their more limited power of obtaining nitrogen, could not appropriate from the soil. They assumed that it was the nitrogen rather than the mineral constituents of the fungi to which the manuring action was mainly to be attributed, and in this they were right; but the theory has required some correction nevertheless, inasmuch as they have since proved the source of nitrogen in the fungi to be the soil, not the atmosphere.

As doubts were entertained at first on this point, direct experiments were tried at Rothamsted, and in 1874 samples of soil were taken within a fairy ring, immediately upon it, and outside, and these yielded on analysis the lowest percentage of nitrogen in the soil within the ring, a higher percentage under the ring, and a higher still outside it. The soil therefore had lost nitrogen by the growth of the fungi, and the obvious conclusion was that the fungi possess a greater power than the grasses of abstracting nitrogen from the soil.

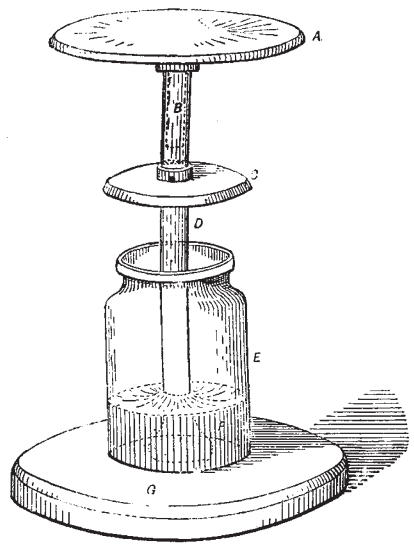
The analyses of the various species of fairy-ring fungi do not greatly differ. Two species occurring at Rothamsted—*Agaricus prunulus* and *Marasmius orcadum*—contain nitrogenous compounds to the amount of one-third of their dry substance, the ash being rich in potash and phosphoric acid. Their occurrence on pastures, like that of the common mushroom, is probably due to the manuring of the ground by animals and their continuance and growth depend on certain conditions of soil and season. They are rarely developed on rich soils, or on those which are highly manured, or in seasons favourable to the general herbage of the turf; and when they do appear under these conditions they will probably not be reproduced, or only in patches. The recent wet seasons have dispersed fairy rings in situations where they have usually proved persistent. They prevail wherever the growth of the grasses is inferior, especially on the poor downs of the chalk districts, and on poor sandy soils where the natural herbage is wanting in vigour.

The history of fairy rings, as it has now been written at Rothamsted, will attract close attention from all who are interested in the nutrition of plants, including the student of agriculture, and all, in fact, who are specially concerned in the question of the food supply. It was not previously known that any kind of plant could feed directly on the organic nitrogen of the soil itself. It was recognised that the root-development of plants differed, and that the greater extension of their roots enabled some plants to secure a larger proportion of the constituents of the soil than others. But here is a race of plants possessing quite unsuspected powers of assimilation! Instead of rising from the ashes of the phœnix they feed upon its undecayed body, that is, upon the organic nitrogen of the soil. The Leguminosæ, for example, such as beans and clover, are known to assimilate more nitrogen from a given soil than the Gramineæ, such as wheat and barley, and this has been attributed to absorption by their leaves, or to the superior development of their roots. Another alternative is now suggested, and possibly a new departure may be taken in the science of agriculture, as the result of the recent discoveries in connection with fairy rings. HENRY EVERSHED

A CHEAP INSULATING SUPPORT

INSULATING-SUPPORTS are so indispensable in the work of an electric laboratory that several forms have come into extensive use. The plan devised by Sir W. Thomson for securing high insulation by surrounding a glass stem with concentrated sulphuric acid to absorb the moisture which otherwise would condense from the air and form a conducting film over the surface of the glass is remarkably efficient, and has many advantages. Modifications of this form of insulator have been largely used by Prof. Clifton, F.R.S., in the Clarendon Laboratory, and by Profs. Ayrton and Perry in the laboratories of the Technical College at Finsbury. Another modification due to M. Mascart, was described in NATURE, vol. xviii. p. 44; and this pattern has come into extensive use under the name of the *support isolant Mascart*. Though excellent in every way it is very expensive, as its manufacture necessitates a special piece of glass-blowing. The central support of glass is solidly fused into the bottom of a glass vessel with a very narrow neck into which acid is poured through a tubulure at the side.

The insulating support which I have recently described before the Physical Society of London is a much simpler affair, and can be made very quickly and cheaply from the materials at hand in every laboratory. The figure shows the form of the support. A wide-mouthed glass bottle, E, about 10 cm. high, and from 5 to 6 cm. diameter, is selected. A piece of stout glass tubing about 20 cm. long is then taken. One end is closed in the blowpipe flame, and blown into a thick bulb; and while yet hot the bulb is flattened, so as to form a foot for the stem. The flattened bulb should be as large as is compatible with its insertion into the mouth of the bottle. To hold it in its



place some paraffin wax is melted in the bottle—from 50 to 70 grm. is quite sufficient—and when it has cooled so as nearly to have become solid the stem, previously warmed, is inserted. When cool, the paraffin holds the stem firmly in its place. To keep out the dust a disk cut out of sheet guttapercha is fitted on as a lid. If dipped into hot water for a minute it can be moulded to the required form. It fits loose-tight upon the stem, as shown at C, and when the stand is not in use is slid down over the mouth of the bottle. A brass disk, A, having a short brass stem, B, below it, slips into the upper open end of the tube, and forms the top of the stand. It is also found convenient to make from rods of glass other supports, shaped at the top in the form of hooks, which can be slipped down into the central tube. These are very useful for holding up wires that pass over the experimenting table and require to be well insulated. The bottle is let into a wooden foot, G. In cases where very perfect insulation is required I have poured a little strong sulphuric acid into the bottle above the paraffin. In practice, however, the insulation of the paraffin is amply sufficient for most purposes, provided dust is properly excluded.

SILVANUS P. THOMPSON

JOHN HUTTON BALFOUR

IN Prof. Balfour, whose death we announced in our last issue (p. 365), has passed away another of that group of eminent teachers, including Goodsir, Syme,