties, claim no monopolies, and ask for no legal augmentations of the prices of her commodities, she may yet feel an unpropitious legal providence, and languish under injustice. Though she may flourish in the enjoyment of equal rights with her compeers, she may be stunted, or even stifled by an unequal pressure. Commerce never confines her knowledge to the structure of her ships and the properties of the magnet; nor manufacturing to the powers of steam and the fabrication of tools. Both are politicians. Both write, publish and petition, to gain improvement, justice, or favor. Both sift the laws by which they are affected. Why should Agriculture confine her attention to vehicles and lose sight of cargoes? why should she be careful of her lands and her tools, and careless of her crops? Both her sisters shun this strait road towards impoverishment, and renounce the recreation to be expected from the soups of charity. Every human interest inhabits a human heart, and every human heart pants for wealth or competency. Ought Agriculture to be indifferent to blessings considered by her sisters as essential for human happiness, or remain ignorant of the extent to which their wishes may be gratified, without injury to her rights; may she not at least be permitted to consider, whether bounties to expel competition unlike premiums for exciting it, are likely to beget industry, perfection and economy; or idleness, want of dexterity and profusion? whether the English policy of forcing their manufactures into a competition with those of all the world, or the policy of protecting ours against a competition in industry even with Agriculture, is most likely to compass the end which both countries have in view? Every social interest to flourish, must know whether it buys benefits or scourges. If Agriculture has determined whether an equal or an unequal distribution of rights among men, or between interests composed of men, is most suitable to her nature, or most likely to advance her prosperity, she has solid ground to stand on for making this enquiry. If her political ignorance is like a narcotick administered to a confiding virgin, no physician who wishes to see her vigilant in the preservation of her treasure, can disapprove of her acquiring an intimate knowledge of her own interest, and an acute discernment of such measures as may advance or obstruct it. How can she gain a capacity for this discrimination, so essential to her prosperity, but by an industrious exercise of her best talents through the medium of the press?

In a struggle for empire, even among the true, sound and virtuous social interests, ought Agriculture to relinquish her pretensions to equality, if not to pre-eminence, and tamely yield up a prize, to gain which she so largely contributed? Perhaps a free and candid discussion of her claim to justice, may disclose some less worthy competitor, whose prowess may evince the necessity for a coalition between those interests, founded in principles of mutual right and pure friendship. Are not the consequences of such an union to private happiness and public prosperity, worthy of a dilligent enquiry? Laws may affect Agriculture as well as commerce or manufactures; and hence, as powerfully require the attention of a Society confined to that special object, as laws affecting commerce or manufactures require the attention of Societies for their improvement. Would not a resolution by a Society for promoting commerce, manufactures or internal improvements, to disregard legal favor, justice or injury, and to repose in legal ignorance, be a renunciation of the source of success, and prophetic of its fate? The patriotic advocates for internal improvements, far from confining themselves to mathematical discussions, contend, that legislation constitutes the source of their prosperity or decay, and laboriously investigate its influence upon inferior objects. Are these enquiries irrelative, or ought the cardinal internal improvement to be prohibited by its advocates, from acquiring a species of knowledge, even necessary for the prosperity of her handmaids? Is not a fair competition in industry under the shield of equal laws between the interests which cover all, as necessary to excite emulation and to produce improvement, as such a competition among associated individuals?

Supposing that the maxim "ne sutor ultra crepidam" is as applicable to a science as to a cobbler, and that the votaries of Agriculture ought to stick to the plough, and continue to "whistle as they drive it for want of thought," whilst her friends and her foes are encouraged to become deeply learned in the subtleties of legislation; yet, as one denies to them the knowledge and skill necessary to make good crops, because all eat, it is superfluous to consider whether verbal communications and local examples or essays and books constitute the best means for effecting the end, since all may be united, and each may operate in its own sphere. Agriculture has certainly flourished most in those countries where the press has been most extensively employed as an auxiliary to example. Its great efficacy may possibly be owing to a quality of the mind, neither unfrequent nor inoperative. It is a quality often offended by the wisest lecturers and the brightest examples; but soothed by the appropriations it can make from reading, and delighted by a display of acquirements drawn from the common reservoir of knowledge. To copy example, it looks upon as a species of plagiarism; and therefore, the most beautiful agricultural experiment unrecorded, would be frequently as ephemeral as the tints of the butterfly. To yield to verbal lecture, it abhors, as a confession of ignorance; and the excellence of advice is apt to strengthen its opposition. But the activity of this quality, unrestrained by the fear of degradation, and excited by the hope of applause, may be enlisted through the press, and become highly useful in the improvement of Agriculture. Whatever it can thence acquire, it will practice as its own, and propagate with zeal; and its great share both of talent and industry, renders it a coadjutor worthy to be conciliated.

Great social ends are effected by seizing a crisis in public opinion. During the predominance of a temper for emigration, inflamed by the cheapness and proximity of new land, neither precept nor example could demonstrate the propriety of improving the old, or subvert the ruinous habit of killing, because we could flee from the corpse. But now when this habit is checked by the general appropriation of good new land, by its high price, and by its increasing remoteness from commerce, the public begins to look for prosperity in the true place, and to disclose some ardor to discover a remedy for an evil, which emigration will soon cease to furnish. As we cannot much longer fly from worn-out lands, and recompense ourselves for unequal laws, by retiring to more fertile regions; we shall soon turn our eyes towards the means by which we may be enabled to live at home. Let not this new temper stop at hope or evaporate in theory. Let it not be neglected by a Society for promoting Agriculture. Enlivened by writing, printing, example and experiment, excited by rewards, and encouraged by political justice, it is able to recover the fertility which has been lost and to prevent the ruin of the State which is impending. Neglected, it will gradually sink into despair, and the favourable moment for effecting an object, filled with gratifications for all classes of society, may possibly be lost forever.

From the American Farmer.

Guano versus Coprolites.

LABORATORY OF ST. JOHN'S COLLEGE,
Annapolis, 14th May, 1860.

Coprolites are fossil, or petrified excrements of turtles and other animals.

Guano is the excrement of birds, &c.

Coprolites differ in solubility from guano, although composed of the same elements in the same proportions—being more dense, or specifically heavier, and having their particles so closely united to each other as to exclude solvents except from their outer surface. The finest powder that can be produced by mechanical trituration or grinding will not bring coprolites to that atomic state of division which characterizes the phosphates in guano and bones that have not been petrified or converted into stone.

There are four phosphatic compounds inspected and sold as guano in the Baltimore market. 1st. The guano now obtained from the Pacific coast, resembling the Mexican. 2d. Guano that has been *concentrated* by exposure to the weather, still however retaining its porosity and solubility—such, for instance, as the Nevassa guano. 3d. Guano that has undergone certain changes which have, in a remarkable degree, improved its solubility and value by the interposition of sulphate of lime (gypsum) between its particles; the American guano represents this class. 4th. Coprolites, or fossil phosphates, that are now sold under the name of guano, and used extensively for making manipulated guano, as a substitute for the genuine article above described. In England, coprolites are ground and mingled with oil of vitriol, in order to increase their solubility; but even under these circumstances they are not as valuable as guano or bones similarly treated, for the reason above stated, viz: because each particle is *compact* and solid, while guano is full of pores, however small the particles. It must be manifest, then, that manipulated guano made with coprolites is not as valuable to the farmer as that made with guano.

I wish to call the attention of the agricultural community to this *fact*, and caution them against purchasing coprolites, that are now ground and sold as guano or "manipulated *guano*." Any novice or tyro in chemistry can make an estimate of the comparative solubility of the articles referred to. For instance, take ¼ oz. of the *coarse* Nevassa guano before it is ground, and compare it with the same weight of the *fine* powder that is sold as guano, and vaunted as the best in the market; throw each sample on a small filter *suspended* in a wine-glass, that has been about half filled with nitric acid, diluted with about nine parts of water. After about two or three hours it will be found that the Nevassa guano is more soluble in the proportion of 5 to 21, viz: the Nevassa guano yields 21 parts of phosphate of lime to *cold* dilute acid, while the coprolites yield only 5 parts. A boiling temperature, or prolonged digestion or even infusion, gives a *different result*, and this is the reason why more than a dozen of the best chemists in the United States have endorsed the certificates obtained from Europe calling coprolites guano, and recommending these petrifactions as comparable with guano *in proportion* to the phosphate of lime they contain. I made the same mistake once in comparing the phosphorite mineral of New York with bones; or rather, I endorsed the opinions of some of these very gentlemen.

Why is it that the Maryland State Agricultural Society does not employ its own officer to estimate the relative value of the manures sold or offered for sale in Maryland? I mean the money value to the farmer, not the commercial valne, which depends on the supply and demand, but the estimate of the actual value, and also the relative value of each. The above may be considered an illustration of my mode of estimating the *relative* value of the *pure* phosphatic manures. It will be noticed that it is not the province of the State Inspector to recognize any such distinction; and it will be remembered that I was actually employed in this manner before my appointment as Chemist of the Maryland State Agricultural Society, and during the infancy of the Society. In England, Scotland and even in Massachusetts, where this interest will not compare with a tithe of that in Maryland, the chemist of the agricultural society is expected to report as above to *the farmer or agricultural society*. If I am allowed a page in one of the agricultural journals of Maryland, next month, I will sketch the outline of what I suppose the farmers should have, instead of the garbled extracts from chemists that are published.

When Columbian guano was unsaleable, and the agency was declined by one of the best merchants in Baltimore because it would not sell at $17 per ton, when other chemists were hesitating, I pronounced it by far the richest and most valuable source of phosphates thus far discovered. Now that it is exhausted, I make the same remark with regard to Nevassa guano, having obtained my samples direct from State Inspecter, and under his official seal. I do not accuse any one of fraud; but there are several *valuable* manures now sold in Baltimore at $40 per ton, that are not, on an average, worth more than half the money, except according to the notion that a thing "is worth what it will bring." Farmers seem to forget what "poor Richard" said about "paying too dear for the whistle." A chemist may be perfectly satisfied that a manure is exceedingly valuable, and more universally successful than any other. Moreover, he may be sure that it will pay better at $20 per ton than any other on an average; but if a certificate of this kind create an enormous demand for the article, the merchant must do one of three things, viz: double the price, dilute the supply, or limit his customers. Under these circumstances, our Baltimore merchants usually do as farmers do when their crops are large or of superior quality, while others fail, so as to create a demand for good seed or even bread. This is not considered fraud in either case, and it may be questioned whether the chemist has any right to limit the price of manures except in relation to the price of grain, and that would be impracticable.

I have endeavored to give a popular explanation of the difference between coprolites and guano; there are several other matters of practical importance to the farmer, that any one can understand who comprehends the above. I have not attacked, nor will I attack any one, but merely express my own opinions; I do not seek controversy, nor will I engage in it, as the statements I have made do not rest on authority, but the proof of their accuracy is in the hands of every one who is willing to think for himself.

"Be not like dumb, driven cattle,
Be a hero in the strife!"

DAVID STEWART, M. D.,
Chem. of Md. State Agri. Society.

Valuation and Inspection of Guano and other Fertilizers.

NUMBER TWO.

Written by Dr. Stewart, *Chemist Maryland State Agricultural Society, for the American Farmer.*

There are seven modes of estimating the value of manures. The Inspector gives the porportion of phosphoric acid in guano, and this fixes its relation to an arbitrary standard, called A or B—*according to the law*—but as no regard is had to the *solubility* of the phosphoric acid in articles sold under the name of guano, this must be an *arbitrary* or *unreasonable* valuation—and the inspection only enables the farmer to guard against the reception of one variety of *damaged and adulterated guano*. As coprolites and bones *are not* guano, they can be adulterated ad libitum—but if the bones of turtles, or a petrifaction "*as hard as marble*,"* is ground *and called guano*, it must be inspected according to law and stamped or stencilled by State authority, and delivered to the farmer as guano. The name, guano, sells it, and it cannot be sold under the name of guano unless it is inspected, consequently all this extra expense is put upon the poor farmer, upon the same principle that "American brandy is put up in French barrels, exported and then imported again, in order to obtain the Custom House voucher for its French origin." This is "paying dear for the whistle;" but in this case the expense falls on the consumer, whereas, in the case of guano, it rests on the farmer *exclusively*.

