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By M. MAC LEAN.

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AGRICULTURAL.

For the Farmers' Gazette.

LEIBEG.

The science of Chemistry, in the last fifty years, has given to man more correct data, whereby he may reason on the organization and growth of plants, than all other sources of information together. Previous to its application to the science of Agriculture, mystery veiled the reasons for the truth of facts, which mankind were ages on ages acquiring. The Chinese were a thousand years learning by experiments without the assistance of scientific principles, what Europe has demonstrated, by a recurrence to these principles in fifty. Sir Humphrey Davy, by the application of Chemistry to Agriculture, pointed out the correct course of reasoning, and Leibeg standing on his shoulders, availing himself of the lights before him, has boldly pushed his enquiries beyond his predecessors. A brief exposition of his organic Chemistry, or some of the results of his reasoning it is thought might amuse some of your readers, and lead them to a thorough study of the work. It is to be regretted that the introduction, by the American Editor, is so abstruse, and out of the reach of the common readers, as to deter them from a perusal of the text.

HUMUS.

Humus is that substance in soils, which is formed by the decay of plants, and is that which we usually call vegetable matter. It has received other names from Chemists, according to the external characters, and properties it possesses, such as Ulmin, Humic Acid, Coal of Humus &c. This substance heretofore has been considered the principal nutriment of plants, which they receive from the soil by their roots, and that Carbon or Coal which is known and acknowledged to be the most abundant ingredient in plants, is thus received: since the known abundance or scarcity of Humus in a soil seems to afford proof incontestible of its correctness. Yet this position, the truth of which seems settled beyond dispute, Leibeg entirely overthrows, and proves that Humus in the form which it exists in the soil, does not yield the smallest nourishment to plants. Without going into all the proofs he adduces on this subject, one will be sufficient for the present purpose.

Alkali's and Alkaline earths do exist in the different kinds of soils, in sufficient quantity to form soluble compounds with Humic Acid. 40,000 square feet, Hessian, of wood land, (equal to 26,917 English square feet) yield annually on an average 2656 lb. Hessian, of dry wood, which contains 5-6 lb. Hessian, Metallic Oxides. Now, according to estimates, 1 lb. of Lime combines chemically, with 10. 9 lb. of Humic Acid, 5. 6 lb. of the metallic Oxides would introduce into a tree 6 lb. Hessian, of Humic Acid; which admitting Humic Acid to contain 5-8 per cent of Carbon would correspond to 91 lb. of Hessian dry wood. But we have seen 2650 lb. of fire wood are really produced. A calculation of the quantity of Humic Acid which plants can receive under the most favorable circumstances through the agency of rain water, will come as far short in accounting for the quantity of Carbon contained in vegetation.

A certain quantity of Carbon is taken away from the forest or meadow, yearly in the form of wood or Hay; and in spite of this the Carbon in the soil augments.

The origin of Humus is doubtless connected with this question. Humus, no one denies, is formed from the decay of of plants, from whence, then, did the first plants on the earth receive their Carbon? Surely not from the soil; for there was none. In the coal formations where plants are found, whose growth was in former periods of the earths history, they are almost destitute of roots, but of immense extension of leaf. The atmosphere must then be the source from which these plants received their Carbon, in the condition of Carbonic Acid gas. The supply of this gas in the atmosphere is kept up with great uniformity by combustion, putrefaction and respiration of animals. The proportion of this gas in the atmosphere, may be regarded as nearly equal to 1–1000 part of its weight. This quantity varies according to seasons, but the yearly average remains the same. In answer to a question that may be raised, whether this quantity, which seems so small, is sufficient to supply the whole vegetable kingdom, on the surface of the earth. The author enters into a calculation, to show that the atmosphere contains 3,000 billions Hession lb. Carbon; a quantity which amounts to more than the weight of all the plants and of all the strata of mineral and brown coal, which exist on the earth. The quantity of Carbon contained in Sea Water is proportionally greater. This gas with the elements of water, Oxygen and Hydrogen, is absorbed by the roots, leaves and all green parts of plants; and by the assistance of light and heat are assimilated and produce the growth of plants, the roots and other parts which possess the same power, absorb constantly water and Carbonic Acid. This power is independent of solar lights. In the shade and during the night, Carbonic Acid is accumulated, in all parts of their structure; but the assimilation of Carbon and the exhalation of Oxygen do not commence until the solar rays strike them.

