

as, though varying considerably in quality, all been remarkably free from sand and foreign matter; and when directly im- analysis has been less important than other manures, the more especially as differences in quality are not recognised as modifying the price. It is probable, however, that attention will require to be paid to this in future. A case has recently occurred in which a cargo of guano said to be questionable direct importation from the Chincha Islands and to contain in some parts as much as 50 per cent. of sand, and only 11 or 12 of ammonia. Should this turn out to be actually the case, then much greater vigilance will be necessary, and no one will in future purchase a Peruvian guano without analysis. The investigation in the case to which I refer is not yet complete; but I understand there is little doubt about the truth of the circumstances which have come to my knowledge, there is reason to suspect that all similar cargoes have been imported. In understanding these differences, however, it is admitted that Peruvian guano is distinguished from all the other varieties of that name by a certain degree of uniformity, so that, as far as it is to be genuine, the chances are that the purchaser receives value for his money. But this is very different with the other kinds of

These differ not only in composition from Peruvian guano, but are obtained in most cases from small and shallow deposits, so that different cargoes, and even different parts of the same cargo, differ to an extraordinary degree. The farmer therefore, can place no reliance upon their uniformity, but every cargo requires to be separately examined. Still less can reliance be placed upon the name given them. When we speak of Peruvian guano, we always think of that which comes from the Chincha Islands. But Chilean, Bolivian, and Bolivian are names applied to guano found at different places along the coast of those countries of even several hundred miles apart, and which have not the slightest resemblance in composition. All other guanos differ from Peruvian in regard to the quantity of ammonia they contain. Peruvian guano, from its being deposited in the small zone in which it falls, retains almost undiminished the ammonia existing in the dung of the bird; but in other localities rain has produced a greater effect upon the manure, causing the more complete decomposition of the organic parts, which, along with the soluble matters, is wasted out. It is then possible in the samples from different localities to find a gradual passage from guanos like Peruvian in ammonia, until we arrive at those which have been so long and thoroughly exposed to weather that little more than traces of ammonia remain. In consequence of the presence of these substances, the phosphates have been the largest and most important constituents of those guanos, which are commonly designated as phosphate guanos. But the

difference does not stop here; not only do these guanos often contain a considerable quantity of sand, due no doubt in part to the subjacent sand being sifted along with it when it occurs in thin layers, but they often contain carbonate and sulphate of lime, and sometimes oxide of iron. The mode in which these substances find their way into these guanos is not well understood, because the localities have never been examined by scientific men; but they are not alterations, that is to say, they have not been deliberately added to the guanos, although of course they necessarily diminish their value. The composition of guanos other than Peruvian is so variable that I shall not fatigue you with reference to numerical details. I shall content myself with observing that the analysis of such guanos are made out in exactly the same manner as that of Peruvian, with the addition, however, of the constituents which they often contain. In reading the analysis, reference must in the first instance be made to those substances, and their amount, together with that of the sand and water, being added together, you get in the first place the total quantity of worthless matter. In the next place, attention must be directed to the quantity of phosphates; and it is necessary to bear in mind that in guanos of this description from a-half to five-sixths in their value depends upon the quantity of phosphates they contain; while the ammonia, especially in guanos like Saldanha Bay, Patagonian, Chilean, &c., is comparatively unimportant. Little difference is found in the mode of expressing the analyses of guanos, almost all chemists being agreed as to the system to be employed. The only difference is, that occasionally the phosphoric acid in the alkaline salts is written in the body of the analysis; occasionally also the phosphates of lime and magnesia; but such differences cannot occasion any difficulty. It sometimes happens, however, that analyses are seen with such items as phosphate and carbonate of lime, sulphates of lime, potash and soda. The analyses with such heterogeneous items should be unhesitatingly rejected. They are entirely worthless, and in place of affording the means of forming an estimate of the value of the manure, are only calculated to mislead and confuse the purchaser. When we turn to the analysis of a super-phosphate, many questions present themselves to us for consideration, dependent on the fact that these are manufactured manures, and that their composition depends to a great extent on the nature of the materials employed in making them. It will be understood that the term super-phosphate was originally applied to a mixture of common bones and sulphuric acid, and therefore strictly merited the name of dissolved bones originally applied to it. The introduction of coprolites, and more recently of apatite and various other phosphates, has rendered the wider designation necessary. The use of these substances has also entailed further differences in the mode of manufacture, sulphate of ammonia, flesh, fish, offal, and vari-