If, *as I suppose*, the dealer is an honest man, who adopts the name guano because sustained by the best authority, *as in the case referred to*, (coprolites,) then it is just the case I want "*to show up*," as it exhibits facts without attributing bad motives—especially if I proved that the article is neither guano nor as good as guano!!

Phosphoric acid, as it naturally exists in guano, may be soluble in pure water—or it may be comparatively insoluble, except the water be acidulated, as, for instance, that of bones and some varieties of phosphatic guano—or it may be difficult of solution *even in acidulated water*, except by the aid of heat or prolonged infusion, as, for instance, that of coprolites or *petrified* excrements of animals, *that are now ground and sold under the name of guano*—the Inspector being sustained by the best authority for branding them guano, and it being his duty so to do, according to the law as it now stands—(but this I explained in the last number of *American Farmer*)—and I will only mention one more class in which phosphoric acid is very insoluble, even when boiled in acidulated water, viz: phosphate of iron and alumina or earth, and mineral phosphates that are sometimes ground and sold as manure, and their value estimated, *by the best authority*, by the *proportion* of phosphoric acid.

Now, it will be observed that these four classes embrace *all* phosphatic manures—also the classification is *rational* and *not arbitrary* and *unreasonable*, as are the distinctions or classifications of the Inspector, and which he is bound by law to adhere to.

My fourth class is less than one-fourth the value of the first, and the first is double the value of the second, to any farmer.

It matters not *where* the article comes from, my classification by four numbers gives the farmer a *distinct* idea of the relative value of the article he buys; whereas the present mode of inspection does not, as the bag must be branded according to the ipse dixit of some *interested party*, who sends it to the Inspector under the most *saleable name*—this being, of course, a double lie when the article is neither guano nor from the locality designated by the brand.

It will be observed that I classify *all* phosphatic manures together and value them in *proportion* to the *solubility* and the per cent. of phosphoric acid that they contain. Two items, just as two items are made the basis of valuation in Peruvian guano, viz: ammonia and phosphates—the one worth 17 cents per pound, and the other 2 cents in Peruvian; the one worth 4 cents per pound and the other 2 cents in phosphatic guano.

For instance—if any phosphatic compound is found to contain over one per cent. of phosphoric acid soluble in pure cold *rain* water, it is classed as No. 1, and marked A, B, C, just in proportion as the quantity of *soluble* acid varies, upon the same principle that Peruvian guano is marked A, B, C, in proportion as its quality varies.

If any phosphatic compound is found to contain *less* than one per cent. of phosphoric acid soluble in water, then brand it No.

* Since writing the above paper, I have received two letters from Baltimore, with regard to the article in the last *American Farmer*, headed "Guano *vs.* Coprolites." The request is made that I should distinctly state the names of those articles now sold in Baltimore under the name of guano that are not as soluble as guano and that I pronounce to be coprolites.

I will give a test by which any one can, without chemical reagent or manipulation, *see for himself*. With the aid of a good pocket lens, or, still better, a microscope, the Sombrero guano will be found compact and dense as one of the secondary marbles, whereas Nevassa guano will appear *porous* and evidently composed of "*organic* matter." I have *proposed*, however, under these circumstances to examine all the varieties of guano, or articles sold as guano, provided I can secure samples of the State Inspector that have never passed through the hands of interested parties, but sent to me directly *by mail*, under the official seal of the State Inspector.

2, A, B, or C, in proportion to the per cent. of phosphates soluble in *cold* acidulated water.

If any phosphatic compound or guano contains less than one per cent. soluble in cold acidulated water, then brand it No. 3, A, B, C.

And so, upon the same principle, No. 4 would be stamped A, B, or C, or X, XX, XXX, in proportion to the phosphates, soluble in boiling acidulated water, (that were insoluble in cold acid percolating through them in the proportion of 10 to 1.)

There are other details of my plan for the inspection and valuation of manures, that I must reserve for the next number of the *Farmer*, and I will only add that by my plan *all* manures *sold in packages*—whether imported or manufactured—should be weighed, numbered and sampled, so as to diminish the expense to the farmer to one-half the preseut tax for inspection,—consume only one-half the time, and double the security—making the inspection seven-fold more definite and reasonable, instead of the present arbitrary and *un*reasonable mode.

I have no reason to suppose that the present Inspector does not carry out *strictly* the provisions of the *present* law under which he acts. I know him to be a polite and obliging officer—several interesting specimens of guano that I have obtained for comparison, and for our cabinet, I have received from him out of his reserved samples, and under his seal, per mail. But if the next Legislature changes the law, I am willing to offer the result, of ten or fifteen years' experience and observations to aid them in improving the present law; provided I am requested so to do by the proper authority—and in the meantime I will endeavor to expose some of the errors in the inspection and valuation of manures.

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REAPING MACHINES ON THE PRAIRIES. The Chicago Times and Herald says that an idea of the amount of ground in wheat may be gathered from the statement of a responsible gentleman of Janesville, who says that, with the assistance of a spy-glass, he saw one hundred and forty-six reapers at work at one time. This is on the line of the Chicago and North-western railroad.

From the British Farmers' Magazine.

Top-Dressing.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

In this unusually late spring the question of top-dressing has become of more than ordinary importance. And this remark is not confined to the grasses, however essential to our live stock may be an early and rapid growth of green food. The entire question of top-dressings both for grasses and corn lands will indeed well repay our anxious and extended examination. The mode of the action of several substances usually employed as dressings; the latest period at which these or a portion of them may be applied; their practical utility for the *second* crop are only amongst the chief sections of this most important research. In the present scarcity of food for stock another question imports itself into the inquiry, viz., the degree of rapidity with which the commonly applied spring dressings operate. The most prompt of these in their action are cubicpetre and Peruvian guano. It was on a recent opportune occasion that Mr. Caird remarked, when briefly speaking on the late scarcity of spring feed, and the use of stimulating dressings: "The most sure in its action on the grasses, either in dry or wet weather, and probably also the most rapid, is nitrate of soda. I shall use it," he adds, "pretty largely at the rate of 2 cwt. per acre. No outlay can pay better. The addition of 1 cwt. of Peruvian guano or 2 cwt. of the best superphosphate of lime will materially increase the produce."

Every reader of this magazine is aware that the effect of these fertilizers is materially accelerated if they are sown in wet weather. And this fact leads us to another suggestion, well worthy of careful examination, viz., the advantage of applying these dressings in as wet a state as possible, either by the water-drill, or by mixing them with wetted ashes, or other friable substances, and also having this done as near sunset as possible. Even when water cannot be added, it is very desirable that the ashes should be used. It was in the last number of the Journal of the Royal Agricultural Society that Professor Voelcker observed, when speaking of the application of top-dressings, "I cannot refrain from observing that all artificial manures—such as nitrate of soda, guano, or a mixture of nitrate of soda and salt—should not only be first passed through a fine sieve, but they should also be mixed with three to five times their own weight of fine red ashes, dry soil, or sand, before sowing them broad-cast by hand, or, what is much more convenient and better, by the broad-cast manure distributor. Chambers' or Reeves' dry manure distributor cannot be too highly recommended for sowing, in a most uniform and expeditious manner, top-dressings of every description."

I certainly seem to incline very strongly to the opinion, that the maximum benefit in applying cubicpetre to grass, is obtainable by applying it in solution. Some experiments of the late P. Pusey on a small scale decidedly support this view of the case, (*Jour. Roy. Ag. Soc*, vol. xiv., p. 376.)

The recently reported field experiments of Professor Voelcker on top-dressing wheat, are valuable on several accounts. They not only were conducted with the careful accuracy of the chemical philosopher, but they tend to elucidate more than one difficult question to which I have just alluded. In the opening sentence of his essay he observes, (*Jour. Roy. Ag. Soc.*, vol. xx., p. 386.):

"There is no lack of experiments made with guano, nitrate of soda, soot, shoddy, gas-water, and other nitrogenized substances, which are occasionally used as top-dressings upon wheat. Experience has shown that all these manures may be used, with more or less advantage, for the wheat crop; and that, generally speaking, they are the more effective the more nitrogen they contain. Thus Peruvian guano or nitrate of soda, which are both very rich in nitrogen, are justly considered more powerful wheat manures than soot or shoddy—two materials much poorer in this element. Whilst I consider the relative proportions of nitrogen in different fertilizers, intended to be used for wheat or other cereal crops, to be an important element in estimating the comparative commercial and agricultural value of artificial manures, such as Peruvian guano, nitrate of soda, or sulphate of ammonia, I am of opinion that the form or state of combination in which the nitrogen is contained in the manure materially effects its efficacy. Any one who has tried side by side nitrate of soda, Peruvian guano, and shoddy, must have felt surprised at the different degree of rapidity with which the effects of these three fertilizers are rendered perceptible in the field. I have noticed more than once that, under favourable circumstances, the effects of nitrate of soda became visible in the course of three or four days in the darker green colour and more luxuriant appearance of the young wheat, whilst it took eight or ten days in the case of guano to produce a similar effect. On wheat dressed with shoddy no apparent effect was produced even after the lapse of four or six weeks. So slow is the action of the latter that a superficial observer might well doubt the efficacy of shoddy as a wheat manure, for it often produces no visible improvement in the wheat crop, and it is only after thrashing out the corn that it can be ascertained that shoddy has had some effect upon the yield of corn. These examples appear to indicate that nitrogen in the shape of nitric acid has a different practical value from that which it possesses in the shape of ammonia, and that it has again another value in the form of nitrogenized organic matter. It must be confessed that our knowledge of the comparative efficacy of nitrogen, in its various states of combination, is extremely limited, inasmuch as we scarcely possess any sufficiently accurate and trustworthy comparative field experiments which are calculated to throw light on this subject. As yet the sure foundation on which an explicit opinion as to the relative merits of nitrogen—in the shape of nitric acid, ammonia, or organic matter—can be given, is altogether wanting. It is true the experience of practical men affords certain useful indications to the scientific observer, but nothing more. In the absence of clear, unmistakable, and sufficiently extensive practical evidence, no definite answer can be given to the question so frequently addressed to the agricultural chemist, Shall I apply nitrate of soda or guano upon my wheat?"

As Professor Voelcker's top-dressings were applied to the wheat on the 22d of March, 1859, they do not serve to indicate at how late a period in the spring such dressings may be applied. The following table gives the manures applied by him and the produce per acre of both seed and straw, the first being given in bushels, the straw in tons and cwts.:

	Seed.	Straw.
Soil simple,............	27	0 17
2½ cwt. Peruvian guano,	40 1-10th..	1 3
1¾ cwt. nitrate of soda, .	38	1 4
180 lbs. of nitrate of soda, 1 cwt. common salt, ..	40 6-10ths..	1 4
4 cwt. Proctor's wheat manure,............	39½	1 3
6 cwt. ditto ditto,	44 1-5th..	1 7
Chalk marl 4 tons,......	27	0 16

There are some recent reported trials by Mr. Dove, of Eccles Newton, Kelso, which rather encourage us to the hope that certain top-dressings may be applied with advantage much later in the season than is usually the practice. In his trials, (*Trans. High. Society*, 1860, p. 229,) the dressings to the grass were generally applied on the 13th of May. The following are the reported results; those described in italics, however, had the dressings divided into three portions, a third being applied on the 13th of May, the others on the 27th of May and the 23d of June, the cost of each manure being £1 17s. per acre, and the produce given in tons and cwts.:

	Tons.	Cwts.
Soil simple,................	1	4
3 cwt. guano, ...	2	0
3 cwt. guano,............. ..	1	15
2 cwt. nitrate of soda,........	1	17
2 cwt. nitrate of soda,........	1	19

The same experiment repeated on another portion of the field:

	Tons.	Cwts.
Soil simple,........	1	10
3 cwt. guano,................	2	1
3 cwt. guano,................	2	0
2 cwt. of nitrate of soda,....	1	18
2 cwt. nitrate of soda,........	2	1

The practical observations of Mr. Dove are well worthy of our earnest attention. He tells us, when commenting upon the result of his own experiments, (*ibid*, p. 220,) that he has generally found application to grass of 3 cwt. of guano per acre to be equal to 2 cwt. of nitrate of soda, but that when a dry season occurs nitrate of soda has a decided advantage. He says, "Even if guano is applied on a wet day, and apparently well washed in, if it should immediately after set in for some weeks of dry weather, I have always observed that it has not nearly the same effect as it has when the weather continues damp for sometime after; while nitrate of soda, if once washed in, never loses its effect. Taking this into consideration, along with the fact that it requires less rain to wash it in, I consider nitrate of soda decidedly preferable to guano as a manure for grass. Guano should only be used when the weather is favourable for getting it applied in April: when this can be done, it answers very well to apply a moderate quantity of it, and afterwards a little nitrate of soda sometime in May.