Humus when in contact with the oxygen of the atmosphere, is converted into Carbonic Acid; but this decay of Humus ceases upon the exclusion of Oxygen. The Carbonic Acid which protects the undecayed Humus from further change is absorbed by the roots of plants. This is replaced by atmospheric air, by which the decay is renewed, and a new portion of Carbonic Acid formed. The roots and leaves act as so many mouths, stomach and lungs to plants, and the size of a plant is proportional to the surface of the organs which are destined to carry food to it. Through the process of vegetation there is an expulsion of matter unfitted for nutrition, hence the soil receives again the greater part of the Carbon which it had at first yielded to the young plant as food. This matter thus acquired is capable of decay and of furnishing renewed sources of nutrition to another generation of plants. The leaves in autumn and the roots of grass, and the like, are converted into Humus, so that a soil in this form, receives more Carbon than its decaying Humus had lost in Carbonic Acid. Thus it is asserted that plants do not exhaust the Carbon of a soil, on the contrary they add to its quantity. This being true, their growth must depend upon the reception of nourishment in the atmosphere. Plants thrive in powdered Charcoal, and may be brought to blossom and bear fruit, if exposed to the influence of rain and the atmosphere; because, says our author, it is known to possess the power of condensing gas within its pores, and particularly Carbonic Acid, thus preforming all the offices of decaying Humus.

It has been observed that the elements of water enter into the composition of plants. These elements are Hydrogen and Oxygen; all the Hydrogen necessary for the formation of any organic compound is supplied to a plant by the decomposition of water. Wax, Fats and Volatile oils contain no Oxygen; hence they are formed by the extraction of Carbon, from Carbonic Acid; and Hydrogen from water, by the expulsion of Oxygen. The known composition of the Organic compounds generally purest in vegetables enables the chemist to state the different quantity of Oxygen separated during their formation. In the formation of Acids the smallest separation takes place; in the formation of neutral substances the amount increases; and in the formation of oils there is almost an exclusion of Oxygen.

In the ripening of Fruits, by the action of sun shine and the influence of heat, there is a regular diminution of Acid, by the expulsion of Oxygen.

The next important ingredient in the structure of plants to be noticed, is nitrogen; without which in the richest vegetable mould plants could not attain maturity; this enters into the composition of Albumen and Gluten. Ammonia, compounded of nitrogen and hydrogen is the form in which the roots of plants receive their hitrogen. Ammonia is the last product of the decay and putrefaction of animal bodies. As animal manures act only on vegetation by the formation of Ammonia a knowledge of the sources from whence it is derived becomes doubly interesting to agriculturists.

By the putrefaction of animal and vegetable matter, this gas escapes and rises into the atmosphere, even from deep recesses under ground. It has been the fate of Leibeg, first to publish to the world, that this gas, obtained by the atmosphere, as just described, is afforded to vegetation by rain water, though undetected in atmospheric air; it is found that one fourth of a grain may be obtained from one pound of rain water; or a field of 40,000 feet square H. must receive 80lb. of ammonia, or 65lb. nitrogen, provided that 2,500,000 lb. of rain water fall in the space of a year; which is the estimated quantity that falls in some parts of Germany; in our own country it is doubtless greater. Ammonia may likewise be detected in snow water, and the inferior layers of snow which rest upon the ground will contain the greatest quantity. This discovery has led to the solution of the question which has heretofore puzzled the Agricultural Chemist. How does Gypsum, burnt clay, or oxide of Iron, add to the fertility of a soil? That they act as stimulants to plants, as aromatics to the human stomach, cannot be true; for plants have no nerves. It has been ascribed to the great attraction they have for water; but common dry arable land possesses this property in a greater degree. They act simply in giving a fixed condition to ammonia, received by rains, and prevents its escape again into the atmosphere. The solid excrements of animals contain less ammonia than their urine; and human urine is the most powerful manure for vegetables containing hitrogen; 100 parts of wheat grown on a soil manured with cow dung (a manure containing the smallest quantity of nitrogen) afforded only 11.95 parts of gluten and 64 38 parts starch; while the same quantity grown on a soil manured with human urine yielded the maximum of gluten, 35 per cent. Cultivated plants receive from the atmosphere the same quantity as trees and the like; but this is not sufficient for the purposes of agriculture. It becomes the interest of the Agriculturist to employ all the various means of increasing the quantity of ammonia, and fixing it in the soil. Leibeg closes the chapter on this gas with this somewhat remarkable sentence: Carbonic acid, water, and ammonia contain the elements necessary for the support of animals and vegetables. The same substances are the ultimate products of the Chemical process of decayed putrefaction, all the innumerable products of vitality resume after death the original form from which they sprang; and thus death—the complete dissolution of an existing generation, becomes the sources of life to a new one.

