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Nec araneorum sane textus ideo melior, quia ex se fila gignunt, nec noster vilior quia ex alienis libamus ut apes.

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LECTURE IN NAPAN.

(Continued.)

I am now to speak of Manures! The best soils you know by repeated cropping, become exhausted of their fertile properties; and indifferent soils require the aid of certain qualities, to enable them to yield a due return to the labors of the husbandman. There are, I grant, soils (of which I shall speak more particularly by and by) so naturally rich, that although used for twenty years, in growing successive crops of grain, show but little indication of impoverishment: yet these in time do become exhausted—Therefore, in all circumstances, manures being so valued as fertilizers, demand the best consideration of Farmers.

Manures are of two classes, both of which have distinctive characters, and perform different offices in the economy of vegetation. The first comprehends all animal and vegetable decomposing matter, and is principally employed in feeding the plant, increasing its size and keeping up the vital energy. The second operates more on the soil and decomposing matter, than it does on the vegetable itself. The first kind, as I have said, is called animal and vegetable; the second fossil manures. Under this second class are ranked not only Lime, Marl and Gypsum, but Sand, Gravel and Clay.

I will show you by and by, that animal and vegetable manures are foremost in importance and dignity, that they consist of certain elementary parts of animal and vegetable substances, and that the dung of all animals is neither more or less than the remains of the vegetable or animal food which has been received into the stomach of animals—undergone there a partial dissolution, and been thrown out as of no farther use to the nutrition of the system which contained it.

I may safely aver, that nothing connected with Agriculture is so little understood or studied as the quality, use and application of manures. Generally speaking, all sorts of it, solid and liquid are treated by our farmers, with perfect indifference—I mean as regards the effects produced upon them by exposure, and drawing away in the form of liquids. Now this is surely a gross abuse in farming. That offensive stream to which I refer, is the very essence of the manure; and should be either scrupulously confined within the limits of the dunghill, or be conveyed to fresh vegetable or earthy matter, that it may impart its nutritive qualities to them.

A knowledge of this important truth first led to the practice of compost heaps, in which the valuable liquids and gasses of different kinds and manure are absorbed or drank up by the earth, or other substances, and the whole brought into the condition of an active and efficient manure for the field.

Hitherto it has been the custom everywhere, to speak of Dung-hills or Dung-heaps; but I would be for scoring out both these words from the Farmer's vocabulary altogether, and substituting the words Dung-hole or Dung-pit. The collection of manures from the farm yard and offices, should form this Dung-pit, and the greatest care and skill should be exercised in managing the contents of it. The situation, depth and size of the Ducts or Spouts, leading to it from the outhouses, and the best mode of flooring and siding this pit, so as to render it most convenient, tight and best adapted to the climate, would each form a fitting subject for discussion at a Farmer's Club; and such a topic as almost any farmer in Napan, could with fireside familiarity, contribute his quota of information.

While upon this part of my subject, I had intended to speak in favour of ornamental farming and gardening. To have explained to you that whatever administers pleasure, to the senses, lightens labor—a lovely landscape does so—& this—such a finely situated locality as

Napan, if decorated with trees tastefully planted—would at once become; nor can anything be more refreshing to the wearied farmer, at the close of a hot summer's day, than a stroll in his fruit or flower garden. I had also intended to call your attention, to the propriety of introducing a system of the most rigid economy into every department of your affairs. I am strongly of opinion that a great cause of the misery and want which prevail among mankind, is downright extravagance, and that we might live equally well & happy at half the present cost: but as I observe, with much satisfaction that a commencement in the way of planting ornamental Trees, and improving your gardens has been made since my last visit, and as by going fully into the subject of economy, I might have occasion to pay my respects and that somewhat incourteously to the rosy cheeked daughters of whom I spake favourably, yet so truthfully the last time I was here, I shall say not a word more about these delicate and difficult subjects.