In top-dressing potato oats on the 15th of April and the 23d of May, the produce per acre in Mr. Dove's trial was as follows:

11 stones of nitrate of soda and 2 cwt. of common salt on the 15th of April,..............	56 bushels.
11 stones of nitrate of soda and 2 cwt. of common salt on the 23d of May,..............	62 bushels.

In the very elaborate and valuable experiments at Rothamsted, by Messrs. Laws and Gilbert, on top-dressing old pasture land, other very important objects of inquiry have been steadily and successfully pursued. The results of these important researches have been reported in volumes xix. and xx. of the Journal of the Royal Agricultural Society, and these will be advantageously reperused by the farmer, for they contain much more valuable matter than may appear at the first reading. The main object of these laborious inquiries was to determine the effect of certain nitrogenous and mineral substances *applied for successive seasons to the same plots of natural pasture;* and to ascertain not only the amount of hay and aftermath produced by each, but also the different kinds of grass whose growth might be encouraged by the continued application of these different dressings. These natural grasses they divide in their elaborate report into three classes, viz.:

1. *The Graminaceous Herbage.*—In this is included the common rye grass, the woolly soft grass, the tall oat-like grass, the sweet scented vernal grass, the bent grass, the quaking grass, the crested dog's-tail grass, the rough cock's-foot grass, the smooth-tailed meadow grass, the soft brome grass, the meadow oat grass, &c.

2. *The Leguminous Herbage.*—In this class they specify as present in the Rothamsted grass land the meadow vetchling, the

bird's-foot trefoil, the perennial red clover, &c.

3. *The Miscellaneous Herbage, chiefly Weeds.*—In this the reporters include, as found in their plots, the rib-grass or plantain, common carraway, the milfoil or yarrow, the sheep's-sorrel or dock, the silene or catchfly, various species of ranunculus or crow's-foot, the germander speedwell, and the bed-straw or cheese-rennet.

The soil of the half-acre plots of natural pasture at Rothamsted, on which these trials were made, in a somewhat heavy, loam, with a heavy clay subsoil resting on chalk. These plots were *yearly* dressed in February or March *with one and the same kind of manure.* But each plot had a different *kind* of manure: two plots, however, for the sake of comparison, were left unmanured. After three years' experience, during which their produce had been carefully ascertained, these plots were, in 1858, botanically examined. The result of these lengthened trials and observations was as follows, (*Jour. Roy. Ag. Soc.,* vol. xx., p. 250.)

The *effect* of these manures on the produce *per acre* of hay will be found in the subjoined table, which I thus abridge:

Plot, Nos.	MANURES. (Per Acre, per Annum.)	ANNUAL PRODUCE. 1856. tns. cwts.	1857. tns. cwts.	1858. tns. cwts.
	SERIES 1.—Without Direct Mineral Manure.			
1	Unmanured,	1 2	1 5	1 2
2	Unmanured (duplicate plot,)	1 0	1 3	1 10
3	2,000 lbs. Sawdust,	1 0	1 0	1 0
4	200 lbs. each, Sulphate and Muriate Ammonia,	1 15	1 13	1 15
5	200 lbs. each, Sulphate and Muriate Ammonia, and 2,000 lbs. Sawdust,	1 15	1 13	1 17
6	275 lbs. Nitrate of Soda,	—	—	1 6
7	550 lbs. Nitrate of Soda,	—	—	1 11
	SERIES 2.—With Direct Mineral Manure.			
8	"Mixed Mineral Manure,"	1 10	1 12	1 16
9	"Mixed Mineral Manure," and 2,000 lbs. Sawdust,	1 13	1 15	1 19
10	"Mixed Mineral Manure," and 200 lbs. each, Sulphate and Muriate Ammonia,	2 16	2 17	3 4
11	"Mixed Mineral Manure," and 200 lbs. each, Sulphate and Muriate Ammonia, and 2,000 lbs. Sawdust,	2 16	2 17	3 1
12	"Mixed Mineral Manure," and 200 lbs, each, Sulphate and Muriate Ammonia, and 2,000 lbs. Cut Wheat Straw,	2 8	2 14	3 0
13	"Mixed Mineral Manure," and 400 lbs. each, Sulphate and Muriate Ammonia,	3 2	3 1	3 7
14	"Mixed Mineral Manure," and 275 lbs. Nitrate of Soda,	—	—	1 17
15	"Mixed Mineral Manure," and 550 lbs. Nitrate of Soda,	—	—	2 10
	SERIES 3.—With Farm-yard Manure.			
16	14 tons Farm-yard Manure,	1 15	2 7	1 17
17	14 tons Farm-yard Manure, and 100 lbs. each, Sulphate and Muriate of Ammonia,	2 3	2 13	2 7

The estimated average annual amount of hay per acre from the aftergrass from the 17 plots was as follows:

Plot 1 produced of hay in lbs. 539
do 2 do do do 617
do 3 do do do 503
do 4 do do do 594
do 5 do do do 594
do 6 do do do 823
do 7 do do do 823
do 8 do do do 689
do 9 do do do 689
do 10 do do do 800
Plot 11 produced of hay in lbs. 800
do 12 do do do 937
do 13 do do do 1,067
do 14 do do do 823
do 15 do do do 823
do 16 do do do 638
do 17 do do do 638

After then three years employed in these experimental grounds, the first four general conclusions to which the authors of these reports arrive, with regard to the influence of the fertilizers upon the growth of the natural grasses, are:

"1. That, whether the produce of hay be considerably increased by means of farm-yard manure alone, farm-yard manure and ammoniacal salts, or artificial mixtures of suitable mineral manuré and ammoniacal salts, the proportion of the whole which will be *graminaceous* will be very much increased.

"2. That the produce will be by far the *most graminaceous* when the '*artificial mixtures*' are employed. In fact, when the increase of hay is obtained by artificial manures containing *both the necessary mineral constituents and ammoniacal salts*—and it is then greater than under any of the other conditions—both the *leguminous* and the *weedy* herbage are nearly excluded, and the produce is then, therefore, *almost wholly graminaceous.*

"3. That the *graminaceous produce itself*, when grown by *farm-yard manure*, is less complex in character than that *grown without manure;* whilst that grown by the *most active artificial manures*, is *less complex still.*

"4. That, up to an equal period of the season, the *graminaceous* produce, grown by the *active artificial manures*, will be in larger proportion in *flowering and seeding stem*, than that grown *without manure;* and that the produce grown by *farm-yard manure* will be in still larger proportion in that condition."

Such are only a few of the important practical questions relating to artificial dressings which will well repay the most patient and repeated examination. It is needless to remind the skilled agriculturists who read this widely circulating magazine, of the increasing value of every improvement in the growth of food for stock. As there is yet time in many places during the season to try the effect of late top-dressings, I would earnestly commend such trials. There is no need, I again repeat, to risk either much time or money in this search after knowledge and power—a very small plot of grass will tell the effect, make the same response to such an inquiry as the adjoining broad acres. Nature is indeed ever ready to respond to questions of all sizes. These dressings of small experimental plots it would be well to carry on till after the time of the removal of the first crop of grass. We all know how *possible* it is for the land to produce in the same season three or four crops of grass of even increasing weight; this is regularly and extensively accomplished in certain favoured localities by the owners of sewage-irrigated meads, both in Scotland, the southern water meads of England, and on the continent; and it is yet to be determined to what extent the pastures of our island may be increased in their produce by the use of more copious and oftener-repeated dressings than those we have hitherto applied.

Horace Greeleys's Endorsement of the Agricultural Press---How Government Clogs its Wheels instead of Aiding it.

There are at present some fifty or sixty periodicals published in our country devoted to Farming—as many, I presume, as in all the world beside. They have been built up at great expense of talent, labour, and money; for when Col. Skinner started the first of them at Baltimore, some forty or fifty years ago, the idea of teaching farmers anything in that way was hooted by them as ridiculous, and he found it hardly possible to give his early numbers away. Hundreds of thousands of dollars have been spent on these publications; and they are this day, in my judgment, doing more to promote the true growth of the country, and the substantial, and enduring welfare of our people, than Congress, the Army and the Navy, for the support of which they are taxed some forty millions per annum. Their publishers are asking nothing of the Government, wishing nothing but the common rights of American citizens. Yet Congress pays annually for gathering and compiling the material for a publication necessarily rival to theirs, of which the House has just ordered 300,000 copies, and the Senate, I believe, 50,000—all to be printed, bound, enveloped, and conveyed to the recipients in every part of the country at public cost—that is, at *their* cost and mine—and thus distributed in most unfair competition with the Agricultural journals, and to enable penurious and easy-going farmers to say, "Oh, *I* don't want to take one of these—I get a Patent-Office Report from our member of Congress every year, and that will do for my boys to chew upon till another comes around!" Thus Congress is doing its worst to undermine and destroy the Agricultural Press, by a policy which you heartily support—which, I grieve to say, has been practically supported by a majority of the Republicans in both Houses throughout the late Session, while opposed by a majority of the Democrats. I am very glad of any chance to do honour to my political opponents; and I must say that, on this qnestion of abolishing the Franking Privilege, they appear to great advantage in contrast with most of the Republicans.

Greeley to Senator Wilson.

REMARKS.—We publish the foregoing endorsement of the agricultural press, by Horace Greeley, not because within the line of our calling, but because we believe it. It has been a well settled conviction of our minds for a long time, that the agricultural press of the country, with its weekly and monthly issues, teaming with all that is suggestive, instructive, or useful, opening as it does a ready channel of inquiry between all the *reading* farmers of the State or nation, becomes a more direct and efficient agent of thought, action, and progress than any other one or a dozen instrumentalities that can be mentioned.

Still, we are aware that it is an opinion not generally entertained. We have often heard Governors in their messages, and lawyers in their agricultural addresses, talk learnedly of other great agencies, in the way of agricultural schools, &c., &c., that were advancing the agricultural world, and at the same time wholly ignore the great agricultural press of the country, as entirely as if it did not exist at all. All very natural, to be sure, as such men seldom read anything but political papers, still they are employed as expounders in agriculture, not because they know anything about it, but merely because they can talk, (so can a parrot, if some one will put the words into its mouth.)

The agricultural journals, as a whole, are but poorly sustained. We do not believe that one-third of them pay their publishers one penny for their labours. True, a few, at a favourable location, with good luck, or great talents, pictorial illustrations, or clap-trap, get up a large circulation, and, possibly, make something out of it; but the great mass, whistle as they may to keep up their courage, are making but a small fortune for old age. The legal advertising, often so profitable for political papers, they know nothing about. True, some very generous county agricultural society will occasionally put them on sparingly as premiums, provided they can get them at cost or a little less, but thick-headed, penurious farmers, (and there are lots of them,) who *have* to take them instead of some ragged dollar bill, not unfrequently deem themselves very badly used.

Agricultural journals that are worthy of their high mission, should be sustained to a much greater extent than they are by the agricultural societies, and in the way of premiums, it would operate as a double benefit; first, by putting such reading in the hands of many men and their families as would not have the liberality to subscribe for it. Secondly, such patronage upon an ordinary liberal plan, would in some measure sustain and warrant the publication of good and useful journals. The *School Journal* of our State has a subscription list of five thousand, or thereabouts, from the treasury, which sustains it; but, alas! for too many of our agricultural papers, what its tardy subscribers do not pay, must be lost by the publisher or cheated out of his printer. Will those who believe with Horace Greeley in the usefulness and high mission of agricultural journals, think of these things, and do what they can in their day and generation, for a worthy but a suffering cause?

