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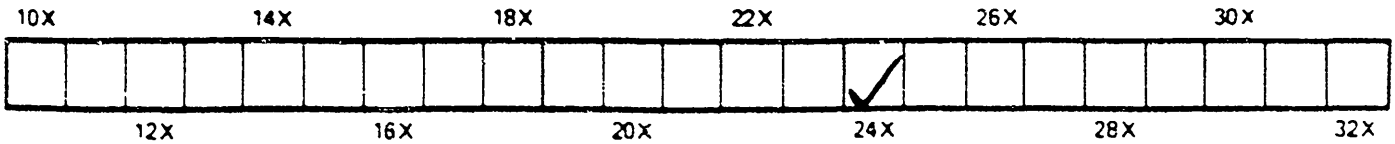


NEWCASTLE FARMER.

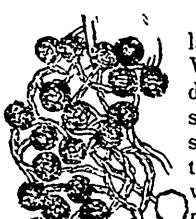
VOL. II.—NO. IX. COBOURG, MAY 1, 1848. THOS. PAGE,—Editor.

BLIGHTS OF THE WHEAT.

CHAPTER IV.

The fungus now to be described affects only the grain, and is one of the most common diseases to which wheat is subject. Unless, indeed, the precautions that will be pointed out are taken to prevent it, scarcely a field will be found free from its encroachments, which often extend to a most injurious degree. The botanical name of this fungus is *uredo fœtida*, or stinking rust, so called from its most disgusting odour, which may be perceived on passing through the field where it prevails; and if an ear or two be broken in the hand, the smell is intolerable. It resembles the stench of putrid fish, and adheres to the fingers, from which it is not easily removed. The farmers, as usual, have given it a variety of names, as bladder-brand, bunt, pepper-brand, and sometimes smut; which, however, properly belongs to the last-described fungus. The *uredo fœtida*, or bunt, its most general name, confines its ravages to the grain, completely filling the seeds it enters, and replacing the flour by a black disgusting fetid powder. This powder is a mass of spores. To examine them, open an infected grain, which is easily distinguished by its rounded, scaly, and dead appearance. The black matter will be found to have occupied the whole interior, and may be now looked at with the microscope. As in the case of the other fungi, take a very small quantity, and lay it on a strip of glass with a globule of water. Over this place a bit of the thin glass previously alluded to as useful in microscopic examinations. This will prevent a lens of high power touching the water. If considerably magnified, the spores present the appearance of a number of spherical fungi on their *mycelium*, or spawn, as they are here accurately drawn from some specimens given to the artist, Mr. Leonard, for that purpose. The group below shows the fungi magnified 375 diameters, while the single spore above is magnified 1,000 diameters; and the thread of mycelium is also magnified to the same extent.

Single spore magnified 1,000 diameters.



Group of *uredo fœtida* magnified 375 diam'rs.

Small as these spores are, they are much larger than those of the *uredo segetum*.—When a spore has been magnified 1,000 diameters, it has been seen by some microscopists to emit a cloud of sporules, but so small that no definite forms could be distinguished. The mycelium is remarkably well shown in these diagrams; and every person who examines this fungus with an eighth-of-an-inch achromatic, may very readily see the pedicels by which the spores are attached to it.

This uredo was very carefully examined by M. Bauer, and his drawings of the various points of interest in which it should be viewed, are made with his accustomed skill. He has not, however, shown the mycelium as it is shown here. Opinions seem in favour of the entrance of this fungus by the spongioles of the roots, and of their being propelled through the tissues by the ascending sap, as was stated in the case of the *uredo segetum*. This question will be discussed presently. It is when it enters the young ovum that it finds a suitable place for vegetating. When once there, all fecundation is destroyed by it; there is no development of the parts of fructification, and no embryo whatever can be detected. Still the grain swells on; and when the harvest is cut, the diseased grains are actually larger in circumference than those which are sound. Before they assume their final brown hue, the diseased grains are of a very dark green colour, and emit, when broken, the peculiar fetid smell previously mentioned. Singularly enough, the stigmata of the flowers are not destroyed.

M. Bauer's remarks on the progress of this fungus are well deserving of a place in every treatise upon it. He says,—"The earliest period at which I discovered the parasite within the cavity of the *ovule* of a young plant of wheat (the seed grain of which had been inoculated with the fungi of *uredo fœtida*, and sown the 14th November, 1805.) was the 5th June, 1806, being sixteen days before the ear emerged from its hose, and about twenty days before the sound ears, springing from the same root, were in bloom. At that early stage, the inner cavity of the ovum is very small, and, after fecundation, is filled with the albumen or farinaceous substance of the seed, and already occupied by many young fungi, which, from their jelly-like root or spawn, adhere to the membrane which lines the cavity, and from which they can be easily detached in small flakes, with that spawn. In that state their very small pedicels may be distinctly seen. At first, the fungi are of a pure white colour; and when the ear emerges from its hose, the ovum is much enlarged, but still retains its original shape; and the fungi rapidly multiplying, many of them have then nearly come to maturity, assumed a darker colour, and having separated from the spawn, lie loose in the cavity of the ovum. The infected grains continue growing, and the fungi continue to multiply till the sound grains have attained their full size and maturity, when the infected grains are easily distinguished from the sound ones by their being generally larger, and of a darker green colour; and if opened, they appear to be filled to excess with these dark-coloured fungi. But the grains in-

A healthy grain of wheat. A grain of wheat affected by the *uredo fœtida* with which it is filled.

fected with the *uredo fœtida* very rarely burst, and these fungi are seldom found on the outside of the grain; but if a grain be bruised, they readily emit their offensive smell, which is worse than that from putrid fish. When the sound grains are perfectly ripe and dry, and assume their light brown colour, the infected grains also change, but to a somewhat darker brown, retaining, however, the same shape which the ovum had at its formation, the rudiments of the stigma also remaining unaltered."

The sketches here given will convey to the reader a correct idea of the form assumed by the grain when occupied by this fungus. The dark green colour of the infected grains is merely a common effect of the presence of the mycelium of fungi. Mr. Berkeley, in a note to his masterly paper in the Journal of the Horticultural Society on the disease of the potato, remarks—"It is well known that the presence of the mycelium of fungi acts as a stimulant to the chlorophyl: witness the rich tint of fairy rings. A curious instance has, within a few days,

fallen under my notice. The hazel leaves, a week or two back, were very generally spotted with dark patches of green. On examination, it was found that the reverse of such patches was covered with *erysiphe guttata*, which had been living at the expense of the paler portions of the leaf, while in the subjacent part the *chlorophyl* had become of a deeper green." The *chlorophyl* is the term applied by botanists and vegetable physiologists to the green colouring matter of leaves.

The question whether the fine contents of the spores of bunt, *uredo fœtida*, as well as those of smut, or *uredo segetum*, enter by the roots and circulate in the plant, has already been glanced at. This has been the surmise of most observers, but no one has yet seen them grow; nor would this, as is stated in the first chapter, be the normal mode of growth. The spores themselves are undoubtedly too large to enter either by the stomata of the leaves, or the spongioles of the roots. Some ingenious experiments have been recently made by Mr. Berkeley, which he most kindly communicated to the author, that appear to establish the theory that these contents of the spores do enter the plant in the way suspected, and grow. The mode of proceeding was to immerse some seeds of wheat in water containing bunt. One of the first appearances was a curious mould with peculiar spores that sprung up on the spores of bunt. The plants which came up from these seeds were evidently affected; but no communication whatever could be traced between the cells of these plants and the shoots thrown out by the spores. No intrusion whatever of the mycelium developed by the bunt spores into the wheat could be discovered. This looks, therefore, as if the fine contents of the spores do certainly propagate the fungus. Some writers have called these kinds of fungi growing in the interior of plants *entophyta*, or plants within living substances, as *entozoa* is made to designate animals living within them. Fries says, these entophyta never grow in living animals, but this is clearly a mistake, as several kinds of moulds have been found in various parts of them. The whole subject is one of the most curious that can be conceived.

To return to the bunt: we may observe as before, that of the multitude of its sporules or fine contents no adequate conception can be formed. One grain of wheat is capable of containing four millions of spores; it is therefore beyond all calculation what quantity of sporules these may send forth. Care of the seed is the only way to prevent the encroachments of this pest, which will otherwise appear in almost every field of wheat. The way in which this happens, is by most writers on the subject considered to be, that when the grain is threshed, or from other causes, the bunted seeds are ruptured, and the cloud of sporules then escapes. They are of a greasy, oily nature, and consequently adhere to the skin of the sound grains. It is quite certain that the disease may be at any time propagated by rubbing sound wheat against that which is infested, by the fungus. If, then the seed be sown in this condition, the result may be easily predicted. The method also of counteracting the evil at once suggests itself. It is merely to cleanse the wheat which is about to be sown, from all the bunt which may have attached itself to it by reason of its unctuous character. The principle of effecting this object clearly must be, to use means to convert the oily matter which causes it to stick obstinately, into a sponaceous, or soapy matter, which will allow it to be readily washed off. Chemistry here comes to our aid. An alkali will convert oil into soap; and this is the basis of all effectual *dressing*, as it is called, of the seed-corn. Almost every district has its peculiar dressing, but the best are merely modifications of this principle. Whatever other ingredients may be used, the effective constituent is some alkaline matter in the form of a ley. Lime, which possesses alkaline properties, has accordingly been not unfrequently resorted to: it must not however be too much slaked in mixing, or it loses these properties, and thus often fails. Common potash, and substances containing ammonia, as for example, the liquid excrements of animals, have been adopted for remedies. Some persons employ brine, sulphate of copper, arsenic, and other things not possessing alkaline qualities. Whenever these methods succeed it cannot be for the reasons advanced, but it may happen that they destroy the vegetative powers of the fungi, though they still remain fixed to the grain. It would be well to follow the advice given by professor Henslow, and to institute a set of experiments on these points. They are curious and interesting questions; and indeed many things relating to these fungi still require minute and accurate investigation. It is unquestionable, however, that a good dressing of an alkaline ley thoroughly applied, completely arrests the evil. Whatever may be the views of some as to the value of sulphate of copper, it is obvious that the application of arsenic is undesirable, and indeed improper, from the dangers attendant on the use of so violent a poison. Nor are such things necessary, on account of the efficacy of the dressings upon the principle before mentioned. Indeed, in the fields of careful farmers, bunt has happily become rare.

It is difficult to apply the same precaution against the smut, or *uredo segetum*, with equally good effect, because the scattering of the spores at an earlier season diffuses them extensively. But barley fields, where they often adhere longer than in wheat, ought to be more attended to than they are; for a great quantity of this grain is almost every year destroyed by it. As knowledge advances, it is to be hoped the prejudice which leads some to regard the appearance of this fungus with the complacency before mentioned, will be removed. It may happen that the state of the atmosphere which is favourable to its development, tends to a good yield of barley; but it should be remembered that every ear so destroyed is a loss of superior corn. By all means dress barley where there has been much smut the previous year. In this year, 1846, it is most lamentably prevalent.

With regard to the *uredo fœtida*, although judicious dressing has been found to check it to such a beneficial degree that it is considered to be bad management to have much of it on any farm, it still abounds in districts where the agriculture is of an inferior kind. It is also found to prevail more in the spring than in the autumn sown wheats. The safeguard is the perfect purity and cleanliness of the seed. When mixed with the flour it is excessively disagreeable; but whether it is injurious to health is not quite decided, though it probably does produce ill effects on the constitution.

No other corn plant but wheat is affected by bunt in this country, but there are several fungi in existence attacking seeds of cultivated plants in the same way. Wheat does not afford a solitary instance of this kind of disease. Lately, in Africa, near Algiers, there has been found a uredo, which destroys the seeds of a species of Lucerne just as bunt does wheat. We might also enumerate eight or nine other kinds of vegetables which have their parts of fructification utterly ruined by different uredines, analogous to those producing smut and bunt in corn. The maize is subject to a large uredo; the *panicum* of Egypt has its parasite also in the shape of uredo; while another kind enters grasses, and is propagated within the sheaths.

Almost every farmer will say, that wherever the berberry-tree grows it produces fungal diseases in corn. The common fungus on the leaves of this shrub is the *æcidium*, and it looks, at a casual glance, very much like the rust, or uredo, of the rose, when it comes in large patches; but examine it with a good microscope, and the form is quite different. It has nothing in common with any uredo, except that it belongs to the same order. If the contents of its spores do affect corn, the fungi must be altered by being transferred to a new place of growth. It will be well worth the while of the scientific reader to examine Corda's exquisite drawing of the æcidium, in his "Icones Fungorum, or Figures of Fungi;" he will gain more by this means at a glance, than he could from pages of description. The berberry also is attacked by *erysiphe*, but no uredo can be conceived to arise out of the sporules of a fungus so entirely distinct from it in every point of view.

SIGISMUNDI, Emperor of Germany, being one day asked what was the most sure method of remaining happy in this world, replied, "Only do always in health what you have often promised to do when you are sick."

ON THE PROBABLE CAUSES OF THE FAILURE OF THE POTATO CROP.

BY DAVID MILNE, ESQ.

