

Nitrogen Fixation with Cow-Dung

WHEN freshly collected cow-dung (containing 0.368 per cent nitrogen and 7.5 per cent carbon) is mixed with soil and exposed to sunlight daily for six hours in dishes, nitrogen fixation is observed. Thus the nitrogen content of a mixture containing 500 gm. soil and 100 gm. cow-dung rose from 0.0905 per cent on July 27 to 0.14 per cent on November 4, 1936.

In field trials, when 25 tons of cow-dung were added per acre, the total nitrogen was increased from 0.052 per cent to 0.061 per cent in a month. When the same amount of cow-dung and 25 tons of molasses were added per acre in fields, the total nitrogen was

increased from 0.053 per cent to 0.07 per cent in the same time. Hence cow-dung, which is used as a manure for its content of nitrogen, potash and phosphate, has been found to supply to the soil not only the nitrogen it contains, but also it can add nitrogen to the soil from the nitrogen of the air by fixation. The cellulose and pentosans present in the cow-dung undergo oxidation on the soil surface and liberate the energy necessary for nitrogen fixation.

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Points from Foregoing Letters

By further purification of the crystalline protein preparation having the property of producing the mosaic virus disease in tobacco plants, F. C. Bawden, N. W. Pirie, J. D. Bernal and I. Fankuchen have obtained solutions which (in concentrations greater than 2 per cent) separate into a lower liquid crystalline layer and an upper layer showing optical anisotropy when flowing. The liquids form gels on drying. X-ray investigations show a common pattern corresponding to a 'repeat unit' of 3×22.2 A. in the crystal, liquid and gel stage; other features of the X-ray pattern indicate hexagonal close-packing in the gel stage and parallel, charged, rod-like molecules in solution. The authors estimate their length to be greater than 1000 A. and their width about one tenth of that length. This corresponds with a molecular weight agreeing with Svedberg's estimate of 17×10^6 . It is not yet conclusively proved, however, that these are actually the 'virus' particles.

Prof. J. B. S. Haldane and also E. B. Ford criticize several of the statements made by Prof. E. W. MacBride when discussing the mechanism of natural selection. Both authors give examples of inheritable variations which can be graphically represented on a 'curve of error', and they claim that the return of the garden variety of *Calceolaria* to the wild type is irrelevant to the topic of mutation.

When protoplasm (for example, cells from human saliva, eggs of freshwater molluscs, liquefying pericarp of berries) flowing through a capillary is observed between crossed nicols, a system of many coloured rings appears parallel to the capillary direction. This, Dr. H. H. Pfeiffer states, is in accordance with the hypothesis of a fibrillar structure of protoplasm.

To explain the close proportionality between the flow of current and the rate of chemical reaction in certain cases of electric discharge, for example, in the formation of NO from nitrogen and oxygen, it has been suggested that positive ions are the reacting bodies. Dr. E. J. B. Willey states that the hypothesis that the positive ions are forerunners of the 'reactive species' explains a larger number of observed facts.

A continuous absorption band observed in rubidium vapour in presence of certain gases (neon, helium, hydrogen or nitrogen) is described by Ny Tsi-Zé and Ch'en Shang-Yi. The position of the band varies with the gas. The authors suggest that the absorption is produced by a rubidium atom at the moment of collision with a foreign gas atom.

Dr. W. C. Pei, who was until recently in charge of the excavations at Choukoutien and is now studying in France, writes to confirm recent reports of new discoveries of material relating to early man in China at the well-known site at Choukoutien (see NATURE, Dec. 12, p. 1004).

A table showing the displacement of the $K\alpha_{1,2}$ doublet in the X-ray spectrum of the lighter elements (magnesium to chlorine), when they combine with oxygen and with fluorine, is given by Dr. N. G. Johnson. The displacements appear to increase as the square of the valency. In the case of sodium the evidence for displacement is not conclusive since owing to its smallness it falls within the experimental error.

Evidence is brought forward by Dr. F. Dickens suggesting that the early stages in the oxidation of carbohydrate are hexose monophosphate, phosphogluconic acid and phospho-ketogluconic acid, the latter being decarboxylated by different routes in animal tissues and in yeast. Phosphohexonic dehydrogenase has been isolated from yeast; it converts phosphogluconic acid into the corresponding keto-acid, and for this it requires Warburg oxidation co-enzyme and yellow enzyme to complete the dehydrogenase system. In the biological oxidation of carbohydrates by this system, indophenol oxidase and cytochrome probably take part, since oxidation of hexosephosphate and phosphohexonic acid by brain tissue is strongly and reversibly inhibited by cyanide.

'Citrin', a physiologically active constituent of lemon juice having vitamin properties, consists, according to V. Bruckner and Prof. A. Szent-Györgyi, of a mixture of hesperidine and eriodictyol glucoside.

Photomicrographs showing spiral structure of chromosomes in the spore mother cells of the Royal Fern (*Osmunda regalis*) at the metaphase stage of the sexual nuclear division (meiosis) are submitted by Dr. I. Manton. Similar structures hitherto described have belonged mainly to monocotyledonous plants.

Sidney T. E. Dark records that the common stick insect (*Carausius*), while occasionally refusing to change its food plant, will sometimes inadvertently eat other stick insects in the immobilized (akinetie) condition even in the presence of plenty of its normal food.

Prof. F. L. Hopwood describes the formation of liquid diaphragms in a partly filled bent tube under the influence of sound vibrations, and also a simple sound amplifier consisting of a short glass tube with a thin rubber diaphragm slipped over the end of a Knipp's tube.