The Talent of Success.

Every man must patiently abide his time. He must wait. Not in listless idleness, not in useless pastime, not in querulous dejection, but in constant, steady, cheerful endeavor, always willing, fulfilling and accomplishing his task, "that when the occasion comes he may be equal to the occasion." The talent of success is nothing more than doing what you can do well, without a thought of fame. If it comes at all, it will come because it is not sought after. It is a very distressing and troublesome ambition which cares so much about fame, about what the world says of us, to be always looking in the face of others for approval—to be always shouting to hear the echoes of our own voices.—*Longfellow.*

[CIRCULAR.]

American Pomological Society.

The Eighth Session of this Institution will be held in the city of Philadelphia, commencing on the 21th of September next, at 10 o'clock, A. M., and will be continued for several days.

This Society, the first National Institution for the promotion of Pomological Science, was organized in the year 1848. Its sessions have brought together the most distinguished cultivators of our country; its transactions have embodied their various researches and ripest experience, and its Catalogue of Fruits has become the acknowledged standard of American Pomology.

Its example has created a general taste for this science, inspired promologists with greater zeal, and called into existence many kindred associations. Its progress has been remarkable and gratifying, but it still has a great work to perform. Its general catalogue should, from time to time, be enlarged and perfected, and local catalogues formed, embracing the fruits adapted to each State and Territory of the Union. The last of these suggestions was made by the Chairman of the General Fruit Committee, at the seventh session of the Society, in the year 1858. This has been carefully considered, and is deemed worthy of special attention. It is, therefore, earnestly recommended that each State Pomological, Horticultural, or Agricultural Society, charge its Fruit Committee with the duty of collecting information, and presenting the same, with descriptive lists of Fruits adapted to their location.

The importance of this subject, and the increasing value of the fruit crop of the United States, call for a prompt and cordial response to this request,—for a careful preparation of said list, and for a full and able representation, at the approaching session, from all parts of the country.

The various State Committees of this Society are expected to submit accurate and full reports of the condition and progress of fruit culture, within their limits, together with definite answers to each of the following questions. These reports, it is desirable, should be forwarded to the Chairman of the General Fruit Committee, Hon. Samuel Walker, Roxbury, Mass., if possible, as early as the 1st of September, or to Thomas W. Field, Esq., Secretary, Brooklyn, New York.

What *six*, *twelve* and *twenty* varieties of THE PEAR are best for family use on the Pear stock? What varieties on the Quince stock? What varieties, and how many of each of these are best adapted to a Pear orchard of *one hundred* or of *one thousand* trees?

What are the *six* and *twelve* best varieties of THE PEACH? What are the best varieties, and how many of each, are best adapted to a Peach orchard of *one hundred* or of *one thousand* trees?

Answers to these questions should be made from reliable experience, and with reference to the proximity or remoteness of the market.

Held, as this convention will be, in a city easily accessible from all parts of the country, it is anticipated that the coming session will be one of the most useful the Society has ever held. Societies, therefore, in every State and Territory of the Union, and the Provinces of British America, are requested to send such number of delegates as they may choose to elect. Fruit-growers, Nursery-men, and all others interested in the art of Pomology, are invited to be present—to become members, and to take part in the deliberations of the Convention.

In order to increase as much as possible the interest of the occasion, members and delegates are required to forward for Exhibition as large collections of fruit as practicable, including specimens of all the rare and valuable varieties grown in their respective districts, and esteemed worthy of notice; also, papers descriptive of their mode of cultivation—of diseases and insects injurious to vegetation—of remedies for the same, and to communicate whatever may aid in promoting the objects of the meeting. Each contributor is requested to make out a complete list of his contributions, and present the same with his fruits, that a report of all the varieties entered may be submitted to the meeting as soon as practicable after its organization.

Societies will please transmit to the Secretary, at an early day, a list of the Delegates they have appointed.

Gentlemen desirous of becoming members can remit the admission fee to Thomas P. James, Esq., Treasurer, Philadelphia, who will furnish them with the Transactions of Society. Life Membership, twenty dollars; Biennial, two dollars.

Packages of Fruits may be addressed to Thomas P. James, 630 Market Street, Philadelphia.

MARSHALL P. WILBER, *President.*
Boston, Mass.
THOMAS W. FIELD, *Secretary.*
Brooklyn, New York.

For the Southern Planter.

"Science a Witness for the Bible."

Science a Witness for the Bible. By REV. W. N. PENDLETON, D. D. Philadelphia: J. P. Lippincott & Co. 1860. Pages 350.

We think a notice of this valuable scientific work will not be out of place in the columns of an agricultural paper. No class of men should be, and we believe are, more interested in all the grand discoveries of science, which so eminently distinguish our day, than the Farmers of Virginia; and there is no branch of science that so particularly addresses itself to the agriculturist as *Geology*, and whatever pertains to the exploration of the component elements of the great subject of his labors, Mother Earth. In our observation of men, and the distinctive classes into which they are divided, for vigorous research and strong wholesome thought and reflection—in a word—for all the great purposes for which *mind* is required, the character of their education and pursuits well adapts our Southern Planters to rightly appreciate the importance of the subjects treated by Dr. Pendleton in the work whose title heads this page. We think it an advantage on the side of the Farmers of our country, that their minds have not been subjected to mere professional or technical training, but that *things* rather than words, or the names of things, furnish the great staple of their mental pabulum; and while the mind of the so-called scholar is going its round in the tread-mill of academic or collegiate studies, and following out the same system in the more advanced stages of scholastic learning, they, in more direct communion with nature and her laws, are engaged in the great practical business of life; and thus have their intellectual faculties, uncramped by the mere artificial systems of men. Therefore, is it most appropriate that such a class—a class who, under such influences, has furnished a Washington to the world—should be called to pass upon—as Judges, both of the law and fact—the important questions involved in the theories, the learned author makes the subject of his investigations, and we will, now, without more preamble or apology proceed to criticise—for the benefit, or it may be the amusement, of your readers—the work in question.

In the last twenty-five or thirty years a man appeared in Scotland, who was, in the circumstances of his life and education, a brilliant illustration of the idea we have above endeavored to commit to paper. With little, or none of the learning of the schools; with no advantage of parentage or patronage, Hugh Miller, while doing his duty in that humble state of life in which it pleased God to place him, and working faithfully at his daily task as a stone-mason, displayed powers which, in their operations and developement, have produced effects but little less than those of the greatest benefactors of our race.

The Cromortie stone-mason, from his own observations in the quarries in which he worked, had his attention aroused towards those wonderful manifestations of the Creator's power as declared in "the testimonies of the rocks," and having, in common with the youth of Scotland, been taught "to know his Bible true, if nothing more," his active mind set itself to the task of reconciling the wonders of creation, as evidenced by the records of Nature, graven on the imperishable granite, and those wonders of creation and redemption, as described or foreshadowed in the books of Moses and the other sacred writers. The great question of the day was, whether the world we inhabit, as laid open by the hand of Science, is the same as that whose creation is described in the book of Genesis; whether it had but existed the 6,000 years, as commonly held by Bible readers, or had existed, self-created, vast ages ago,—a question which, in its proper solution, involved the mighthy issue of the Scriptures being true or false,—the Bible being the word of God, or a cunningly devised fable.

The author of "the double record" is justly entitled to the leadership in the great battle of the Evidences that has been raging for years past on the field of physical science against those falsely called philosophers who, from a superficial observation of the laws and layers of the material universe, and a comparison therewith of the Mosaic account of creation as understood by themselves, have made deductions tending to shake the faith of some.

This contest, however, like all that have gone before it, has resulted in the complete overthrow of "the fighters against God" by the establishment of the axiom, that Nature and Revelation, proceeding from the same infinite mind, must be consistent—that God's words and works must agree. A conviction similar to that which put in motion the mighty energies of a Hugh Miller, has enlisted the vigorous pen of our author in the cause of what we believe to be Divine Truth. On page 18, *et seq.*, he says:

"It is this conviction which induces us to submit the views which we are about to present concerning the actual relations between the disclosures of the Bible and the progress of scientific inquiry. Of the correctness of these views we have not the slightest doubt, nor of their tendency to remove prejudices which now hinder alike the material and the moral elevation of our species. We would contribute our mite toward the harmonious development of that wisdom which makes man triumphant over nature, and of that which fits him for heaven. * * * * *.

"That there is, in truth, an entire harmony between the moral and the material agencies that have been mentioned, between the triumphs of Science and the teachings of Scripture; nay, more, that they are so thoroughly intertwined and blended in their relations to the human mind, as to prove their common origin in the Source of all wisdom, it will be our first endeavor to show. Perfectly clear is it to our view, that discoveries in the wondrous plan of nature, made by rightly-directed inquiry, have aided the human faculties to a better understanding of the documents of inspiration, and a firmer grasp of the precious verities they disclose. Nor is it less evident to us, that influences proceeding from Revelation have opened the way to those right methods of investigation which constitute the basis, and have resulted in the miracles of modern Science.

"Indeed, it must, we think, be to all obvious, on reflection, that, addressed as are Natural and Revealed truth, to the same creatures, and to faculties in them altogether inseparable, reciprocal relations of action and reaction cannot but exist in the mental processes by which they are respectively realized. Hence may it be conceived how Revelation, though embracing in its plan no direct instruction for mankind, in regard to things naturally cognizable, has, nevertheless, through its influence upon the cognitive faculties, incalculably promoted that amazing scientific progress which we witness in Christendom, and nowhere else. And hence may be understood the service which scientific discovery is rendering the interpretation and the evidences of the sacred records.

"These views we now proceed to expand and illustrate. We shall endeavor to establish the position that mankind are largely indebted to influences derived from the Scriptures for that intellectual revolution in modern Christendom which has emancipated the mind, as it was never liberated before, and which has placed the keys of nature even in the hands of children. And then it will be our aim to point out, as only second to this, a debt on the other side, to the all-wise Author of nature, for the scientific methods to which he has adapted the faculties of creatures made in his own image. To exhibit the reciprocal influence which Science exerts in correcting inadequate apprehensions of things revealed; and in placing Divine truth in a fortress so strong that enemies, however inveterate, must forever assail it in vain, and so lofty that the celestial light thence emanating shall at length reach every eye that will behold.

"We maintain, then, in the first place, that, for that simple and humble process of inquiry into facts, and that systematic ascertainment and application of natural laws, which constitute what we mean by Science in its every department, man owes, incalculably more than the mere scientific reason supposes, to influences connected with Christianity. And in support of the position, we appeal to the nature of things, and to the evidence of history."

The writer, then, in the first chapter—"Science and Revelation"—gives a hurried synopsis of the whole subject of his disquisitions, and shows clearly that the race who has done most for the moral and physical advancement of man, is the same who has ever held fast to the Bible as the great teacher of the world's past history, as well as the true exponent of man's future destiny, and then concludes the subject of the entire harmony of Science and Revelatior in the beautiful language of Dr. McCosh, that—

"It is, assuredly, no useless or profane work that is engaged in by those who would, with proper humility, endeavor to remove jealousies between parties whom God had joined together, and whom no man is at liberty to put asunder. . . . We are not lowering the dignity of science when we command it to do, what all the objects it looks at and admires do, when we command it to worship God. Nor are we detracting from the honor which is due to religion when we press it to take science into its service. . . . Let not science and religion be reckoned as opposing citadels, frowning defiance upon each other, and their troops brandishing their armor in hostile attitude. Each has its own foundation. These, let them unite, and the basis will be broader, and they will be two compartments of one grand fabric reared to the glory of God. Let the one be the outer and the other the inner court. In the one let all look, and admire, and adore; and in the other, let those who have faith kneel, and pray, and praise. Let the one be the sanctuary where human learning may present its richest incense as an offering to God; and the other, the holiest of all, separated from it by a vail now rent in twain, and in which, on a blood-sprinkled mercy-seat, we pour out the love of a reconciled heart, and hear the oracles of the living God."