In organic bodies substances are likewise requisite for the formation of certain organs destined for special functions peculiar to various families of plants.—These substances in solution are imbibed by the roots of plants acting as a sponge. Substances thus conveyed are retained in greater or less quantities, or are entirely separated when not suited for assimilation. The organic acids in the varieties of vegetation, are in combination with pot-ash, soda, lime or magnesia.—These bases regulate the formation of the acids. The leaves contain more alkalis than the branches; and the branches more than the stem; because their office is to prepare substances for assimilation; and it is important to remark that any one of the alkaline bases may be substituted for another, the action of all being the same. Unequal quantities of alkalis are required for different kinds of trees or plants. 10,000 parts of oak wood yield 250 parts of ashes; the same quantity of fir wood only 83. Does not this fact give a reason why old fields that have been long in cultivation when turned out first grow up in pine? The alkalis of the earth being partially exhausted, a sufficiency is left for the pine and the oak follows when a restoration takes place.

The discovery of Leibeg of the supply of ammonia to plants from rain water, says the North American, will probably be carried to a much farther extent. Already has it been proved in Germany, that several seeds of Alpine plants whose germination has hitherto been attended with difficulty will grow readily if sown in contact with snow.

Some of the most intelligent farmers in Germany have already testified to the value of the new views disseminated by Leibeg; and in France amongst the learned they are exciting general admiration. A new edition has been published, with the addition of extracts from the lectures of Dr. Dauberry founded on this work; discussing the principles, and their practical application; besides which they contain the result of many experiments undertaken as tests of those principles.

From the Albany Gultivator.

MANAGEMENT OF POULTRY.

Messrs. Gaylord and Tucker:—I have been requested to give you and your readers some account of my success, in the management of domestic fowls. My experiments having been continued for many years, have wrought in me the full conviction, that there is as great a difference and as much ground of preference among the breeds or varieties, as there is among cattle. Having tried a great number of different kinds, I have adopted as my favorite, the Poland breed, or the black top knots, as they are familiarly called. These, when pure or thorough bred, are of a glossy coal-black, with a large tuft of long white feathers on the top of the head, and are the most beautiful domestic fowl probably, that can be found in this country. Their excellence consists mainly in their disinclination to set till they are three or four years old, and when well fed, continuing to lay eggs the whole year, except during moulding time, this generally commences in the month of October and November, and occupies about six weeks, during which time they never lay eggs.

Last year I kept of the black top-knots, two cocks and fourteen hens. Early in December, 1840, they began to lay and continued laying, with occasional intervals of from three to six days, all winter and summer, till about the middle of October, 1841. The whole number of eggs produced, I did not ascertain; but of the eggs of three hens, that laid by themselves the year round, I kept an account, and found that they averaged 260 eggs each. Only two of the fourteen hens showed the least disposition to set during the year. The food they consumed during one year, consisted, first of twelve bushels of damaged wheat which I purchased at twenty-five cents per bushel, and afterwards twelve bushels amounting to six dollars. This, with a supply of fresh water every day, kept them in good condition, and caused them to produce large eggs, for all fowls lay larger and heavier eggs when well fed, than when they are poor.—My fowls have also laid the whole of this last winter. I have never succeeded so well with any other.

Buffon says, a common hen, well, fed and attended, will produce upwards of 150 eggs in a year, besides two broods of chickens.—But the common hens I formerly kept, always fell much short of this number.

Were I to describe as the result of my experience, what I think the *best food* for fowls, I should say a plenty of grain, not much matter what kind, either boiled or soaked in water, and in winter mixed with boiled potatoes, fed warm, twice a day. It is also of great importance that they have a warm sunny place to stay in during winter, for if left without care to find their roost here and there in an open barn or shed, they will produce no eggs. If they could, in winter, be roosted in a tight, room, ten feet square, where by their contiguity they could mutually impart warmth, their improvement would be manifest to the most incredulous.

The only *disease* of consequence that I have observed among my fowls, has been the *pip*, which is a kind of horny scale growing on the tip of the tongue, and by which they are liable to be attacked late in autumn and early in the winter. When attacked with this, they appear stupid, stand by themselves, with no inclination to move about, refuse all food, and if not attended to in two or three days, they die. On discovering these symptoms, they should be immediately caught, and with a knife or the thumb nail, this scale may be caught on the lower side of the tongue and peeled off, when they will immediately recover.

