

Sir Alexander emphasized the close connexion, in the latter half of the nineteenth century, of the development of organic chemistry with the rise of chemical industry, and showed how in this field science and industry have worked hand in hand. He believes that the future of industrial organic chemistry is assured, though he foresees no radical departures. While in the latter half of the nineteenth century there were few chemists working on the chemistry of living matter, in the past fifty years there has been a striking return to the original objectives of organic chemistry, and, thanks largely to new experimental techniques, academic organic chemistry may well be on the threshold of striking developments, especially in the natural products field. We now have the necessary knowledge and technique to embark on the study of such problems as the relation between chemical structure and biological action and the mechanism of biological action with reasonable hope of success. Organic chemistry, without doing the job of biology or becoming a mere handmaid to biochemistry, is likely to continue to be concerned, as was Perkin, with the natural products.

The form of the centenary celebrations thus differed considerably from that of the jubilee celebrations in 1906. The presence of Dr. Levinstein provided a living link, as already noted, and the reception at Guildhall on May 8 and the banquet on May 9 gave some measure of resemblance, and especially in the international character of the gathering. Lord Salisbury, in his tribute to Perkin, stressed appropriately the importance to Britain of being alert to make the fullest and speediest use of existing knowledge, as well as being active in research, and Mr. Paine, in proposing the toast of the guests, contrived a happy reference to the British industry's Perkin medallist, the late Mr. J. Baddiley.

Nevertheless, the celebrations, for all the excellence of the lectures, left a certain sense of disappointment

or frustration, and this bears on a further feature which the jubilee and centenary celebrations have in common. In 1906 a Perkin Research Fund was established and is administered by the Chemical Society. In connexion with the centenary celebrations, it is hoped to raise £100,000 to found Perkin Centenary Scholarships designed "to promote, advance and encourage technical education in relation to all aspects of the fabrication or application of colouring matters". The proposal is timely, and Lord Salisbury's speech was well calculated to commend it. Not only was that speech, however, unnoticed in the daily Press, but also the whole opportunity which the centenary celebration offered of commending a career in technology to youth was ignored. That opportunity is not likely to recur speedily, and the excellence of the lectures testifies to what was missed. It is easy to suggest reasons for the comparative seniority of those present, though equally easy to suggest ways in which youth might have been encouraged to attend to receive inspiration. But the contrast between the treatment by the Press of the celebrations in 1906 with those of 1956 suggests some neglect of responsibility. *The Times* could find nearly three columns for the proceedings at the Royal Institution and the banquet in 1906; but in 1956 neither lectures nor the Lord President of the Council received a line. The *Manchester Guardian* published an admirable supplement on the centenary, but did not report the celebrations, and only in *The Times* was there a brief note of the exhibition at the Science Museum. Yet the fine-chemical industry is of even greater significance now than it was in 1906. Without the imaginative co-operation of the Press, it seems idle to hope that youth can be brought to realize the opportunities which technology offers, or public support and understanding secured for the expansion of technical and technological education that Britain's economic future demands.

RESEARCH ON THE HUMID TROPICS

THE UNESCO PROGRAMME

IN the humid tropical regions, as in other parts of the world, the development of the land to meet the needs of rapidly growing human populations and the ultimate attainment of a satisfactory equilibrium between man and his environment, depends on scientific research. The need for fundamental research is especially great in these regions, partly because scientific activity has been centred mainly in the temperate zones and partly because so much of the research which has been done in the tropics has been applied and short-term in its aims. To-day the need for research on the problems peculiar to the humid tropics is particularly urgent, not only because there as elsewhere populations are rapidly outgrowing their food supplies, but also because at a time when large areas of tropical Africa and Asia are passing from a Colonial to a more or less independent status, countries which formerly depended on Colonial powers for the staffing and impetus of their research programmes will in future try to depend wholly or to a large extent on their own resources. For this reason, and because a great many of the scientific problems of these regions are world-wide

or at least common to more than one country, the help of United Nations specialized agencies such as the World Health Organization, the Food and Agriculture Organization and the United Nations Educational, Scientific and Cultural Organization is both timely and necessary. Unless stimulus and support are given to fundamental research in the humid tropics by powerful international bodies, research in such countries is likely, for political and economic reasons, to be even more narrowly 'applied' and *ad hoc* in the future than it has tended to be in the past.

It was considerations of this sort which prompted the proposal that Unesco should develop a programme to assist research in the humid tropical regions parallel and complementary to the programme which it initiated in 1951 for research on the arid regions. The proposal was approved at the eighth session of the General Conference of Unesco held at Montevideo in November 1954, and in accordance with the resolutions of the Conference a preparatory meeting of specialists in humid tropics research was held at Kandy in Ceylon during March 22-24 last. Since

many of the most urgent problems of the humid tropics concern deforestation, erosion and land-use generally (and are therefore in the broadest sense of the word ecological), it was thought appropriate that the preparatory meeting should be preceded by a symposium on "The Study of Tropical Vegetation". This took place at Kandy and was held during March 19-21. The preparatory meeting was attended by delegates from Brazil, Ceylon, France, Holland, India, Indonesia, Pakistan, the Philippines, the United Kingdom and the United States, as well as by representatives of the specialized agencies of the United Nations (Food and Agriculture Organization, World Health Organization and World Meteorological Organization), of several international scientific unions and associations and of the Unesco secretariat. Several members of the preparatory meeting also took part in the symposium, but not all the twenty-one members who presented papers to the latter attended the meeting.

