

to vegetation with that in a cwt. of Ichaboe guano. Those who are doubtful upon this point may easily supply any supposed deficiency in the former, by the addition of a few pounds of sulphate or ammonia.

"6 The proportion of the phosphates in bones is twice as great as in the Ichaboe guano. In this respect, therefore, bones are decidedly the more valuable.

"c The soda salts are generally in somewhat larger quantity in guano.—They consist chiefly of common salt, mixed, in the case of guano, with a variable proportion of sulphate of soda. If any stress be laid upon this difference, it is easy to remove it, by adding to the bones a few pounds of sulphate of soda, which can be bought at a very moderate cost."

From this comparison between bones and Ichaboe guano, Johnston thinks that we are entitled to infer—

(1.) That what can be said of the value and permanent effect of the one manure may almost of equal truth be said of the other.

(2.) That we can fully supply the place of the one by the use of the other; and, what is more important to our present purpose,

(3.) That, *weight for weight, bones ought to go farther than Ichaboe guano in fertilizing the land.*

In following up this subject the writer quoted, puts these questions:—If this latter inference be true, why do bones not produce in all cases an equal effect with guano? Why are 8 or 10 cwt. of bones required to raise an average crop of turnips, while 4 or 5 cwt. of guano will fully serve the same purpose? The answers to those questions are—(1.) That while guano is in the form of a fine powder, bones are often applied either in form of a coarse powder or in large pieces, and are thus unsuitable for giving immediate action; also (2.) The chemical condition of the organic matter is different in the two substances, being in guano in a great measure in a soluble state.

The gelatine or organic part of bones consists, according to Johnson, of

Carbon	50.37
Hydrogen	6.33
Nitrogen	7.55
Oxygen	25.35
	100.

And is thus identical in composition with horn, and with isinglass, and nearly so with hair, wool, and skin, containing nearly 18 per cent., or one-sixth of its whole weight of nitrogen. The last-mentioned fact is sufficient to suggest the utility of this gelatine as a manure, and it has been in fact found in practice to be a valuable manurial agent when employed in the form of waste size obtained from the calico manufactories of Manchester. This proves that the beneficial action of bones as a manure depends to a certain

extent upon their organic, as well as their inorganic constituents. These details we give as an explanatory reply to the question often put, Are burnt bones as valuable as fresh ones? It will be seen that unburnt bones are the more perfect manure, since they contain nitrogenous matter as well as phosphates.

Mr. Watson of Keilor, was one of the first agriculturists to draw attention to the importance of bones as a manure, and his highly successful experiments detailed in the first volume of the "Quarterly Journal of Agriculture" (1828), have been fully borne out by the experience of succeeding years. Their remarkable effects in inducing a luxuriant growth of turnips were well shown; and doubts having been raised whether the succeeding crops of oats and barley were in any degree benefitted by the small quantity of bones used in growing a crop of turnips, he confidently stated that on his farms, both the quantity and quality of his barley particularly were improved, and the grass for the first year was a fortnight earlier in its growth than after other manures. In the crop of 1825 the bone manure was a great blessing to the breeders and feeders of cattle in Scotland, and in some instances saved the industrious tenant from ruin. The severe drought even of that season did not prevent a crop of turnips with bones, while all other manures failed; and it was thus the means of bringing through that disastrous winter herds of cattle which must have otherwise perished for want of fodder.

BLIGHTS AND DISEASES OF PLANTS.

When animals die putrefaction ensues, and their bodies become more or less quickly decomposed. The same is the case with plants. Their bodies are no sooner dead, than they begin to undergo the putrefactive process, and to resolve themselves into their chemical constituents; they in great measure pass away into a gaseous form. Now this decomposition in dead animals and plants is usually attended by the presence of certain living organisms; some of the low forms of animal or of plant life, such as the common blue mould with which we are all familiar as occurring on decaying substances, although we do not all know it to be itself a peculiar form of vegetable existence. Now some of these minute and lowly organised plants and animals often make their appearance in the tissues of the bodies of living animals and plants of the higher forms, especially while these are labouring under disease—seeming Vulture-like to await the anticipated dissolution. In certain diseases, in fact, there are certain of these organisms constantly present, so much so indeed that

the presence of the parasitical organism is regarded as a diagnostic mark of the disease. These facts show that in discussing the *diseases of plants*, we ought always to devote special attention to those fungoid parasitical growths which in plants are so conspicuous, as they are no doubt in many instances connected with plant-diseases; these in fact arising much more frequently in this way than the diseases of animals.

According to Schleiden, the condition of a plant as an object of cultivation and its disposition to disease are perfectly identical. Both are alterations of chemical action in the plant, produced through the conditions under which it grows.—All our cultivated plants, with very few exceptions, may be regarded as diseased; that is, as deviations from the normal process of formation of the species, and it is only the egotism of man which thinks otherwise of them, in as much as he finds his profit in these diseases as in the artificial enlargement of the liver in the Strasburgh goose. The greater part, indeed, if not all the peculiar internal diseases to which plants as well as men are subject, arise from an improper, deficient, or more frequently too abundant nourishment. In order, however, not to deviate too widely from the common mode of speech, Schleiden distinguishes that condition of cultivated plants in which they deviate from the normal form which they exhibit when wild, in consequence of too abundant nourishment as a general inward tendency to disease.

This tendency, however, becomes specific when they belong naturally to a very light or sandy soil, as oats or potatoes, and are now cultivated on heavy ground, or if, in consequence of the plan of cultivation which was once universal, they are grown in the first year in which the land is manured as wheat, rye, potatoes; or finally, if the climate in which they are cultivated, deviates greatly from their natural place of growth as is the case in wheat, maize and potatoes. Under these circumstances, very slight prejudicial influences are requisite, as for instance wet, cold, or extreme heat at an improper time, to cause the appearance of disease.

The only point which man has in his power is the avoidance of unsuitable soil and site in the cultivation of a plant, which will, however, be exercised by every intelligent agriculturist. Climate is beyond our power, and we cannot increase the general disposition to disease without at the same time hazarding the total loss of any particular species. The outer appearances of the diseases of vegetables are well known, and their specification belongs to the pathology of plants. The inward phenomena, as far as they have at present been examined, possess something general, which deserves a place here since it points decidedly to the fact