nearly round, are usually yellowish to white in color, and generally carry fossils of coral, brachiopods, and bryozoans common to the limestone.

At many places between outcrops of the limestone occur beds of limestone cobbles which are more or less silicified and in all respects identical with those found in the disintegrating limestone. Furthermore, upon noting their elevations, these isolated beds of cobble stones are found to lie in the plane of the limestone—never above it, and only scattered or displaced cobble stones are found below the plane. These facts point unmistakably to the limestone as the source of the cobbles and bear evidence of the former presence of the limestone at all points where these beds occur.

Wherever the Mississippian-Pennsylvanian contact dips much below the plane of the Maxville limestone, little or no trace of the limestone was found. Where the contact is not far below this plane, silicified cobble stones are often found in the base of the Coal Measure basal conglomerate which are identical with the residual cobbles of the limestone. Within the belt considered the contact sometimes falls 100 feet or more below the Maxville plane and all such places have been found to be clearly defined valleys which trenched the Mississippian surface.

It is now known that the Maxville limestone is found two thirds of the distance across the state with strong probability of still further extent formerly.

The Berea sandstone, lying at or near the base of the Mississippian system, is an excellent datum plane. Using it for this purpose in the general direction of the Maxville outcrop, it is found that the Berea-Maxville interval increases northward. In Vinton County, in the southern part of the state, the interval between the top of the Berea and the top of the Maxville is about 650 feet; at Rushville, in the eastern Fairfield County, about 800 feet; at New Castle, in Coshocton County, about 840 feet; near Killbuck, in southern Holmes County, about 870 feet; and twenty miles north of the last point in central Wayne County east of Wooster a thickness of 900 feet of shale and sandstone above the Berea does not quite reach the Maxville horizon. Northward from Wayne County the total thickness of the Mississippian strata decreases notably, due to greater erosion in late Mississippian time. In northeastern Ohio the Pennsylvanian beds lie, commonly, only about three to four hundred feet above the Berea, and in the old Mississippian river valleys, so clearly defined in this area, the Sharon conglomerate sometimes lies but 100 feet above the Berea. These thicknesses are clearly far below the Maxville horizon.

Central Wayne County is about fifty miles from Cleveland and 150 from Portsmouth on the Ohio River, the region of the southern outcrops of the Maxville. If the plane of the Maxville be projected northward to Cleveland with the slowly increasing interval between it and the Berea, the Maxville would lie about 1,050 feet above the Berea.

In the light of these facts it is apparent that the Maxville will not be found in northern Ohio, and that outcrops may not be expected beyond northern Holmes, or central Wayne County.

It will be noted further that these figures reveal the interesting fact that the Mississippian system thickens northward, although thinnest in the north now as a result of erosion.

Mount Union College G. F. Lamb

A METHOD FOR MAINTAINING A CONSTANT VOLUME OF NUTRIENT SOLUTIONS

With plant experiments involving the use of various nutrient solutions it is important that there should be no undue loss of solution due to evaporation or the taking up of the solution by the plant, as it has been shown that an increase in concentration due to a loss of water by evaporation or transpiration may seriously impair results.

To save time in refilling the culture vessels to a constant volume the following simple method has been devised. It works automatically and keeps the solution at a constant level, and the only attention required is to refill the reservoir when empty.

A drawing will show the arrangement of the device, which consists of a flask or bottle of

any convenient shape fitted with a two-holed rubber stopper through which are inserted two glass tubes of 5 mm. bore, one projecting 5 cm. and the other 2.5 cm. from the stopper.

