

Organic Soils and Epinastic Response

CONSIDERABLE interest is being shown at the present time in plant auximones and the chemical regulation of plant growth. Traces of many substances have been found to influence growth profoundly. Such substances range from complex or as yet chemically unidentified bodies produced in the growing regions of plants to quite simple chemical substances produced by plant tissues or in the laboratory.

Among the latter is the gas ethylene which, when present in the air in amounts of the order of one part per million, produces characteristic effects on tomato, potato and other plants specially sensitive to it¹. In the case of tomato, the most obvious reactions to traces of ethylene are: (1) stimulation of growth on the upper sides of petioles inducing characteristic epinastic curvatures, (2) stimulation of the formation of root primordia associated with inhibition of root growth—copious root growth occurring as soon as the treated plant is removed from the ethylene atmosphere. These reactions have been used to detect the presence of traces of ethylene and certain other gases, and it appears that the evolution of ethylene is a frequent accompaniment of plant metabolism, particularly during the ripening of many fruits¹.

In view of these facts it may be of interest to place on record some results of recent experiments of my own with certain infertile organic soils. Without entering into details, the following facts appear

to be established. (1) A gas may be extracted from such soils (by aeration, centrifuging or heating) which produces on tomato plants epinastic curvatures of the petioles similar to those brought about by traces of ethylene. (2) Extracts from such soils when added to water culture solutions produce similar epinastic curvatures on cuttings and influence the rooting of cuttings and the manner of root growth of cuttings and seedlings. There are indications that the intensity of these effects is seasonal.

Comparison with soils of other types in relation to these effects is being carried out, and the results of the work will be published in due course.

In view of the known effects of gases such as ethylene in stimulating the formation of root initials and controlling the growth of roots, it seems not improbable that failure or success in the establishment of a root system on the part of seedlings in some soils may be influenced by the presence in the soil atmosphere of varying amounts of ethylene (or other gases producing similar reactions), the origin of which doubtless may be sought in the decomposition changes taking place in the organic constituents of the soil following upon biological activities.

W. NEILSON JONES.

Bedford College,
University of London.
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¹ Contributions from Boyce Thompson Institute, 7, 1935.

Points from Foregoing Letters

SIR JOSEPH LARMOR expresses his disapproval of the introduction of the new meter-kilogram-second system of units. He considers that the c.g.s. units, expressed in powers of ten, are adequate; he inquires, on the other hand, whether the Helmholtz system of electrical units may lead theorists astray.

Measurements of the ionisation in the F_2 layer of the upper atmosphere (at a height of about 300 km.), by means of radio-waves reflection, indicate that during magnetic storms there is often a reduction in the electronic content of the layer. Prof. E. V. Appleton and Miss L. J. Ingram suggest as a possible explanation that the agency responsible for magnetic disturbances heats and expands the atmosphere, thus reducing the electronic density.

Prof. J. Kaplan describes the experimental production of the light of the aurora and the night-sky by means of uncondensed electric discharges through nitrogen. Slight traces of hydrogen prevent the characteristic nitrogen afterglow with auroral spectrum. This fact, together with the absence of hydrogen lines in the spectra of the aurora and the night sky, suggests that hydrogen is absent in the upper atmospheres at the level where those phenomena occur.

Prof. Karl Pearson states that, in general, laws of Nature are neither true nor false, but merely more or less good 'fits' to our observations of Nature. He maintains that statisticians can only state that a hypothesis is false when the P , χ^2 square gives $P = 0$. As an example, he applies the P , χ^2 test to the data recently given by Sir James Jeans for the observed and calculated eccentricity of binary stars, and shows that the theory of equipartition gives a poor fit, if all the binaries are considered.

Contrary to Dr. Baker's view, J. van Zuylen considers that when making stereoscopic photographs

the axes of the cameras can be either parallel or convergent to the object. The convergent method does give, however, a larger stereoscopic field of view. Dr. Baker admits that true stereoscopic views may be obtained with parallel cameras if the photographs are mounted so that corresponding points are nearer than the interpupillary distance; otherwise, as is usually the case, a wrong impression is conveyed.

Three new bands in the Raman spectrum of light scattered by heavy water are described by R. Ananthakrishnan, who infers that heavy water is polymerised in a similar way to ordinary water.

The velocity of diffusion of heavy into ordinary water has been measured by M. Temkin, and the diffusion constant is found to be of the usual order of magnitude, contrary to results previously announced by W. J. Orr and D. W. Thomson.

The antirachitic effect in chicken of vitamin D obtained from liver and body fat of various (mostly marine) animals has been compared by Dr. Ottar Rygh. No differences were observed between them.

Experiments with bats infected with *Trypanosoma equiperdum*, a parasitic organism causing venereal disease in horses, carried out by N. Kalabuchov and L. Levinson, show that if the animals are kept in ice boxes at 10° C. or 3° C. for 3–5 days immediately after the infection, the micro-organisms disappear from the blood and the animals recover. Infected controlled animals kept at ordinary temperature die within 9–13 days.

Prof. W. Neilson Jones records experiments pointing to the presence of chemical regulators of plant growth, such as ethylene, in certain organic soils. Such constituents of the soil atmosphere may exercise an important influence on the rapid acquirement of an effective root system on the part of seedlings.