Many of you will remember, that just after I had concluded my former lecture at this place, a vote of thanks was tendered through you Mr. President to Mr. Pierce, for the valuable agricultural information to be found weekly in the columns of his well conducted journal, and certainly if I may be allowed to obtrude my opinion on such a subject, I would say, Mr. Pierce was well worthy of the compliment thus paid him: but the fact that the Gleaner contains valuable information, is but slim proof that farmers appreciate that information; that they subscribe to the paper which contains it, or read it when they do subscribe. Now before proceeding to the second, and most important branch of our subject, I would fain convince every one who hears me, that there is really and truly an absolute necessity for Farmers who would profit by farming, to be intimate not only with the common art, but likewise with much of the science of Farming, for as was remarked in one of the Reports of our Agricultural Society, as well might a man unacquainted with the art of mixing colours—yet calling himself a painter—expect to produce a striking portraiture as a farmer—so called—expect to produce luxuriant crops, who knows little or nothing of the elements contained in the composition of his soil, or of the manures with which he would enrich that soil. Are not the earth, the air and the water all full of instruction to the farmer.—Yet, how very few think so? I trust I will not be deemed uncharitable (for I hope I am mistaken) if I assert, that scarce ten to one has ever troubled himself, to ascertain the causes that make a fire burn, its smoke to ascend and disappear, its emission of heat or its ultimate consumption, yet all such reflections demand your best attention, and would well reward the time and labour of study devoted to them. I recollect having heard of a man who went into a neighbourhood of farmers—respectable men like yourselves, but who did not read much, and felt the old-fashioned contempt and aversion for those who did. This man was a reader of agricultural works and Newspapers, and when an improvement was pointed out, which his good judgment showed to be adapted to his means, his farm and his circumstances, he adopted it at once. He improved his farm by draining his lands, and nearly doubled the ordinary crops by skillful cropping and rotation. He improved his Stock by purchasing at great cost, superior animals to breed from. His neighbours at first called him a *Book Farmer*, a *Blockhead*, and sneered at his management! But by and by they began to discover that the *laugh was on the wrong side*, and slyly to enquire the cause. The bookfarmer—as I shall call him by way of distinction—was a kind hearted man: if he could get a neighbor to read his papers they were always at his service, and if he met a brother farmer, some proposition was made, or some inquiry started, which he was sure would lead to useful results. Ere long they

found agricultural papers necessary, and became subscribers themselves, and now an agricultural paper has become as indispensable as the most puffy political ones had hitherto been, and its arrival is always looked for with interest and pleasure. The prominent farmers of that neighborhood are now readers, and different publications—the Gleaner among the number—are taken by them. They have a Club, at which when they meet, the comparative merits of the different methods of husbandry are freely and intelligently discussed; and our friend the Bookfarmer is their worthy President. Would that such examples as this were more frequently imitated. In such instances, we have the true secret of improvement, for although the looker on may at first sneer at the Reader, take my word for it, he will eventually imitate—first the improvement he makes and then his course of reading. Read then my friends, & while you read reflect. Reflect I say, on the means of improving your cultivation, and be assured that increasing permanent prosperity will be your reward.

I now claim your attention to a few remarks on the *Science of Agriculture*.

Agriculture is a Science as well as an Art, and must depend for its successful prosecution, not only upon the skill that may be acquired by a practical pursuit of the subject, but likewise upon the knowledge of the qualities of soils, and a thorough acquaintance with the substances required for the nutrition or nourishment of plants. So that you see, at least a rudimentary knowledge of chemistry and geology, is indispensably necessary, in order that you may farm upon anything like correct and scientific principles.

We are made aware of the truths of chemical science by studying nature. Asking questions of nature and receiving her answers. We ask Nature a question when we make an experiment, and the result is Nature's answer; and by varying these questions, and putting them first in one shape and then in another we have the truth fairly brought out. Well, by experiments repeated a thousand times, and in ten thousand different forms, it has been ascertained that the earth we inhabit, together with all the vegetables and animals it contains, are made up of some 50 or 60 elementary principles of matter which differ from one another in their properties.

The great bulk of the earth, however, is composed of from 12 to 14 of these elements, which are found in large abundance all over the globe, in the water, air, and earth, and it is with these substances few in number, and with properties easily understood, that the farmer particularly has to do.