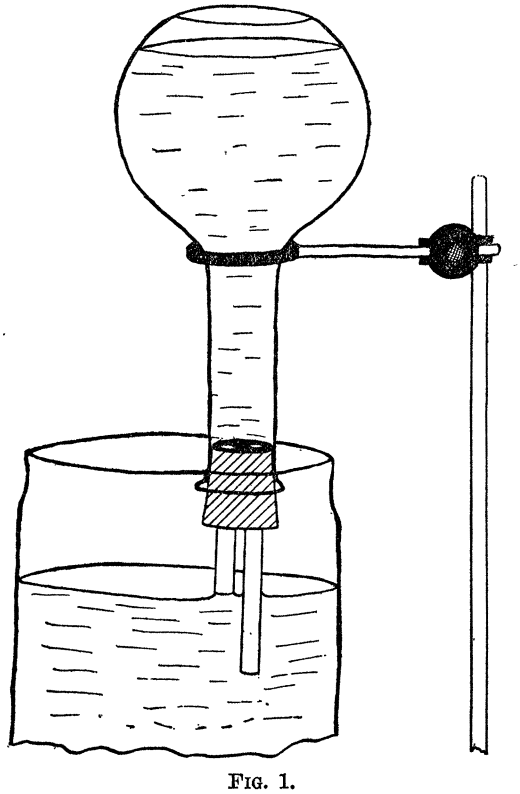

FIG. 1.

The operation of the apparatus is as follows: the flask is filled with the nutrient solution which is used in the culture jar and inverted above it (or the glass tubes can be bent so that the flask is above and at one side of the jar, and thus out of the way of the plants). The solution flows out of the longer tube, the shorter tube allowing the ingress of air. This flow of solution from the longer tube may be stopped by lowering the flask until the end of the shorter tube comes in contact with the solution in the culture jar, which seals the end of this tube and prevents the entrance of air and thus the exit of solution from the longer tube. The flask is adjusted so that the lower end of the shorter tube is at a level desired as the constant one, and as soon as the solution sinks (about 1.5 mm.) below this level either from evaporation or the taking up of the solution by the plant the air enters through the lower end of the shorter tube, allowing the exit of solution through the longer tube until the level of solution in the culture jar rises to the end of the shorter tube, which is sealed until the water level sinks again. In the case of culture experiments where the mouth of the culture jar is covered it is only necessary to bore two holes to admit the two tubes projecting from the reservoir.

ORTON L. CLARK
MASSACHUSETTS AGRICULTURAL EXPERIMENT STATION

SOCIETIES AND ACADEMIES

THE BOTANICAL SOCIETY OF WASHINGTON

THE 112th regular meeting of the Botanical Society of Washington was held in the Assembly Hall of the Cosmos Club, Tuesday, April 4, 1916. Fifty-two members and five guests were present. Harry R. Fulton, George L. Keenan, Lester A. Round, J. F. Clevenger, C. E. Temple, A. E. Aldous, Victor Birckner and Forrest S. Holmes were elected to membership. The following papers were presented:

Botanical Explorations in South America: DR. J. N. ROSE.

Plants Domesticated in Peru: MR. O. F. COOK.

Mr. Cook gave a brief account of the agriculture of the Incas with their wonderful terraces and system of irrigation. Among the plants domesticated by them were maize, beans, lima beans, peanuts, quinoa (*Chenopodium quinoa*), red peppers (*Capsicum*), mandioca, tomatoes, passion fruits, sweet potatoes, tuberous *Tropœolum* and *Oxalis*, arracacha (a celery-like plant), squashes and pumpkins, gourds; and among the fruits, chirimoyas, lucumas and pepinos. The narcotic coca, from which cocaine is now prepared, was also grown. Mr. Cook's paper will be embodied in a forthcoming article in the *National Geographic Magazine* for May, 1916.

THE 113th regular meeting of the Society was held in the Assembly Hall of the Cosmos Club, Tuesday, May 2, 1916. Mr. Frank N. Meyer, geographical explorer of the U. S. Department of Agriculture, was elected to membership. The program consisted of the following papers:

Dr. Edward L. Greene, an Appreciation: H. H. BARTLETT.

As it was impossible for Mr. Bartlett to be pres-