annual reports of the agricultural experiment stations of the different states of the Union. Of these some are fairly concise, while others extend over from 105 pp. to 200 pp., and require a considerable time to be devoted to their study before the marrow can be extracted from the bone. I hope to be able to give a *résumé* of each of them in turn, and to-day I shall begin with The Proceedings of the Ninth Annual Meeting of the Society for the promotion of Agricultural Science.

I hear that a laboratory is about to be established at Quebec, for the purpose of conducting experiments in artifi cial manures, soils, &c, and I conceive that a general know ledge of the transactions of similar establishments, that have preceded us in the road of investigation, cannot fail to assist us in the direction of our steps.

The society in question was organised, in 1880, at Boston, for the purpose of bringing together those who are interested in the application of science to agriculture, and I observe in the list of the officers for the past and present years the names of some of the best known professors of agricultural science in the States, such as, R. C. Kedzie, of Michigan, E. L. Sturtevant, of New-York, E M. Shelton, of Kansas, &c. The number of members is limited to fifty, of whom Professor Saunders, of the Central Experimental Farm, Ottawa, is one Papers are read before the society at its meetings, but a very wise provision is made against the introduction of extraneous matter by the following resolution, passed in 1880 : No paper shall be read before the society unless previously presented to the Executive Committee, in full or by abstract, and accepted by them.

Mr. G. C. Caldwell, professor of agricultural and analytical chemistry, of Cornell university, read a most interesting and deeply meditated paper on "The present aspects of the question of the direct utility of the free nitrogen of the air for plant-food."

The readers of this Journal need not be told that, for many years past, Lawes and Gilbert, Boussingault, now, alas, no more, and others, have been trying to solve this important question. Ville, the well-known French agricultural chemist, coolly begs the question, without discussing the arguments of his opponents : "Clover," says he, "draws its nitrogen from the air, therefore the incomplete manure," i. e. superphosphate, muriate of potash, and plaster, which he recommends for the clover plant, "which does not contain nitrogen, is all it requires." v. Crooke's trans., p. 246. Curiously enough, a passage in the report of the North Carolina experiment station, which I only received yesterday, bears a special reference to this statement of Ville's. Mr. Milton Whitney, the superintendent of the station, in describing certain experiments in the management of permanent meadow and pasture, in which large doses of farmyard dung, of kainit, bone-dust, ground and dissolved mineral phosphates, &c., were employed, makes the following observation : It is interesting to call attention to the very luxuriant growth of red clover on *all the permanent pasture-plots* that received stable-manure, and the marked absence of the clover on the other plots receiving phosphoric acid, kainit, &c., although the same amount of clover-seed was put on each. This effect is so marked that those plots which received stable manure can readily be recognised from any distance that the plots can be seen, from the green of the clover.

Now, in the dressing of stable manure referred to above, there would be probably 350 lbs. of nitrogen, though, of course, only a portion of this enormous amount was available for plant-food at first; still, is it not fair to suppose that the clover found something to suit it in the dung that it did not find in the phosphoric acid, potash, &c., of the artificials, and profited thereby, and if that something was not the nitrogen what was it? We know that Lawes and Gilbert, of Rothamsted, hold strongly to the view that it is the large native stock of combined nitrogen in the soil that supplies that excess of nitrogen that the leguminous crops can get over and above the amount afforded them by the farmer. The two philosophers confess that it is exceedingly difficult to prove the truth of their theory by chemical analytical data, but it is just as hard for Ville to prove the truth of his theory, and the evidence which Lawes and Gilbert bring forward in the gradual diminution of the amount of nitrogen in their continuous clover fields, very greatly strengthens the position.

I must remind my readers that, at Rothamsted, though clover, sown more frequently than once in eight years or twelve on the ordinary field with the ordinary manuring, refused to grow a crop, when an old piece of garden-ground was sown with that seed the result was very different. Red clover was grown at Rothamsted continuously for 35 years on such a soil without the application of manure. The soil and subsoil to the depth of 18 inches were exceedingly rich in *nitrogen*, and it was clear that dung in large quantities had been trenched to that depth into the soil.

When I received, some 18 months ago, a communication from Sir John Lawes on this subject, he informed me that, then, the top garden soil had lost an enormous quantity of its nitrogen, but was still very much richer than the farm-land. The subsoil, in fact, contained, even then, much more nitrogen than the surface soil of the farm. But, still, the clover grows, and yields crops as large as, if not larger than, the crops grown on the farm, though they are very inferior at present to those grown in the earlier period of the experiment. Here, then, is evidence that, while red clover has been grown at Rothamsted on land exceptionally full of nitrogen for 35 years successfully; on the farm, it is unsafe to repeat the crop until the period of eight or twelve years have elapsed since the previous crop was grown.

The researches of the French chemists, Berthelot and Joulie, tend to show that operation are going on in the soil itself, which result in a transfer of nitrogen from the free state in the atmosphere to a combined state in the soil, by the action of *microbes*.

Professor Atwater's experiments were described by him at the Natural History Society's rooms in Montreal in 1882. Pease were grown in burnt sand, supplied with definite quantities of solutions containing nitrates and other necessary plant-foods. Gains in nitrogen were made over and above any known accessible supply of combined nitrogen.

So, nothing is as yet *determined* on the point, whether the leguminosæ do or do not assimilate the free nitrogen of the atmosphere. Investigations are being carried on in England, France, and Germany, and, sooner or later, we may depend upon it, a satisfactory solution of the question will be arrived at.

The plum curculio.—A very practical paper was read at the same meeting on "the mode of preventing the injuries inflicted by the curculio on plums and cherries," by Mr. Clarence M. Weed. *London purple*, an arsenite, was first selected for spraying the tree; the powder being used in the proportion of one-half pound to fifty gallons of water. The first application was, on eight cherry-trees, made May 15th, just after the *petals* had fallen, and before the *calyces* had fallen from a large proportion of the fruit. Heavy rains fell on May 18th, and the application was repeated on the 21st. It rained again on 25th, and the trees were again sprayed on the 26th for the last time, though heavy showers fell on the 26th and 27th. Other trees were left unsprayed, and the results arrived at seem to be that the spraying saved 75.8 per cent. of the fruit.

Lime was tried as a spray, in the proportion of a half-peck