FOOD OF VEGETABLES.

[FROM THE GENESEE FARMER.]

The following article from the *New Genesee Farmer*, will strike the intelligent reader, as being entitled not only to be read, but studied. It is written by Dr. Lee of Buffalo, New York, a gentleman possessing powers and original views upon all matters connected with science, and who has also, the happy *nack* of making people understand him. We commend it to all.

To understand the process of nature by which certain elements of earth, air, and water are transformed *into living* plants, and the best method of preparing these elements so as to produce the largest crops at the least expense, are objects worthy of the careful and profound study of every cultivator of the soil.

If we take 100 pounds of ripe hay, oats, wheat, or corn, including the roots, stems, and seed, and burn them carefully in the open air, we shall have only about 3 per cent. of alkaline earths left, most of which can be dissolved in water. If we burn a pound of candles, or a pound of oil, whether animal or vegetable, the whole of these substances (which are truly "the fat of the land") will be transformed *into* invisible air and vapor. The atmosphere and water are nature's great storehouse for preserving an exhaustless supply of vegetable food. By *respiration*, *fermentation*, and *rotting*, all organic structures are transformed into gases and soluble salts. It is from the lime dissolved in the ocean that the oyster elaborates its shell, and the coral insect rears its massive mountains of coral rock. It is mainly from the phosphate of lime held in solution in its mother's milk, taken from her food, that the sucking calf elaborates it solid bone. Without lime to be dissolved in her gastric juices, and taken into her circulating blood, the hen can make no solid shell to her egg. The unnursed infants in the great cities of London and Paris, brought up without milk, and fed on arrow-root and other food that contains little or no lime, have soft, cartilaginous, rickety bones, simply because neither animals nor plants can make *something* from *nothing*.

As a general rule it is strictly true, and moreover it is a truth of great practical importance, that a feeble, diseased stem in wheat, liable to rust, &c., and a shrunken berry, are owing to some removable defect in the food of the plant. So different are the essential elements of the seed of this plant from those of its straw, that it is practicable to raise wheat that will yield twice as much grain in weight as there is weight of straw, taking it from the root. That it is also practicable to grow wheat which will give five times as much straw as grain, most farmers know by sad experience.

On page 254 of Transactions of the N. Y. State Agricultural Society, 1842, Gen Harmon, of Wheatland, states, that "In 1803 Pettin Sheffer, Esq., of this town, harvested 40 acres of wheat grown on the Genesee flats, that produced 62½ bushels per acre." What elements did nature provide, and where did she get them, for the growth of such a crop? Manifestly they came from the mineral and vegetable matter washed down from the highlands above. These elements are just as abundant now as they were in 1803, or at the close of the creation. Having found out, within the last 40 years, since Mr. Sheffer harvested his famous crop, what these vegetable elements are, and how to combine them under more favorable arrangements for the production of *cultivated* plants that nature has anywhere done, men of science have greatly exceeded the above large product. From nature's crab-apple, that weighs less than an ounce, science has at last grown fruit weighing twenty times as much, or 2,000 *per cent. more than the original!*

By the use of charcoal and lime, a Mr Pell, of Goshen, in this State, has harvested this season at the rate of 78 bushels 24 quarts of wheat per acre. The ground was accurately measured by a surveyor's chain, and the grain in a sealed half-bushel and the statements are all sworn to by two respectable men. I notice this triumph of science with the more pleasure, from the fact that I have long and zealously urged the use of these abundant elements upon the attention of the readers of the papers for which I have written.

It is more than twenty years since I first began to use pulverized charcoal to absorb the gases given off by decomposed vegetable and animal matter, urine, and the like, to be applied to garden and field crops. Its value in correcting the taint in meat, and purifying rain-water in filtering cisterns, led me to believe that it would be just the thing to absorb the food of plants from the atmosphere, into which so much passes, and hold it about their roots in a condition that neither dew, rain, snow, frost, nor the heat of the sun, would injure it or take it away. To labor hard to save and draw out manure on to one's fields, and then lose 60 or 80 per cent of this vegetable food by its solution in water, and washing away to form something like the Genesee flats in the bottom of Lake Erie, I never regarded as very good economy—which, by the way, is the soul of good husbandry.

