

4. Peat-ashes from Lüneburg, found to be a good manure (reddish-yellow). 100,000 parts consist of—

31,700	parts of silica.
5,070	alumina.
31,889	lime partly combined with silica.
0,960	magnesia.
17,728	oxide of iron, and a little protoxide of iron.
0,520	protoxide of manganese.
0,120	potash.
0,072	soda.
6,188	sulphuric acid, combined with lime into gypsum.
1,183	phosphoric acid, combined with lime and iron.
0,084	chlorine.
4,486	carbonic acid, combined with lime.

100,000 parts.

Of the peat-ashes No. 1, 3000 lbs. are often used on one Magdeburg acre of land; as thereby about 180 lbs. lime, 300 lbs. gypsum, 48 lbs. common salt, 150 lbs. magnesia, and 120 lbs. phosphate of lime, are conveyed to the soil, it may easily be understood why the industrious Belgians value them so much. Gypsum, common salt, and phosphate of lime are the substances by which they act most powerfully. 3000 lbs. of peat-ashes per acre may appear much, but if only 1000 lbs. should be applied, the gypsum only could be expected to act, as the other substances would not be present in sufficient quantity to benefit the soil. If the above quantity be new it will act for 5 or 6 years. Of the Lüneburg peat-ashes still greater quantities are used, viz. 3 or 4 tons per acre, and by such quantities the texture of a clayey soil will be improved.

We may conclude, from the component parts as well of this as all other peat-ashes, that they can decompose but little the humic parts of the soil; they serve the plants mostly as food; and as, in the main, they do not possess much of the easily soluble salts, even a greater proportion than the above stated might be applied per acre without any chance of injuring the crops. It is the small quantity which has been hitherto used of peat-ashes which has led to the opinion that they are worthless as a manure, whilst occasionally a great quantity has not produced any effect, because they contained a salt not easily soluble in water, for instance sulphate of iron; or because they contained much of phosphate of iron, which, if not soluble in water, is so in liquid humic acid, by which the plants were supplied with more iron than they could bear. Peat-ashes, however, which contain sulphate or sulphuret of iron, are, as we shall hereafter see, amongst the most valuable manures, if used in small quantities, and they entirely supply the place of gypsum.

ON THE REGISTRATION OF FACTS TENDING TO ILLUSTRATE QUESTIONS OF SCIENTIFIC INTEREST.

RUST IN WHEAT.

It was good advice which I once heard given by a dealer in objects of natural history to a friend who had offered to procure specimens for him in some foreign country he was about to visit—"If you really wish to serve me," said he, "do not send me pretty specimens, nor yet anything that you may fancy particularly curious. I am already overstocked with such objects. Just keep a jar at hand, filled with spirits of wine, or gin, and whenever you see some very common-looking reptile or insect, pop it into the jar. The chances are, that everything you may consider least worth preserving will be of most service to me." The fact is, that persons who are not naturalists are no judges of what objects are most likely to be of interest in a strictly scientific point of view. Botanists would rather receive one of our most common weeds from a newly-discovered or newly-explored country than a new species of an already known genus. There are higher departments of botany than mere collectors of specimens are aware of. To ascertain the geographical distribution of a well-known species is a point of vastly superior interest to the mere acquisition of a rare specimen. My friend Darwin well understood this (but then he is an accomplished naturalist), when he so often stepped aside from his geological and zoological pursuits, to preserve specimens of plants for me; though botany formed no portion of his immediate studies. I suppose there are few persons possessing a healthy taste for the details of real adventure, who have not by this time read his most interesting "Journal of the Voyage of the Beagle;" and from what they must there have seen of his appetite for observation, they will not be surprised to hear that I have just received from him two blighted ears of Wheat, which few persons would have thought it worth while to carry with them round the world, but which he brought home upon the chance of their affording some information on the cause of those extraordinary and devastating blights to which the crops are occasionally subject in South America. As the memorandum he has made upon the subject will possess an interest in the eyes of agriculturists, I shall here present it to your readers; and then mention the cause to which these blights must be ascribed:—

MR. DARWIN'S MEMORANDUM.

"Northern Bank of the Plata, Nov. 20-30, 1833.