The earth is composed chiefly of a substance called Oxygen. This body constitutes nearly half the weight of all earthy matter: it is found in all vegetables and in all animals, it is therefore very evident that a knowledge of such a substance must be highly beneficial to the Farmer. Convinced of this I shall here digress for a moment in order to name a few of its properties. The very presence of Oxygen throughout all nature, sufficiently shews its vast importance. The air contains about one-fifth of its bulk of Oxygen, which in that case assumes the character of a gas. Every five bushels of common air contains about one bushel of Oxygen.

Oxygen as a gas, is carried round the world, and penetrates every part, and the substances which require it are always sure to find something from which they can extract it. Water contains a large quantity of Oxygen. Every nine tons of water contains eight tons of Oxygen, and in this way also it is disseminated all round the world. In the generality of earthy matters, fully one third, if not one half is composed of Oxygen. Oxygen is most remarkable as the supporter of combustion. I mean, it is that substance which in natural operation consumes and burns up all vegetable and animal matter. By its action upon the Carbon and Hydrogen of our wood, coal, oil &c., Oxygen produces that light

and heat, which we feel to be so pleasant and necessary, so that it is Oxygen which causes a fire to burn and a candle to give light—if deprived of it they would be extinguished, but increase the supply of Oxygen, and the fire and candle will burn brighter.

The quantity of light and heat then, you will perceive, depends upon the quantity of Oxygen supplied in a given time, because the more Oxygen we can make to pass through any stove or fire place, or the more that can be brought in contact with the fuel in a given time, the quicker will be the consumption and the greater the heat. Look at the Blacksmith's forge,—how often have you seen the blacksmith blowing his bellows, till he was puffing and blowing like the bellows itself. What do you think was his object? why just to send a greater amount of air, (that is to send a greater amount of Oxygen) among the Coals, and by this means to produce a greater amount of heat in a given time.

Now I will give you an instance where common vegetable matter will ignite (that is take fire) spontaneously, merely from the fact of its being brought in union or contact with Oxygen. Take a pound or two of cotton and mix it with Linseed or Olive oil, and lay it by in a corner, and in twenty four hours the mixture will be on fire!

But it is time that I begin to apply Oxygen more directly to Agriculture. When farmers want to make manure heaps, what do they do? They heap together great masses of straw, litter and excrements—don't they? and what takes place? the heap gets heated and begins to smoke: and where think you does this heat come from? How is it produced or generated? You see the mass decreasing rapidly in bulk. In the course of six months it will have lessened more than one third, perhaps one half. Now what is the cause of this? I will tell you. It is that active and energetic agent of heaven, Oxygen, that is at work. The vegetable matter becomes moistened, as in the case of the cotton mentioned above. You have Oxygen absorbed or taken up in this way, and it consumes the manure.

Oxygen, then you see, is the agent appointed for the destruction of all animal and vegetable substances. We are all undergoing its influence. We breathe it, but we return less of it to the air than we took from it. What we inhale produces heat, and this is the reason why our bodies are warmer than these walls. You know I promised not to stain this lecture with one flight of the imagination—nor shall I, but you must exert your imaginations, while I compare the human body to a little steam engine, or if you prefer it, to a blacksmith's forge. Our lungs operate first like a pair of bellows, our mouth may be compared to the chimney, and our food to the coal. Our lungs or bellows are always blowing: if they were to stop but five minutes, we would soon grow cold and die. Yet were it not for the action of Oxygen on our bodies, we could not live; for strange as it may appear, it is from its continual consumption of the muscles, that we derive our strength and energy. Although we should eat nothing the bellows or lungs would not cease to work till every particle of the fat and muscles of the body were consumed. Now this shows that if we take no food to supply the waste of the muscles, we must just as the fire would—we must 'go out,' that is: we must die. On the other hand suppose the blacksmith were to overload his fire, and not blow the bellows enough,—what would be the consequence? Why, the fire would go

* Mr. Care here expressed his regret at not being able to, owing to a disappointment he had with, to illustrate this part of his subject experimentally, but succeeded in clearly describing what these experiments were designed to illustrate.

§ Mr. Care here related instances of mills having been burned, and innocent persons punished as incendiaries, before this fact was discovered.