KEEPING EGGS.—Having tried many ways of preserving eggs, I have found the following to be the easiest, cheapest, surest and best. Take your crock, keg, or barrel, according to the quantity you have, cover the bottom with half an inch of fine salt, and set your eggs in it close together on the *small end;* be very particular to put the *small end down,* for if put in any other position, they will not keep as well, and the yolk will adhere to the shell; sprinkle them over with salt so as to fill the interstices, and then put in another layer of eggs, cover with salt, and so on till your vessel is filled. Cover it over tight and put it where it will not freeze, and the eggs will keep perfectly fresh and good any desirable length of time. My family have kept them in this manner three years, and found them all as good as when laid down. I believe we have never had a bad egg since we commenced preserving them in this manner. The trouble is comparitively nothing, for when we have a dozen or so more than we wish to use, we put them in the cask and sprinkle them over with salt; and when at any future time we wish to take them out, they are accessible and the salt is uninjured. But mark! the eggs should be put down before they become stale, say within a week or ten days after they are laid.

Every man by this process may have eggs as plenty in winter as in summer; and farmers who make a business of selling their eggs, may easily calculate the profits of preserving them in summer and selling them in winter. Eggs where I live, sell frequently in summer at 8 cents, and in winter as high as thirty-seven and a half cents per doz. In view of these various considerations, it must be evident that no investment that a farmer can make, will yield so great a profit as a few dollars in domestic fowls. They will cost, probably in no case, more than 50 cents each per year for their food; the trouble of taking care of them is fully counterbalanced by the pleasure they give; and they will or may be made to produce each on an average; from 200 to 250 eggs, besides an occasional brood of chickens.

The theory of your correspondent B., in your March No. respecting *animal* food being necessary to the production of eggs, does not correspond with my observation of facts. I have for years been obliged to shut up my fowls during most of the summer, where they could neither get insects nor any kind of animal food, and yet they continued to lay as much as any I have ever known to run at large.

The banishment of cocks too, which he recommends, I have tried, and abandoned it as unnatural and worse than useless; for with a good attendance of the male, say one to six in summer, and one to four or five in winter, I have always found the hens to be most profitable.

Buffalo, March, 1842.

MODE OF MAKING SPERMACETI AND OIL FROM LARD.

Mode of manufacturing Elaine and Stearine from Lard, &c.: Patented by John H. Smith, 122 Front Smith street, New York city.

To all whom it may concern: Be it known that I, John H. Smith, of the city of Brooklyn, in the county of Kings, and State of New York, have invented a new and useful improvement in the manner of separating from each other the elaine and stearine which are contained in lard, by means of which improved process the operation is much facilitated, and the products are obtained in a high degree of purity; and I do hereby declare that the following is a full and exact description thereof:

The first process to be performed upon the lard is that of boiling, which may be effected either by the direct application of fire to the kettle, or by means of steam; when the latter is employed, I cause a steam tube to descend from a steam boiler into the vessel containing the lard; this tube may descend to the bottom of the vessel, and be coiled round on said bottom so as to present a large heating surface to the lard, provision being made for carrying off the water and waste steam in a manner well known; but I usually perforate the tube with numerous small holes along the whole of that portion of it which is submersed below the lard, thus allowing the whole of the steam to pass into and through the lard. To operate with advantage, the vessel in which the boiling is effected should be of considerable capacity, holding say from ten to a hundred barrels.—The length of time required for boiling will vary much, according to the quality of the lard; that which is fresh may not require to be boiled for more than four or five hours, whilst that which has been long kept may require twelve hours. It is of great importance to the perfecting of the separation of the stearine and elaine, that the boiling should be continued for a considerable period as above indicated.

My most important improvement in the within described process, consists in the employment of alcohol, which I mixed with the lard in the kettle, or boiler, at the commencement of the operation. When the lard has become sufficiently fluid, I gradually pour and stir into it about one gallon of alcohol to every eighty gallons of lard, taking care to in corporate the two as intimately as possible; and this has the effect of causing a very perfect separation of the stearine and elaine from each other by the spontaneous granulation of the former, which takes place when the boiled lard is allowed to cool in a state of rest. I sometimes combine camphor with the alcohol, dissolving about one fourth of a pound in each gallon of alcohol, which not only gives an agreeable odor to the products, but appears to co-operate with the alcohol to effect the object in view; the camphor, however, is not an essential ingredient, and may be omitted. Spirit of lower proof than alcohol may be used, but not with equal benefit.