"The Human Family," the second subject of discussion, (for we cannot trespass on the patience of your readers longer than to give a mere outline of the contents of the book,) presents the general considerations and the special scientific processes by which the Humboldts, Prichard, Bunsen, Linnæus, Cuvier, Lepsius and Owen, have been brought to the conclusion, fully agreeing with the established sentiment of Christendom, that men, under all varieties, are but of one stock—that the human race is in fact one family—from a common ancestry, in accordance with the Mosaic account of the origin of the race, and the great truth declared by Paul to the Athenians nearly 2,000 years ago, "that God hath made of one blood all nations who dwell on all the face of the earth."

The alternative doctrine, that men were created in nations and not by descent from a single pair, (see Types of Mankind, p. 82,) is fully met, the learned doctors of this theory not agreeing among themselves, or to the number of parent stocks, p. 67. "Virez supposing he had ascertained *two* species, Desmoulins *eleven*, Borey *thirteen*, and others a still greater number of original kinds among men."

"The Chronology of Creation," the 3rd. subject treated by the author, presents the grounds on which it is now conceded that the Bible does not fix the *age* of the earth, nor the length of time, (humanly speaking) in which the Almighty was engaged in the work of creation. The rigidly literal mode of Scripture interpretation which some would insist upon, as only consistent with a becoming reverence for the Bible as the word of God, is the same by which the grand ideas of Columbus and Galileo were in their day opposed.

"Of the evils occasioned by errors of this kind," he says, "the considerate inquirer is well aware. How they prejudice men of mere science against the Bible, and men of exclusive piety against science; and furnish the excuse of perplexity to the uninformed and indifferent on either side. To guard against such harm, therefore, he deems a duty of supreme importance. Hence, in the great question, now pending between the record of creation as read from the rocks and that given in Genesis, as commonly understood, he regards it as a serious obligation to trace, if possible, the whole truth, that its harmony may be discerned, and its excellence vindicated. What, then, the monumental masses beneath his feet, freely and fairly examined, and what the inspired narrative, thoroughly studied, really do teach, severally and unitedly, respecting the antiquity of our world, and the course of its pre-Adamite changes, becomes to him an inquiry of deep significancy.

"The very nature and history of the question at once satisfy him that its edequate solution is not to be reached by any superficial views, hasty conclusions, vague generalizations, or arrogant dicta as to the meaning of Scripture, or of the rocky archives of the world. A faithful and large induction is, he well knows, the only key that can open the secrets of the earth's primeval history. Everything short of this, therefore, he promptly rejects. The Scripture language, he also sees, must be phenomenal, in order to be true always and for all men, since the great appearances appeal to all senses alike, while philosophic expression must vary with degree of culture; yet so constructed must that language at the same time be, he cannot but judge, since truth cannot be at war with truth, as essentially to violate no ultimate disclosure of science. To trace under the phenomenal form this deeper construction, so as to find the true meaning, as evinced in its being every way consistent, is a task not to be performed, he is sure, by an impatient, unfurnished, or fanciful mind. From such guidance he instinctively turns in seeking the truth. He sees the largest, freest, best furnished men mainly agreed respecting the rank and conclusions of geological science. The Cuviers and Brogniarts, the Chalmerses and Pye Smiths, the Bucklands and Lyells, the Sedgwicks and Murchesons, the Mantells, Sillimans, Agassizes, and Hugh Millers, most of them equally eminent as Christians and as explorers of natural truth. Individuals of less callibre and attainments, he finds, either admitting their own ignorance while depreciating geology, or exhibiting in extravagant schemes of reconciliation between it and assumed meanings of Scripture, strange deficiency of knowledge and judgment To the dicta of these, however positive, his mind cannot satisfactorily yield. He is obliged to look for something more clearly and consistently adequate. And the question recurs with redoubled force, What is true on the subject? What is the consistent and reliable explanation of the petrified and of the inspired documents?

"The simple answer is, in our judgment, contained in the *period-day* reading of Genesis i We believe that the six periods (Heb. *Yoms*) of the creative history, are really intended to be read not as "*days*," but as "*ages*." This read_ ing is, we are satisfied, beyond comparison, most accordant with the entire range of facts that have been elicited from the monumental records within the earth, and with the structure of the sacred history, as well as with striking intimations in other parts of the Bible. Reasons for this judgment we shall briefly give, using, as occasion requires, some of the best authorities on both branches of the argument, the biblical and the scientific."

"The Age of Mankind," the 4th subject of investigation—is introduced by the remark (p. 199,) that "we are entering upon no superfluous task . . . in endeavoring to trace what science really does teach as to the age of mankind, and what the scriptures under the scrutiny of learned criticism disclose on the same subject;" and then, after a thorough examination of all the probabilities bearing on this subject, from fossil remains of what are supposed to be parts of the human skeleton dug up in different parts of the world, the writer concludes. that the question as to the age of our race is left very much where it was before, and that the probabilities suggested by science, still remain, that the human term has been about what the sacred books interpreted, with neither rigidness on the one hand, nor violence on the other exhibit; and certain it is—in the language of Professor Owen—"that man is the latest, as he is the highest creature known to have been called into being on this planet."

Astronomy, too, as well as Geology, confirms the truth of the sacred record, as to the time of man's appearance upon the earth. (See Prof. Mitchell, p. 260, as to the inscription on the coffin of an Egyptian mummy in the London museum,) and they, as well as history, both sacred and profane, which are all examined by the author, agree in putting about 6000 years between us and our first parents.

"The Monuments of Lost Races;"—the last chapter,—contribute their testimony to the common parentage of the whole human family, and a further corroborative fact of the truth of Scripture is furnished by "the monumental story" throughout, showing the existence of a far higher condition of intelligence, and adaptation to art, among primitive man, than some contend for. The earlier races in general were certainly far from being the savage creatures—at some stage bordering on the brutes that perish,—supposed in anti-scriptural theories. The old monuments show that man was made in the image of God with original dignity and high endowments, and whether in India, in Egypt or Peru, 'tis clear that the first age of our race is just what might be inferred from the sacred scriptures,—the oldest records that we have, of his past history,—"For thou hast made him a little lower than the angels, thou hast crowned him with glory and honour."

Thus have we endeavored to introduce to the Farmers of our land, a work treating of subjects not at all beyond their comprehension, or their care, for in our Southern country, at least, we know that no small portion of intelligence and cultivation, is to be found among the country gentlemen, whose desire for information and fondness for reading and whose leisure time,—in part the result of our "peculiar institution"—are not entirely satisfied by reading the papers, or occupied in talking politics; to them, we think, Dr. Pendleton's labors will be particularly acceptable, in furnishing in a brief, but yet complete form, the result of scientific investigation down to the present time, and giving them "all the points," by which "science is proved to be a witness for the Bible."

From the New York Observer.

What may be Learned from a Tree.

Under the "shady shadow of our umbrageous trees," we have been vastly entertained and instructed by a remarkable book just from the press of the Appletons. The name of the author, Harland Coultas, is a new one to me, but he has previously written "Organic Life, the same in Animals and Plants," and now teaches us what may be learned from a tree. The life of a tree is traced from its vegetative period from infancy to puberty: its history told by the marks left by the young branches; the anatomy and physiology of the different species of cells are shown, and the conical principle on which a tree is constructed, and the oscillations of growth exhibited as durably impressed on its organism. When the philosophy of the subject is fully presented, the author states a series of facts respecting trees which would be incredible if not well authenticated. A Chesnut tree is now growing on the side of Mount Etna, in Sicily, the trunk of which is hollow, and 180 feet in circumference: one hundred horsemen can be sheltered at once within its interior. There is a walnut tree near Balaklava, in the Crimea, that is at least a thousand years old: The cedars of Lebanon are the remnants of the forest from which Solomon built the Temple more than 3,000 years ago. There are oaks now growing in England which were planted before the Norman conquest. The yew trees are still older. One in the churchyard of Braburn, in Kent, is now more than 3,000 years old. The same cypress which sheltered the troops of Fernando Cortez in Mexico is standing now, and others are there like it, which are 4,000 years of age. The mammoth pines of California are the most wonderful trees in the world, growing four hundred feet high, and attaining a circumference in proportion. These trees are two or three thousand years old. One of them required five men, twenty days, to bore it full of pump auger holes, the only way to fell it, and then it was so nicely poised that it stood till the same men spent two days more in driving wedges with a battering ram into one side of the cut to topple it over. The expense of cutting it down was $550. It is by no means improbable that some of the olive trees near Jerusalem are the same that stood there when the Saviour was on the mount and in the garden. A tree is always venerable. It stretches out its arms with such sheltering care, inviting us to take refuge under its shade, that I wonder the pagans have not worshipped living trees instead of idols. The growth of a tree is curious: it is from the leaves outward and onward: it does not grow from the root upward, but from the branches on. I was amused some few months ago by a beautiful description which one of our popular writers gave of his visit to "Sunnyside", a few days after the death of Irving. The incident that amused me was this. He says, I went out upon the grounds to a tree under which I sat and carved my name on its trunk many years before; now my name was away up among the branches, and I climbed up to see it. But if the poet had carved his name on the trunk of the tree at first, it would never have been any higher up, though the tree should outlive the cedars of Lebanon! The book of Coultas is full of sentiment, and the thought is suggestive of more, leading into the deep things of nature, and revealing the wisdom of the Creator whose power and providence the author observes in every fibre, leaf and stem.

Advantages of Pulverizing the Soil.

The effects of pulverizing or stirring the soil are numerous.

1. It gives free scope to the roots of vegetables, and they become more fibrous in a loose than in a hard soil, by which the mouths or pores become more numerous, and such food as is in the soil has a better chance of being sought after and taken up by them.

2. It admits the atmospheric air to the spongioles of the roots—without which no plant can make a healthy growth.

3. It increases the capillary attraction or sponge-like property of soils, by which their humidity is rendered more uniform: and in a hot season it increases the deposit of dew, and admits it to the roots.

4. It increases the temperature of the soil in the spring, by admitting the warm air and tepid rain.

5. It increases the supply of organic food. The atmosphere contains carbonic acid, ammonia and nitric acid—all most powerful fertilizers and solvents. A loose soil attracts and condenses them. Rain and dew, also, contain them. And when these fertilizing gases are carried into the soil by rain-water, they are absorbed and retained by the soil for the use of plants. On the other hand, if the soil is hard, the water runs off the surface, and instead of leaving these gases in the soil, carries off some of the best portions of the soil with it. Thus, what might be a benefit becomes an injury.

6. By means of pulverization, a portion of the atmospheric air is buried in the soil, and it is supposed that ammonia and nitric acid are formed by the mutual decomposition of this air and the moisture of the soil, heat also being evolved by the changes.

7. Pulverization of the surface of soils serves to retain the moisture in the subsoil, and to prevent it from being penetrated by heat from a warmer as well as from radiating its heat to a colder atmosphere than itself. These effects are produced by the porosity of the pulverized stratum, which acts as a mulch, especially on heavy soils.

8. Pulverization, also, as the combined effect of several of the preceding causes, accelerates the decomposition of the organic matter in the soil, and the disintegration of the mineral matter; and thus prepares the inert matter of the soil for assimilation by the plants.—*Gen. Farmer.*

From the American Ruralist.

A Chinese Gentleman's House.

The commercial connection between China and Japan and this country, which must become stronger and more widely extended in future years, is awakening a peculiar interest in the manners and habits of those secluded people. Our readers will be pleased with an introduction to the house of a Chinese gentleman:

"He first took us to his country-house, now uninhabited. It was the perfect residence of a Chinese gentleman. There was a very large garden, with bamboo hedges, and large fish tanks, edged with walls of blue bricks and perforated tiles. His pigs were in admirable condition, and as beautifully kept as the Prince Consort's at Windsor. About the grounds were nutmegs, mangosteens, plaintains, cocoa-nuts, dariens, and small creepers trained into baskets and pagodas. Inside the house, the drawing-rooms and doors sliding across circular openings. We then went on to this good gentleman's private residence, entering by a Chinese triumphal-gate. He tells me he has ten miles of carriage road round his estate. It is on a fine, undulating tract of land, reclaimed from the jungle, and laid out with rare taste. In the outskirts a tiger killed a man the other day. In his garden I found Jacko, living in a cane cage, next door to a porcupine; there were also some rare birds. Further on were some very small Brahmin bulls, a Cashmere goat, and a family of young kangaroos. There were all sorts of unknown beautiful flowers placed about in enormous China vases.