At the symposium twenty-two papers on tropical vegetation were presented, and the term 'humid tropics' was so widely interpreted that some papers dealt with regions of relatively dry climate such as Madhya Pradesh in India for which 'seasonal' might be a better description than 'humid'. Since the contributions to the symposium will be published by Unesco (it is hoped later this year), it is unnecessary to summarize them here; but it may be noted that the subjects covered ranged from vegetation mapping and the application of aerial photography to the survey of tropical plant communities to the cytogenetical analysis of the forest flora of south-eastern Asia. The papers were circulated in advance and were not read in full, the authors being asked merely to introduce them briefly and to answer questions. This excellent plan left plenty of time for discussion and was undoubtedly largely responsible for the success of the meeting. The many lively discussions were skilfully guided by the chairman, Dr. C. H. Holmes, of the Ceylon Forestry Department.

In addition to the presentation and discussion of papers, which took about half the available time, discussions were held on five general themes chosen by a steering committee. Each theme was introduced and summed up by a chosen speaker, as follows: ecological factors in the tropics with special reference to the definition of dry seasons (Prof. G. Mangenot, France), vegetation types and their subdivisions, including methods of study (Prof. F. R. Bharucha, India), vegetation mapping (Dr. F. R. Fosberg, United States), the concept of the climax as applied to tropical vegetation (Prof. P. W. Richards, United Kingdom) and regeneration as a factor in judging the status of vegetation types (Prof. C. G. G. J. van Steenis, Holland). The discussions left no doubt of the vigorous activity and lively interest in the field of tropical ecology. There was a general feeling that the methods and concepts of ecology are too largely based on experience in temperate countries, where the vegetation has been modified by human activities for a very long period of time. This point of view was expressed perhaps most forcibly by Prof. van Steenis in a paper dealing with the basic principles of plant sociology as applied to tropical rain-forest vegetation. He claimed that homogeneous samples such as current plant sociological methods require cannot be found in rain forest of the usual type, while the concept of the plant association as a unit of constant composition and definable boundaries is one which could have evolved only in tem-

perate regions with their impoverished and specialized flora and largely anthropogenic plant communities. "If plant sociology had been developed in a tropical country," he said, "it would have another face to-day. In fact the whole of botany would have another face if it had developed in the tropical zone." It is clear that the study of tropical vegetation is likely to develop rapidly in the near future, and that the proposal of some of the Indian members of the symposium to found an international society for tropical ecology is likely to be widely welcomed.

On the afternoon of its third day the symposium adopted a series of resolutions aiming at the promotion of ecological research in the tropics. These were presented to the preparatory meeting, which endorsed them and forwarded them to the Director-General of Unesco.

The preparatory meeting of experts on humid tropics research elected Mr. D. Rhind, secretary of the Committee for Colonial Agricultural Research (Colonial Office), as its chairman. Its main purpose was to propose the formation of a permanent advisory committee of Unesco for humid tropics research and to define the scope and method of functioning of this committee. Some discussion took place on the exact meaning of the term 'humid tropics', which is difficult to define, since there are large parts of the tropics which receive a heavy rainfall unevenly distributed through the year so that the climate is only seasonally humid. It was finally decided that a rough line of division should be drawn in agreement with Unesco's Arid Zone Committee, so that there should be no overlap and no omission of intervening regions from the field of interest of either committee.

There was also discussion on the meaning of 'fundamental research'. Though the general feeling seemed to be that the main duty of the proposed committee should be to provide or initiate research on the basic underlying scientific problems of the humid tropics, some members were opposed to defining its field in such a way as to exclude all kinds of 'applied' research. Careful consideration was given to avoiding overlapping with other international organizations concerned with research such as the Food and Agriculture Organization, the World Health Organization and the Commission for Technical Co-operation in Africa South of the Sahara ('C.S.A.'). There were certain fields of research such as geology and human health and physiology under humid tropical conditions which the meeting considered were probably adequately cared for by existing organizations, but which it was unwilling to exclude formally from the field of interest of the proposed committee.