"No. 1593.—Bearded Wheat materially injured by a blight, called the 'Polvillo.' When a field is attacked, it seems, even at a distance, burnt up, and of a red appearance. On walking amongst the Corn, the shoes and trowsers become covered with a fine rust-coloured powder: hence the name. The powder is lodged in minute oblong patches, beneath the epi-

dermis, which may at first be seen partially raised, and forming a scale. It attacks all parts indiscriminately. If the leaves are a little infected, the grains of Corn are light and dry; but if the ear and stalk are attacked, the crop is entirely spoiled. The blight is not observed before the grain is pretty full; and its attacks are very rapid—three or four days being sufficient to spoil a whole field. It is endemic in the whole district, though not equally destructive throughout. From this cause, last year, when the weather was wet, no grain was gathered. Hence an immense importation of flour took place from North America. This year, the weather being fine and dry, the blight will destroy or injure the greater part of all the crops. Fields thrown up in Butts, clear of weeds, on high ground, are equally attacked with those of less favoured aspect. It is here attributed to the sun's action after heavy dews. Crops grown from grain of the country, from the Cape of Good Hope, and from Rio Negro in Patagonia, were all more or less affected. It is remarkable that the Wheat at Rio Negro itself (which is grown on low diluvial lands) produced, even last year, its immense crop uninjured. This blight is a prodigious evil to the country, and most mortifying to the agriculturist, who does not know that all his labour will be lost, till within a week or fortnight of the time when he was expecting to reap the fruits of it."

This account of Mr. Darwin's would alone have inclined me to suppose that he was describing an example of a very virulent attack of rust or red-gum, a form of fungus which I have noticed in the Journal of the Royal Agricultural Society, vol. ii. p. 9, and again at p. 220, where I have endeavoured to prove its specific identity with mildew. The two forms of rust with which we are acquainted in England have been termed *Uredo rubigo* and *Uredo linearis*; and it should seem that the form which ravages the banks of the Plata is the latter, for I sent one of the two specimens with which Mr. Darwin supplied me to the Rev. M. Berkely, who is far better authority on such a point than myself, or than any one else in this country. His remarks are as follows:—"Your rust appears to me the same with what I have received from Ohio, and agrees with our European species, which is referred to *U. linearis*, distinguished from *U. rubigo vera* by its longer spores, and by the more inflated cuticle of the sori. I believe *U. rubigo vera* to be the young of the common mildew. I have never myself gathered *U. linearis*. The La Plata specimen exhibits plainly the myceloid base. I have also *U. rubigo vera* from Ohio with the European characters."—*J. S. Henslow, Hitcham, Sept. 9.*

ON SEA-WARE.

SOME of your correspondents have noticed the properties of the *Alga marina*, and the modes of using it, but not so fully perhaps as might have been expected. The names of *Varech*, *Wrack*, or *Wreck*, by which it is designated by the farmers on the coasts of Brittany and Ireland, where the Celtic is the vernacular language, explain to the etymologist their true signification—substances thrown up or torn away, as the sea-weed is, by the force of boisterous waves. Strange to say, the authors of the "Cours Complet d'Agriculture" have asserted, without even a modest doubt of the correctness of their judgment, that all marine plants, so called, are animal productions, though resembling the latter in form and organisation: they considered them to be either the remains of animal matter or the receptacles of animals, confounding all the tribes of *Alga marina* with coral fabrications, &c.

The primitive mode of using sea-ware was, probably, that of spreading it on pasture land; the more artificial system of applying it to the formation of composts, and the blending of it with the soil by the plough or spade, were subsequent steps in the progress of husbandry; yet, though various methods of combining this substance with the earth have been adopted, there is no uniformity of practice observed. The spreading of sea-weed very thinly and as fresh as possible produces a rapid alteration on coarse and unsavoury pasture; the quality of the herbage unequivocally shows the beneficial effects of the saline substances which the weed contains, and the cattle which feed upon the new Grasses improve in health and condition.

The best season for putting out sea-weed in this way is in the early part of the spring, at which time too it yields the most abundant supplies; but unless the fields be adjacent to the coast, and the quantity of weed excessive, I do not consider this so economical a mode as that of mixing it with other substances in compost, or that of spreading it on stubbles, if in the winter season, and ploughing it into the ground, by which means it becomes an active agent in decomposing the short straw, which otherwise would be suffered in many instances to wither away on the surface of the land, instead of being rotted and incorporated with it.

It is a common practice in some parts of Ireland for the peasantry whose fields may be a few miles from the strand, to collect and dry the weed in the latter part of spring, if it should at that period be wasted to the coast, and to convey it when dry from the influences of the sun and wind, in large bulk to their Potato-drills, over which they shake it thinly, but not actually in contact with the germinating sets, which perhaps have been in the ground a fortnight previously. This mode, however, indicates the inability of the person who so uses the weed, to manure his crop at the usual time, and with a better material. Four moderately-sized (one horse) cart-loads saved in the above way is sufficient for a rood of Potatoes, the ultimate success of which is most uncertain,

depending on the timely application of the weed (which in a calm season may not be collected), and the subsequent humidity of the atmosphere. As regards the succeeding crop of Corn, this mode of applying the weed is the most defective; but the immediate effect upon the vegetation of the plant from the absorption of the saline matter is very apparent, though I have never seen large tubers raised in this way (nor very farinaceous ones with any modification of the manure in question), comparatively with the other methods. In dry weather the weed lying on the surface shrivels up; but when affected by moisture it expands again. The salt, which does not evaporate like gaseous matter, acts in a humid atmosphere continually as a stimulant; yet common salt, if scattered over the ground, would not serve in the same manner. There must, therefore, be certain combinations formed that favour vegetation, by means of the excessive susceptibility of absorbing moisture from the atmosphere which the *Alga marina* possess.