Here I first saw the tea-plant growing. It is of the camelia tribe, three or four feet high, and bears a small white flower, like the opening dog-rose; also, I was shown the "moon flower," a kind of rounded convolvolus, that only opens at night. There was a bower of "monkey-cups," the pitcher-flower, which collects water, and from which Jacko refreshes himself in the jungles. The fan palm, a beautiful tree, on the lawn, produced water of a clear, cold quality by being pierced with a pen-knife: Several minute creepers were trained over wire forms to imitate dragons, with egg shells for their eyes; and there were many of the celebrated dwarf trees, the first I had seen, little oaks and elms about eighteen inches high, like small, withered old men. The house here was superbly furnished in the English style, but with lanterns all about it. At six o'clock the guests arrived—mostly English, all dressed in short white jackets and trousers. The dinner was admirably served in good London style, and all the appointments, as regarded plate, glass, wines, and dishes, perfect. The quiet, attentive waiting of the Chinese boys deserved all praise. After dinner we lounged through the rooms, which were decorated with English prints of the royal family, statuettes, "*curios*" from every part of the world, rare objects in jode-stone and crackle-china; also a portrait of our host's son, who is being educated in Edinburgh. He was in English dress.

Albert Smith's "To China and Back."

The Southern Planter.

RICHMOND, VIRGINIA.

Office of the Va. State Agricultural Society.
RICHMOND, August, 1860.

DEAR SIR:—The attendance of a full delegation at the next annual meeting of the Farmers Assembly is felt by the Executive Committee to be of vital importance to the welfare of the Virginia State Agricultural Society. They would therefore, earnestly invoke your active co-operation in promoting, by all suitable means, the attainment of so desirable an object.

The existing constitution has signally failed in its practical operation. Important and radical changes, suggested by the experience of the last five years, are manifestly necessary to adapt it to a more efficient subservience to the purposes and objects for which the Society was originally founded, and so munificently endowed. Notice was given at the last Assembly of some of the most important of the proposed changes, to bring them within the scope of the constitutional provision, requiring a vote of two-thirds of the members in attendance to pass an amendment thus notified in advance. All other changes which may be proposed, will lie under the disadvantage of requiring a unanimous vote to secure their adoption when offered.

The failure to form a quorum next Fall would frustrate all present purposes of amendment, and the consequent postponement of action to another year, and perhaps to an indefinite future period, would prove extremely disastrous to the Society. Hence the great importance of an earnest and concerted movement on the part of the friends of the Society, to secure the election of persons in every district competent to the efficient discharge of the representative trust, and who will pledge themselves, if elected, duly to attend the meeting of the Assembly.

As there is a most encouraging prospect for a very fine exhibition, to be effected through the united counsels and efforts of the State and Central Societies, it will not be difficult, if the effort is faithfully made, to secure from amongst the numbers who will attend the fair from your county, the attendance of gentlemen well qualified to work out the deliverance of the society from the embarrassments arising from the defects of the Constitution.

CH. B. WILLIAMS, *Secretary*,

In behalf of the Executive Committee.

To the Members of the State Agricultural Society.

Poor Land---What shall We Do with It?

Perhaps there is no question in which so many farmers are, or ought to be, interested as in the satisfactory solution of the one under consideration. Poor land, the chief heritage of many, MUST BE IMPROVED, or the owner will, year by year, become more and more a sufferer, both in body and mind, and acquire an increasing and more intimate association with harrowing cares, gloomy prospects, pressing necessities, and unprofitable pursuits, until at last the unfortunate "tiller of the soil" finds his efforts to attain wealth, health, and prosperity unavailing, and his hopes of all these benefits finally *threshed* out of his heart, leaving little room for aught save weariness and despair. And who is it that is brave and strong enough of heart, to keep his courage up when crop after crop fails, and no rich field "in living green" appears to bid him hope for a "better time coming," when the worthy labourer shall reap his well-earned hire; but when labour is almost thrown away in pitching a crop upon an ungenial soil, and the future opens a view of—ruin? This is a dark picture, certainly, but its shadows will fall on many a face among the "sovereigns" of this "great and prosperous country."

That so much undesirable and worn-out land can easily be found in all quarters of our old States, is not altogether the fault of the present generation. Imperfect tillage, rapid cropping, grazing, and an utter indifference to the necessity of manuring, together with ignorance of many a truth, since revealed to us by chemistry, all conspired to make our forefathers bad farmers. But along with poor land, unfortunately, they have left their sons, in many instances, a mistaken pride as to the number of acres which they deemed necessary to make up the homestead of a respectable farmer. There can be no doubt that one of the greatest obstacles in the way of the rapid improvement of our lands, is to be found in the fact, that nearly all of our agriculturists have too great a disposition to acquire land, rather than to improve their present possessions with reference to a large yield from a small surface, and to benefit each field in a well devised rotation as it comes under cultivation. In consequence of this error, we find on many farms a great deal of worn-out waste land, useless to the owner, unless the number of his acres give him pleasure and satisfaction to feel that they add to his yearly tax bill, if not to his income. Good policy would suggest the expediency of getting rid of such an incubus; thereby lessening the expenses and the laborious oversight of the farm, and rendering it as a whole, more compact, easily managed, and productive. Thus, a farm containing one thousand acres of indifferent land might, with benefit to its owner, spare five hundred acres towards improving the remaining half, by being sold off. This plan being followed, would raise a considerable capital for many a man who, under the present custom, cannot obtain the funds to improve with. Capital judiciously expended, is as sure a benefit to agriculturists, as it is to merchants and others. We cannot apply, or obtain manures of any kind, without expense. Without manure, we need not expect to make crops. We *must* have it, and we *must* pay for what we get. In ours as well as other professions, "'tis money makes the mare go." How often do we hear a farmer say, in reference to some work which it is evident would benefit himself and his farm if it were done, "If I could afford it, I would have it done at once." If he has more land than he can work well, which lying idle runs him to expense every year, he can afford it by acting on the hint above.

We must contrive to raise larger crops to the acre than we have been in the habit of doing, or we shall not be able to compete for labourers with the Southern States, and must lose the greater part of our negroes. We cannot afford to raise ten or fifteen bushels of wheat, or four barrels of corn to an acre of land, while a good negro man will hire for from $100 to $150 per annum. When wheat was considered high at $1 per bushel, we could hire a labourer for a year at from $40 to $50. Labour is so much more remunerative in the cotton and sugar growing States at present, than it is in our own section of the Union, that at the present ratio of exportation of negroes from our midst to a more Southern clime, it will take but a short period to deprive us of our present stock, and to raise the price of labour to a rate ruinous to farmers.

The only way we can get out of the difficulty, is to raise a much larger crop on the surface which we at present cultivate, thereby reducing our expenses, and increasing the profits to each hand. This can only be accomplished by a judicious and economical use of manures, and by giving proper attention to the ploughing, draining, and cropping of the fields. We hope to present views on this subject which will prove of service to our readers—theories which they are at liberty to pass by unheeded, if they do not stand inspection in the light of common sense.

Supposing, then, that a farmer has reduced his farm to that size, which will put it in the power of his "force" to work it thoroughly, we would suggest as the first step towards improving it, that he should *plough the land deeply*, breaking up the subsoil below the bottom of the old furrows, and disintegrating the "*hard pan*," as it is usually called. This *pan* is formed by the deposition of the fine, partially dissolved earth, which is carried to the bottom of the furrow by rain water. When it dries up, it forms a close, compact layer, which is almost air and water proof, and injurious to the crops growing over it in two ways, viz: by arresting effectually any rising from the subsoil of moisture, and inorganic plant food—and preventing the surface water from sinking below its depth, of course tending to greater washing of the land, and a more speedy evaporation of its moisture after rains. We have all seen the effects of shallow cultivation in corn fields, especially during a dry summer, and how much greener and fresher the crop appears in the hottest, dryest weather when planted on soil broken up by the four-horse plough. This beneficial effect may readily be accounted for, and results not only from the fact that the corn roots have a deep furrow of soft mellow earth to expand in without difficulty—but, also, that there is a gradual sinking of the rain water, with atmospheric air accompanying it.

The next step to be taken for a course of improvement, is to make upon the farm as much putrescent manure as possible; to husband and apply it well. Also, to use as a convenient and ready adjunct, such of those concentrated fertilizers which the present commercial market supplies, as have proved trustworthy and effective, *in such a manner as to lessen the risk of pecuniary loss, if the crop to which they are applied should fail.* One of the greatest benefits which the use of guano can confer on the farmer, is the increased facility which it affords him of adding to his stock of putrescent manure by giving him a large bulk of straw which may, with great benefit to the land, be used as cattle food, stable litter, or as a top-dressing to his grass lots, or to the field turned out to rest. We have ourselves effected a very considerable improvement of our own land by ploughing in as much wheat straw as we could whirl under with a large plow, on stiff clay intended for corn, and using lime along with it. The straw rotted sufficiently (before the corn was planted) to become very short, and to act mechanically on the soil by rendering it friable and loose—promoting aëration, besides returning to the soil, the chemical salts in its composition.

Tobacco planters are, we believe, almost the only cultivators in Virginia, in any considerable number, who have used their straw to lighten and loosen the ground before planting. Experience has, with them, proved its efficacy. Why should it not be used for other crops, for similar purposes?

To avoid making our article too long for the present number, we must reserve for our next the continuation of the subject.

Let it not be forgotten that the United Fair of the State and Central Societies occurs on the 22nd, 23rd, 24th, 25th, 26th, and 27th of October.

Loudoun Agricultural Society.

☞ We return our thanks to N. Berkeley, Esq., for an invitation to visit the Exhibition to be held under the auspices of this society, at Leesburg, on the 4th, 5th, 6th and 7th of September. If it is possible for us to do so, we shall, with great pleasure, accept it.

"Share's Coulter Harrow."

We call attention to the advertisement (in our present number) of Messrs. Treadwell & Pell, who have sold the Patent Right, for this implement, for the State of Virginia, to *Messrs. George Watt & Co.*, of this city.

We have already expressed, in the Planter, our opinion that this is an admirable instrument for pulverizing the ground, and for covering grain when sowed broadcast.

We refer to it now, because Messrs. Treadwell & Pell, as well as ourselves, *unintentionally* trod on the toes of the Messrs. Watt, in publishing the advertisement of the harrow in our August number. The present advertisement sets the matter all straight, and covers up the *inadvertence* of the August advertisement as thoroughly as the harrow will a grain of wheat.

Manipulated Guano Again.

In our remarks, to which the following letter from Mr. Kettlewell is a reply, we did not intend to depart from the neutrality of our position as hitherto maintained in relation to the paternity of the manufacture of what is called "manipulated guano," but simply to apprise our readers that however honorable it might be, to be the acknowledged "father of the theory," that yet the claim to that honor had not been established "beyond contradiction." We are not called on now to recede from our former position, or to take sides with any of the contestants, but we cheerfully accord to Mr. Kettlewell the privilege of asserting his claim, through our columns, promising that any suitable reply, which others may desire to make through the same channel, will have an equal claim upon the courtesy of the [EDITOR.

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BALTIMORE, August 14th, 1860.