Mr. Milne briefly alluded to the various theories propounded, and gave reasons for thinking that the failure could not be ascribed to insects, parasitic fungi, or degeneracy in the plant. Insects of the description referred to did not generally prey upon healthy plants; and at all events they had not been seen on the potato plant till after it had shown symptoms of disease. The advocates of the fungus theory had never been able to decide whether the fungus was the cause of the disease, or whether the diseased plant produced the fungus; and the recent discovery, that in the diseased leaves and stem there are five or six different species of fungi, and nearly as many in the tainted tubers, renders it very improbable that the malady is caused by any one of them. As to the dying out of the potato, the majority of botanists deny that such an event has ever occurred in regard to any species of plants; and the notion that the potato may have degenerated from over cultivation, is contradicted by the fact that potatoes grown in this country from Chilian and Peruvian seed were affected last year like all others. The only alternative, therefore, is to suppose that there was something in the atmosphere which specially caused the disease in the potato crop. On examining the subject more narrowly, this supposition will be found to be confirmed by many circumstances, incapable of any other explanation. (1.) Thus it was well ascertained, that in 1845 and 1846, certain other plants and shrubs were affected simultaneously with the potato. This was the more remarkable in the year 1846, when, from the fineness of the season, vegetation generally was most luxuriant; and whilst these effects on particular shrubs, and even trees, were, in 1846, observable in the Highlands as well as Lowlands, they were, in 1845, not observable in the Highlands, in which part of the country the potato disease was, in 1845, also unknown. There can be little doubt, therefore, that those other plants which were injured simultaneously with the potato, were injured by the same agents, and this must have been atmospheric.

(2.) The parts of the potato and other plants which were *first* affected, were those exposed to the air. The disease in the potato was clearly ascertained to have commenced, not in the tubers, but in the upper parts of the plant—in the *leaves* of the finer varieties (which were the most common), in the *stems* of the coarser varieties.

(3.) The only cases in which the potato plants were generally saved, were either when the shaws had been cut over or pulled up, before the plants became diseased, or when they had been effectually screened from the blowing on them of the external air. Many cases were quoted in which potato plants well covered over with weeds, Savoy cabbages, Indian corn, and other tall plants, in garden and cucumber frames, and in out-houses, through which there was no draft of air, had been saved. In some of these cases it was mentioned that two or three plants, next the broken panes of a cucumber frame and the open door of an out-house, had become spotted, whilst the rest, which were not exposed to the blowing of the air, had been saved. Under this class of cases, it was mentioned that particular fields had been *streaked* with parallel bands of blight, which bands were found to have been coincident with the direction of the wind, and to have been produced by single hedge-row trees on the windward side of the fields.

Having, by these and other facts, established that the destroying agents had been in the atmosphere, the author proceeded next to inquire into the nature and properties of it.—(1.) He showed, by elaborate meteorological tables, that it could not be ascribed to any of the ordinary elements of the weather. As to *humidity*, which was believed to be the cause by many persons, and in particular by Professor Harting, of Amsterdam, (who had published a memoir of a hundred quarto pages on the subject,) it was stated that in 1845, the quantity of rain which fell was, in England (where the disease was worst,) rather less than usual, and in the Highlands, (where the disease did not appear,) rather more than usual; and that the moisture suspended in the air was less than usual all over Great Britain. There had also been many former years in which the rain and moisture had been much greater than in 1845. As to *temperature*, though it was true that in 1845 it had been in England 5 deg. to 7 deg. and in Scotland 2 deg. to 3 deg. less than the average, yet when it was considered that the potato grew equally well in Orkney with an average temperature of 46 deg., and in the south of England with an average temperature of 58 deg., it was evident that it could stand much greater variations of temperature than had occurred in 1845; and this theory was completely put at rest by the weather of 1846, which in Great Britain, during the summer months, was from 3 deg. to 4 deg. warmer than the average. If this atmospheric agent was not to be identified with any of the ordinary elements of the weather, the only alternative was, that it must be some foreign matter diffused through the atmosphere. This presumption was strengthened by several well-established facts.

(2.) It had been ascertained that, near the copper-works of Swansea, which gave out not only abundance of smoke, but copious fumes of sulphureous and arsenious acids (to such an extent as to blight the pastures), the potato crops of the miners had remained absolutely intact. The same exemption had been observed on a farm surrounded by lime-kilns; and it appeared that along the sea-shore the potatoes were less and later affected than elsewhere. Coal smoke contained much sulphureous acid, and the exhalations of the sea-air contained much chlorine. Now all gases, though themselves injurious to vegetation, had anti-septic properties, and some of them were commonly used to destroy or prevent contagion. From these facts it might be inferred that the atmospheric agent was some matter capable of being neutralized in the noxious effects by the gases above mentioned, and that it was probably some compound organic body, similar to what miasmatic exhalations are supposed to be.

(3.) Perhaps the farther properties of this deleterious matter might be inferred from the following circumstances:—A gentleman near Elgin stated that his field contained a number of basin-shaped hollows, which, though composed of the same soil as the rest of the field, were the most affected. Then it appeared that generally the low grounds were the first and most affected, the higher parts of the county the last and least affected. From these facts it might be inferred that the deleterious matter was heavier than atmospheric air. It could not be that the low grounds were most affected because wettest; for the evidence went rather to show that on the best drained soils the disease was worst. The other circumstance was the appearance of a fog or mist simultaneously with the appearance of the blight, which in some places gave out a sulphurous odour, and deposited a peculiar looking substance.

(4.) The inference from these facts is, that the atmosphere in 1845 and 1846 had been, over a large part of the earth's surface, impregnated with some subtle or highly comminuted matter, which was of such a nature as to be injurious to particular plants. It was shown from experiments by Dr. Christison, made some years ago, that sulphurous chlorine, and certain other gases, when mixed, even in so minute a quantity as not to be perceivable by the smell, would injure and ultimately kill plants; and it was interesting to observe, that the effects produced by these artificial means were precisely similar to what occurred in 1845 and 1846, the injury being shown first by spots in the leaves, and then descending by the footstalks. This coincidence is the more remarkable, as one of the gases operated with (the sulphurous) is heavier than atmospheric air, and might therefore have been expected to have attacked the stems before the leaves.

(5.) If the foregoing theory be correct, it might be presumed that the matter impregnating the atmosphere would be to some extent also injurious to animal life. This corollary is verified by the experience of the years 1845 and 1846. During both years there had prevailed pulmonary complaints among human beings, as well as among cattle and sheep, to a much greater extent than usual. The mortality of the population of England and Wales had for the three months ending September last, exceeded by 30 per cent. the average of the same

quarter during the eight years that the registration of deaths had been carried on—in some of the counties on the west coast, the mortality had been more than double of what is now stated.

As to the *origin* of this anomalous and noxious matter in our atmosphere, it was impossible to conjecture. It certainly could not be of local origin, judging from the great extent to which it prevailed. It appeared to have moved over this part of the earth's surface, in the year 1846, in a direction from S.W. to N.E. (at least in the British Islands), judging by the dates of its arrival at different places, the streaks of the blight in fields, and the sides of plants first affected.

Though the cause of the disease might thus probably be inferred—yet, as there was no absolute certainty of it, it would be injudicious to suggest any practicable remedy, even if the case was such as to admit of any.

How long our atmosphere was to continue in this state, of course no human being could tell. The failure of the potato during two successive years, proved, if the foregoing views were correct, that our atmosphere had become entirely unsuited to the plant. This fact ought to a warning, not to persist in the culture of it. To do otherwise, would be only striving against the God of Nature, and those beautiful adaptations which are discernible in all His works. For wise and beneficent reasons, no doubt, this visitation had been sent; and, after these purposes had been served, its cessation might be looked or hoped for. But until then, and till it had been ascertained by experiments on a small scale, in different quarters, that our atmosphere had again become purified—it was alike the duty and the interest of rational creatures to submit to the dispensation.

VEGETABLE CURIOSITIES.

The vegetable kingdom has often supplied the natural theologist with the most striking and forcible of his illustrations in proof of the lavish goodness of the Creator. He has seen in its varied productions of the exhaustless skill of the All-creative hand; in the adaptation to the wants and necessities of man, His wisdom; and in the gratifications they present to his eye and to his taste, the clear evidence, that while utility has been amply regarded, the enjoyment of the creature has been equally remembered and abundantly provided for. With the most of the utilitarian products of this kingdom we are sufficiently familiar; but with regard to its more exquisite gifts, we believe a good deal of ignorance to prevail, which it will be our endeavour, though imperfectly, to dissipate.

The Rev. Dr. Walsh, in a paper upon plants glowing in the neighbourhood of Constantinople, contained in the "Horticultural Transactions," speaks in an interesting manner of several of the ground tribe, which grow luxuriantly in that district. One of the curious varieties was the *Cucurbita clavi-formis*, or "Jonah's Gourd," which is believed to be really that plant which was caused to grow up over the head of the prophet in a single night. It forms a beautiful dense arbour, through which the rays even of the eastern sun are unable to penetrate; under its shade the Easterns delight to smoke; while overhead the singular fruit of the plant hangs down in long, delicate, tempting clubs, somewhat like very stout candles. The fruit is not eaten in the uncooked state; but the central part being scooped out, it is filled with forcemeat, and boiled, forming a very delicate and relishable repast. Another remarkable gourd is the "Turk's turban," the *Cucurbitar cidariformis;* in form, it is like a large quince placed on the top of a large melon, thus bearing a pretty close resemblance to a turban. The history of its origin is curious, and more "wonderful than true," as we fear. A gourd was planted in Campania, near a quince; and an affection apparently springing up between the two, the gourd came to the conclusion of adopting the form of the quince, in addition to its own glossy rotundity, and the result was the form we have just noticed. It is used as an excellent addition to soups. Another species is the white, or *Cucurbita pepo;* this is found in the markets principally in the winter, and is commonly piled up in heaps, like cannon-balls, or more like pyramids of snow-balls. Romantic associations attach to this chaste production; it is presented at every native marriage ceremony to the married pair, and is supposed to insure peace and prosperity to them and their house. The *Momordica elaterium*, a member of the same family, is otherwise known as the "Squirting Cucumber," from its possessing the strange property of squirting out its contents on one of the ends being pulled or touched. It is a common piece of gardener's wit to request one to take hold of the dangerous end, and if we consent, the face and person are covered with the acrid slimy contents of this vegetable pop gun.—Where the plant grows in abundance, they may be heard popping off frequently; and by simply walking near these irritable instruments, the passenger is often shot in the eyes with great force by them. Some of this tribe occasionally reach an enormous size, particularly the mammoth or American gourd. Among many examples, one is specially recorded as having attained the colossal weight of two hundred and forty-five pounds! a size truly monstrous.

Among delicious fruits, the tree known as the "Tomberong" produces small berries of a yellow colour, and exquisite flavour. These are highly esteemed by the natives, who convert them into a beautiful sort of bread, which, curious to relate, both in colour and flavour bears the closest resemblance to our finest *gingerbread*. A tree belonging to the natural order *Assocynaceæ*, produces a fruit called the "Cream Fruit," which is estimated by some as being the most exquisite fruit in the world. Two are always united together, and they depend from the extremity of a small branch; when wounded they yield a quantity of white juice resembling sugar, or the best milk in its taste. For allaying the thirst incident to a tropical climate this fruit is invaluable; and its delicious quality gives it an appropriate estimation in the eyes of the weary traveller in those regions. Of another curious fruit produced by one of the same tribe, Dr. Lindley writes,—"The sages of Ceylon, having demonstrated, as they say, that Paradise was in that island, and having therefore found it necessary to point out the forbidden fruit of the garden of Eden, assure us that it was borne on a species of this genus, the *Divi Ladner* of their country. The proof they find of this discovery, consists in the beauty of the fruit, said to be tempting in the fragrance of the flower, and in *its still bearing the marks of the teeth of Eve*. Till the offence was committed which brought misery upon man, we are assured that the fruit was delicious; but from that time forward it became poisonous, as it now remains." The fruit of another tree of the same species affords a capital substitute for red currant jelly, and one of the celebrated "cow trees," inhabitants of equatorial America, belongs to this natural order also. The delicious custard apples of the East and West Indies are produced by the *Anono reticulata*. It is a small, weakly, branching tree, bearing fruit about the size of a tennis ball, which is of a dull-brown colour. The flesh is said to be of a yellowish colour, soft and sweet, being about the consistence, and sharing even much of the flavour of a good custard. Another variety is a small tree, which bears a fruit of a greenish yellow colour, and is the size of an artichoke, called the "Sweet Sop." The skin is half an inch thick, and encloses an abundance of a thick, sweet, luxurious pulp, tasting like clouted cream mixed with sugar.* Rumphius says, that it has in some degree the smell and taste of rosewaster, and is so delicious, that one scarcely ever tires of partaking of it. It has a complete contrast in the "Sour Sop," which belongs to the same species, which is a fruit of the size of a large pear, abounding in a milk-white pulp of a sweetish acid taste. Sir Hans Sloane, in the "Natural History of Jamaica," particularly mentions the alligator, or avocado pear, the product of one of the Lacerels; the fruit is the size of a large pear, and possesses a rich delicate flavour, not unlike that of the peach; but it is described as being even more grateful. Another curious fruit is that called the "Mammee;" it is round and yellow, and when ripe, the rind peels off, discovering the eatable part, which has an acidulo-saccharine taste, and is of great fragrance. The tree by which it is borne reaches the size of the largest of our oaks.