After the boiling of the lard with the alcohol has been continued for a sufficient length of time, the fire is withdrawn, or the supply of steam cut off, and the mass is allowed to cool sufficiently to admit of its being ladled, or drawn off into hogsheads, or other suitable coolers, where it is to be left at perfect rest until it has cooled down, and acquired the ordinary temperature of the atmosphere; as the cooling proceeds, the granulation consequent upon the separation of the stearine and elaine will take place and become perfect. The material is then to be put into bags, and pressed moderately, under a press of any suitable kind, which will cause the elaine to flow out in a state of great purity, there not being contained within it any appreciable portion of the stearine; this pressure is to be continued until the stearine is as dry as it can be made in this way.

The masses of the solid material thus obtained are to be re-melted, and in this state to be poured into boxes or pans, of a capacity of ten or twelve gallons, and allowed to form lumps which I denominate blocks; then when removed from the vessels and piled, or stacked up for a week or ten days, more or less, the room containing it should be at a temperature of nearly 80 degrees, which will cause a sweating or oozing from the blocks, and they will improve in quality; the blocks are then to be rolled in cloths or put into bags, and these placed between plates, and submitted to very heavy pressure by means of a hydraulic press. After this pressure it is brought again into the form of blocks, and these are to be cut up by means of revolving, or other knives, or cutters; the pieces thus obtained are to be put into bags, and subjected to the action of hot water, or of steam, in a press, until it becomes hard enough to be manufactured into candles, or put up for other purposes to which it may be desired to apply it.

The manner of subjecting it to the action of heated water, or of steam, is to place the bags containing the stearine in in a box, or chest, into which heated water, or steam, may be introduced, but not to such an extent as to fuse the stearine. A follower is then to be placed against the bags contained in the box, or chest, and moderate pressure made upon them; the material will now be found to have acquired all the required hardness, and to possess a wax like consistence, such as would generally cause it to be mistaken for wax.

I am aware that alcohol has been used for the purpose of separating elaine and stearine from each other in analytical chemistry, but the lard or other fatty matter consisting of these substances, has, in this case, been dissolved in the heated alcohol, and the whole has been suffered to cool together; this process would be altogether inapplicable to manufacturing purposes, as the cost would exceed the value of the product. In my manufacturing process, instead of dissolving the lard in alcohol, I add a small proportionate quantity of the latter to the former, the whole of which is driven off at an early period of the ebullition, but by its presence, or catalytically, disposes the elaine or stearine to separate from each other, which they do after long boiling and subsequent cooling. I do not, therefore, claim the use of alcohol in separating elaine and stearine from each other, by dissolving the fatty matter in heated alcohol, and by subsequently cooling the solution; but what I do claim, as of my invention, and wish to secure by letters patent, is the within described method of effectively promoting their separation, by incorporating alcohol, highly rectified spirits, with the lard in small proportionate quantities; say one gallon, more or less, of said alcohol, or spirit, to eighty gallons of lard, and then boiling the mixture for several hours, by which boiling the whole of the alcohol will be driven off, but will have left the elaine and stearine with a disposition to separate from each other on subsequent cooling, as herein indicated and made known.

JOHN H. SMITH.

Witnesses,—T. H. Patterson, H. S. Fitch.

BUSINESS HORSES.

To the Editor of the N. Y. "Spirit of the Times;" Dear Sir,—Your correspondent, signing "South hill," in the No. of July 3, 1841, asks, as to "The business horse, the horse of all work—strong, but showy, full 16 hands high, not deficient in activity in the harness, or under the saddle, but patient and powerful for draught—how is such a variety to be obtained and perpetuated?"

This question is one of such importance to the public, that I beg to answer it so far as in my power. I cannot pretend to tell how to produce this most desirable kind of horse *in perfection,* but a little experience and some observation and reflection have enabled me to say how a horse, very nearly of the required standard, may be produced in a majority of trials, by the breeders of the United States, *as cheaply almost as the poorest. Let them employ choice stallions of the Norman French Canadian* breed.

Those who have not seen will scarcely believe (for many who have themselves reared such animals do not admit the cause of their excellence, but attribute the growth and perfections to "*chance,*") that an ordinary American mare under 15 hands, put to a stout active Canadian of 14 or 14,1-2 hands, will produce a foal, which, though small, crooked, and inferior at birth, will frequently at 8 years of ago pass 16 hands in height, be well formed, active, true, resolute, and kind, and when