COMPARISON OF THE NUMBERS OF SPECIES ISOLATED BY DILUTION AND SOIL-PLATE METHODS

	Soil plate	Dilution suspension	Dilution residue
Soil *E*			
Av. no. of species per plate	10·5	9·5	9·5
Total no. of species per sample	22	16	21
Soil *C*			
Av. no. of species per plate	15	10	15
Total no. of species per sample	24	21	24

It is interesting to note that both soil plates, and isolation plates made from the residue after preparation of the soil suspension, gave a higher number of species than isolation plates poured from the suspension. It would seem that shaking soil with water does not allow all the fungi present to pass into suspension, and that isolation plates which incorporate soil particles are likely to yield a wider range of species than dilution plates.

By the use of this method a wide range of fungi has been isolated from soil, including genera such as *Pythium*, *Mortierella* and many of the darker-coloured Hyphomycetes, which are not usually recorded from soil[2]. Other interesting organisms such as *Dictyostelium mucoroides* and Myxomycete plasmodia have been found on soil plates. Several Basidiomycetes, particularly 'fairy ring fungi' such as *Marasmius oreades*, *Tricholoma nudum* and *Psalliota arvensis*, which have a definite mycelial zone in the soil, have been isolated from soil by this method.

A detailed account of this work will be published elsewhere.

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J. H. WARCUP

Botany School,
Cambridge.
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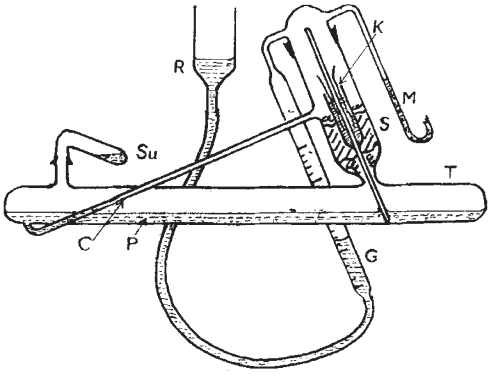
A Percolating Respirometer

THE soil percolation technique[1] was introduced for the study of soil metabolism. In this technique small volumes of a water solution of metabolites are taken regularly and frequently from a reservoir, allowed to percolate through a column of aerated soil, and returned to the reservoir. The course of soil metabolism is then followed by analyses of the reservoir fluid. The original apparatus[2] has since been modified[3] and adapted to the measurement of the carbon dioxide outputs of percolated soils[1]. The apparatus to be described permits the measurement of the oxygen uptakes of percolated soils or indeed of any metabolizing system capable of being supported on a solid porous medium.

The design of the apparatus is shown in the diagram. It consists of two halves, the second of which (not shown) is essentially a compensating vessel for the first and is connected to the other side of manometer *M*. This compensating vessel is similar to its companion in all respects except that it has only one side arm and does not carry a graduated pipette *G*. The oxygen uptake of the soil in the first vessel is followed by the Haldane technique already used for static experiments with soils[4]. As the soil *S* consumes oxygen it evolves carbon dioxide, which is absorbed by the caustic potash solution in the cup *K*. This cup is removable and has the usual slip of filter paper



inserted into it to facilitate absorption of carbon dioxide. Oxygen uptake in the first vessel is measured directly from the readings of the water-levels in the graduated pipette *G*, taken when the water reservoir *R* has been raised to a point at which the levels of liquid in the two arms of manometer *M* are equal.

The whole apparatus is mounted on a rocking platform with the soil tubes in a vertical plane. To make the percolate *P* run through the soil *S* (which is held in position between glasswool plugs), the platform is tipped clockwise in a vertical plane. The small amount of percolate that has collected in the bend of tube *C* then runs down *C* on to the soil, forcing the air in *C* before it and through the soil, while the bulk of the percolate runs back to the other end of the main tube *T*. If the apparatus is kept gently rocking between two positions, in one of which *T* is horizontal as shown in the diagram, and in the other of which *T* is tipped clockwise some 60° to the horizontal, continual and satisfactory percolation and aeration of the soil is achieved.

The side arm *Su* contains a solution of substrate, for example, glucose solution. In the position shown for *Su*, the substrate solution remains apart from the bulk of the percolate even when the apparatus is rocked. The substrate may be added to the percolate without opening or disturbing the apparatus in any way merely by rotating *Su* through 180° on its ground-glass joint, when the substrate solution will automatically run into *T* as *T* tips clockwise. The tube *Su* is conveniently removable when the percolate is to be sampled.

Preliminary experiments, in which the excess oxygen uptake due to the percolation of 5 mgm. glucose in 50 ml. solution through 10 gm. lots of soil has been measured, have given results that indicate that this uptake is about two-thirds of what is required by theory for the complete conversion of glucose to carbon dioxide. These results are in agreement with those obtained on glucose-percolated tropical soils[5], which were found to release, as carbon dioxide, some two-thirds of the carbon percolated as glucose.

Full constructional details of the apparatus, and a description of the results obtained with it, will appear elsewhere.

HOWARD LEES

Department of Biological Chemistry,
University, Aberdeen.
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