How often has the question been asked,—is free nitrogen directly absorbed by vegetables from the atmosphere? And how repeatedly and with what force of illustration and argument has the question been answered in the negative. Latterly the subject has again excited attention, and an able advocate for the direct absorption and assimilation of Nebrague from the atmosphere been found in M. Ville.* It is unnecessary here to refer further to this difficult and unsatisfactory subject; and for present purposes it is sufficient to assume that nitrogen is not directly absorbed from air, but that before entering into plants for assimilation it takes the form of ammonia or nitric acid.

Ammonia we know exists in the atmosphere, probably to the extent of one part in ten million parts on the average. At times the quantity of Ammonia present is much greater than the above ratio, at other periods less. Rain water contains on an average nearly one part of Ammonia to the million, and of nitric acid about five parts to the million.† Dew always contains ammonia, and mists have prevailed so rich in this substance that the water had an alkaline reaction. Barral analyzed the water collected in the rain guage of the observatory at Paris. He found that in one year, 10.74 lbs. of ammonia fell with the rain, and 10.7 lbs. of nitric acid. In July he found the amount of the ammonia to be the greatest; in September the amount of nitric acid to be the greatest. The ammonia was least in March and increased gradually to July. In August it diminished suddenly, and continued to diminish until October, attaining its second maximum in February. These observations although very interesting are not satisfactory, because they were made in the neighborhood of a great city. Hence we find that Boussingault discovered much less ammonia in the air far away from towns—a gallon of rain water containing only one twenty-fifth of a grain of ammonia. As a general fact, however, the water collected during fogs was extraordinary rich in Ammonia, containing on an average one third of a grain to the gallon—but an instance has been known—before referred to—of a gallon of water from a fog containing not less than four grains of Ammonia. The constant presence of this substance in the atmosphere is not only now fully established, but its influence upon vegetable growth in this gaseous form is of the highest interest, and possibly, of the highest importance.

The experiments of M. Ville upon the effects of ammonia in air upon vegetation show how rapidly and remarkably its influence is felt. If ammonia be artificially introduced into air in the same proportional average as carbonic acid is found to be constantly present, namely, about one part in 2500 parts of air, its influence soon shows itself upon the leaves, which continually acquire a deeper and deeper tint. The presence of such ammoniacal vapours not only stimulates vegetation, but changes the growth of the plant, and causes the developement and enlargement of particular organs. In prosecuting a series of experiments on the phenomena of vegetation with a view to ascertain whether nitrogen was directly absorbed from the atmosphere and assimilated, M. Boussingault observed the growth of minute green cryptogamia on the outside of the flower pots which had been exposed to the air, but he failed to detect any vegetable growth on those from which fresh air had been carefully excluded. The sudden growth of varieties of fungi during misty weather has often been noticed, and their appearance may be accelerated by the introduction of a small quantity of vapour of ammonia into any confined space where they are observed. I am not aware that any extensive experiments have been made upon the growth of fungi in an atmosphere rich in ammonia, such as certain fogs. I have, however, remarked with surprise their absence in an atmosphere from which ammoniacal vapours were probably abstracted by powdered charcoal, without, however, drawing any conclusions

* Transactions of the Paris Academy of Science.
† Experiments of Dr. Gilbert and Mr. Lawes.