dealing on the part of the local government, the Isthmus would soon be worth all the mines of Peru, with all the gold-washings of California besides.

The next great enterprise would be the junction of the Mediterranean and the Red Sea, by a passage across the Isthmus of Suez. There is already a road, but the passage is slow and difficult, from the heat, the soil, and the imperfect conveyance. Two proposals have been long since made, the one for a canal and the other for a railroad. To the canal there seems to be insuperable objections, the shallowness of the sea at Suez, the shifting nature of the sands on the way, which would soon fill up the canal, and the difficulty of water for its supply. It has been also ascertained by the survey of the French engineers that the Red Sea is about thirty feet higher than the Mediterranean.

The railroad is obviously not merely the true expedient, but the only one. But it is almost impossible to deal with the foreigner on any subject of prospective profit. The habit of living but for the day deteriorates all the movements of national progress. Unless he can grasp his profit at once, it exists no longer to his eye. With the man of the East the grasp is eager and avaricious. Mehemet Ali might have brought millions of wealth into Egypt by a railroad, while he was wasting thousands in paltry contrivances to make a royal revenue for himself, out of the contending bargains of English and French engineers. The result is, that except a miserable canal between Alexandria and the Nile, dry half the year, and scarcely navigable during the other half, nothing has been done; and the journey across the isthmus occupies nearly two days, gives infinite trouble, and makes money only for donkey-boys and tavern-keepers, which, by a railroad, might be effected luxuriously in three hours.—*Johnston's Physical Geography.*

[Some opinions are expressed by Mr. Johnston in the foregoing article, political in their aspect, with which we must not be identified.—*Ed. Ag.*]

LECTURE ON THE STRUCTURE, FUNCTIONS AND CHEMISTRY OF PLANTS, DELIVERED BEFORE THE WEALD OF KENT FARMERS' CLUB, BY DR. PLOMLEY.

In undertaking to introduce to your consideration the connection between agriculture and vegetable physiology, a few preliminary explanations and apologies may be naturally expected. Viewing agriculture as the most interesting science, and the most useful art, it occurred to me that it was entitled to the services of every one, to the best of his ability and acquirements, however limited the one may be, and however few the other. Agriculture has derived valuable assistance from the natural sciences, but, up to the present time, very little attention has been paid to the application of the doctrines of the physiologist to its illustrations; and this is the more to be regretted, as almost every operation performed on the farm is more intimately, or more remotely connected with this subject of inquiry.

I may further mention that my object in this lecture is not the advancement of views that are new to science, but rather to bring before you in as ample and intelligible language as I can, all that is known on the subject, and point out the connection between these facts and observations, and every day field operations; and I submit all with the greatest deference to your practical experience.

A lecturer in chemistry has many circumstances in his favour in addressing an audience; he receives attention and illustrates his remarks by the exhibition of interesting and brilliant experiments, and any one calling your attention to agricultural mechanics might exhibit models of machines and implements, and interest you with certified accounts of their extraordinary capabilities in performing work at a small expenditure of labour and time. On the present occasion I can avail myself of none of these accessories, but merely lay claim to instruct, rather than amuse; and, I solicit your attention whilst I make a feeble attempt to explain to you some few of the most prominent principles of vegetable growth, a knowledge of which will enable you to understand the wonderful machinery of plants, through the agency of which the air and the earth are converted, under your guidance and assistance, into the food of man and animals. Plants and animals, and, indeed, all organized beings, however complex their structure and valuable their properties, are composed of very few elementary substances, when they are considered chemically, and many that are most opposite in appearance and properties, are nearly identical in chemical constitution.

All vegetables, from the mushroom to the oak, are composed of merely four elementary substances. They are carbon, hydrogen, oxygen, and nitrogen. Hydrogen, oxygen, and nitrogen are airs or gases. Carbon is a solid substance which, in the rough state, is charcoal, in the pure and crystalized, diamond.

The hydrogen is obtained from water, the carbon or charcoal from carbonic acid gas, the oxygen from the air, and nitrogen from ammonia.

These four elements, carbon, hydrogen, nitrogen, and oxygen, form in living plants a variety of compounds, but there are only two classes of these compounds that have a deep importance to man and animals, and they are indeed most important to the grower of plants, and the feeder of animals. These two classes of compounds are called nitrogenous, or flesh producing, and carbonaceous, or heat producing, both essential to animal existence.

The first, the nitrogenous, or flesh producing compounds, are composed of all four of these elements, carbon, hydrogen, nitrogen, and oxygen, in the shape of gluten and albumen, which in animals form flesh, and without which no part of an animal body can be formed; and when life becomes extinct this flesh becomes resolved again into water, carbonic acid and ammonia fit again for the food of plants. The second class of compounds called the carbonaceous, or heat producing, are formed of three only of these elements, carbon, hydrogen, and oxygen, without the nitrogen; these are starch, gum, sugar, and the liquors prepared from them, as beer, spirits, and wine, &c., and also all kind of oil and fats; these pass through the body, and are burnt off in the lungs, producing heat only, and in so doing are again converted into carbonic acid and water, fit for the food of plants.

We are made aware by the discoveries in chemistry and physiology, that the animal body is incapable of forming any of these substances which are absolutely necessary to its developement and support; that every animal must receive substances ready prepared, in order to supply them to its nutrition, its growth, and to the formation of its bones, its muscles, its nerves, &c., and therefore the flesh producing compounds are the exclusive materials for nutrition. Every man requires five ounces daily, merely to supply the usual waste of the body. These cannot be replaced by any other substance, and when withheld, the body must die of starvation. The carbonaceous, or heat producing compounds, must be present also in the body for fuel. Every man consumes, when at rest, eight ounces of carbon daily, and when in exercise, fourteen ounces; a horse consumes seventy-nine ounces in a day. These substances, usually called food, are materials for respiration only. They are consumed in producing the warmth of the body. When we compare these substances necessary for the maintenance of the animal body, with the contents of plants, which serve for the food of man and animals,