On the coasts of Brittany and parts of Normandy, sea-weed is sometimes reduced to ashes in order to obtain the alkalies they yield by this process for manure (I am not alluding to the common operation of kelp-making), which is spread on the surface. This, I think, is a wasteful way of using it. The most generally convenient and profitable manner of converting sea-weed into manure is to remove it from the beach as soon as circumstances admit, and to lay it on a substratum of sand, loose mould, or scourings of ditches, to absorb the oily juices and salts which the weed contains, until he can find leisure for taking it away. The force and rapidity with which the fluid penetrates through the subjacent layer, and rots whatever vegetable substances it may contain, is astonishing. In the course of putrefaction the weed generates maggots and flies in immense quantities—a living testimony to the richness of the matter which produces them. For stiff soil, which this weed of itself has a tendency to render still more cohesive, a mixture of sea-sand is preferable to that of clay, as the latter would answer better for a light sandy soil; but any calcareous sand and a rich loam can never be otherwise than valuable recipients of the sea-weed, which should be fully blended with the substratum, whatever that be, until the whole becomes a black mass of well-pulverised compost, which any one possessing the sense of smelling will perceive to contain a great portion of carbonic gas—the principal food of plants. A compost of this nature is a chief resource of the farmers in the baronies of Forth and Bargie on the Wexford coast; without it many of them would be poor indeed; by means of it they are enabled to raise some of the heaviest crops of Beans and Potatoes that I have ever seen.

In the Sketches of East Lothian Husbandry it is considered a very useful species of manure for the light dry soils adjacent to the coast, but not advantageous on clays—"immediate, but transient in its effects," "seldom lasting longer than a single crop." It is certainly much better for light than heavy lands, but I have found it very efficacious on stiff soil also, when applied in the compost form; it is "seldom mixed," in Berwickshire, as the Report continues to state, "with other substances." If it were combined with sand, the mechanical effects of which in loosening cohesive soil are so perceptible, it would be found effective. As to its being transient, "only lasting for one year," so is guano, which, on the high authority of Professor Buckland, is so volatile, that it produces but one crop. But this mode of expression is practically incorrect, for these volatile manures cause the earth to yield two crops, sometimes three; Potatoes or Turnips, succeeded by a Corn-crop, may be followed in many cases by Clover. Though the properties of such manures be too evanescent to afford nourishment to a second or third crop, they are the agents through which the farmer is enabled to pursue the course of preparation of the soil, by which he renders his land productive of the succeeding crops. The great degree of tilth which usually accompanies manured green crops insures, on a soil of good quality, which has not been exhausted by over-production, a crop of Barley succeeded by Clover. Supposing a sufficient quantity of lime applied to the Clover-ley, for Wheat, after it has been fed off by sheep or cattle (not mown), the farmer will find his compost of sea-ware, &c., again successful in the second rotation, immediately after the Wheat; but he will act more judiciously in using farmyard dung, the superior value of which is undoubted, if he can. Judiciously managed, sea-ware, though far less permanently beneficial than other manure, is a valuable auxiliary to any sea-coast farmer, because it affords him the facility of pursuing his regular rotations if the farmyard dung be insufficient; and to the poor peasant it is in countless cases the sole means which he possesses of raising his Potato-crop. But except to husbandmen, whose land is close to the shore, the collection of sea-weed ought not to be systematically an object of anxiety, because the gathering and removal of it, if the distance exceed a very short space, greatly interrupts the regular routine labours of a farm, and occasions much fatigue to the horses employed in drawing it from the shore to the bank, during the busy intervals between the tides which bear it to land; and such labour and fatigue are hardly compensated by the acquisition of it, unless the subsequent cartage be inconsiderable: to the farmers who cultivate the sea-coast of Berwickshire, and who are, in every respect, among the magnates of their valuable order, I can well conceive that an influx of sea-ware is unimportant; to those who can accumulate, *ad libitum*, the best farmyard dung by means of cattle, Turnips, oil-cake, and straw, the extraneous manure which the sea affords, with more or less profusion, is not an object of much value.