Papers on an enormous range of subjects covering such diverse fields as zoological surveys, coral atoll ecology, reclamation of swamp land in Brazil, pedology, climatology, research on medicinal plants and much else were laid before the meeting, as well as requests for financial support to various research projects, several of which were recommended to the Director-General of Unesco for favourable consideration. A remarkable feature was the number and diversity of the requests for more taxonomic work on both plants and animals (especially insects) in the tropics. Many speakers made it evident that the lack of modern Floras and other taxonomic works for many tropical countries is at present an insuperable hindrance to research in a great many fields. The remedy depends on trained man-power as well

as on finance; but it is clear that the belief that the biological sciences in the tropics can progress in the absence of strong support to taxonomy is quite unrealistic.

The preparatory meeting accepted gratefully an invitation from the delegate for France that the new Humid Tropics Advisory Committee, which Unesco

has been asked to set up, should hold its first meeting, if possible in 1957, at Abidjan in the Ivory Coast. At the symposium on tropical vegetation it was recommended that this meeting should be preceded by another symposium with the theme "Ecological Studies of Tropical Vegetation in Relation to Soils"

P. W. RICHARDS

GEOCHEMICAL AND GEOPHYSICAL LABORATORIES IN THE IMPERIAL COLLEGE

By PROF. DAVID WILLIAMS

ONE of the initial steps towards the goal of full expansion of the Imperial College of Science and Technology, London, has been the addition of a top story to the Royal School of Mines. This story, incorporated in the Department of Geology, provides about 11,000 sq. ft. of accommodation for the Sub-departments of Geochemistry and Applied Geophysics, which are mainly concerned with training and research in certain modern aspects of mineral exploration. The new laboratories were open to inspection on May 24.

The Geochemistry Section comprises a main laboratory for the chemical analysis of minerals, rocks and soils, two laboratories devoted to spectrochemical analysis and the study of trace elements in geological material by means of large quartz spectrographs and other modern instruments, together with sample preparation and balance rooms. X-ray equipment for mineral identification is available, and a mass spectrometer is shortly to be installed. Several research cubicles are provided for postgraduates engaged in the investigation of a wide range of problems in pure geochemistry and geochemical prospecting.

Analysis of silicate rocks by the so-called classical methods is a protracted and highly skilled technique. Fortunately, however, rapid spectrochemical methods of silicate analysis, recently devised in the United States and substantially modified as the result of research in the new Pure Geochemistry Laboratories of the College, now permit a productivity of ten complete and reliable analyses per man-week. Thanks to this increased tempo the Department has been able to make comprehensive studies of the chemical changes induced in sediments by the emplacement of granites in Donegal, and to investigate chemical variations in the serpentinized basic igneous rocks of Insh in the Scottish Highlands. The research programme in pure geochemistry also includes a comparison of different analytical procedures, using spectrographic, polarographic, chromatographic and colorimetric techniques. This study should indicate the most appropriate method to adopt for determining particular elements, and it is hoped eventually to offer interested workers in other universities and research establishments a variety of silicate rock powders of guaranteed major- and minor-element composition.

Although much is known about the partitioning of certain elements among different minerals and among varieties of particular species, little research has yet been concentrated on the geochemistry of the less common metals, including those of the rare-earth group. Timely investigations, however, are now

under way in the new Department concerning the distribution in minerals of cerium, gadolinium, terbium and other rare-earth elements, knowledge of which will be especially valuable in view of the increasing interest in atomic energy. Regional studies of the distribution of trace elements in specific ore minerals continue to receive attention, and the dispersal of certain elements throughout soil profiles in temperate regions is under consideration. A virgin field of attractive research in nuclear geology awaits the arrival in the Department of a mass spectrometer capable of determining the isotopic abundance of a wider range of elements than has hitherto been investigated anywhere. Among the many problems to be studied is the isotopic constitution of copper, zinc and other metals within a single sulphide deposit and within a particular mineralized district, an inquiry which should not only shed light on the origin of the deposits but may also herald a novel approach to mineral exploration.

In applied geochemistry, a flourishing research school is primarily concerned with critical studies of existing methods of geochemical prospecting, with the development of new field and laboratory techniques, and with the fundamental principles involved in the formation and detection of geochemical anomalies of economic significance. Geochemical methods of prospecting rely on the presence of significant traces of metals naturally dispersed in the rocks and soils near an ore-body, in the vegetation growing on these soils, or in the waters and sediments of streams draining the mineralized area. Thus, although there may be no visible manifestations of mineralization, the presence of concealed mineral deposits may be revealed by the detection of anomalous concentrations of metals in surface materials. Since the concentrations involved are usually very minute, rapid and simple trace analytical techniques have been specially devised to detect them. A Geochemical Prospecting Research Centre has been established in the Department, partly with the aid of funds from the Colonial Office and the Department of Scientific and Industrial Research, and active research is being carried out in various parts of Africa and Britain in mineralized areas containing cobalt, copper, gold, lead, zinc and other metals. Results to date augur well for the continued success of this new method of discovering minerals.

The Applied Geophysics Department is provided with a diversity of modern prospecting instruments, including vertical and horizontal magnetometers, a Worden and a North American gravity meter, seismic equipment and a variety of electrical instruments for spontaneous polarization, resistivity and elector-