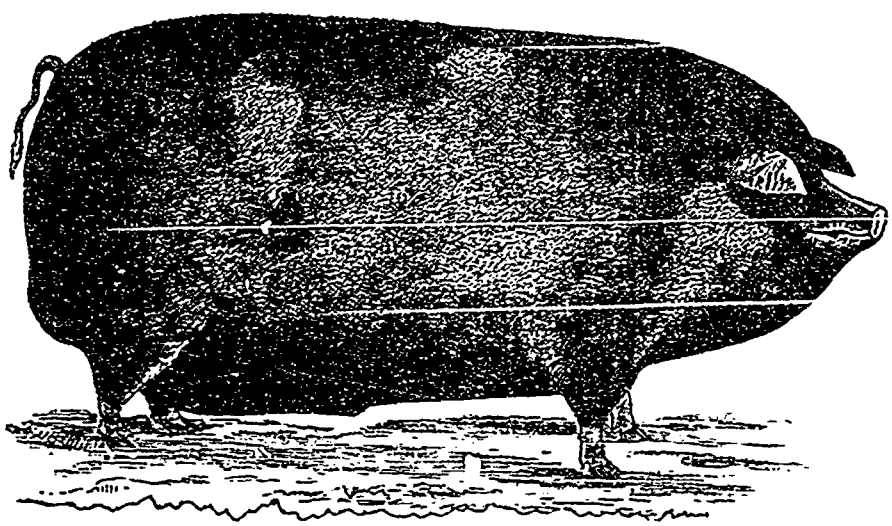
It is evident that, while the unmanured plot shows an average higher than the last 10 years, it is considerably below that of the average yield of the previous 18 years, and the whole period of 28 years respectively. This plot has been now entirely without manure of any kind for 40 years, and is evidently suffering from exhaustion. The plot having had 14 tons of farmyard dung every year gives nearly 39 bushels, which is above the average of the three periods. The three artificially manured plots give about the same as their average for the 28 years.

In 1874, the only good wheat year of the last ten, the produce of the unmanured and the dunged plots was almost exactly the same as this year; but the mean yield of the three artificially manured plots was, in that year, 39½ bushels, against 34⅝. the yield of this year. The mean produce of whole plots (unmanured, dunged, and artificially manured) is equal to 27 bushels of 61 lbs. to the acre; and from these data Mr. Lawes calculates that, as his farm and neighbourhood suffered more than most parts of England from heavy rains in July, the average crop of the country will, when threshed, turn out to be something like 30 bushels an acre; amounting in all to something like eleven and a half a millions of quarters, precisely the amount at which I arrived,



POLAND-CHINA PIG.

(see October No. of Journal) by a perfectly different process of reasoning. England's wants this year, at 5½ bushels per head of population, will be 24 and a half millions—therefore, deducting seed, she must import 14,000,000 quarters, or 112,000,000 imperial bushels. She will not have much difficulty in finding them.

We see now what chemists have done for agriculture—let us look on the other side of the question, viz: what they have left undone, but what, in time and with patient study, it is to be hoped they may some day accomplish.

Sir Ughtered Kay-Shuttleworth, chairman of the section, stated at the Edinburgh meeting, that he questioned very much whether agricultural chemists had got beyond the mere rudiments of their business. "We want chemists of authority and standing, men of large scientific training to give themselves up, not so much to what had been alluded to at the meeting, not merely to making analyses of manures for farmers, and telling them what substances they received, but men who should enter into the very essence and principles of the matter, and tell them the reasons why particular soils required particular manures, and what were the manures calculated to bring into play the best qualities of the different soils we have to do with."

I, for instance, should like very much to know why lime is of no use, or, at least, of no paying use, in the East of England; while chalk and marl (both equally carbonates of lime) are of the greatest possible benefit. Why is guano invariably used for turnips by the best farmers in Scotland, and of course profitably, whereas, in Kent, it is money thrown away, in nine cases out of ten?

If, again, hay is only grass deprived of its water, why does it not fatten cattle as well as the original herbage? Swedes and other roots are said to contain, in round numbers, 90 per cent of water. Is that water common water, or does it contain some mysterious substance unknown to chemists, which accounts for the rapid fattening of cattle fed on them? Take again the varying quality of grain and other crops—why do oats grown on gravel answer for porridge meal, and when grown on clays suit brose and cake? Why does the Vale of Aylesbury fatten on its grass the largest oxen, and the Vale of Evesham, equally rich in appearance, refuse to do anything of the sort? Why, as I have before remarked in this journal, do the Scotch turnips with straw fatten bullocks, and the Kentish turnips with hay refuse to fatten sheep? It won't do to say it is the climate, for on the coast of Sussex the same difference exists between crops of swedes with only 10 miles of distance from one to the other—notably, between Hove, near Brighton, and Shoreham. All these questions chemists must find an answer to, some day or other, if they wish to retain the farmers as their clients.

We all know, practically, that wherever a deep friable loam rests upon a thick bed of gravel, and that upon clay, we find a fertile soil that will grow anything you like to ask it. On the other hand, a thin clay, on a retentive subsoil, will grow nothing except at an immoderate expense.

Look at the table lands of the Andes. Wheatfields there have yielded good crops for more than two centuries. At Santa Fe and Quito potatoes grow for ever on the same soil, and are nowhere better. Talk about *humus* being a necessity of fertility! How about the land near Vesuvius, formed as it is by the disintegration of *lava*, and containing not the smallest particle of vegetable matter; and yet every one knows that when this lava has been exposed to the air for a time, all kinds of plants grow in it with the utmost luxuriance.

Why does the bite of the deadly *Cobra* inflict no injury on the *Mongoose*? The *Acari* feed on the poison, *strychnia*: and the *Hornbill* (Buceros) eats with impunity the fruit of the *strychnos*, (*Nux vomica*) tree: yet chemists can give no reason for such anomalies!

And, thus, we see that, in spite of all our searching, nature has still secrets of her own which she seems, at present, resolved to keep from us. Even Liebig allows that the *physical* conditions essential to the fertility of a soil are unknown to the enquirer: a mere chemical analysis being of very subordinate value, since all the mineral means of nourishment in a soil do not necessarily afford a measure of its value, nor does the want of vegetable matter prevent its being able to produce luxuriant crops. Whatever it is that causes fertility in land, climate must be a great factor in it. All the instances of perpetual fertility are found in a southern climate: