driving it out of cultivation. I do not know whether these qualities of the potato and Hopeton oats be within the dominion of mechanical or of chemical causes.

"2. WHEAT.—Winter wheat fails in many places where spring wheat is found to do well. Such a result has been observed in the island of Islay, where so many improvements have, in late years, been made by Mr. Campbell of Islay. Is chemistry or climate, or the special constitution of the variety of wheat, or the mechanical condition of the soil?—and which of these causes has most to do with the capability of this or that field to grow white or red wheat, or with the greater reproductiveness of this than that variety of seed on similar soils?

"3. BARLEY affects a lighter soil, but the quality of the grain varies with the natural dryness, the drainage, or the quality of the land; and the malster, the feeder, or the pot-barley maker, buy it accordingly. Yet, in regard to the physical condition of the soil, different varieties have different tendencies. The chevalier barley grows on clays on which the Annat—one of our best varieties—does not succeed; and this is probably one reason why the chevalier barley has spread so widely, and yields good crops even on the Huntingdon clays. Some varieties show a great indifference as to the physical nature or condition of the soil, while others are most choice in their selection of a suitable soil. Thus the Annat variety, already mentioned, not only dislikes a clay, but a gravelly soil also, and thrives best on a dark coloured loam.

"4. RICE grows usually on low alluvial flooded tracts of land, and abundance of water at the earlier stages of its existence are, in most cases, a necessary of life to this plant. But there are varieties of hill rice which grow healthily, and ripen on dry land. This difference, though a little more striking, is, in reality, not more remarkable or deserving of attention than the constitutional differences above mentioned in regard to barley.

"5. THE TURNIP.—The numerous variety of turnip so generally known in this country, differ little less in habit, and tendency, and choice of soil, and power of resisting climate, than varieties of grain do. It is essentially favoured by a cold and humid climate. Hence it is a less profitable culture in our southern counties, and yields less abundant crops along our eastern borders. The yellow and the white varieties differ greatly in nutritive value and in climate habits. Of white turnips, again, varieties differ. Thus the *white stone* comes quicker to maturity than the *white globe*; so that what is fitted to nourish and bring forward the one will not promote the growth of the other in an equal degree, or cause it in the same month of the year to yield an equal crop. In different districts, also, and under different treatment, the same variety is differently nutritive—a circumstance of much importance in all experiments on feeding.

"The turnip is also liable to special attacks from insects, and special diseases—such as that called fingers-and-toes—accidents which are more or less completely beyond the calculations of pure or theoretical chemistry.

"6. As the cultivated carrot is the offspring of the wild carrot (*daucus carota,*) so the white beet (*beta vulgaris campestris alba*) and the mangold-wurtzel (*beta vulgaris campestris*) are allied to the sea-side beet, (*beta maritima,*) which, like them, has a fleshy root, and is good for food. This analogy indicates the probable wants of the beet tribe, the probable utility of saline applications to the plant while growing, and the especial expediency of making experiments upon it with that common salt for which the *beta maritima* frequents the sea shore.

"The farmers of the Guildford Club (Surrey), in a recent discussion on the growth of beet, came to the unanimous resolution that, in their soils, experience had shown common salt to be a valuable promoter of the growth of this root, and that it was worthy of being generally recommended.

"The analogy above stated throws light on this result of practical experience, and points out to the improving experimenter the special value to him of a familiarity with such analogies: they not only modify and restrain the conclusions to which pure chemistry might erroneously lead him, but they indicate new paths of enquiry on which his chemical knowledge may exercise itself to the manifest advantage of scientific agriculture.

"7. THE PEA exhibits, among its several varieties, similar liabilities to be attacked by insects as the turnip does, and which, as in the case of the turnip, do not admit of easy or satisfactory explanation.

"I lately saw on the home farm of Lord St. John, at Melshburne, in Huntingdon, a field of winter peas, sown in November 1848, which had been all treated and manured alike, but on one half of which the seed sown was the early maple—a common field pea; on the other half the Ringwood marrow dwarf—a white pea. The latter was attacked at Christmas by the slugs, and in great part devoured so as to require filling up with fresh seed, while the former—the grey pea—was untouched by them. There may have been some other reason besides the difference of variety for this limited attack of the slug; but it is obvious that circumstances or liabilities of this kind may materially modify the effect of chemical applications made to our crops, and may be the often unsuspected cause of important discordancies in our results."

Professor Johnston also shows that the experimenter must know of what the soil consists (telling him of course, in case he should not, in his own popular style), the difference of soils from geological origin—chemical combinations in the soil and plants—the general principles of husbandry, with local or individual practice. He must possess local climatic knowledge, and know the composition of the several parts of animal bodies—how they are built up and sustained; the general functions of the animal body, and special structure of the digestive organs; the general relations between the soil, the plant, and the animal. Through the perception of such relations it is that, according to Professor Johnston, analyses are to be corrected, and an exact knowledge of the composition of the plant, the soil, and the animal, arrived at. The experiments which he suggests, he says, will rectify past results, and suggest researches. "The results of these, again, will send us back to revise our opinions, and repeat our analyses; and thus, by the joint aid of the laboratory, the field, and the feeding-house, will Scientific Agriculture be carried slowly but steadily forward."

It is on that same progressive principle of investigation we attach importance rather to the elementary portion of Dr. Johnston's work, which shows us how to experiment, than to the latter part, which criticises experimental work performed. We do so however, not to discourage, but to stimulate experiment, and, if possible, direct it aright. And from time to time, we shall not fail to return to those *comptes rendus*, as a mine of the most valuable truths within the range of REPRODUCTIVE SCIENCE.