A *pint* of human urine contains ammonia enough to make, with the other necessary elements, 60 pounds of good wheat. Charcoal will absorb this liquid, and render it quite inoffensive to the olfactories of the nose. The direct application of urine to the soil, after the German practice, is bad economy, unless the soil contain a large portion of humus, or vegetable mold, for its tenacious retention. It is a better plan to have a reservoir filled with pounded charcoal under the stable floor, or near to the stable, into which the liquid excretions of all animals should be conducted like cider from the press. When nearly or quite saturated with urine, this coal will be manure of extraordinary power and durability—for nothing in the soil, but the roots of growing plants, will be likely to extract a particle of this vegetable food.

After wheat, corn, or grass has taken up all this nourishment, the coal (unlike lime, which has parted with its carbonic acid in the same way) is insoluble in water, and remains, as in a filtering cistern, to absorb and hold, for the benefit of the growing plant, more vegetable food from every rain that falls to the earth. For be it remembered, that dew, rain, and snow—the poor man's manure, bring back to the earth all the gaseous elements given off by all the fires, respiration, and other decomposition of solid and liquid matter.

For the same reason, coal should be largely used in the formation of compost heaps. And where the farmer has straw which he can use to make beds for his horses and cattle in the stable, this, with a quantity of coal pounded with a flail, can be spread upon the table floor, to absorb all liquid excretions. All these excrementitious substances should be kept under shelter. Wood ashes, lime, and muck, or vegetable mold, are valuable ingredients in all compost heaps. The coal stratum should be placed between the lime and the manure, and the whole should be covered with turf or more coal.

The analysis of soils abounding in fragments of limestone rocks shows a marked deficiency of this important element in their composition. The reason of this perhaps unexpected deficiency I will now explain:

Disintegrated limestone is decomposed by the vital action of plants, and its carbonic acid is taken up by their roots. It will then combine with more of this gas which abounds in the air and soil, and will again give it out to growing vegetable. It is in this way that plaster (sulphate of lime) after it has parted with its oil of vitriol, often produces such wonderful effects, although the amount applied is less than one fourth thousandth parts of the soil from which plants draw their nourishment. The action of the sulphuric acid, as I understand the matter, I will not stop to elucidate. But I wish to fix public attention upon the circumstance, that when lime in the soil has parted with its acid, whether sulphate or carbonic, and especially the latter, it is soluble in water, and hence very liable to be washed out of the soil by rains, &c. All water that has passed through a soil possessing sufficient lime to be good wheat land, is *hard*, or holds lime in solution of which it has robbed the soil. The same is true, in a less degree, with regard to leaching of the soil, and its loss of alumina, potash, and soda. The cultivation of the earth, without allowing any vegetables to grow upon it, would exhaust its fertility very rapidly.

The remedy for this is, to cultivate less land in grain crops, and cultivate it far better; to remove all excess of water by draining; to plough deep, and turn up to the sun virgin earth from below, and apply thereon manure, coal, lime, ashes, and salt. Instead of applying large quantities of quick lime at distant periods, it is far better to apply a less quantity and often, to make up for the loss that occurs from its being dissolved in water, and carried with it into rivers and the ocean.

Leached ashes are valuable, when applied to grass lands and are far from being worthless on wheat, rye, oats, and barley—all of which need their silicate of potash, to give them a good, firm stem. Grass and wheat know as well how to convey the apparently insoluble elements in leached ashes up into their organic structure, as did the trees from which these ashes were obtained. D. L.

Buffalo, Dec. 17, 1843.

ON VEGETABLE PHYSIOLOGY.

[FROM THE EASTERN CHRONICLE.]

I shall now say something on the food of plants. In commencing this part of the subject I may remark, that to chemistry we are chiefly indebted for what we know of the food of plants; consequently it may be regarded as a modern discovery. Our forefathers knew the value of manure perhaps as well as we do; although they might not imagine that the whole virtues of 50 loads might be contained in a puncheon. The celebrated Lord Summerville, once told an old farmer, that he did not despair of finding a manure, which he could carry in his snuff box. The farmer archly replied, "My Lord, when you carry your dung heap in your snuff box, I will carry your stack-yard in my pocket;" and I doubt not the farmer expressed the sentiments of Agriculturists in general, although my Lord's anticipations were well grounded, as modern discoveries have demonstrated.

First,—In endeavouring to explain the still mysterious operations of vegetation, the first and most important object of inquiry is, to determine, by what means the simple or inorganic elements of fossils and aerial origin which are recived into the vessels of plants are there changed into vegetable compounds—by what means, from these simple elements or binary compounds, vegetables form those other matters by which they are nourished, increased in size, elongated and expanded, and which thus give occasion to all the successive phenomena of vegetable life.

Secondly,—It may be observed that in the