

A Microchemical Test for Protein Grains in Plant Cells.

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PROTEINS and their products of decomposition yield a variety of colour reactions each characteristic of a particular group of nucleus. These reactions are not directly applicable for their detection when they occur with other interfering substances as they do in plant cells. The cells of leaves, in particular, offer exceptional difficulties, on account of the presence of the green chlorophyll.

We have developed in our laboratories a convenient and reliable microchemical method which has been found useful in the study of the synthesis of proteins in the leaves of *Abutilon asiaticum* G. Don., and those of *Ricinus communis* L., under exposure to artificial light.

Folin and Wu's¹ β -naphthoquinone-sulphonic acid colour reaction found applicable for the detection of amino acids in blood was extended to plant cells. Sections of tissue under examination are first treated with alkaline β -naphthoquinone (2 c.c. of 0.5 per cent. aqueous solution of the sodium salt of β -naphthoquinone-sulphonic acid + 1 c.c. of 1 per cent. sodium carbonate and 4 drops of 1 per cent. phenolphthalein) for 30 hrs., then transferred to a mixture of acetic acid (50 per cent.) and sodium acetate (5 per cent.), washed for half minute, treated with a 4 per cent. solution of sodium thio-sulphate for 5 minutes, washed, dehydrated and finally mounted in glycerine. On exam-

ination under the microscope, the presence of amino acids in the leaf, petioles, cotyledons and hypocotyledonous regions of the seedlings and radicles of the beans and gram is revealed. The method, however, suffers from the disadvantage that it is not specific to proteins, since their degradation products also respond to the test.

A reagent obtained by dissolving 0.2 gm. of orthoquinone in 20 c.c. of 95 per cent. ethyl alcohol and mixed with 1 c.c. of 1 per cent. sodium carbonate solution has proved satisfactory as a specific reagent for proteins. Preliminary trials with rice and wheat grains definitely indicate that while the starch and other non-proteinous matter are not stained, the protein grains in the aleurone layer take up a deep colour. It should be mentioned however that the reagent stains the protoplasm but the protein grains are more deeply stained and are therefore distinguishable from the surrounding protoplasm.

In the case of leaves, the interfering chlorophyll is first removed by treatment with hot boiling 20 per cent. alcohol for 15-30 mins. The leaf is then kept in the orthoquinone reagent for 2 days and after washing with alcohol sections are cut, mounted and examined under the microscope. The deeply stained protein grains are easily distinguishable. This procedure has proved invaluable in the study of the size and number of protein grains in cells.

¹ *J. Biol. Chem.*, 1922, **51**, 377.

The Public Health of India.

THE Report of the Public Health Commissioner for 1931 which has now become public is a valuable document dealing with Vital Statistics, Antimalarial and Anti-tuberculosis campaigns, Leprosy surveys, etc., and several other topics of public health interest. The infantile death rate was high—more than double that in Germany, England & Wales and South Africa. Tuberculosis was on the increase and the

anti-tuberculosis campaign had not proceeded very far. The Leprosy Survey clearly indicated that the disease was much more prevalent than was formerly supposed.

Major-General J. D. Graham, Public Health Commissioner, recommends the formation of a Ministry of Health, an organisation which shall be competent to frame and conduct a Public Health Policy for the country as a whole.