To J. E. Williams, Esq., Editor of the Southern Planter:

DEAR SIR—The August number of your valuable journal contains a most sensible and admirably written article upon "Manipulated Guano," in which you express yourself as follows: "We regret that we cannot give the name of the father of this theory to our readers, beyond the possibility of doubt or contradiction." Now, had you expressed this in different language, the doubt could have been most satisfactorily answered; for while the THEORY is in conformity with the opinions of nearly all who have written upon agricultural chemistry—at this time without an exception—the *Origination of the Manipulated Guano* is yielded to myself, with a unanimity and fairness not customary amidst the rivalry of conflicting interests. Your own article, referring to its benefits, affords the best solution of the anxiety with which I desire to retain a just and true connection with an enterprise, the origination of which has not only proven to be a great public good, but which cost me the devotion of some of the best years of my life, subjected me to pecuniary sacrifices and difficulties, and also a patient toil of which no man can know but myself. If others are sharing the benefits of this effort, exclusively my own, it is more a subject of gratulation than of regret, for whilst it is a demonstrative vindication, I am sure they would be the last to refuse me what I am justly entitled to, viz: the credit of being "THE SOLE *and exclusive originator of Manipulated Guano, in name and substance.* You will, therefore, not be surprised at my requesting you to publish the enclosed certificates and letters from among the first men and agriculturists of Maryland, who can be reached by mail in a single day, and to further add, that I will present a fitting testimonial to any charitable institution of your State, if any other party can make the same claim, equally authenticated, antecedent to the date of the enclosed letters and certificates up to the period of time to which those letters and certificates refer, of having used and sold Manipulated Guano, manufactured by machinery.

Most truly your friend and ob't serv't,

JOHN KETTLEWELL.

☞ See certificates referred to above in the advertising sheet.

Notes on the Cane-Brake Lands of Alabama.

This invaluable treatise on the cretaceous region of Alabama, by Edmund Ruffin, Esq., commenced in our August number, is completed in this. We have also published a phamphlet edition, that those who may wish to possess themselves of the most interesting and accurate treatise on the peculiar geological structure of this highly interesting portion of our country, which has yet appeared, may be accommodated at a cheap rate. It will be forwarded by mail, *prepaid*, to any part of the country, on the receipt of four postage stamps, or it will be sent by express, *prepaid*, to any person ordering 100 copies, on the receipt of six dollars.

Mr. J. W. Randolph has laid upon our table "*Southern and South-Western Sketches*"—Fun, Sentiment, and Adventure. Edited by a Gentleman in Richmond. pp. 190.

"The peculiar humor of the South, and its characteristic generosity, are happily illustrated in many of these sketches. Those who love that innocent mirth which leaves no pain, and can relish the honey of wit without the poison which it sometimes leaves. will find," says the Editor, "in these pages ample sources of entertainment."

The Practical Miner's Own Book and Guide; comprising a set of trigonometrical tables, adapted to all purposes of mining-surveying; also, a treatise on the art and practice of Assaying Silver, Copper, Lead and Tin, with tables which exhibit at one view the value of assayed ores. Rules for calculating the power of steam and water engines, together with a collection of essential tables, rules and illustrations, exclusively applicable to mining business. Also, remarks on the ventilation of mines, with some remarks upon the middle division of Eastern Virginia Coalfields, &c., being an improvement upon an English work, by J. Budge, on the same subject. By Job Atkins.

The work will, no doubt, be found of great value as a manual to those who are professionally related to the subjects of which it treats. We hope Mr. Atkins will reap a rich reward from its publication. We wish it, not only because we deem his work to be very valuable in itself, but because the compiler is one of our naturalized citizens, who, in the midst of the excitement of the John Brown raid, stood up in New York, and in the face of all opposition, boldly vindicated the character and institutions of the South, amidst the tumultuous hisses and other demonstrations of contempt by English and Yankee abolition fanatics, who attended his lectures.

Virginia will own him as one of her children, true to his adopted mother.

Messrs. J. W. Randolph & Co., No. 121, Main Street, Richmond, will issue in a few days a new and original work, entitled:

"Anticipations of the Future to Serve as Lessons for the Present Time."

The work is in the form of a series of letters, purporting to be written by an Englishman, resident in the United States, post dated and extending from 1864 to 1870, and addressed to the London Times newspaper.

The object of the author in speaking of supposed future occurrences, as if of events already transpired, is not only to invest his subject with the charm of novelty, and thereby to render it more attractive and impressive, but it is also his aim to meet "current and popular objections of opponents, by supposing to occur as early, and principal consequences of the secession of a Southern portion of these, now United States, incidents, which are not such as the writer deems to be either necessary, legitimate or probable results." Nevertheless, as objectors allege that the remaining Northern States will make war on the Southern States to compel them to abide the terms of the present union, he treats of the war as thus waged by the North against the seceding States, and traces beforehand what he supposes would be the legitimate consequences of such warfare to both of the belligerent parties. But, as the book is so soon forthcoming, we will not further anticipate its contents.

We acknowledge the receipt of the following pamphlets:

Regulations and list of premiums of the annual exhibition of the Philadelphia Agricultural Society, to be held at Powelton on the 25th, 26th, 27th and 28th days of September.

Rules, Regulations and Premium List of the fifth exhibition of the Macon County Agricultural Society, to be held near Decatur, Illinois, on the 1st, 2nd, 3rd, 4th and 5th of October, 1860.

T. C. Maxwell & Bro.'s Descriptive Catalogue of Fruit and Ornamental Trees, Shrubs, Roses, &c., &c., Rochester, N. Y.

Central Nurseries, York, Pennsylvania, Edward J. Evans & Co.'s Trade Catalogue of Fruit and Ornamental Trees, Vines, Roses, Bedding Plants, &c., for autumn 1860, and spring 1861.

The Seth Wright Sheep.

A few facts bearing unfavorably upon the Darwinian hypothesis respecting the origin of species.

BY E. EMMONS, M.D.

Rather more than half a century ago, a male lamb was added to the flock of Seth Wright of Vermont, whose configuration excited the special attention of its owner and his immediate neighbors. This lamb was low in stature in consequence of its short, bow legs, with a rather long body, its whole organization rendering it incapable of leaping fences, or even the ordinary stone walls common in that section of country. This fact suggested to Mr. Wright and his neighbors the idea that if a breed could be propagated, certain advantages would be secured, especially the certainty of confining the flock within the pasture ranges. This object seemed to furnish reasons for attempting to carry it into practice. The attempt was successful, and there arose a new variety of sheep, which became for a short period quite widely distributed in Vermont and Massachusetts. About this time, however, the merinoes were introduced, and as this breed was much more orderly, and less disposed to ramble than the old long-legged sheep, and was moreover much more valuable than either the long or short-legged, the latter was neglected and soon disappeared.

Now, the manner in which this short, bow-legged sheep appeared, has a very significant bearing upon the Darwinian hypothesis. This hypothesis sets forth the doctrine, that breeds or varieties, and finally species, originate in principles which its author calls *natural selection* and *a struggle for existence.* I leave the reader to make out the meaning and import of the phrases the best he can, as we have not time and space to illustrate them. It is important, however, to say that the changes induced by struggle for existence, and through the operation of which an existing type is changed, first to a variety, and finally to a species, are extremely slow, and upon this fact the doctrine mainly hinges. It is maintained that a prolonged exercise of the faculties concerned is necessary before a distinct departure from the original type becomes visible. Let us now see how this doctrine tallies with what we know of the origin of varieties. The bow-legged sheep of Seth Wright came into existence at once; and so constant is this fact, that wherever and whenever varieties have appeared, the parentage is ushered upon the stage unexpectedly. The progenitor of the five-fingered race of men was born five-fingered, so that whenever varieties marked by changes of form or qualities originate, they are not the result of the slow operation of causes, such as are implied by the term, *struggles for existence.* They are sudden and unexpected developments. If so, this fact strikes at the root of this fanciful Darwinian hypothesis. There are no struggles prior to the fact; but the struggle for existence comes afterward, and herein has Darwin erred in placing his cause before the fact; whereas, the struggle, if any, has to be maintained after the variety appears. This is very clearly seen in Seth Wright's sheep. It was ushered into the world without the struggles contended for, and the moment man ceased to bring his knowledge of causes to bear upon its preservation, it became extinct. Even the varieties of pigeons which Darwin employs to illustrate his doctrine, are all originally sudden developments. The fantail pigeon did not acquire its tail by a gradual metamorphosis, or additions; it was hatched a fantail, and it has been preserved a fantail by influences which man has brought to bear upon it. Darwin's principles, implied in the terms, *natural* selection and the struggle for existence, are totally different from the modes pursued by man for the improvement and perfection of breeds. The Bakewell sheep, the Durham short-horns, are called varieties among sheep and cattle. They stand out somewhat separate and distinct from the breeds of the classes to which they belong, and man has been instrumental in thus isolating them; nevertheless, the parents of these breeds possessed an individuality at birth, and it was entirely independent of selection or struggles. We do not propose to consider at this time other reasons and arguments equally fatal to Darwin's views of the origin of species; it is sufficient to show, that all of our knowledge of the subject goes to disprove the assumption, that prolonged periods have anything to do with the origin of varieties. What is true of the animal is equally true of the vegetable kingdom. Time is not an element of change; is not called for in the developments of breeds or kinds; they spring up at once, and are preserved by the fostering care of man, and without his knowledge would generally perish with the individual.—*N. Y. Observer.*

From the Farmer and Planter.

Domestic Economy, Recipes, &c.

An Excellent Liniment.—Take the whites of two eggs, beaten to a froth, a wineglass of vinegar, a wineglass spirits of turpentine, and a wineglass of alcohol, beating it all the time. This liniment must be put together in the order mentioned above, or it will not be thoroughly incorporated. We find this very superior in all cases of sprains, bruises, &c., on man or beast.

Potato Apple Dumplings.—Boil any quantity of white, mealy potatoes; pare them and mash them with a rolling pin; then dredge in flour enough to form a dough; roll it out to about the thickness of pie-crust, and make up the dumplings by putting an apple, pared, cored and quartered, to each. Boil them one hour.

Spruce Beer.—For three gallons, take one quart of molasses, twenty drops oil of spruce, fifteen drops oil of sassafras, fill the pail with hot water, mix them well together, let it stand till blood warm, then add a pint of yeast, let it remain ten or twelve hours, then bottle it. In three hours it will be fit for use.

Indian Cakes.—Six well beaten eggs, one quart of milk, warmed, a small lump of butter, a teaspoon of salt, one of soda, two tablespoonfuls of sugar, one pint and one-half Indian meal. Bake in buttered tins about two inches thick. Better than sponge cake for tea.

Vinegar Pie.—Take a gill of cider vinegar, one quart of water, a teacup of molasses, or sugar enough to make it sweet, stir in half a dozen spoonfuls of flour, put it on the fire and let it boil. Bake with two crusts, or put the top crust on in strips if it is liked better.

Newton Short Gingerbread.—Eight cups flour, three cups sugar, one of ginger, one of butter, six eggs, one teaspoonful of soda.

Baked Apple Pudding.—Boil one pound and a half of good apples with a gill of water, and half a pound of brown sugar, till reduced to a smooth pulp; stir in one gill of sweet cream, a tablespoonful of flour or fine bread crumbs; flavor with a little lemon juice, or grated lemon, and bake forty minutes.

Cheap Sponge Cake.—Two eggs, one cup of flour, one cup of sugar, one spoonful of sweet milk, half a spoonful of soda, one teaspoonful of cream of tartar, and a little salt; grate in some rind of lemon, and add part of the juice, and a teaspoonful of butter. Bake fifteen minutes.

To Restore Sour Milk or Cream.—Milk or Cream, when it has turned sour, may be restored to its original sweetness by means of a small quantity of carbonate of magnesia. When the acidity is slight, half a teaspoonful of the powder to a pint of milk.

Orange Tart.—Squeeze two oranges and boil the rind tender, add half a teacup of sugar, and the juice and pulp of the fruit, an ounce of butter, beat to a paste. Line a shallow dish with light puff crust, and lay the paste of orange in it.

Loaf or Tea Cake.----One cup of sour milk, one cup sugar, one teaspoonful rose-water, a little nutmeg, one tablespoonful of butter, one teaspoonful of soda, one and a half cups flour.

Lemon Dip.----Thin two tablespoonsful of flour with water; stir it into a pint of boiling water; let it boil once; take it up and stir in four tablespoonfuls of sugar, a little butter and the juice of one lemon.

