

Quantitative Cytochemistry using ultra-violet light and a Quartz Microscope is elaborately discussed by Prof. Caspersson. "All results show that the ribose nucleotides belong to the regular cell constituents. The ribose nucleotides were found in fact, to be one of the most common of all cell constituents, and in 1939-40 evidence accumulated from different lines of studies that they were connected with the synthesis of the cytoplasmic proteins" (p. 136). The Nerve Cell does not appear to be an exception to the general rule. Hyden presents evidence that extensive quantitative changes in nucleotide and protein contents of nerve cells are associated with motor and sensory functions. Changes in neurons, morphological, physiological and chemical, during regeneration are shown by Bodian to be "in the direction of reversion toward the levels of embryonic period, with subsequent return to adult levels as regeneration is completed" (p. 175). Experiments with pentose nucleotides are discussed by Parsons, Gulland and Barker who were able to "reproduce with singular exactness the systemic effects induced in mice by X-radiation, by treatment with carcinogenic compounds, or by the growth of a primary or grafted sarcoma"

(p. 189). The role of ribonucleic acids in metabolism and the phenomena of induction during development is discussed by Brachet who emphasizes that "both during normal induction and evocation, there is a marked synthesis of ribonucleic acid in the reacting ectoderm; one of the consequences of induction is, therefore, a local synthesis of ribonucleic acid which might well lead in its turn to the production of specific organ-building proteins" (p. 221).

There are very interesting contributions by Stowell on "Histochemical Observations on Nucleic Acids in Homologous and Neoplastic Tissues", by Catcheside and Holmes on the "Action of Enzymes on Chromosomes" and by Koller on "Experimental Modification of Nucleic Acid Systems in the Cell".

The diverse trends of investigations on Nucleic Acids are admirably presented by the different contributors making available to those interested a mine of information. An attempt is made to establish closer links between biochemistry, cytology, embryology and genetics, and the volume hence deserves the attention of students of the different disciplines. It ought to find a place in every library.

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THE TRAINING OF PLANT PATHOLOGISTS IN INDIA

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PLANT pathology comprises a study of all diseases of plants, whether caused by fungi, bacteria, viruses, physiological disturbances, or by insects and other animal pests. In the U.S.A., however, plant pathology does not include diseases caused by insects and higher animals. The training of plant pathologists in India consists of taking a degree in Botany or Zoology, or a diploma or degree course in Agriculture at one of the Universities. There is also the two-year post-graduate course at the Indian Agricultural Research Institute at New Delhi for the advanced worker. While this course is the best training available, the following remarks apply only to the training in Natural Science and Agriculture available in the Universities. The views expressed are with particular reference to the Botany and Mycology teaching, but the position with regard to Zoology and Entomology is not far different.

These remarks were prompted by the report prepared by the Plant Pests and Diseases Committee of the Council of the Association of Applied Biologists entitled "The recruitment and training of plant pathologists in Great Britain",¹

The report deals with four classes of officers:

(1) the County Officers, (2) Specialist Advisers, (3) Research Workers and (4) Technical Assistants. The Specialist Advisers and Research Workers are men with two-year post-graduate training after a degree in Pure Science, and hence they are beyond the scope of this note. The technical assistants do work of a routine nature as assistants to research workers and others, and are drawn from various sources and

trained in some particular branch by their seniors. Sometimes these may also eventually engage in research or other work of their own. They require all encouragement but their number will always be very small. There are then left only the County Officers (corresponding to our Agricultural Inspectors or Demonstrators and the junior technical staff), who are usually persons who have obtained a degree or a diploma in agriculture or horticulture, at an Agricultural or Horticultural College. The course for these officers is "of a general nature, and plant pathology being one of many subjects in a heavy syllabus, is often dealt with only briefly". The training facilities at present at many Universities and Agricultural and Horticultural Colleges in Great Britain are such that "certain of the Pure Science courses give little training in field studies, and many of the Agricultural and Horticultural courses devote very little time to certain aspects of Pure Science."

