known world. This branch makes us acquainted with the nature of the various products of the animal and vegetable kingdoms, the different kinds of food, and the manner in which they are formed in the plant, and the laws which regulate their transformations; how, for instance, the very same elements in the same proportion can form gum, sugar, starch, and woody fibre. By the same science we ascertain the food of plants, and the source of it. We see that a large part is derived from air and water; and by analysing the ashes of plants and of their products, we can trace their mineral constituents to the soil and manure applied. This knowledge gives us power over the soil, and discovers to us many sources of waste. The great truth that animal manures are nothing else but the ashes of the food consumed in the bodies of men and animals, is the chief cause of the scientific improvements in agriculture. By such discoveries we are made aware of the cause of exhaustion of soils, namely, the removal of its most precious ingredients in our crops, and we thus learn what to add to our soils to restore and augment their fertility. We obtain the constituents of the bread and meat that nourishes and sustains us in the form of guano from Africa and America, while the mineral ingredients of plants are abundantly obtained from the waste products of manufactories. It was only a few years ago supposed that the earthy and saline constituents of vegetables were merely adventitious or accidental, but the researches of organic chemistry, aided by physiology, have taught us that these bodies, though small in quantity, are as essential as the larger ingredients. Thus we learn from the researches of Liebig, that the phosphates and the alkalies are always present in the seeds and roots of plants cultivated for food, and that they enter into the animal system and contribute to the formation of the bone, muscle, fat, &c., of the body; while the excess is removed in the solid and liquid excretions to be returned to the soil, absorbed by plants, and again undergo the same unceasing circle of changes. Now, what are we to expect to be the result of this application of science to the theory and practice of agriculture? Obviously to great results: the first, an increased fertility in our soils, and a corresponding increase in all the crops cultivated for man and beast; the other, a higher quality in the nourishing property of these products. At the present time the average produce of food in Britain is inadequate to supply the wants of our rapidly increasing population; but, from what is already done, we have every reason to hope that, when all the arable land is improved by thorough draining, deep ploughing, &c., and waste lands brought into cultivation, and chemical manures of a far richer and stronger nature manufactured and supplied, our supply of home-grown food will not only be commensurate with the present, but with a greatly extended population; and I trust, ere long, to see this country not only independent of the foreign grower, but even an exporter of corn as it once was (*applause*). To many, such anticipations may be regarded as visionary, but a little reflection on the immense results effected by scientific skill in our system of manufactures will go far to establish such an opinion. I will just ask if there is anything in the art of agriculture to render it less susueptible of improvement than the art of manufacturing cotton or woollen goods? There is nothing but what is susceptible of improvement. It is in vain to look for improvement in any art, if we do not make the workman acquainted with his tools: and to make improvements in agriculture, the agriculturist must be acquainted with the nature of the bodies he works with, with the ingredients that enter into his seed, and with the manures which he applies to his soil, so that he may know how to put them to the most beneficial use. Until this is the case, we cannot expect any great result. Guano might have been used without the knowledge of chemistry, but it is the facts discovered by organic chemistry that tells us the reasons why it should produce such and such results, for it shows us that no more will vegetable life, than that of man, thrive without its proper food; and that when the food is given to it in that state in which it can be most easily taken up, it increases its vegetating powers, and causes an increased production. In regard to the supply of corn, I am rather disposed to adopt the opinion that for any amount of population that may exist on the earth, subsistence will always be found; and this would be the case in Britain at present, if we attended as we ought to do to the immense and incessant waste of the most valuable manure at home, instead of going to great expense to bring the very same from the distant isles of the ocean, We are greatly at fault in not attending carefully to the operations of nature. The supply of food and the production of manure are commensurate with each other. Were we, therefore, to collect the whole of the daily solid and liquid excretions of any man or animal, ferment and properly prepare and apply it, I believe it would grow on any given well-prepared soil as much food as would support that animal. Hence, to use a homely expression, every animal may be regarded as a manufactory of manure (*laughter*). Look at what is done in this respect in foreign countries. Look at the Chinese, who take every means for preservieg these substances. If they were acquainted with the laws of chemistrsy and not only collected these substances, but knew, how to ferment, prepare, and preserve it, they would have an immense increase of produce. It would be a curious and highly interesting point to investigate as to the productive value of these manures—to collect for instance, all the liquid and solid excretions of one animal, properly prepare and apply it, sow the seed, grow the food, and then ascertain whether it was sufficient for the sustenance of that animal. If such were the case, as I believe it would be, from philosophical principles, we would see in it another adaptation of means to ends, and another beautiful illustration of the connection between the animal and vegetable kingdoms, as we have seen one already, during the lectures in the case of plants absorbing carbon from the atmosphere and giving off oxygen, while animals inhale the oxygen and exhale the carbon, thus constantly keeping up the purity of the atmosphere. (*Great applause.*) By attending to these natural processes, we may thus be enabled to supply food for any amount of population. You are aware that, since the introduction of guano as a manure, various mixtures have been manufactured to resemble its composition and effects. None of these have succeeded as a manure like guano; it still keeps its superiority, and the reason is, that many of these artificial mixtures are made by men indifferently acquainted with or altogether ignorant of chemistry. It is not to be expected that such can succeed; to do so requires a thorough knowledge of the whole range of chemistry; we must endeavour to imitate nature in the decomposition and fermentation of the animal mattar. I have had some thoughts of commencing to make artificial manure myself, but have hitherto been prevented from want of capital. I see no difficulty in making up an immense amount of manure from the refuse daily thrown away, such as fish, the refuse of slaughter houses, and the excretions of man and animals. These could be treated in such a way as to preserve their fertilizing properties, and at the same time remove their offensiveness. It is quite possible to get a richer and stronger