Deborah's Batter Pudding.----Sixteen tablespoonsful of flour, one quart of milk, six eggs, salt; beat the eggs to a froth on a plate, and after it is mixed beat it fifteen minutes. Either boil or bake.

Rice Pudding.----Quarter of a pound of rice, one quart of milk. Stir well while boiling. When nearly cold, add one-quarter pound of butter, same of sugar, six eggs, spice to taste. Bake one hour.

Salem Cookies.----Three and a half pounds of flour, one and a half of sugar, one of butter, one teaspoonful of caraway seeds, one and a half cups of milk, and a teaspoonful of soda.

Tea Cake.----Three cups of sugar, three eggs, one cup of butter, one cup of milk, a spoon of soda and four cups of flour, well beat up. If it is so stiff it will not stick easily, add a little more milk.

To Brown Coffee.---Coffee should be browned gradually, and only to a *light* chesnut brown, so that when it is ground it will be lively and fly around the sides of the cup.

Potato Pudding.----Two pounds of potatoes, boiled and sifted, three-fourths of a pound of sugar, one-half pint of cream, seven eggs and nutmeg.

To Preserve Eggs.----Set them away in a dry cellar, standing on their ends, and turn the other end up once a week. They will keep fresh a year.

Boiled Pudding.----One quart of milk,

nine eggs, seven spoonfuls of flour, a little salt. Put in a bag and boil three-quarters of an hour.

A Funny Speech.

The Wisconsin Legislature have formally considered a proposition to abolish all laws for the collection of debts. The mover of the bill, Mr. Elmore, is a great wag, as is evidenced by the following extract from his speech upon the subject:

"The speaker proceeded to review the present system of collecting debts. It was all a humbug and a cheat, a matter of technicalities and legal shuffling. Lawyers gave advice in order to obtain a fee and encourage litigation. Judges made blunders and mistakes. He had but little experience in law, and that was rich, (Laughter.) He would give a history of it. The speaker then related how he had purchased a yoke of oxen, about fifty years ago----paid fifty dollars for them----a few days after, the son of the man, of whom he bought the oxen, came to him, and said the oxen were his. He insisted on having pay over again, and commenced a suit before a justice. The jury didn't agree. Finally, through the blunders of the Bushwood justice of the peace, the case went against him. He appealed it to the Circuit Court in Milwaukee. 'There,' said he, 'I lost again, and said to my lawyer: I will give you ten dollars to quote Pennsylvania law to Judge Miller, and have a new trial ordered. (Great Applause.) He took the ten dollars, and performed the duty.

"'A new trial was then granted, and venue changed to Walwouth county. Judge Irvine was then the Judge. Any man who wanted to gain a cause in his court, had either to go hunting with him and let the judge claim all the game that was shot, or else pat his dog. Well, I patted the dog. (Laughter.) The case was decided in my favor. When I heard the decision I thought to myself the dog had followed me about long enough. I turned around and gave him a kick. (Laughter.) The yelp of the dog had hardly subsided ere I heard the judge say, 'Mr. Clerk, this judgment is set aside and a new trial granted.' (Great laughter.) Mr. Speaker, that kick cost me $200! (Convulsive laughter.) You have no doubt seen a suit in a justice's court in the country. There is time spent by the jurors and hangers-on, besides other costs, at least fifty dollars, besides the ill-feelings and dissentions caused by it. It is all a cheat. The litigants had better sit down and play a game of old sledge to decide the case. It would be more sure to settle the disputes justly.'"

Japanese Industry.

The Japanese are an industrious and ingenious people. Nearly all the useful metals are worked by them with great skill, especially iron, copper, gold and silver; and they possess an art, in the combination of metals, for beauty and effect unknown to other people. Their sword blades are admirable. They also manufacture astronomical instruments, and clocks and watches, copied after European models, probably introduced by the Dutch.

Their mirrors are metalic, and very beautiful. Their carpenters' and cabinet-makers' tools are also equal to any of European manufacture. They are said to be quick in observing any improvement introduced by foreigners, make themselves masters of it, and copy it with skill and exactness. Their coinage is well stamped, as they are good die sinkers. In wood, no people work better, and in lacquering they excel the world. Other nations have attempted in vain to imitate and equal them, owing chiefly to the materials necessary in preparing the wood, which is the gum of a tree known only to themselves, called the varnish tree. Occasionally, specimens of their lacquer-work have, through the Dutch residents of Dezima, found their way to this country; but it is said the best samples are never sent out of the kingdom. They manufacture glass, both colored and uncolored, and their porcelain is delicate and beautiful, beyond all rivalry. Paper they produce in abundance, principally from the bark of the mulberry tree. It is of different qualities; and some of it is as soft and flexible as our cotton cloth, for which it might be mistaken, and is used for handkerchiefs, and other domestic purposes. They make silk, the best of which is superior to that of China, and is said to be woven by criminals of high rank, who are confined upon a small, unproductive island, deprived of their property, and compelled to support themselves by their labor.

The exportation of these silks, it is said, is prohibited. As a substitute for cotton cloths, as before remarked, in the manufacture of which they have little skill, they use their coarse, spongy paper—which is quite as useful and durable. As they have no sheep or goats, the manufacture of woolen is unknown among them. Very little leather is produced in Japan, owing to a Budhist superstition, which makes those manufacturing or vending it outcasts from the rest of the population. It is never used for shoes or other covering for the feet, such being made from plaited straw, for the lower classes; the nobility and dignitaries wear slippers made of fine rattan slips, neatly plaited.

The ragged appearance of their feet frequently affords a ridiculous contrast to the splendor and richness of the other portions of their picturesque costume.

We had alluded to the ingenuity of the Japanese; take the following as an example in clock making. It is in the description of one given by a former Governor (Dutch) of Dezima, an island of the Dutch Company, and to which they are exclusively confined: 'The clock is contained in a frame three feet high by five feet long, and presents a fair landscape at noontide. Plum and cherry trees in blossom, with other plants, adorn the foreground. The background consists of a hill, from which falls a cascade, skillfully imitated in glass, that forms a softly flowing river, first winding around rocks placed here and there, then running across the middle of the landscape, till lost in a wood of fir trees. A golden sun hangs aloft in the sky, and turning upon a point, indicates the striking of the hours. On a frame below, of beautiful finish, the twelve hours of the day and night are marked, where a slowly creeping tortoise serves as a hand. A bird perched upon the branch of a plum tree, by its song and the clapping of its wings, announces the moment when the hour expires, and, as the song ceases, a bell is heard to strike the hour, during which operation a mouse comes out of a grotto and runs over the hill."—*American Ruralist.*

Draining.

The great advantage of land drainage, apart from that circulation of the feeding agent through the soil which it promotes, depends no doubt on the immediate penetration of the spring and summer showers, and their conveyance of the atmospheric temperature into the soil and subsoil, which, without some such agency would retain the winter season for the roots of plants, while their leaves and stems were rejoicing in the summer sun and air. This influence is hardly injured by any merely surface cooling which evaporation may produce, and the probability that drained land experiences, during summer, even more of this surface cooling than land that is undrained, is thus no difficulty in the way of our understanding the immense influence of land drainage on fertility.

The Origin of "Hail Columbia."

In the "Recollections of Washington," just published, occurs the following anecdote:

"The song of Hail Columbia, adapted in measure to the President's March, was written by Joseph Hopkinson, of Philadelphia, in 1798. At that time war with France was expected, and a patriotic feeling pervaded the community. Mr. Fox, a young singer and actor, called upon Mr. Hopkinson one morning, and said: "To-morrow evening is appointed for my benefit at the theatre. Not a single box has been taken, and I fear there will be a thin house. If you will write me some patriotic verses to the tune of the President's March, I feel sure of a full house. Several people about the theatre have attempted it, but they have come to the conclusion that it cannot be done. Yet I think you may succeed." Mr. H. retired to his study, wrote the first verse and chorus, and submitted them to Mrs. H., who sung them to a harpsichord accompaniment. The time and the words harmonized. The song was soon finished, and that evening the young actor received it. The next morning the placards announced that Mr. Fox would give a new patriotic song. The house was crowded—the song was sung—the audience was delighted—eight times was it called for and repeated, and when sung the ninth time the whole audience stood up and joined in the chorus. Night after night 'Hail Columbia' was applauded in the theatre; and in a few days it was the universal song of the boys in our streets. Such was the origin of our national song, 'Hail Columbia.'"

☞ The bark of a willow tree, burned to ashes, mixed with strong vinegar and applied to the parts, will remove all corns or excrescences on any part of the body.

Will Wood of the Farm.

BY B. W. PEARCE.

The bright Spring days have come, Will Wood,
The cold, bleak weather is past,
The husbandman speeds his plough once more,
The Frost King's gone at last.
The fields have cast their mantle of white,
And are donning their carpet of green,
The cattle e'en now on the hill-side graze,
And the green bursting buds are seen.

My mind's eye wanders to the farm, Will Wood,
The farm with its meadows and trees,
Where in years gone by—bright boyhood's years—
Our hearts were light as the breeze;
The house by the road, where years it has stood,
Unscathed by the hand of decay,
The peach and the pear trees, 'neath whose shade,
We went in the sunshine to play.

The hand that planted them is cold, Will Wood,
And is laid 'neath the white marble stone;
But the trees he left, bright monuments stand,
To tell of the patriarch gone.
That old well sweep you've taken away,
And a "new-fangled" pump, in its stead,
Brings to your hand the pure cooling draught
From the well that our good sire made.

And don't you remember the oven, Will Wood,
We built 'neath the buttonwood tree?
And how in that oven the apples we baked,
And none were so happy as we?
A score of years have passed since then,
But the oven remains there still,
Though the soft green moss now covers its sides,
That oven close under the hill.

There is one gentle voice now hushed, Will Wood,
That we all so delighted to hear;
Her form lies cold in the embrace of death,
That was wont the dwelling to cheer;
But her memory lives in the hearts of those
Who joyed in her presence then;
She'll mingle no more with the scenes of earth,
But anon we shall meet her again.

We're scattered all hither and yon, Will Wood,
We ne'er again shall meet
Around the board in the old farm-house,
With kindly words to greet;
But our hearts cling fondly around that spot,
Where we never knew aught of harm,
And we joy to grasp thy hard brown hand,
Will Wood of the homestead farm.

Be Gentle With Thy Wife.

Be gentle! for you little know
How many trials rise,
Although to thee they may be small,
To her of giant size.

Be gentle! though perchance that lip
May speak a murmuring tone,
The heart may beat with kindness yet,
And joy to be thine own.

Be gentle! weary hours of pain
'Tis woman's lot to bear;
Then yield her what support thou canst,
And all her sorrows share.

Be gentle! for the noblest hearts
At times may have some grief,
And even in a pettish word
May seek to find relief.

Be genle! for unkindness now
May rouse an angry storm,
That all the after years of life
In vain may strive to calm.

Be gentle! none are perfect—
Thou'rt dearer, far, than life;
Then, husband, bear and still forbear—
Be gentle to thy wife.

The Maiden's Choice.

BY MRS. F. D. GAGE.

Oh! give me the life of a farmer's wife,
In the fields and woods so bright,
'Mong the singing birds and lowing herds
And the clover blossoms white:
The note of the morning sky lark
Is the music sweet for me;
And the dewy flowers, in their morning hours
The gems I love to see.

Oh! ask me not, to your city lot,
Or your pave, where Fashion throngs
Thro' the live long day, in vain display,
As the idlers pass along;
Where the sickly hum of piano
By nerveless fingers played,
Tell the morbid life of maid or wife
In the blighting city shade.

Oh! give me the breeze from the waving trees
And murmur of summer leaves,
And the swallow's song as he skims along,
Or twitters beneath the eaves;
The plowman's shout as he's turning out
His team at the set of sun,
Or his merry good night, by the fire-fly's light,
When his daily work is done.

And give me the root, and the luscious fruit
My own hands reared for food;
And the bread so light, and honey white,
And the milk so sweet and good:
For sweet is the bread of labor
When the heart is strong and true,
And a blessing will come on the heart and home
If our best we bravely do.