difficulties are avoided, by determining, in random microscope fields from a parallel series of stained films, the ratio between the number of bacteria and the number of particles of indigotin, a counted suspension of which has previously been added to a given mass of the soil. The ratios thus obtained from parallel fields are found to be distributed at random, and the bacterial numbers calculated therefrom are of course independent of the amount of soil in the film.

The following is a description of the method tested by us. A suspension of indigotin in distilled water is sterilised and the number of particles per c.c. counted on a hæmocytometer by means of a high-power water-immersion objective. 5 grams of the soil are shaken for three minutes in 25 c.c. of this standard indigotin, and further shaken for one minute after the addition of an equal volume of sterile 0·01 per cent agar. From each soil to be examined three or four parallel slides are made, each having four or five small drops of soil-indigotin-agar suspension, applied by means of a mapping pen. The suspension is shaken between the application of successive drops and the slides placed immediately under a damp cover for a few minutes. The films are dried and placed for 10 minutes in a bath of carbol-erythrosin (1·5 gm. erythrosin; 5 gm. phenol; 100 c.c. water; filtered before use); washed in a bath of distilled water; stained for 10 minutes in 2·5 per cent aqueous erythrosin; washed in distilled water, and dried. Bacteria and indigo particles in four to eight random fields from each drop are counted. The ratio of bacteria to indigo is thus obtained, and since the absolute number of indigo particles is known, the number of bacteria per gram of soil can be calculated.

The accuracy of the method has been tested in the following experiments:

(i) A known number of cells of an organism were added to sterilised soil and estimated to within 1 per cent.

(ii) The bacterial numbers in four portions of the same soil sample agreed within a standard error of 5 per cent.

(iii) In all tests the deviations observed between parallel drops were within expectation based on random sampling, and can be brought down to a standard error of 2·5 per cent by counting sufficient fields.

(iv) The numbers found by two workers counting independently in test (ii), and

(v) The numbers found in films prepared by three workers from the same soil sample, showed no significant differences.

A full description of the method and the results obtained will be published elsewhere.

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Cress Grown on Adrenaline.

A FEW preliminary experiments relating to the action of the internal secretions of animal glands upon vegetable life have yielded a somewhat extraordinary result with adrenaline. Cress seeds grown on pads of cotton wool soaked in 1 in 10,000 solution of adrenaline showed the following marked differences from control crops grown on distilled water.

(1) The seeds germinated later, and there was a retardation of approximately twenty-four hours.

(2) After the preliminary retardation, growth advanced at a rapid rate, and within three days the plants were considerably taller than the controls.

(3) When maturity of growth was reached the plants were much taller, and the leaves larger than the controls. Also, the plants were a paler shade of green.

(4) The most striking feature was the presence of adrenaline, or adrenaline-like compounds, in the 'heads' of the cress. It is important to note that no adrenaline was added after the initial dose, and the wool pad kept moist with distilled water. The plants were continuously exposed to the air and light.

After carefully washing the cut 'heads' of the plants they were reduced to a paste with distilled water, and the fluid filtered and tested for adrenaline. A deep rose pink colour was obtained with the iodine test and other oxidising tests for adrenaline. The control cress entirely failed to show any of these reactions.

Some of the cress was extracted with normal saline and injected into decerebrate cats. Typical adrenaline curves were obtained, and it has been possible to demonstrate all the pharmacodynamical reactions of adrenaline in the cress.

(5) The cut ends of the stalks show a distinct tendency to bud.

Tests of the cotton wool pads at the time of mature growth failed to reveal the presence of adrenaline even in minute amounts. It therefore is suggested that the cress in some manner either produces a stable form of adrenaline, or manufactures an adrenaline-like compound which is stable.

Moreover, it appears to be probable that the cress synthesises adrenaline, or a similar compound, from the products of the oxidation of adrenaline.

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The Crystalline Structure of Benzene.

BY means of X-ray measurements upon single crystals, using the rotation method, I have been able to determine the unit cell of benzene. The cell is simple orthorhombic, of dimensions $a = 7{\cdot}44$ A., $b = 9{\cdot}65$ A., and $c = 6{\cdot}81$ A. at $-22°$ C., and contains four molecules. As a result of the examination of about one hundred crystal planes, the space group was found to be $Q^{15}{}_h$ (orthorhombic bipyramidal). From this it can be shown that *in the crystal* the molecule has a centre but no planes of symmetry. Taking a standard molecule at a corner of the cell, the three derived molecules are situated at the centres of the cell faces. This pseudo-face-centred arrangement accounts both for the fact that the plane (111) gives the strongest X-ray reflections, and also for the bipyramidal habit of benzene crystals.

The cell now determined has axial ratios 0·771 : 1 : 0·704. Using the powder method, Eastman (*J.A.C.S.*, **46**, 917; 1924) obtained the values 0·775 : 1 : 0·725, while Broome (*Phys. Zeit.*, **24**, 124; 1923) found the ratios 0·763 : 1 : 0·700. Mark (*Ber.*, **57**, 826; 1924) measured the c – axis, and obtained a value between 6·8 and 6·9. He inferred from his measurements that the space group was either $Q^{11}{}_h$, $Q^{15}{}_h$, or $Q^{16}{}_h$.

Further work is in progress with the view of determining the remaining variables in the structure.

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