* Dr. Lindley in a valuable paper upon tropical fruits in "Horticultural Transactions."

Those who are admirers of marmalade (and we expect a vast number of our readers are guilty of that indiscretion), will learn with some surprise that nature presents the inhabitants of Surinam with the article ready confected. The fruit is called the "Marmalade Box;" it is about the size of a large apple, and is covered with down. At first it is green, but when ripe it becomes brown, and then opens into halves like a walnut; the pulp is of a brownish colour, very sweet and tempting, and is eaten by the natives with the greatest avidity. The Brazilians boast also of a delicious fruit, the *murucuja*, said to be unsurpassed in fragrance and flavour, possessing a pulp of a deep yellow, and exhaling a fine vinous odour. Yet it must yield to the far-famed mangustin of the Indian Archipelago. This exquisite production is universally esteemed, and is alike agreeable to strangers as to the inhabitants of its native country, whose pride it is. In shape and size it is like a middling apple; it has a thick purplish rind, which surrounds three or four cloves of snow-white pulp, which almost immediately dissolve. The flavour is extremely rich, yet never becomes luscious, nor palls on the taste; and the fruit may be eaten almost *ad libitum*. Dr. Lindley says that an intelligent traveller and his companions were anxious to bring away with them some precise expression of its flavour; but after satisfying themselves that it partook of the compound taste of the pine-apple and the peach, they were obliged, after of course a series of tastings, to confess that it had many other equally delicious, but utterly inexpressible, flavours. Not only is it grateful to the strong and hearty, but even to the sick, who may eat it with impunity; and, as if to swell the list of its good attributes, it is related that Dr. Solander was cured of putrid fever by eating it. A more singular, and at first a most uninviting fruit, is the "durian;" it combines in a remarkable manner an odour the most disgusting and offensive—creating an almost insuperable aversion to the fruit—with a very rich and delicate taste. The tree is described as being something like a pear-tree; the fruit externally resembles that of the "bread-fruit" tree, the outside being covered with tubercles. When ripe, it contains several cells, in each of which is a large seed of the size of a pigeon's egg, imbedded in a rich pulp. The taste is very curious, and has been compared to a dish commonly known in Spain under the name of "*Mangiar Blan*," composed of hen's flesh dressed in vinegar. The fruit really appears to partake more of an animal than vegetable nature, and never becomes sickly or cloying. The natives are passionately fond of it, and when it is to be procured, live almost wholly on its luxurious cream-like flesh. It is said soon to turn putrid. One durian is worth more than a dozen pine-apples.

The rose-apples of the East have long been had in esteem, and take a high position among the elegant delicacies of nature. In all respects, this fruit is a lovely production; it is borne by a tree called the jambo; it is about as large as a pear; externally, it is arrayed in a coat of the most splendid red; inside, its pulp is of the loveliest white; and in perfume and taste it much resembles the rose. Some varieties of the rose-apple are so fine, as to be preserved for the king's use alone; a beautiful variety, the jamrosade, is most highly perfumed with rose, while its colour is a delicate transparent pink mixed with white. The well-known guava is a fruit belonging to the natural order—the myrtleblooms. One of the chief delicacies of the Indian desert is the fruit of the mango, the offspring of a considerable tree like a walnut. When fresh, it is of an exceedingly delicate, sweet, and acidulous flavour, and forms pickles and preserves, which are highly esteemed. Some of its varieties are as large as an infant's head, and exceed two pounds in weight. Sir William Jones, in the "Asiatic Researches," mentions a very delicious fruit, known as the malura, which is curious in consequence of its possessing a fragrance strongly resembling that of the wall-flower.

The Chinese horticulture has long been famous for its productions, some of which are very anomalous. Marco Polo says they have some pears of most gigantic sizes; pears are at all seasons in the Chinese markets, and some appear to have been fattened up to a degree of obesity that would do good to the eyes of an agricultural prize-breeder. What would be thought in England of a pear weighing *ten pounds*, therefore somewhat of the size of a Southdown leg of mutton! Yet such this industrious traveller affirms as a fact, adding that they are white in colour, melting, and most fragrant in taste. Other authors mention pears of approximative sizes, some measuring nearly sixteen inches in circumference the long way, and upwards of a foot the round way. Their peaches, too, are equally fine; many of them are of the most beautiful colours and exquisite flavour, and some attain enormous sizes. The Chinese gardeners boast of having produced peaches weighing 2 lbs.; and it is not for us to doubt their assertion, although we know somewhat of the elasticity of the Chinese conscience. They are also said to be possessed of the valuable secret of preserving fruit gathered in October until the succeeding January, in all its beauty, freshness, and flavour. Among other fruits, the "flat peach" well deserves the title of a horticultural curiosity. It is in all respects like a peach, except that it is flattened out into a cake; this fruit is well known at Canton; its colour is a pale yellow; when cut into, a beautiful circle of pink is seen surrounding the stone, and radiating into a mass of delicately coloured pulp. In the indulgence of their dwarfing propensities, they *manufacture*, for such it is, miniature fruit-trees of various kinds by the method now become familiar to most persons. Large sums are set on the heads of those diminutive trees in proportion to their ugliness and their abundance of fruit. Venerable old plum-trees, a foot high, laden with fruit, are without a price; while finger-fruits, marygos, peaches, caramboles, and grapes, come in for subordinate attention. The beautiful orange, the "mandarin" (*Citrus nobilis*), one of the recent importations into this country, is remarkable for having a deep crimson rind when ripe, which is quite detached from the fruit. "The whole," writes Sir J. F. Davis, "has a flattish aspect, and has sometimes four or five inches in diameter; and the loose skin, when broken, opens like a puff-ball, disclosing the juicy lobes surrounded with a kind of net-work of fibres." The celebrated finger-fruit comes very manifestly into our category, and is a curious result of an ingenious horticulture. It is a peculiar kind of citrus, which, by some means or other, is made to run entirely into rind, the whole terminating at the head in several long narrow processes like fingers; it has hence been named "Fo show," or the hand of Fo. Its odour is very powerful, but is considered as very fine. "So entirely, however, is this strang production the result of art operating upon nature, that it does not appear a second time after the plant had been purchased." The Chinese have also some curious oranges, known as the horned oranges, from the circumstance of a number of little horn-like processes projecting from its upper end. It may be mentioned in connection with these plants, that the productiveness of the orange is something quite enormous. A single tree at St. Michael's has been known to produce 20,000 oranges fit for packing, exclusively of about one-third more of damaged fruit. Mr. Fortune supplies a curious account of the production of "vegetable tallow." The seeds of the tallow-tree, after having been steamed and bruised, are heated over the fire; the tallow is thus completely separated, but it looks like coarse linseed meal; subjected to expression, it exudes in a semi-fluid state, and beautifully white, soon hardening and becoming solid. It is then made into cakes, and exposed for sale in the markets, for the manufacture of candles; but as these are apt to get soft, they are often dipped in wax of various colours, and sometimes are finely ornamented. But this is a subject with an unconquerable tendency to expansion; let us therefore, having gone thus far, take a hasty leave of it at once.

The *Invernesss Courier* states that mussels, as large as a man's shoe, are found on Loch Carron; one, being left uncovered by a spring ebb-tide, was induced by the rays of the sun one day to open itself. While thus open, it was observed by a prowling fox, which thrust its tongue into the shell in the hope of securing the fish; but the mussel instantly closed on the tongue of the fox, which was retained a prisoner until drowned by the rising tide.

From Bell's Weekly Messenger.

COMMON SALT.

The application of common salt as a manure produces this effect, in one mode, which is evidently doubly advantageous to the farmer. We allude to the destruction of insects, and the conversion of the substances of which they are composed into the food of vegetation. It is needless to enlarge upon the countless tribes of insects of all kinds, which tenant the farmers' lands, and prey upon their crops. It will be more useful on this occasion to direct our attention to the powerful action of common salt in effecting their destruction. In producing some fresh evidence of this fact, it will be well to remember that this important use of salt is not a recent discovery, for it is now 16 years since we find inserted in a work on the uses of salt in agriculture (Johnson on Salt), reports from different counties, amply proving its powerful effect in the destruction, amongst other insects, of slugs and worms. There were, for instance, those of Mr. Jacob Busk, of Ponsbourn Park, in Hertfordshire. His valuable experiments extended over some hundreds of acres of wheat. To use his own words—"In every situation, and at every time, the effect appeared equally beneficial." The quantity per acre—"about four or five bushels, sown out of a common seed shuttle." The period—"in the evening." The effect—"in the morning each throw may be distinguished by the quantity of slime and number of dead slugs lying on the ground. In some fields it has certainly been the means of preventing the destruction of the whole crop." In Oxfordshire again, "six bushels of salt per acre were applied by hand, in April, to a field of oats attacked by the slugs and worms, on the farm of Mr. John Slatter, of Draycote, near Oxford. The crop was completely saved by this application, although an adjoining field, *not salted*, was completely destroyed by this sort of vermin."

It is ascertained that the salt readily penetrates sufficiently into the soil to destroy many of the insects in their cells. Of this Mr. Lennox Bigger, in a recent communication, bears valuable testimony, when he remarks (Agricultural Gazette, Dec. 4, 1847,) "I beg to state my own use of salt, for upwards of 20 years, and I do so, feeling that I have been very much benefitted by it. Having at that time seen that it was doubted, whether or not it was a manure or beneficial to the land, I made trial of it first on lea (grass), on which I had it sown like seeds before ploughing the land; and to satisfy myself as to any effect it could have in the first instance, I turned up the sods which had been ploughed down and found no trace of the salt, for it had all melted away by the damp of the grass or the atmosphere; and in place of it I found slugs, snails, worms, clocks, and every insect to which our climate is usually subject, lying dead. This decided me to persevere in the use of it, and I have never omitted it any one year during the course of the time I have stated; and latterly I have shook it over land in all states of cultivation, both before and after sowing the seed, but most particularly on stubble, and at the breaking up of grass land. I sowed at first, about seven cwt. per acre, for fear of putting on too much; latterly I have increased it to half a ton, which is the least proportion I would recommend. The proof of the result of adopting my plan can easily be made in any garden. When pulling up cabbage stalks, sprinkle a few handfuls of salt over the bed; watch the effects. In less than a quarter of an hour you may observe that the slugs, snails, and worms, have dragged white lines after them, and at the end of each you will find the insect lying dead. The reason a few of my neighbours did not follow my practice, I am certain, was, that some who did so put on such large quantities, that they totally destroyed the crop. One of them, for instance, put three tons on an acre of potatoes; of course none of them grew, and I was often told that it would destroy the crop. and indeed in their way of applying it, I did not doubt it. But, on the contrary, I declare that in the twenty years I have used it I never saw the appearance of any bad effect from it; and I can have no doubt that, judiciously sprinkled over the manure heap, it must have a benefit which, if not exactly seen, is now well understood in agricultural science." In the same page in which Mr. Bigger's communication is found, Mr. Mechi adds (Nov. 23, 1847) some valuable evidence as to the value of salt, in the way just described. He observes—"During the last twelve months I have applied salt very liberally to my manure in the yards and tanks. The salt was brought in by the cartload, and spread or thrown about by the shovel. My bailiff was alarmed at the quantity, but we carted the manure and ploughed it in, and there are now growing upon it wheat, tares, and winter barley, all looking perfectly healthy. The animals seem much more healthy when they have access to salt. I have at least 120 pigs in my yards, and have not lost one for six months. The salt is applied freely, and frequently to the corner where the pigs dung. It removes effluvia very quickly. Any weeds that are collected are placed in heaps, and readily decomposed by admixture with salt. "My observations," he adds, "leads me to the following conclusions,—That salt and water are destructive to wireworm, slug, and other vermin; that salt decomposes very rapidly any insect, or dead vegetable matter, without injury to growing vegetation; that salt is injurious to heavy or wet and undrained lands, making them wetter and colder, and delaying vegetation; that it forwards the crop in drained lands; that it attracts and retains moisture (one fine summer's morning in July I observed some fresh sown land covered with moist spots about the size of a shilling, the other parts being perfectly parched. These spots were covered by the salt which had been sown broadcast a day or two previous. The moisture had been attracted from the dews. I also observed a similar effect about a fortnight since on a foggy day). That salt blanches, or bleaches, the straw of cereals, giving them a whiter cast. The increase in weight and quality is more observable in the grain than in the straw, although the latter is very solid and brittle, not light and frothy; an abundance of weak, crowded, frothy straw too often deceives as to the actual produce." And again, recurring to the action of salt on insect vermin, he continues, "My swedes escaped the ravages of the cockchafer grub on the salted manure, and are of a very heavy quality and a full plant." There are many other practical farmers ready to give evidence of the destructive effects of salt on insects. Mr. William Beardsley, of Shipley, near Derby, observes, in a letter to the editor of the *Derby Mercury*, "I apply salt as a top-dressing to all my white crops (I have been using salt pretty fr'y for 10 or 12 years past), in the months of April or May, as the season may be, by sowing broadcast three or four cwt. per acre, taking care to do this after sunset; and I repeat this dressing in about three weeks, if required, which seldom happens. If the young plant should appear sickly and turn yellow, it is a true sign that the slug and wire-worm are making ravages upon it, and I have always found the application of salt exterminate these destructive insects. I believe that slugs, &c., will not generate in lands so treated. I have found that my yield of wheat is four bushels to the acre more from the salted than from the unsalted land, when all other circumstances have been precisely the same; and I also find that where salt has been employed I get a much bolder, brighter, and heavier sample of wheat; and I have been entirely free from rust, blight, or smut, ever since I have been using salt." Mr. F. Fairbank, of Sible Hedingham, thinks, from repeated trials, that salt at the rate of four bushels per acre, dug in the previous winter, is a complete preventive of the louse in peas. We might readily add to these valuable statements those of many other practical farmers. It is hardly necessary, however, to add more evidence in support of the commonly admitted conclusion, that salt operates powerfully and radically in the destruction of insects and the seeds of weeds, which are too apt to abound in the manure of the farmyard. On this subject, then, with the remarks of Professor Way, we will conclude our observations on this important portion of the agricultural uses of common salt.

