ging it in the centre, between the drills. Such a watering—now called liquid manure—kept the land mellow and free of cracks during the following summer. It might be considered expensive to manure in this way; but I found the crops to pay well for that trouble. I cultivated no more land than I could find means to manage well.

The consideration which led me to adopt the drills at nine inches apart was this—I observed a very strong wheat-stalk in the month of July, and in its neighbourhood several puny stalks with thin, short heads. With a wooden skewer I cleared away the soil from the roots of the large and two small stalks.

On taking them up I measured the tap roots and lateral feeders, and found they measured—the large stalk tap root 5¾ inches; the lateral feeders or side roots 3⅝ inches at each side of the tap root; the length of the side roots declining as they descended towards the point of the tap root.

The small stalk tap root measured but 3¼ inches, and the longest side root measured but 2⅝ inches from the tap root; the length declining downwards. The longest side roots, in both cases, were nearest the surface of the soil.

From the examination of those stalks and roots, I drew the inference, whether just or unjust, that the land was not capable of supplying so many roots with food, but could be made to do so by a supply of liquid manure occasionally applied. I also drew the inference, that, at least in width apart of drills, the distance should be double the length of the longest lateral roots, or 7¼ inches, to prevent their interference with each other's food; but I should prefer *nine inches* apart, or *more*, to prevent that interference. It appears to me as necessary, in the economy of growing corn, to keep the feeding plants in their own places, and to their own supply of food, as it is in the fatting of animals, to keep them and their food separate from each other; otherwise, as in the stalks before alluded to, the stronger will eat all, and the weaker plants and beasts must perish.

In the preparation of oat-seed, I followed the same plan as with wheat; but as the specific gravity of oats is less than wheat, I dissolved only one peck of salt and four ounces of salt-petre in seventy gallons of water, so that the good heavy grains might sink, and the light bad seed swim, to be skimmed off. The time of steep was four hours, as for wheat, and I used lime, without ammonia for drying. With your permission, I shall return to this subject on some future occasion.

I am, Sir,

PHILO GEORGIUS.

ON THE COMPOSITION AND USE OF ARTIFICIAL MANURES.

Professor Johnson, at a meeting of the Highland Agricultural Society at Inverness, proceeded to explain the nature of what were called artificial manures, and to recommend their use. In regard to the nature of these manures, he might state to them that they might be arranged into two different classes—such as consisted of mineral only, and those which were composed of organic matter. He believed most of them were aware, that the mineral matter contained in the soil and the mineral matter contained in plants was composed of the same substances. There were a considerable number of different things of a mineral nature which went to the composition of plants. Some of the manures applied to the land consisted wholly of mineral matter. Amongst these, gypsum was much used, which was entirely a mineral manure, sulphuric acid and lime, common sulphate of soda, and other substances.—But there were mixtures of these substances, and these mixtures were now used very extensively. They were made up containing all the different mineral ingredients to which he had referred; and they were mixed on certain principles which he would explain. There was also a class of artificial manures, which contained what he might call combustible or organic matter, which could be consumed or burned. The manure used in fertilising ground, very frequently contained a portion of this organic matter, which was of great value in the growth of plants, and which he would by and by explain. Amongst these manures, so extensively used of late, was ox bones, which were composed of the following substances:—

Cartilage - - - -	33.3
Phosphate of lime - - -	57.1
——Magnesia - - -	2.0
Carbonate of lime - - -	3.9
Soda, with a little common salt,	3.4
	100.0

Now, 33 per cent. of this matter burned, while the rest was not consumable. Rape-dust was extensively used as manure, and contained a large proportion of organic matter, for when it was burned it left a residuum of 8 or 10 per cent. of mineral matter. Another substance—guano—which was the droppings of birds, was very different, and, when burned, left a large proportion of mineral matter, and was a very useful manure, if applied in proper time, in proper quantities, and under right conditions. These substances were more or less natural manures; but now they had received, in consequence of the researches made into the composition of plants, and soils, and minerals, a knowledge of what a given soil required to grow a given crop. They were, therefore, enabled to make artificial mixtures of what the soil required to grow a given crop, and he considered this most important in the present transition state of their Agriculture. The principle was this: if they took a given plant of any sort and burned it, there remained behind a certain quantity of mineral matter—sometimes more and sometimes less, according to the nature of the plant.—Grain contained a certain quantity of mineral matter, and the straw a great deal more. Now in proportion to the different quantities of that matter carried off by the crop was the exhaustion of the soil. One plant contained more of one substance, and another of another. The principle upon which the manufacture of the substances to be added to the soil for the purpose of giving it fertility proceeded, was to compose such a mixture as would give back or add to the soil in sufficient quantity the constituents of the crop which it was intended to raise, and it depended on a knowledge of the number of those substances, and the proportion in which they existed in different plants, that this could be effected. So much in regard to the nature of artificial manures, and the principle upon which they were manufactured, and upon which their virtue depended. Now, the next point was the recommendation to use them. Many excellent old Farmers told them there was nothing like farm-yard dung, and many young Farmers, and those who had learned most, would say the same thing. Now, all present knew that if they had plenty of well-prepared farm-yard dung, not exhausted of the liquid, which, in too many cases was allowed to run to waste, they need not be afraid of growing excellent crops from that alone. But if they were to look to the best husbandry in the island, and to ask how it was that those men were most prosperous, every one acquainted with the matter would give them the same answer as he would give. These men farmed the highest and added the most manure to their land. They had not been satisfied with returning to their land what they took out of it, but they had uniformly got manures from a distance for the purpose of supplying that additional quantity above what they could produce themselves, for bringing their land into its highest state of activity. He laid it down as a general rule, that in order to have their land in the highest state of fertility, they must add to it more manure than they could make upon their farms. The Agriculture of Great Britain, although most advanced in the world, was nevertheless capable of being promoted to a degree which it was very difficult to form any conception of. This was to be effected after adopting thorough-draining, subsoil-ploughing, and other mechanical means, for improving the soil by more skilful manuring than had been hitherto practised, which was essential to good farming. He recommended this high mode of farming, not only because it would be beneficial to the country, but because it would also be productive of greater profit to themselves. After referring to the improvements which were going on in the northern part of the island, on several estates, and on lands which had never before been cultivated—in one instance, at an expense of £10 an acre—he said, although they were exhibiting extraordinary perseverance, industry, and skill, in improving the soil, it