

the influence, for the improved stock originated by Bakewell, the artificial food raised to feed the improved stock, the scientifically constructed drills, horse-hoes, and other implements which the Norfolk rotation called into use, all met with an extended development in the retentive soils rendered kindly by the use of "Parkes' clay pipes." It will usually be found that an advance in one direction gives a corresponding impulse in every other.

The Royal Agricultural Society had an important share in the propagation of the principles of thorough drainage first propounded by their author in a complete shape in a lecture at one of their meetings at Newcastle. Another great change, by a fortunate coincidence, accompanied, or rather preceded, the conquest over the clay lands. This was the chemical revolution, which gave the farmer the use of concentrated portable manures, for stimulating the growth of crops in a degree unknown to the preceding generation. Previous to 1835, as nearly as we can fix the date, agriculturists, in addition to farm-yard dung or night-soil, employed as manures lime, chalk, gypsum, marl, soot, salt, saltpetre, rapecake, and bones. The discovery of the fertilizing properties of bone was accidentally made at a Yorkshire foxhound kennel. Liberally used on the heaths and wolds of Lincolnshire, it was the philosopher's stone which turned rabbit-warrens and gorse fox-coverts into fields of golden grain. A Mr. Nelson, one of the late Lord Yarborough's tenants, used to say, that "he did not care who knew that he had made £80,000 out of his farm by employing bones before other people knew the use of them." But what succeeded in one parish or even in one field often failed in the next, and sometimes the farm which had once yielded bountifully in return for a dressing of lime or gypsum stubbornly refused to respond to a second application. Worse than all, the root crop—the foundation of the famous Norfolk rotation, the wealth of half a dozen counties—began to fail, devoured in tender infancy by the fly; and, without the turnip, where was the food for sheep and winter-fed cattle? The philosopher came to the assistance of the farmer, and rescued him by timely aid from the difficulties which beset him. Nitrate of soda and guano were imported, superphosphate of lime from bones was invented; and agricultural chemistry, having earned the place of a practical, that is, a profitable science, the anomalies in connexion with the use of lime, chalk, gypsum, &c., were mastered and explained by the joint exertions of the farmer and his new ally the chemist.

Nitrate of soda was imported from Peru and sold in small quantities by an agricultural manure-dealer somewhere about 1835, and in the same year a cargo of guano was consigned to a Mr. Myers, a Liverpool merchant. Guano (of any agricultural value) is the dung of sea-fowl feeding on fish in a zone where rain rarely falls. The guano of the Peruvian islands was protected in the time of the Incas by special laws. In 1609, its properties were fully described in a work published in Lisbon by Garsilaso de la Vega, but this precious fertilizer was neglected in Europe until the date of Mr. Myers' importation, when investigations into the chemistry of agriculture, commenced by Sir Humphrey Davy with very little practical effect during his lifetime, and carried on by continental philosophers, were beginning to bear fruit. Guano, although incredulously received by farmers in 1836, was eagerly accepted by the dealers in artificial manures, and sold, either in a pure state or under a special name, mixed with less active ingredients. In 1843, a store inferior to that of Peru having been discovered on the Ichaboe Islands, on the coast of Africa, 1100 feet long, 400 broad, and on average 35 feet deep, the whole was removed before the close of 1844, and realized upwards of a million sterling. Three years previously, an article of forty-three pages, from the German of Dr. Charles Sprengel, appeared in the first volume of the "*Journal of the Royal Agricultural Society*," in which, though every kind of animal manure was described, guano only received a