"Common salt," he observed some time since, "may be advantageously employed as a manure directly to the soil, or it may be mixed with the dung heap. In the latter application of it, it must be borne in mind that, in large quantities, it is capable of suspending fermentation altogether, so that if the farmer wants his dung to heat well, he must be careful in the

use of salt; but, in small quantity, during the fermentation, or in full supply to the manure, a short time before its application to the land, salt is likely to be of great service. Not only does it render the ammoniacal compounds less volatile, but it is capable of destroying the germs of both vegetable and animal life, for there is little doubt that we too often introduce into the soil, with the manure, the weeds which choke and the insects which devour our crops. Salt will prevent all seeds from germinating when they are sufficiently saturated with a solution of it. No fear, however, need be entertained of its effect when the manure has been properly mixed with the soil; *it is then, too, diluted to interfere with the germination of the* turnip seed."

ON INSECTS INJURIOUS TO VEGETATION.

THE TURNIP-BEETLE, HALTICA NEMORUM.

One of the most valuable of our cultivated plants, the turnip, is frequently destroyed in the early stage of its growth by several very small colepterous insects, belonging to the family of the *Galerucidæ*, and of which the most prevalent is that popularly designated by the name of the turnip fly. It belongs to the genus *Haltica*, which has the antennæ shorter than the body, slender, of eleven joints, the basal joint obconical, stout, the second shortest, the last oblong, acute; the thorax transversal; the elytra large; the body oblong-ovate; the hinder legs considerably thickened, their tibiæ slender, the tarsi short.

The species are very small, only from one to two-twelfths of an inch in length, and being addicted to leaping, for which their strong hind legs are adapted, are often popularly named Garden Fleas or Turnip Fleas. But, as they are neither flies, although they have wings and can fly, nor fleas, although they are small and can leap, they ought not to be designated by names imposed in ignorance, but by some appellation definitely associated with a particular form. It is often difficult to find or invent vernacular names for the thousands of creatures among which we live: and the genus in question might as readily be named Haltica by the Agriculturist, as by the Entomologist, with this advantage too, that the phrase would be intelligible to all the world.

Haltica nemorum, the species most injurious to the turnip crop, is of an oblong-ovate form, one-twelfth-and-a-half of an inch in length, rather flat, shining, black, thickly punctate; the elytra greenish-black, each with a broad longitudinal sulphur-yellow streak, not reaching quite to the apex; the base of the antennæ, tips of the thighs, tibiæ, and tarsi, light red.

The animal is easily distinguishable from any others that may occur among turnips. It is generally distributed in Britain, and is common among various cruciferous plants. It is perhaps not very appropriately named 'nemorum,' and yet it certainly abounds more in fields surrounded by thickets, hedges, or furze. It feeds on the first leaves of the turnip, not merely the two colyledons, but also the primordial leaves; and may be found either on them, or on the ground beneath, *or among them. It is not very easily caught, however, as it* springs off, on being sensible of danger, with great agility. Whoever is desirous of examining this insect may readily, or with some little searching, find it in gardens and fields, among young turnips, or even after they have advanced to a considerable size. There are various insects and larvæ injurious to turnips and cabbages; but of these no mention is made here, the observations being confined to *Haltica nemorum*, a *beetle*, and not a fly, or a larva. It is not the larva of this insect, but the perfect, adult animal, that inflicts the injuries spoke of. It nibbles holes in the young leaves, or devours them entirely, so as to destroy the vitality of the plant, which can be maintained at an early stage only by the aid of the cotyledons. In this way the drills are not only thinned, but frequently most of the plants destroyed over a large space, 'so that, as Messrs. Kisby and Spence say, the land is often obliged to be re-sown, and frequently with no better success. It has been calculated by an eminent Agriculturist, that from this cause alone, the loss sustained in the turnips in Devonshire, in 1780, was not less than £100,000. Fortunately, in Scotland, its ravages are not so severe, and in our northern counties only partially and occasionally annoying.'

How may they be prevented? Tar, oil, sulphur, urine, tobacco-juice, and other substances that readily suggest themselves, have been tried, and in some cases appear to have succeeded. It is not always easy, however, to discover what animals the experimenters have been operating upon; and at present I speak only of the little beetle, and of nothing else. The turnip seed has been smeared with linseed oil and sulphur before being sown; and this is said to have proved effectual; *although one can hardly understand how it should.* A quantity of turpentine applied to the seed, is also said to have prevented the evil. A tarred cloth dragged along the drills, one would think, would carry off more dust than insects, and rolling, however heavy, certainly would not kill, though it might press into the soil, hard-crusted animals of this kind. Fumigation, by burning weeds and roots on the wind-ward side of a field, has been tried—as has watering with infusion of tobacco,—and with success. Every reporter, of course, has perfect confidence in his own invention; but, unfortunately, it either does not succeed in the hands of others, or people have no faith in it, but allow the insects to proceed without molestation. Mr. Knight used lime slacked with urine, and with three parts of soot added. It 'was put into a small barrel, with gimblet holes round it, to permit a certain quantity of the composition,—about four bushels to an acre—to pass out, and fall into the drills with the turnip seeds. Whether it was by affording highly stimulating food to the plants, or giving some flavour which the flies did not like, I cannot tell; but in the year 1811, the adjoining rows were eaten away, and those to which the composition was applied, as above described, were scarcely touched at all.' But,

'After trial of innumerable substances and mixtures,' says Dr. Shier, 'practical men seem almost unanimously to have arrived at the conclusion, that little or nothing can be done in the way of cure when the turnip fly has once established itself. As ammonia is obviously the active principle of the mixture used by Knight, I made trial of a diluted solution of that substance in the summers of 1841 and '42, on a field much infested with the fly, but without success.' But the mechanical nature of the substances used, more than their chemical action, may be what produces the effect, and a slight dose of ammonia could have no bad effect on a beetle. 'As the fly,' he continues, 'attacks only the seminal leaves of the plant, it seldom proves very destructive, unless when the braird is scanty, and the plants are sickly from protracted drought and cold weather.' On the east coast of Scotland, dry east winds often cause this condition, and slow growth from any other cause would doubtless produce the same effect.

'The most efficient means of prevention are; 1st, Liberal manuring, to promote rapid and luxuriant growth. For this purpose it is essential that the manure be not too much diffused through the ground, nor so deeply buried that the young plants cannot reach it. That both these evils are avoided in *the drill system, appears from a consideration of its nature,* as well as from the uniform success that is known to attend its use. A vigorous braird is still further secured, by using, in addition to the ordinary dose of farm-yard manure, some of the more rapidly acting extraneous manures, such as guano, bone-dust, or dry bone-dust with sulphuric acid. These substances are either hand-sown above the dung before covering in with the plough, or when economy is studied, they are dibbled, or put in by the dust-dropper after the covering in of the manure. 2nd, Thick sowing, to secure abundance of plants, so that if a portion should be attacked, there may be others to supply the deficiency; the surplus is easily got rid of by the hoe. In addition to thick sowing in the drills, it is well to sow about a pound of seed per acre broadcast over all, as the plants growing between the drills appear rather before the others, and being besides but feeble plants, are preferred by the fly to the rest. 3rd, The destruction of all cruciferous weeds, such as the common charlock, *Iniapis arvensis*, the jointed charlock, *Raphanus Raphanistrum*, on which, as well

as on the turnip plants, the fly feeds, and by which it is preserved in the ground during the other parts of the rotation.'

There is no doubt that a rapid growth of the young plant will soon place it beyond the power of the beetle to injure it, and that this may be effected by liberal manuring, and by moist and genial weather at the time of germination. In the article Turnip, in the 'Penny Cyclopædia,' are some remarks, partly in correspondence with Dr. Shier's. 'It appears that the fly remains in the state of an egg in the ground, and that it is hatched when it is exposed to the light and heat of the sun. The time at which it begins to attack the seed-leaves of the turnip coincides with their vegetation; and it has therefore been proposed, with some appearance of reason, to let the insect have the start of the turnips, by leaving the land some time undisturbed before the seed is sown, and carefully cleaning it, so that the insect shall find no food, and consequently die. This is supposed to require ten or twelve days to effect The seed is then drilled and the land rolled, and it is asserted that the ravages of the fly are thus entirely prevented. However this may be, it is generally found that in moist weather the fly does comparatively little harm, as then the vegetation is rapid, and the plant, when once it has put forth its rough leaves, is considered safe. Whatever, therefore, accelerates the vegetation, will secure the growth of the turnip. Hence the advantage of dunging the soil before winter, by which means it is enriched uniformly, and a great portion of the manure, having become soluble, absorbs moisture from the atmosphere. In very dry seasons, if water is at hand, it is well worth while to water the newly-sown rows by means of a common water cask; and if some liquid manure be mixed with the water, the effect will be astonishing. By means of two leathern hose, two rows may readily be watered at once; and if the pond or stream be not above half a mile off, a vast extent of ground may thus be watered in one day. Nothing brings on vegetation so fast as diluted liquid manure, care being taken that it is not too strong. It sometimes happens in soils rather compact, that a crust is formed on the surface, which has been harrowed fine and rolled, and this impedes the vegetation by excluding the air necessary to germination; in this case no better remedy can be applied than watering, which softens the crust, and lets the young plant through.'

An ingenious method of ensuring the development of the young plants is that of Colonel Challoner, who, to secure the victory, takes care to have an efficient reserve. He procures double the quantity of seed required in ordinary circumstances, steeps half of it in diluted tank-water, for eighteen or twenty-four hours, and sows it; the other half, which has not undergone any preparation, is sown in about a week afterwards. The soaked seed germinates a fortnight earlier than the other. If it came up in dry weather, it was devoured by the beetle, but the second crop from the dry seed escaped. But if the soaked seed came up in wet weather, it remained the standing crop, the insect, probably from the uncongeniality of the atmosphere, not having then made its appearance.

Mr. Curtis, in a recent notice, states, with regard to Dr. Shier's observations, 'that it is undoubtedly an error to suppose that, as the fly attacks only the seminal leaves of the plants, it seldom proves very destructive; for the fact is that the little beetles first attack the cotyledinous leaves, and if those be consumed, the plant must die. It is equally well known that the large leaves are often riddled by them; but when the turnip plants got into rough leaf, the crops are considered safe. If the fly seldom prove very destructive, how does it happen that the ravages of this insect are so fatal, and that entire crops are swept off in a few hours by them, so that the Farmer has to sow twice occasionally to secure a crop? As a remedy against their depredations, I recommend, as soon as the plants appear above ground, and when the leaves are moist with dew or rain, that finely pulverized lime be sifted over them, and the turnip beetles will not touch the crop.' He further states, that this method has been practised with success, and thinks that road-dust might probably answer the same purpose.

Some confusion of ideas is caused by persons speaking vaguely of the 'turnip fly,' and meaning thereby, not the beetle only, but also other insects, very different from it. Now in this paper, the only insect treated of is *Haltica nemorum*, which the Farmer might call a fly if he chooses, but which is a coleopterous insect, or beetle; and one may come to a rational conclusion as to the treatment of the case, by considering the facts:—The turnip, when it has just germinated, and the colyledons have appeared in the form of green leaves, as well as for some time after, or until some of the other leaves have attained a considerable size, is liable to be destroyed by small beetles, which eat up the part above ground. In dry weather, when vegetation is slow, the beetles are most lively, and the plant is unable to produce enough of herbage to satisfy the insects, and at the same time preserve its vitality. Wet weather, especially if warm, is hurtful to the beetle, and favourable to the plant, so that it then thrives, and is soon out of danger, although it is still liable to injury. There are two ways of remedying the evil: either to insure the rapid growth of the plant, or to prevent the insect from attacking it. The first desideratum may be effected by the method of manuring mentioned above, or by the application of diluted manure, or simply of water in dry weather. The second may be obtained in two ways:—1st, by applying to the plant some substance, not injurious to it, and at the same time hurtful to the insect; 2nd, by destroying the insect. The first of these objects is obtained by imbruing the seed with linseed oil and then mixing with it flour of sulphur, according to the method of Mr. James Sherring, who to every 20 lb. of seed adds half a pint of linseed oil, and mixing with it a large quantity of flour of sulphur, which appears to repel the beetles; or by sprinkling the young plants with lime, or with gas-lime, or with soot, or even road-dust, which appear to prevent the insect from attacking them, perhaps merely by preventing the action of their oral apparatus in a mechanical way. The second indication may be effected by the copious application of water, or of water in which some substance injurious to insects has been dissolved or suspended, as lime, sulphuric acid, or oil of turpentine.

Besides the *Haltica nemorum*, there are several other minute beetles; and particularly species of *Hyarmis*, and *Macrovenema*, which are not much less injurious to turnips, as well as cabbages. Of these some account may be given on another occasion.—*W. M'G.*

ON STORING POTATOES IN SAND.

BY DAVID GORRIE, ESQ.

The time seems to have arrived when it is advisable to cease propounding theories respecting the mysterious and undefinable potato taint; and, while waiting to see whether, in the course of providential events, the future history of this valuable esculent shall be more encouraging than recent history has been, to rest content with its ascertaining any useful facts respecting the potato, that may be the result of practical experiment. Among such facts may be classed the benefits resulting from storing potatoes in sand in the pits. It is well known that a degree of heating or incipient fermentation takes place amongst potatoes, as well as amongst apples and other kinds of fruit, when heaped together in large quantities; and it has been proved by careful experiment, that this elevation of temperature amongst recently pitted potatoes is favourable to the transmission of taint from one tuber to another by contagion. The heating, moreover, that occurs in pits at the commencement of the growing season in spring, causes premature growth from the buds of the tubers; thus exhausting them of their strength, and depriving them of what would have been developed into fine, strong, and healthy stems. Sand is a remedy for both these evils. It prevents heating in the pits, and renders the spread of taint from contagion impossible; for if there are any diseased tubers mixed with the others, they shrivel and dry up without injuring their neighbours. It would have been a small thing had the white varieties, stored in sand, continued sound; for these have generally escaped throughout the country, in whatever way they have been stored; but it is an interesting fact, that the Perth-

shire Reds, which have utterly given way when pitted in the usual manner, have continued quite fresh and sound where mixed with sand in the pits,—those individual tubers of course excepted, in which latent disease existed at lifting time. To give this plan a fair trial, it is necessary to have every crevice in the pit filled with sand. This can easily be effected by placing very thin layers of tubers and sand alternately, and using the hand as much as the shovel in the operation. The sand we have seen used seems to be of oceanic deposit, though now contained in a small hill several miles from the nearest sea-beach. It effervesces freely with muriatic acid.—*Braes of Gowrie.*

From the Maidstone Gazette.

DRAINAGE OF PASTURE LANDS.

The following remarks of Mr. Hewitt Davis on this subject, are worthy the attention of all holders of clay pasture lands: "Sir,—The important benefits that are known to have resulted from judicious and scientific draining of arable land, have given rise to the expectation, that the same means which have so beneficially been applied to improve land for the growth of grain, may be resorted to for the improvement of pasture. *But in this I must confess I differ from the opinions* of the first authorities, although fully admitting all the advantages which are said to result to corn from the free percolation of water deeply into the soil; indeed, I may claim credit for having been one of the earliest advocates for four feet draining of arable land. Still I look upon the growth of herbage as requiring a very different condition of soil and climate through the greater part of the year. If we look to the natural position of meadow land, we see that the richest pastures are ever found in moist situations; from the earliest times they have been associated with neighbouring water (I might quote numerous passages from Scripture in confirmation,) and are commonly level land, but two or three feet above intersecting streams; that is to say, two or three feet of soil above the water bed; and if we bear in mind the very different progressive growth, which it is requisite corn bearing plants should make, from what is required of the herbage of pasture land, we at once see why the latter is so much benefitted by a continuance of moisture, which would be prejudicial to corn. The progress of plants cultivated for their seed may be divided into three stages—first, the grassy or vegetable; next, the fructifying; and lastly, the maturing or ripening. *For the first a continuance of moisture in the air and* soil is essential, and which at the season of the year corn is sown, always prevails; but as soon as the flower appears, bright sun and a drying of the soil is required to stop the vegetable growth, and bring on the maturing and ripening of the seed. Gardeners know that by supplying constant moisture at the root, and an interception of the sun's rays, the continued progress of vegetable growth and deference of the fruiting of plants may be attained. I therefore think, whilst the reduction of the too great humidity of the soil is doubtless beneficial to corn, by the aid that the earlier warming of the land in the spring affords in our too moist climate to fruiting and ripening, still in pastures where a continuance of herbage growth all through the summer is wanted, we may do harm in making the land too dry, and have therefore advised, whenever permanent grass land has been presented to me for drainage, that drains not deeper than three feet, and at narrower intervals, should be resorted to. I would bring grass land to the condition of natural pastures; I would prevent the soil ever becoming saturated to the surface; at the same time I would not lower the water bed below three feet (the greatest distance I find it in the richest marshes in the kingdom,) *for I am convinced it is to the presence of water within* that space of the surface that much of the fine quality of our richest pastures is owing. We speak of arable land as dry and warm, and of pastures as cool and moist, using these terms as expressive of the highest qualities. We know that by drainage we may make wet meadow land suitable for growing corn; but by no art can very dry corn land be brought into good pasture.

PRINCIPLES AND EFFECTS OF DRAINING

Continued from page 78 of Newcastle Farmer.

But the draining of wet land, besides facilitating and improving the labours of tillage, greatly abridges their amount, and economizes their cost. The operations are easier, and therefore require fewer horses; and they are far more efficient, and therefore require less repetition. "I should say," remarks Mr. Arkell, in his recent prize essay on draining—and his experience closely coincides with that of all clay-land farmers who have adopted a good system of subsoil-draining—"I should say my land, which is more heavy in ploughing than might be thought from its appearance, ploughs as easily now with three horses as it formerly did with four; and as there are no wet furrows to encourage grass and weeds, the summer fallow is no longer necessary, which will somewhat lessen the number of ploughings. And when we also consider its ploughing up mellower, its requiring less dragging and harrowing to get it to a tilth, also no furrows or trenches to be ploughed out after the seed is sown, and likewise that you are often able to plough it, from the land being dry, when otherwise you could not or ought not—taking the above heads together, I should say there would be saved one-third of horse *labour, though some will say that the saving is a great deal* more, provided the land is only kept as clean as before, but I would rather understate than overstate anything." Some portion of the saving of horse labour, indeed, will require to be expended in the new direction of cartage from increase of crops; but this is a consequence which every farmer will very cordially welcome.

The draining of wet arable soil occasions a great aggregate increase in the productive area of fields. The laying up of ploughed lands in ridges is, in fact, a method of draining; but except on fields of the most unctuous and comminuted clay, which require a system of surface-draining in co-operation with a system of subsoil-draining, it is a method no less rude and wasteful than ancient and general; it throws off an excess of water from the crown of the ridge, at the expense of producing an accumulated excess in the furrow; it requires the ridges to be narrow or the furrows to be numerous in proportion to the very tenacity or fructiferous powers of the soil; and it occasions the stripes of land which constitute the bottoms of the furrows to be almost absolutely barren, and the stripes which constitute the flanks of the furrows or the borders of the ridges to be only semi-productive. A glance at the utterly bare furrow-bottoms *and at the thin and dwarfed pro*duce of the furrow-flanks, as compared with the tall and luxuriant corn of the summits of the ridges, incidentally illustrates the vastly fertilizing power of drainage, and will probably suggest that about one-twelfth or one-tenth of the entire area of ridge-and-furrow fields is unproductive to the farmer.* Now in consequence of the drying effects of good subsoil-draining upon every part, every square foot, of a field, and upon all the parts of it alike, the whole of this great area, the one-twelfth or one-tenth of the surface of all his cropped lands, is saved by subsoil draining to the farmer.

Even on subsoil-drained lands which still require to be laid up in ridges, such as unctuous clays upon retentive subsoils, some saving of productive area can be effected by means of a mode of ridging which cannot be practised on undrained or even on partially but imperfectly drained land. "After I have drained a piece of land," says an experienced georgist in reference to land of this description, "if I wish to keep it

* "Superficial drainage," remarks Mr. Parkes, "is comparatively of little value, and is perhaps, exemplified in its worst practical form by land tortured on the ridge and furrow system. When land is permanently cultivated in high ridges, the crowns can obtain but partial benefit from the *action of rain. The gradation from the comparative dryness and warmth* of the summit, to the suffocating wetness and coldness of the furrows, is commonly evidenced by the state of the crops grown on land so disposed. It would be curious, but possibly more curious than useful, to learn the origin of this remarkable artificial configuration given to land, which is, I fancy, peculiar to England and to particular counties. One would think that this system must have been invented previous to the discovery that water would find its way into cut drains; or the inventor may have considered rain as his greatest enemy, and that he ought to prevent its entrance into the soil, and get rid of it as soon as possible."

in ridges, which I do when the lan is are wide and on a clay subsoil, I plough each land alternately ridge and cast, always plough' ing the two lands that lie to be ridged first, one on each side of the one to be cast. By doing so, I have only one finishing furrow to two lands, and that always on the top of the ridge, and they are generally plain enough to hoe or to reap without fresh striking. By this mode, there is no more treading over the drain than over any other part, and a considerable amount in manual labour is saved annually in not having to make furrows and water trenches, which are quite requisite before the land is drained, though, besides taking off the water, a considerable portion of the best soil is washed off with it."

The loss of rich soil and prime manure by surface currents on undrained retentive land is very great. The portions of soil most thoroughly pulverized, those which possess the highest intermixtures of ammonia, potash, and other food of plants, and those which have been worked by chemical action into a state of the greatest fitness for the immediate uses of the growth of plants, are precisely the portions which the rains sweep away; and the amount of them on all kinds of undrained retentive land is so great as to render the streams into which they are carried exceedingly turbid; while the amount on fields which are laid up in high and narrow ridges is sometimes so enormous as to render the little rills of drainage almost like thin paste. The manure swept away, too, is the very best on the land—either absolutely liquid manure, holding in solution the largest possible proportions of ammonia—or solid organic manure in the last stages of eremacausis, almost ready to assume the seriform condition, and quite ready, in a great degree, to be absorbed and assimilated by the plants; and though the quantity washed away cannot be accurately estimated, it must in all cases be very considerable, and in some so great as nearly to exceed belief. On pasture lands, also, the loss is enormous. Not only are some portions of the manure deposited by the flocks washed away piecemeal by successive heavy rains during the pasturing season, but a large proportion remains to be swept off by the deluging rains of winter. Much of the manure from the summer's depasturing is still on the surface of the land in autumn; and though portions of it continue to sink into the soil till the latter becomes saturated, yet almost all which remains after the point of saturation is swept away. Now thorough draining, in all instances, prevents by far the greater part of this very serious loss to both ploughed lands and grass lands; and whenever the draining, the soil, and the weather, are such as to coax into the drains the whole of the superfluous waters discharged by the atmosphere, every particle of the loss is prevented.

The draining of wet wheat lands occasions a considerable saving in seed, and secures great regularity and fulness in germination and growth. On undrained clay soils, many seeds of wheat, especially in any unusually wet season, burst and perish; some young plants are starved, dwarfed, and eventually destroyed by stagnations of cold moisture; and some, in consequence of the swelling and shrinking of the parts of the soil from excess of damp, are thrown out of the ground and killed by alternations of frost and thaw. Draining may occasion the saving of two pecks of seed per acre, and prevent the loss of from one-twentieth to one twelfth of the whole crop from the destruction of seed and of young plants.

(To be continued.)

EFFECT OF DRAINING UPON THE ACTION OF LIME.

The effect of draining upon both the chemical and the mechanical action of caustic lime is great. Lime naturally decomposes and converts into the food of plants many varieties of dead vegetable matter which, but for its action, would lie inert in the soil; but it requires a free circulation of air through the interstices of the soil and among its own particles, in order to exerting its power, and, when dispersed throughout a soil which is saturated with moisture, it loses its causticity, and becomes as worthless and almost as deleterious as drowned chalk. Lime naturally acts also with mechanical effect, separating the particles of adhesive soil, and drying and pulverising hard and cloddy clay; but it can produce this effect only in the absence of all excess or saturation of moisture; and if applied to clays in a wet and saturated condition, it would convert them into a kind of mortar, and would occasion them to become almost as hard as pavement during droughts. Even when lime is spread as top-dressing upon grass-land, it can produce its well-known beneficial effect only if the land be either naturally dry or artificially drained. Many ploughed fields, in either a naturally or an artificially dry condition, contain such an excess of vegetable matter as to want sufficient cohesion or consistency for giving mechanical support to plants; and when there are such free filtrators as never to to become stagnantly saturated with rains, they derive from lime the great additional advantage of having part of their soft and incoherent substance converted into a supporting pabulum; but this advantage, as truly as the previous ones, cannot be obtained on any land which is excessively wet; for there the little masses of soft organic matter are soaked with water like sponges, and the lime lies incoherently beside them like lumps and particles of saturated chalk.

FORCING OF RHUBARB.

At this season, many may have forced rhubarb on their tables at very little trouble and at little expense. If they have a few roots to spare, let them be lifted and put under the stage of a green house, or any room or cellar where the frost is kept out, and an early crop will be obtained, and a supply kept up, until it is fit to gather in the open ground. We have found the temperature of old mines sufficient to force it.