Comparing the position in Great Britain with that in the U.S. of America, the report says, "this situation compares unfavourably with the position in the United States where the facilities for the teaching of plant pathology in some Universities are on a very extensive scale. The accommodation and equipment for the study of the subject are considerably better than those of any British University. In the U.S.A., besides the Federal and various state Governments, private benefactors have contributed large sums of money for training and research of scientific workers, as evidenced by the

grants from the Carnegie Institution of Washington, The Boyce-Thompson Institute for Plant Research, New York, and the Rockefeller Institute for Medical Research, Princeton, New Jersey, which is also financing research on the virus diseases of plants.

In India the study of Botany and Zoology in the schools and colleges was a late introduction, and quite naturally the attention paid to mycology, bacteriology and entomology is very limited. The second meeting of mycological workers of the Board of Agriculture in India held at Pusa in February 1919, passed the following resolution: "That this meeting desires to call attention to the neglect of mycological science in Indian Universities, and wishes to emphasize the importance of the subject in India, and to urge on the Universities to give courses and found lectureships or chairs in the subject." During the course of the discussion the late Dr. F. J. F. Shaw observed that even students taking the M.Sc. degree were totally ignorant of the fungi of their own country, although they could answer complicated questions on European fungi and plant diseases, and he said that some Indian Universities appeared even to resent any questions in their examinations on Indian mycology. The position to-day, after the lapse of nearly thirty years, is only slightly better. The curriculum in Mycology is not much improved, and the number of students offering mycology for the M.Sc., or M.Sc. Ag., is limited. The course in the Agricultural Colleges is slightly better, but still not of the standard to make the student an efficient plant pathologist. Until adequate facilities are available for a post-graduate course in the subjects the position will remain the same.

Regarding the recommendations for the future, the Plant Pests and Diseases Committee of Great Britain suggest the formation of a new Plant Pathology Training Centre or Centres, or in the alternative, the strengthening of certain existing University Departments of Botany and

Zoology to allow of post-graduate training in plant pathology. The Centres should be out in the country where different types of crops could be grown, and liaison established with farmers, and not too far from towns so as to ensure attendance at meetings of scientific societies. In addition to class work it is recommended that there should be fully-equipped mycological and entomological laboratories where the students will receive a thorough training in laboratory technique to be supplemented by training and research in the field. The students should be trained in the methods of observation of disease in growing plants, in methods of plant protection and in the technique of field experimentation. In addition to this there must be an active research section where researches on plant diseases and pests is being carried out by senior research workers. The training and maintenance of students should be covered by adequate financial provisions, the number of scholarships being related to the estimated demand for the workers, and the scholars assured that on satisfactory completion of the training suitable positions will be offered to them.

The Indian Council of Agricultural Research has, as one of its aims, the granting of research scholarships and provision of post-graduate training, but since it can only utilize the existing facilities, and since the translation of agricultural improvements into practice is the function of Provincial Governments and States, not much headway can be made in this direction. It is to be hoped that the measures of income-tax and super-tax relief in the case of endowments for scientific research contemplated by the erstwhile Finance Member of the Government of India, Sir Archibald Rowlands, will start a stream of generous contributions for a National Institute of study and research in the various plant sciences in India.

1. *Applied Biol.*, 1946, 33, 119.

EARTH'S MAGNETIC FIELD

INVESTIGATIONS of the mysterious changes in the magnetic pull of the earth experienced by aircraft flying over British Empire routes have been undertaken by a team of experts from the Empire Air Navigation School, Shropshire.

Research by the school into the earth's magnetic field has already yielded valuable scientific results. The flight of "Aries One" over the North Pole two years ago resulted in confirmation of calculations of the location of the magnetic field pole and gave practical experience of the behaviour of the magnetic compass when flying over these regions.

The changes in deviation now to be investigated were first noted when "Aries Two" flew to South Africa last April at the same time as the Transport Command Mosquito which broke the record to the Cape. Both aircraft experi-

enced unexpected changes in deviation, sometimes as much as ten degrees, although these were found to have disappeared when the compasses were checked on their return home.

The equipment used for this new investigation included twelve magnetic compasses, and aircraft magnetometer, for measuring the strength of the earth's magnetic field, and a new type of electric compass which does not depend on a magnet for direction, but which incorporates an electronic control.

The route flown covered Malta, Habbaniya (Iraq), Negombo (Ceylon), Singapore and Darwin (Australia) outward; and Singapore, Negombo, Nairobi, Cape Town, Heany (Southern Rhodesia) and Khartoum homeward. Possible explanations arising from these investigations are awaited with interest.