Knight on the forcing of rhubarb, gives the following *rationale* of the principles on which his practice is founded: 'The root of every perennial herbaceous plant contains within itself, during winter, all the organisable matter which it expands in the spring in the formation of its first foliage and flower stems; and it neither requires food nor light to enable it to protrude these, but simply heat and water; and if the root be removed entire as soon as its leaves becomes lifeless, it will be found to vegetate, after being replanted, as strongly as it would have done if it had retained its first position.' These circumstances led me, last winter, to dig up the roots of many plants of the common rhubarb, which I had raised from cuttings in the preceding spring, and to place them in a few large and deep pots, each pot being made to receive as many as it could contain. Some fine sandy loam was then washed in to fill entirely the interstices between the roots, the tops of which were so placed as to be level with each other, and about an inch below the surface of the mould in the pots which were covered with other pots of the same size inverted upon them. Being then placed in a vinery, in a situation where nothing else could be made to thrive, on account of want of light; and being copiously supplied with water, the plants vegetated and strongly; and from each pot I obtained three successive crops: the leaf-stalks of the two first being crowded so closely as nearly to touch each other over the whole surface of the pots.

The heat of a hot-bed, a kitchen or other room, and on the approach of spring, (probably at any period after the middle of January,) a cellar will afford sufficiently high temperature; and the advantage in all cases will be that of obtaining, from one foot of surface, as much produce as in the natural state of growth of the plants would occupy twenty feet; and in the shady space of the vinery or peach-house, not applicable to other purposes, and without incurring any additional expense in fuel or doing injury to the soil, a succession of abundant crops may be raised.—*P. M.*

THE POULTRY FACTORY.

Although the hatching of eggs in ovens, hot sand, and by other means, is not quite novel, there is decided novelty in the manufacture of poultry by machinery and hot water. By these means I positively saw the other day upwards of 1200 cocks and hens, chickens and ducks, thriving admirably. The eggs were got from the farmers, and dealers in the surround-

ing country, and were put up by the inventor, a Mr. Cantelo, into his patent machine, which he calls the hydraulic incubator. Externally it resembles a shop counter, and has drawers inside, in which the eggs are placed in contact with a sheet of patent Macintosh cloth, over which there flows constantly a stream of warm water from a connected cistern, heated by a peculiar vessel full of charcoal to 106°, the natural warmth of the breast of a hen. The eggs being placed in the drawers, which have a perforated zinc bottom, are pressed by a wedge up against the waterproof cloth in such a way that the top of the egg only is buried in the warmth; thus exactly imitating the breast of a hen. Every day they are withdrawn for twenty or thirty minutes, as a hen leaves her nest for about that time to feed. At the lapse of twenty-one days after being set, the drawers full of eggs become animated, and hundreds and thousands of chickens in natural perfection appear. These are immediately removed into other drawers, filled with chaff, in a warm place to dry, when they are removed to another part of the machine called the mother, which is heated with warm water pipes, and over which is laid a flap of baise to resemble the wing of a hen. There the little things nestle, pressing their half-fledged backs against the warm pipes for the first day, when they begin to shew a disposition to seek food. That is suitably provided in a small open space, where they run out, take a few pecks, and then again nestle against their mother—the warm pipe. It is perfectly amazing to see how they grow. Departments are provided for chickens and fowls of every age, up to the coop in which they are fattened for the table.

The inventor has, I believe at great cost and labour, brought the principle to practical perfection, and in a superior manner to any that exists in either Turkey or Egypt, where it is carried to a great extent, and where chickens are positively sold by the bushel. Every minutiæ of nature is imitated; and by the care which is taken, much fewer eggs are lost than when left entirely to the care of the common hen. Poultry, produced in this way, will lay eggs all the year through, so that it is only necessary to have a stock to start with that the affair may go on, *ad infinitum*, to give fresh laid eggs and poultry for the million.

It has been estimated that there are 480,000 Farmers in Great Britain; now suppose these to send twenty head of fowls each on an average to market every year (some will send many more and others none), that will give 9½ millions per annum, which is only about one-third of a fowl to each member of the community. Many do not taste chicken all their lives. In Egypt it is estimated that ninety-eight millions of poultry are reared every year for a population of only ten or twelve million inhabitants, which would be about eight or ten chickens a-piece annually to every person, which looks like luxury.

Now the cost of every commodity in this calculating country is the rub. To bring up an ox to 1200 lbs. weight may take five years, and it is a fair estimate to allow on an average the produce of an acre of land for a beast every year. For the sake of simplifying the calculation, say that the crop every year was to be barley, and allowing five quarters to the acre, that would be twenty-five quarters or 200 bushels, which, estimated at 30s. a quarter, makes the ox of 1200 lbs. weight to cost £37 10s., or about 8d. a lb.; whereas it has been clearly calculated, from actual experiment, that seventy-five bushels of barley will in ninety-six days produce, by this patent process, 1200 lbs. weight of poultry for £15, being within a fraction of 3d. a lb., not to speak of the large quantity of *guano* which remains. Truly we may exclaim, this is the age of invention! What I have stated may be seen in actual operation this day within a sixpenny ride of London.—*M. A. C. in Agricultural Gazette.*

From the Scottish Farmer.

THE ECONOMY OF FARM-YARD MANURE.

Farm-yard manure is usually made by cattle feeding on turnips, hay, or straw; and sometimes about 4lb of oilcake per day is allowed to each animal, along with 4lb of cut hay, and 3lb of bean, pea, or barley meal. The manure arising from cattle so fed is of excellent quality, and much superior to that made by lean cattle. The refuse of their food is of value to pigs, one of which will be able to live with one bullock, by picking up bits of turnips, and excrements of the cattle fed as stated. Those laborious animals are of great use in rooting among the straw and dung in search of corn or other food, by which means the manure is much improved in value, by being more regularly mixed. The cattle kept on straw are usually put in yards by themselves; but the manure made from them is of an inferior quality, particularly if they are allowed to range about the fields in the day-time. The horse-dung is generally thrown out at the stable door, and allowed to accumulate. Horse-dung lying in large heaps soon ferments and heats, and the centre of the dunghill becomes dry and fire-funged, or burnt to a white mouldy substance, and must lose half of its value. The industrious Farmer usually guards against such destruction and loss, which may be prevented by making it a rule to throw the horse-dung into the yard where the cattle are kept on straw (alone) and spreading it over every day. Perhaps some may object to this on account of expense, &c.; but bear in mind that cattle living on straw are very fond of stable litter, and the benefit they would receive from it would amply pay the expense. On the formation of dung-yards there are various opinions. On this point some recommend them to be round in the middle, so as to allow the water to escape, and thus keep the dung as dry as possible: others insist upon them being concave, almost like the bottom of a basin, so as to keep the dung in a moist state. But, from experience, I would recommend a form between the two extremes—to have the yards a little hollow in the middle, which is the best. As to the preparing of the heaps, dung is usually carted from the yards in the winter or spring months, and not unfrequently thrown up as lightly as possible. A dung-heap formed in this way, and if the dung be good, soon heats to an extreme degree. The gases evaporate—the juices drain from the sides and bottom of the heaps and of course are wasted. In a week or two the fermentation subsides, and the middle of the heap is left in a dry and burnt state, while the outsides of the heaps from the action of the sun and winds, are dried frequently to a state of straw. In this state they remain, perhaps until the turnip season is approaching. They are then turned over, and fermentation again takes place; and by the time the dung is wanted it is considerably reduced in quantity and deteriorated in value. I have now pointed out what I consider the erroneous method of husbanding farmyard manure, and shall next try to explain my views of a more perfect system. It is of great importance to have farmyard manure regularly mixed together; and too much attention cannot be paid to the horse-dung, which should be spread over the straw cattle-yard daily, as before-named. The horses employed on the farm should be kept in the yards in summer, and fed on grain food; and all kinds of course grass, &c., such as nettles and weeds (but not in seed,) and should be cut from the breast and back of the fences, and brought into the yards, and not suffered to waste. In short, all substances, as named above, should be gathered into the farm-yard; and if sand or sawdust can be procured for the bottom of the yards, it will be of great use, by absorbing the urine. The bottoms of dunghills should be made of soil, sand, marl, and clay of about twelve inches thick. Soil can be got from the sides of ditches; and if it lie a year or two, so much the better. The dimensions of those bottoms must depend on the quantity of dung to be laid upon them. The dunghill should be of less dimensions by three feet all round than the bottom, so as to allow a sufficient quantity of soil to be thrown over the top and sides when the dung is turned over. When the dung is brought from the yard it ought to be strewed on the bottom for the purpose of compressing it so as to prevent fermentation; and care should be taken to mix it properly by taking the loads alternately from different parts of the yards. After the carting is completed, a covering of soil, burnt earth, or coal ashes, should be applied, about three or four inches thick. The heaps should remain in this state until within three weeks or so of the time

it is required to be set on the land. It should then be turned over, taking care to mix it and cover it with the soil which was laid for the bottom. As soon as the turning is finished, the soil which is left round the sides should be thrown over it and smothered down: it will then ferment a little, and the earth intermixed with it and the covering will absorb the gases and juices of the dung, which will be of excellent quality, without diminution in quantity.

ON RAISING POTATOES BY DIVISION OF THE PLANT.

By Mr. David Gorrie, *Errol.*

In the summer time, when the stems of potatoes are about three inches high, and on a cloudy day after a refreshing shower, the drills are to be gone over by a careful operator, whose business it is to separate all the stems, save one, from each plant, by inserting his forefinger and thumb deeply into the soft and mallow soil, and pinching off each stem near its junction with the old tuber or set, so that it may possess a share of root fibres. Having obtained a basketfull of these *Highland cuttings*, the next thing is to plant them in rows firmly, with the dibble, on ground properly prepared. The stems may be inserted as deeply as their lower leaves will allow, only the soil should not be pressed against the collar, or that part of the stem just at the surface. Firm below and free above, is the grand rule in transplanting with the dibble. Instead of predicting what is likely to follow after all this has been done, it may be as well just to refer to past experience. Last summer, potato stems thus treated, took with their new quarters at once, and would soon have shown a fine row of foliage from end to end of each drill; but unfortunately the sooty denizens of the rookery made so free with the embryo produce of the transplanted stems, that before measures were taken to scare them away, they had pulled up at least one-half of the plants. Little care was taken of the remainder throughout the season, and it was expected that they would be scarcely worth the lifting; but to the agreeable surprise of the cultivator, it was found at the end of the season that, leaving the extent of ground out of consideration, and looking only to the number of plants, the return from the transplanted drills was a third more bulky than that derived from drills planted in the ordinary way; while, at the same time, the individual tubers were larger, and all of a marketable size. It was not altogether because they were more easily pulled up that the rooks attacked the transplanted stems at such an early period of their growth, while they left the rest of the field untouched,—they had found out that the young tubers at the roots of these stems were larger and better fitted to remunerate them for their trouble, than those growing at the roots of ordinary plants. Doubtless it was experience that guided them in forsaking a whole field to concentrate their operations within the space occupied by three drills along one of its sides; for we are not to suppose them to have been so great adepts in the science of vegetable physiology as to have expected the result, supposing them to have witnessed the transplanter at his work. They were not aware of the fact that some grasses have only fibrous roots in moist soils, while they lay up requisite stores of nutriment in the form of knots or bulbs to fall back upon in a time of need, when the soil wherein they strike their roots is liable to be parched at certain seasons by sunshine and drought. They could not have explained the reason why the stems of early potatoes, after the tubers have been taken from them, and after they have been laid in the earth in a slanting or nearly flat position, and covered with soil for two-thirds of their length, instantly commence the rapid development of fresh tubers in clusters around every joint or knee. Neither could they have appreciated the truth, had they been told it, that the transplanted potato stems, which they so unsparingly attacked, had suffered a check in the progress of their growth at the time of their removal from the parent plants—that they had become more excitable in consequence; and that after a reaction had commenced, the formation of tubers at their roots had proceeded with redoubled celerity. All this, and much more, bearing reference to natural science, the rooks did not know; but they soon found out the practical result of what a vegetable physiologist might take whole pages to describe.

How many are the mysteries of vegetable life; how wonderfully complicated, and yet how harmonious its results; how strange the existence of an unseen impelling force pervading every part of the humblest weed, and inciting it to rise triumphant over adversity, and to grow and aim at maturity all the more vigorously after it has been pinched awhile for nourishment, that the destined aim of its existence may be reached unto and fulfilled!

Difference in Value in the First Milked, and Last Milked Portions of Milk.—"Is any experiment on record in which the different value between the first and last portions of milk have been precisely ascertained?—One who Keeps Cows."—Professor Traill discovered, in some experiments, that where the first drawn pint of milk contained 5 grains of butter, the last drawn pint contained 551 grains, being an increase of 110 to 1. This was from a cow which had calved five weeks. The following is the account of the experiment:—"A cow was selected which had calved five weeks before, and the experiments were begun on Monday, 26th May, 1806. No. 1 was the first pint milked. No. 2 was a pint of the whole milking, after the separation of No. 1 and No. 3. No. 3 was the last pint of the milking, or afterings. As in previous experiments, *scalding* the milk was found to favour the more perfect separation of the butter, after the three portions were allowed to remain twenty-four hours in the milk-house. They were at the same time placed in earthenware basins, in a pan of water heated to 180deg. Fahr. They were removed within an hour from the water, when the milk had acquired a temperature of 130deg. They were replaced for ten hours in the milk-house, and then examined. No. 1 then showed scarcely any indication of cream. It formed a very thin pillicle only; and the quantity being too small to be churned, was estimated, from other comparative trials, to be equivalent to five grains of butter. No. 2 was evidently richer to the eye, but the cream was pale-coloured, and, when churned, yielded 181 grains of firm butter. No. 3, The cream, before churning, had a rich yellow tint; the butter produced was well flavoured, and weighed 551 grains. The difference between the richness of the first milk and the afterings, in a cow yielding about fifteen pints of milk at each milking, is thus as 1: 110."—*Maidstone Gazette.*

The Waste Manures of a Farm.—"Can you give a hint or two as to the best mode of getting a good quantity of manure, to A Young Farmer."—We would reply "Waste nothing." The following extract from Mr. Hannam's work on Fertilizers will enlighten "A Young Farmer" on details. —"Of the nature of the refuse vegetable and animal matters of the farm," says Mr. Hannam, "it is not necessary to enter into particulars. *Whatever has had life*, or what *contains the materials of which the living structure is composed*, will be useful to future life, and are manures which ought to be preserved. Hence, then, the various weeds, stubbles, grass, leaves, hedge bottoms, ditch and pond scouring, saw-dust, animal matters, &c., &c., which may be collected, are deserving of our attention. For instance, the weeds, grass, and vegetable remains contain in them the very matters future vegetables require. The animal matters, such as in flesh and blood, are extremely rich in nitrogen, carbonic acid, &c.; and the soil, scourings, &c. often contain some decayed or decaying vegetable matter; and when they do not, they have in them some of the inorganic matters of plants; and, even if deficient in both organic and inorganic food of plants, they may be employed as absorbants for liquid manures, for admixture with animal or other highly azotized substances, (which are apt to ferment too rapidly,) or with such as are too potent in their action to be used without being reduced. But it is for the purpose of making compost with liquid and other fertilizing matters, that even the vegetable substances are most useful.—Many of the vegetables contain much more nitrogen than the straw of grain, and are also peculiarly rich in the inorganic

matters, especially the saline; they, therefore, give the farmer the means of increasing his manure heap greatly, as they are, in every point of view, capable of being made into as good compost as that which is generally formed in the yard. To do this, they must, however, be subject to the same process—mixed with the dung and urine from the cattle, and properly fermented. Saturated with the liquid drainings, they form a manure of no inconsiderable value.—*Ib.*

Making Cloth Waterproof.—"Will you be kind enough to inform me of the best composition for dressing a very thin canvas to make it waterproof, as a covering for a carriage, also as an over-coat; by so doing you will oblige—A Traveller." The following mode of making cotton cloth waterproof has been patented by Mr. Hatch, of Eastport, and will probably also do for canvas:—"Take half a pound of gum shellac and one pint of alcohol, and put them in a tin kettle with a cover, and suspend the kettle with said contents in a boiler of boiling water, and keep the heat up till the gum dissolves; then put one quart of boiled linseed oil in the kettle with the shellac, and boil them together till they are well mixed. Secondly, take one once of India rubber, cut it in very small pieces, and one quart of spirits of turpentine, and put them in another tin kettle with a cover as before named, and suspend it, with its contents, in a boiler of boiling water, and keep the heat up till it is dissolved: then put two quarts of boiled linseed oil in the kettle with the rubber, and keep the heat up till they are completely mixed. Thirdly, take one pound of yellow hard soap, and two quarts of water, and boil them together till the soap is all dissolved. Then, to make the composition, take eight pounds of white lead ground in oil, one gill coal tar, six ounces lamp black, one pound gold litharge, four quarts boiled linseed oil, three quarts of the above named solution of India rubber, one gill of the solution of shellac, as above named, one pint of copal varnish, and mix them all well together. Then put one quart of the soap and water in the composition while the soap and water are boiling hot, and stir them together till the whole is completely mixed together, and then apply the composition to the cloth with a common paint-brush, and when the cloth is nearly dry, so that it will not rub off, apply the second coat of the composition, and, when the second coat is nearly dry, apply the third coat of the composition, which makes the cloth waterproof and pliable."—*Ib.*

Economy in Feeding Horses.—In all attempts at economising food, none can be effectual that will not embrace the system of producing the greatest amount of food on a given space, at the least possible expense, and of extracting from a given amount of food, the greatest possible amount of nutritive matter. Thus we find that land under mixed crops, grain and root crops, will produce more food than the same land would under the old system of corn and hay culture. One acre of root crops, two acres of oats, wheat, and barley, with one acre of clover and Italian rye-grass, will give more good food for horses and cattle than ten acres of hay and six acres of oats, as our forefathers used the produce; whilst the profitable employment given in the four acres well tilled will be greater than that which could be given by our ancestors on a twenty acre farm. This is well known to every practical man; we need, therefore, urge it no farther, beyond stating, that all produce of straw, chaff, and roots, with the required amount of grain, should be economised by cutting, crushing, steaming, or boiling, and mixing, when cooked or being cooked, all the food, or at least the principal part of it, to be given to work horses. Turnips, mangels, carrots, parsnips, and chaff of all grain, or chaffed hay and straw, should be cooked together by steaming, boiling, or in fusion, before being given to horses. Oats should on no account be given to horses without being crushed, as by such means a saving of from one-fourth to one-half will be effected. Free and pure, but not currents of air, will be found indispensable in all well regulated stables, to aid in the purification of which sulphuric acid, diluted with water, sprinkled over the floors, will not only prevent the injurious effects of bad smells on the constitutions of horses, but also preserve the most valuable part of the manure by preventing its escape into the atmosphere. Due attention to the skin of the horse, by brushing, currying, and otherwise promoting the due secretions of the skin, will have a powerful effect in preserving the health of such animals.

Mineral Manures.—Lime serves for resolving the silicates of alumina (clay,) and consequently it cannot fertilise soils in which the clay is wanting; for instance, sandy soils. It must be apparent to every one, that on the calcerous and gypseous fields of France and England, one-half per cent. of gypsum or lime can have no influence at all on vegetation.—This can be said with equal justice of bone ashes, and of every other mineral substance serving for the nourishment of plants. If these substances exercise a favourable effect, some of the constituents of the soil or manure or restored, which are indispensible to the nourishment of plants, and which have been wanting in the soil. If this be the case in the other bodies, equally necessary, must be present in sufficient quantity. On a field, on which sulphate of lime has acted favourably, but in which clover has been cultivated without it, the crop was 2,200 pounds of clover and hay, in which 53 pounds of potash were removed. On the same field, after it had been dressed with gypsum, 8,000 pounds of hay were produced, which contained 191 pounds of potash. If this potash had not been present in the soil, the gypsum would have had no effect—the crop would not have been increased. On fields which are richly provided with all other mineral ingredients, with the exception of gypsum, the latter is applied with the greatest success. But if gypsum is present in the soil, the same effects are produced by ashes and lime, as is the case in Flanders. On fields on which phosphate of lime is wanting, bone ashes increase the produce of grain, clover, or grass, and on argillaceous soil, lime produces a decided improvement. All these substances act only on those fields which are defective in them, and if the other elements of the soil are present. The latter cause the former to come into action, and *vice versa*. The Farmers, who thought that by using lime, gypsum, bone earth, &c., they might dispense with animal manure, very soon observed that their fields deteriorated. They observed that after a third or fourth successive manuring with those simple substances the produce decreased; that, as is the common expression, the soil became tired of the manure, that at last the field scarcely produced the seed.—*Letter from Dr. Liebig.*

Manure from Geese.—"I know that it is generally said that geese destroy the grass where they congregate, by their droppings; can you inform me whether or not there is anything really deleterious to vegetation in the droppings of geese; by so doing you will oblige one who cannot boast of A.Y.Z."—We fear it will puzzle many A.Y.Z. (a wise head) to make out our correspondent's signature, indeed many more than will be puzzled to answer this question. The dung of geese would be excellent manure, if treated as the droppings of other animals, and contains no more deleterious matter than that of a cow.—*Maidstone Gazette.*

Rooks, Turnips, and Corn.—"Having read with much attention the interesting account your correspondent gives of the benefit derived in some districts by rooks in the destruction of grub and other insects obnoxious to vegetation, I beg to add my mite of experience with regard to the operations of your correspondent's *friends* the rooks. My neighbour had, this season, a very considerable portion of land in turnip season, which he manured abundantly, and bestowed upon it every sort of fertilizing operation that could be thought needful to ensure a return. The turnips came up regularly and plentifully, and the rooks were soon seen amongst them. Every day their numbers increased, and their visits were more frequent and of longer duration. We consulted regarding them, watched their operations, and searched the parts of ground where they most frequented, and found, in frequent instances, the very grub we concluded they were in search of, and satisfied ourselves they were doing infinite good. We found the turnips beset in some instances by three or four grubs, and had every possible proof of what the rooks were doing, short

of demonstration, by destroying some of them, and opening the stomach; this we did not think right to do, knowing how dreadfully shooting at them annoys them. But it turned out that they did not half do their work, or did not do it soon enough, for more than half the crop was destroyed. I mean that more than half the land was left bare, notwithstanding they were at first setting out as fine and even a plant as I ever wish to see. So much for the rooks, and now a word or two for the co.... In the present autumn the rooks have visited my fresh-sown corn very much, and my bailiff felt it his duty to call my attention to them. We were at the time observing them upon a new sown piece, and being upon clover ley, I supposed they might be after worm or grub; but he appeared strongly of opinion they were getting up the corn, and I arranged with him that he should shoot one as soon as possible. He did so, and brought it to me. We skinned and opened it, and took out the stomach entire. We found it literally hard stuffed with unbroken wheat, unmixed with any other matter excepting one solitary grub, or rather a short coarse-coated worm. If the above account is deserving a place in your valuable journal, it is at your service, and you have my assurance of its correctness. At some periods of the year they are of great service, but they do not make clean work. I am much assailed by them, and no corn that I saw in the late season was so eaten up by wire-worm as my own, and I am at the present fully persuaded that whilst they can get corn, they seek for nothing else. Yours faithfully, A CONSTANT READER. Rochester."—We are obliged for this communication, which we think is very favorable evidence of the value of the rook in destroying the grub which infests turnips; for although "they do not make clean work," they must evidently destroy a great may; and when it is considered that they must live on insect food all the year excepting seed time and harvest, the expense of a boy to keep them off for a few weeks at these seasons, is little, compared with the value of thir services at all other times.—*Maidstone Gazette.*

The agriculture of Kent exhibits peculiarities as striking as her physical capabilities. Beyond the crop cultivated in all other counties, she stands pre-eminent for her hops, her fruit, her filberts, and woodlands, of which her general management is unsurpassed. Hundreds of Kentish acres cost in cultivation from £30 to £40 per acre every year, and the crop of which has often been worth double the fee-simple of the land. We hear of one acre in the last year having produced a ton of hops and a ton of filberts! We mention these, though extreme instances, to give some idea to strangers of the amount of capital which is embarked in Kentish agriculture, which we believe very far exceeds, on a given area, the amount invested in cultivating the same space in any other portion of the empire.

How is this great capital expended? A large sum is paid for labour. If the farmers of Kent are substantial, the labourers of Kent are eminently skilled in Kentish operations. Higher wages have always been given in Kent than elsewhere—not, however, without value received; for the best class of the Kentish labourers have more versatile capabilities (and can use a large number of different tools) than probably those of any other county; but a very large proprotion of this capital has been expended in manure, particularly in London dung brought down by barges, in woollen rags, and, of late years, in bone-dust and guano. We know of one farmer who has expended about £1000 in guano alone in one year. The spirit of a Kentish farmer has generally been estimated by his expenditure in manure on his hop ground; consequently manure has been heaped on some lands, year after year, till the soil has positively become so surfeited, that the crop has been lost by the mould; when, perhaps, one single chemical ingredient only was wanting, out of the ten of which the manure was composed, to keep the soil at its highest point of fertility. As much money has, perhaps, been annually lost in Kent by the indiscriminate and injudicious application of powerful manures, as has been expended on the whole quantity of manure purchased by many other counties.

The late Mr. SPRINGETT, of Linton, was a very spirited farmer, and having an excellent hop-ground, determined to over-manure it than allow it to deteriorate. At length the crop became couldy, and when the land came into the hands of Mr CHARLES SPRINGETT, its present possessors, he discontinued manuring it for a year, when the crop improved, and after another years's "total abstinence," recovered its superior character. From that time, during the period of 25 years, that hopland has not received a shillings's worth of manure (excepting, of late, years, half a pint of guano to here and there a weak hill,) and has yet every year furnished bine for 14ft. poles, and produced a fair average crop as compared with the district. Had Mr. SPRINGETT, Sen., known the chemical condition of his land and what the crop required, he might have saved hundreds of pounds; but, forty years ago, a *complete* analysis of his soil and of the crop could not have been procured had he offered a thousand guineas for them.

THE TELESCOPE AND MICROSCOPE.—While the telescope enables us to see a system in every star, the microscope unfolds to us a world in every atom. The one instructs us that this mighty globe, with the whole burden of its people and its countries, is but a grain of sand in the vast field of immensity; the other, that every atom may harbor the tribes and families of a busy population. The one shows us the insignificance of the world we inhabit; the other redeems it from all its insignificance, for it tells us that in the leaves of every forest, in the flowers of every garden, in the waters of every rivulet, there are worlds teeming with life and numberless as are the stars of the firmament. The one suggests to us, that above and beyond all that is visible to man, there may be regions of creation which sweep immeasurably along, and carry the impress of the Almighty's hand to the remotest scenes of the universe; the other, that, within and beneath all the minuteness which the aided eye of man is able to explore, there may be a world of invisible beings; and that, could we draw aside the mysterious veil that shrouds it from our senses, we might behold a theatre of as many wonders as astronomy can unfold; a universe within the compass of a point, so small as to elude all the powers of the microscope, but where the Almighty Ruler of all things finds room for the exercise of His attributes, where He can raise another mechanism of worlds, and fill and animate them all with evidence of His glory.

CHEESE FROM BUTTER MILK.—"Can you oblige me by stating, in your scientific column, whether cheese can be made from butter milk?—A FARMER'S WIFE."—The only information on this point which we have at hand is the following taken from the Quarterly Journal of Agriculture, to which it was contributed by Miss Neilson, of Kirkintilloch:—"Having seen it observed that it would be useful to Scotch farmers to make cheese from butter milk, I will give a recipe which I obtained from a person while residing in Long Island, in the United States. 'The contents of my churn I put into a pot, which I hung over a slow fire. The buttermilk curdled, and the curd sunk to the bottom of the pot. I then poured off the whey, and worked the curd as I would do other cheese, giving it salt to the taste, which was about half the quantity given to skim milk curd. The curd was then put in a clean coarse linen cloth, tied tight, and hung from the ceiling to dry for a few weeks, when the cheese was fit for use. The linen cloth, when hung in a net, gives a neatness to the appearance of the cheese. If a little bit of butter be worked into the curd, and the cheese kept for three or four months, it will then be very good—at least my visitors said so.' Cheese can be made in this manner on a small scale, even from the produce of one cow. I used to buy small cheeses in the market of New York, which I expected would be like Scotch skim-milk cheese; but on finding them to taste like ewe-milk cheese, I was informed they were made from butter-milk."—*Maidstone Gazette.*

THE BEST SOUP.—When 1lb. of lean beef, free of fat, and separated from the bones, in the finely-chopped state in which it is used for beef sausages or mince-meat, is uniformly mixed with its own weight of cold water, slowly heated to boiling,

and the liquid, after boiling briskly for a minute or two, is strained through a towel from the coagulated albumen and the fibrine, now become hard and horny, we obtain an equal weight of a most aromatic soup, of such strength as cannot be obtained, even by boiling for hours, from a piece of flesh. When mixed with salt and the other usual additions by which soup is usually seasoned, and tinged somewhat darker by means of roasted onions or burnt sugar, it forms the very best soup which can in any way be prepared from 1lb. of flesh.—*Liebig's Researches on Food.*

Newcastle Farmer.

COBOURG, CANADA WEST, MAY 1, 1848.

After a mild, open, and generally considered, unfavourable winter for the farmer, the Spring has commenced with us in a most genial form. The wheat, which has remained during nearly the whole winter exposed to every vicissitude of the weather, and which was to all appearance nearly destroyed, is now rapidly recovering, and the fields are assuming their renovated livery in all its verdant beauty.

It would seem that the commonly received opinion that the plant required a most efficient protection by a constant covering of snow, is founded in error, and that it is of a much hardier nature than is supposed; and that, provided the intense frosts were not of long duration, it was able to withstand for a protracted period the rigour of our ice-bound climate.

As we have before stated on several occasions, it would appear that the destruction that has almost invariably attended the winter wheat, is not produced merely by intense cold, and that the term "winter killed" is a misnomer; and that when the frosts do not extend to a great depth from the surface, there is not that continued upheaving of the plant by the change of temperature on the frost relaxing its rigour, and giving place to the renovating influence of our Spring suns; the roots of the plants are not in consequence thrown out of the ground, and their spongioles continue to derive sufficient nutriment to start them again on the first favourable indication of a milder season.

In consequence of the very small quantity of snow which has fallen, the percolation from the surface has been inconsiderable, and the land is in a state for tillage at an earlier period than ordinary; and there is scarce a farm or a field (on which wheat ought to be sown,) but may be considered safe, so far as it may be affected by atmospheric changes. The plough and harrow have been efficiently employed, and Spring wheat and Peas are being got rapidly into the ground. The land for Barley and Corn may now be effectively prepared and the subsoil plough brought into operation, for tap-rooted plants in particular.

It is a question whether it would be prudent to sow the various descriptions of carrots at so early a period, as they are very apt to run to seed instead of root, as it is always in their later stages of maturity that the greatest amount of produce is obtained, and if pushed forward too early, a loss (from seeding) frequently occurs.

We have no faith in any necessity for delay in sowing turnips (swedes,) if the land can be earlier prepared than is usually the case, for "the Fly" knows no season; sow when you will, *that* depredator will make his appearance, nor does there appear any certain mode of preventing his attacks; and those who sow early have the best opportunity of repeating the operation, and should a second sowing be a failure, the land being well prepared, could be planted with potatoes of the later kinds, although we believe concerning them that the earliest sown (if beyond the frost,) are the surest and safest crop. In Germany it is usual to plant early, and earth up entirely but lightly the leaves as soon as they make their appearance, until all ungenial weather is past, and the plant sufficiently vigorous to withstand any ordinary change of weather.

There is certainly an appearance generally of the Wheat being more productive than last season, and it needs to be a good yield, for the price will not probably be higher than at present, and there will be pinching times with too many before the next harvest.

On the subject of turnip growing we would remark, that all those persons who procured a supply of guano through the medium of the Agricultural Society, will now have a fair opportunity of testing its merits with that plant. It should be sown in the drills with some well-decomposed manure, or compost of swamp-muck decayed leaves, or any other minutely subdivided vegetable matter, and if well mixed and passed through a screen, would be more easily and regularly applied in the drills.

It must be remembered, that it does not preclude the necessity of enriching the land with ordinary manure. It is said that it should not "in an unmixed state" come into immediate contact with the seed, as it is likely to burn it, and destroy the germinating principle.

That such is *not* the case with seed wheat we have tested, having sowed several drills immediately under the grain, and the drills are at this time in full vigour; but it may be different with the smaller and thinner coated seed of the turnip.

Amongst the many fertilizing substances which are permitted to go to waste in Canada, and which would be especially beneficial to that auxiliary to the farmer "the turnip crop," are bones, the phosphates for the formation of which are abstracted annually from the land, and in their combination with the lime are seldom returned. These should and might easily be collected at a comparatively trifling expense, and by the use of a crushing machine (one of which would suffice for a township), or in lack of such machine, the Plaster mills would be as efficacious; a large amount of stimulating manure might be made immediately available, to the great increase of the crop. The use of such manure in Europe, and particularly in England, sufficiently demonstrates the value set upon it, and vast sums are annually expended in the import of bones from the Continent. And the Stock kept in condition by the increased quantities of the root raised (of which there is never a surplus), is a sufficient guarantee to us that the value of the article is not over-rated.

ERRATUM in the poetry of last No. of *Newcastle Farmer*,—"God speed the Plough," for "grinds" read "guides its shining share."

Miscellaneous.

THE PROGRESS OF THE SEASONS.

The sun shone bright, and all was gay,
In love's delightful month of May;
A little child went out to play,
He had obtained a holiday—
It is the SPRING.

The fruit was hanging on the trees,
And ripening in the northern breeze:
That child had now become a man,
His face was anxious, pale, and wan—
The SUMMER'S come.

The leaves were falling from the woods,
And lying on the dusty roads;
I saw that man—saw that his hair
Was blanched with age, and white with care,
'Twas AUTUMN then.

The frozen snow was on the ground,
No fruit, no flower could be found;
An old man then was on the hearth,
His lips were moist with dews of death—
'Twas WINTER there.

Spring, Summer, Autumn, Winter, when
Will your sad story teach to men
How short is each successive stage,
Our infancy, youth, manhood, age—
How quickly gone!

THE ORIGIN OF INDIAN CORN.

From Hoffman's Wild Scenes in the Forest and Prairie.

When the hour of dinner arrived, and pipes and cigars were laid aside for more substantial refreshment, the introduction of parched corn among the condiments of our repast raised a discussion between the "chancellor" and myself, as to the Asiatic or American origin of this great staple of our farmers; and, upon asking the opinion of Captain Gill as to how the maize was first obtained, the old chief nodded to one of his dusky satellites, who straightway set the question at rest for ever by giving an explanation, of which the following is the purport:—

"There is a place on the banks of the softly-flowing Unadilla, not far from its confluence with the Susquehannah, which in former years, was an extensive beaver meadow. The short turf sloped down almost to the brink of the stream, whose banks, in this place, nourish not a single tree to shadow its waters. Here, where they flow over pebbles so smooth and shiny that the Indian maid who wandered along the margin, would stop to tell over her strings of wampum, and think the beads had dropped below, there came one day some girls to bathe; and one, the most beautiful of all, lingered behind her companions, to gather these bright pebbles from the bed of the river.

"A water-spirit, who had assumed the form of a musquosh, set along watching her from the shore. He looked at her shining shoulders, at her dripping locks, and the gently swelling bosom over which they fell, and when the maid lifted her rounded limbs from the water, and stepped lightly upon the green sod, he, too, raised himself from the mossy nook where he had been hidden, and, recovering his own shape, ran to embrace her.

"The maiden shrieked and fled, but the enamoured spirit pressed closely in pursuit; and the meadow affording no shrub nor covert to screen her from her eager pursuer, she turned again towards the stream she had left, and made for a spot where the wild flowers grew tall and rankly by the moist margin. The spirit still followed her; and, frightened and fatigued, the girl would have sunk upon the ground as he approached, had she not been supported by a tuft of flags, while hastily seizing and twining them around her person to hide her shame.

"In this moment her slender form grew thinner and more rounded; her delicate feet became indurated in the loose soil that opened to receive them; the blades of the flag broadened around her fingers, and enclosed her hand; while the pearly pebbles that she held resolved themselves into milky grains, *which were kept together by the plaited husk.*

"The baffled water-spirit sprang to seize her by the long hair that yet flowed in the breeze, but the silken tassels of the rustling maize was all that met his grasp."

COMMERCE IN THE DAYS OF ABRAHAM.—The various particulars of the transaction between Abraham and the children of Heth, evince very considerable progress at that early period in economics, in commerce, in law. There is money, and of a given denomination or coin—balances for weighing it—a standard thereof, such as was current with the merchant—a superiority thereof in the methods of trade above the way of barter—*forms in the conveyance and exchange of property* before witnesses, as here in audience of the people of Heth—the terms and specifications of a bargain, by which its several particulars were made sure to Abraham in the presence of and before many witnesses—all serving to confirm the doctrine that the progress in these days was from an original civilisation down to barbarism—the civilisation being coeval with the first and earliest revelations, or with Adam himself. A thorough attention to these early chapters of Genesis confirms our belief in this tenet—supported as it is by this very strong negative argument, that a nation was never known to *emerge simultaneously and unaided from* the savage state—the civilisation thereof having always, as far as known, originated in, or been aided by, a movement or influence from without.—*Dr. Chalmers's Daily Scripture Readings.*

REMARKABLE EXPERIMENT.—A recent work of science gives the following novel experiment, which settles questions of some importance in philosophy:—"Two hundred pounds weight of earth were dried in an oven, and afterwards put into an earthen vessel. The earth was then moistened with rain water, and a willow tree, weighing five pounds, was planted therein. During the space of five years the earth was carefully watered with rain water, or pure water; *the willow grew* and flourished; and, to prevent the earth being mixed with fresh earth or dust blown in it by the winds, it was covered with a metal plate perforated with a great number of small holes, suitable for the free admission of air only. After growing in the air for five years, the tree was removed, and found to weigh 169 pounds and about 3 ounces; the leaves which fell from the tree every autumn were not included in this weight. The earth was then removed from the vessel, again dried in the oven, and afterwards weighed; it was discovered to have lost only about 2 ounces of its original weight; thus *160 pounds of woody fibre, bark, and roots* were certainly produced; but from what source? The air has been discovered to be the source of the solid element at least. This statement may at first appear incredible, but, on slight reflection, its truth is proved, because the atmosphere contains carbonic acid, which is a compound, or 714 parts by weight of oxygen, and 338 parts by weight of carbon."

FORETHOUGHT AND SAGACITY OF RATS.—In cutting through an embankment in a field adjoining the river Lune the other day, for the formation of one of the culverts rendered necessary by the passing of the North Western Railway in that direction, *the labourers met with between* 15lb. and 20lbs. of eels, some quite fresh, and others in the last stage of putrefaction. They varied from a quarter to half a pound in weight, and consisted of the common silver-bellied, or silver eels, and Lilliputian specimens of the conger, or sea eels. The latter, of course, had come up with the tide. As teeth marks were visible on the heads of most of them, it was conjectured they had been destroyed in that way, and stored for winter provision, by some animal whose retreat was not far distant; this proved to be the case. On digging a little further, out bounced a matronly rat, with seven half grown young ones at her heels. *The workmen gave chase, and ultimately* succeeded in killing both mother and progeny, with a solitary exception, the trunk of a neighboring tree affording an asylum to one of the family. The embankment is about 100 yards from the water's edge.

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