

The Physical Society is to be congratulated on arranging such a successful conference at a time when a large proportion of those actually engaged in ionospheric research could be present. The publication of the report, which is promised soon, will add considerably to the value of the Conference.

CARBON-14 DATING SYMPOSIUM IN COPENHAGEN, SEPTEMBER 1-4

IT is now generally recognized that the method of dating organic material by assay of radiocarbon content is of outstanding promise for many sciences, particularly archaeology and the aggregate of archaeology, geology and biological sciences which can be called 'Quaternary research'. The demonstration of its feasibility by W. F. Libby was followed by the initiation of many projects for radiocarbon dating, centred in North America and in Europe. Those most concerned in North America have already had more than one joint meeting, but European workers have remained relatively isolated from one another until this year, when they attended an informal symposium in Copenhagen.

The meeting was sponsored by the Danish Rask-Ørsted Foundation, and was actively supported by the organizing committee of the Copenhagen carbon-14 project which has been operating since 1951 under the chairmanship of Dr. Therkel Mathiassen. The secretary of the meeting was Dr. Hilde Levi, head of the Copenhagen carbon-14 dating laboratory, and, through her, invitations were sent to the several European centres known to have carbon-dating plant working or under construction: two or three members attended from each centre.

The first day's discussion opened with consideration of technical matters associated with solid-carbon counting by methods essentially those of W. F. Libby, as now being used in Copenhagen and in Rome, and in preparation at Trondheim and Stockholm. This was followed by accounts of the processes being worked out for the use of gas-counters with the carbon in the form of carbon dioxide (Groningen and Heidelberg), acetylene (Royal Institution, British Museum and Harwell jointly, and Cambridge), and methane (Göteborg). Many interesting aspects of the production of the counting gases were considered, more particularly the hydrocarbons.

It became perfectly clear that gas-counting both by carbon dioxide and by acetylene is more expeditious and somewhat more sensitive than screen-wall counting of elemental carbon, and may be expected to displace the older method, which nevertheless is now producing a large part of the published datings. Only brief reference was made to scintillation counting.

Discussion on the third day concerned sources of error inherent in the samples and the techniques, and precautions which they involve, and some brief consideration of datings secured by European projects. It was apparent that, while cross-checking of samples could usefully be considered in this way, the implications of several unpublished datings were far too wide for the limited personnel and time of the meeting.

Some consideration was given to the standardization of form of publishing results, and to dating

projects requiring international organization. It was agreed that a second symposium ought to be held, at least to deal with technical advances, within the next year or so and that *rapprochement* should be sought with American colleagues.

This first meeting proved extraordinarily profitable to all participants, not least because of the close personal discussions made possible by its small size and informal nature. The hospitality of our many Danish hosts and the skill and tact of Dr. Levi in organizing the meeting were beyond praise.

H. GODWIN

HYDERABAD CENTRAL LABORATORIES FOR SCIENTIFIC AND INDUSTRIAL RESEARCH REPORT FOR 1952

THE annual report for 1952 of the Central Laboratories for Scientific and Industrial Research, Hyderabad*, which has only recently been published, refers to the slow progress of the new building, towards the completion of which the Government of India sanctioned a non-recurring grant of 5 lakhs of rupees. Research in the Oils and Entomology Sections during the year included the preparation of insecticidal material from sitaphal seed and soap-making trials of sitaphal oil, the dehydration of castor oil, continuous preparation of tricinolein, indigenous cotton-seeds and their oils, separation of fatty mixtures and the antioxidant properties of aca-catechin. The Fibre and Paper Section examined the possibilities of manufacturing filter and board paper from tailor wastes and of using casuarina wood pulp as a diluent for cotton-seed linters. The Fuel Section made a rapid survey of the distribution, classification and available reserves of Hyderabad coals and continued its systematic physical and chemical survey. A pilot-plant investigation of the briquetting of non-caking coals has been undertaken and, in connexion with the installation of the Lurgi low-temperature carbonization plant, the weathering properties of Hyderabad coal and its oxidation in a fluidized bed, the recovery of tar acids and hydrocarbons from low-temperature tar and of benzole from carbonization gas are being studied.

The Heavy Chemicals and Fertilizers Section has been concerned with the utilization of feldspar and iron pyrites, and of sulphates for the manufacture of sulphuric acid as well as the preparation of activated charcoal from groundnut hulls. A systematic study of Hyderabad clays was made in the Ceramic Section as well as a study of their utilization as fireclay refractories. The work of the Organic Chemistry, Pharmaceutical and Drugs Section included studies of potential synthetic analgesics, including quinazoline derivatives and a new synthesis of pethidine, studies on Indian turpentine and alkaloids and attempts to synthesize compounds with sex hormone activity. In the Biochemistry Section, fermentation studies included the production of citric acid from sugar-cane molasses and of itaconic acid from glucose, using *Aspergillus terreus*; non-fermentation studies included the production of lævulinic acid from sugar-cane bagasse.

* Central Laboratories for Scientific and Industrial Research, Hyderabad. Annual Report, 1952. Pp. xi+57. (Hyderabad-Deccan: Osmania University Press, 1954.)

X-ray studies were made on Hyderabad clays and on stilbene derivatives, and the conductivity of lithium nitrate in mixtures of methyl and ethyl alcohol and the isomerization of chromic chloride hexahydrate were studied in the Physical Chemistry Section. The Analytical Section is working out a method for the determination of tartaric acid with potassium dichromate, and a systematic study of the fusel oil from the Nizam sugar factory, Bodham, Hyderabad State, indicated that it contains 50 per cent of amyl alcohol with fair proportions of propyl and isopropyl alcohol. Besides erecting the low-temperature carbonization plant, the Chemical Engineering Section determined the solubilities of groundnut oil in 98 per cent ethyl alcohol at 40–60° C., while the Operational Research Unit was concerned with the manufacture of fructose on a semi-commercial scale, of tricinolein and of sesamin.

OXFORD SYSTEM OF DECIMAL CLASSIFICATION FOR FORESTRY

FOREST bibliography has for long been a difficult subject to deal with, more especially since forestry research institutes and new forest departments and their resulting publications began to make their appearance. Certainly nowadays it would be almost impossible to keep *au fait* with the great output of forestry literature without some form of international classification.

The International Association of Forest Research Institutes—since 1929 called the International Union of Forest Research Organizations—had put the question of forest bibliography on its programme as early as 1903 with the object of creating a minimal system of classification and an international forest bibliography, the work being then entrusted to a Bibliographical Committee. The subject was discussed at the three international forestry congresses held in Rome (1926), Budapest and Helsinki. From the outset, the Swiss forester, Dr. Philipp Flury, was one of the most ardent workers in this new cause in preparation, and it was not until 1933 that the Committee presented to the International Union a complete system of classification of forest literature which was adopted in congress. It bore the title "Forest Bibliography", but became widely known as the "Flury System". It was assigned the decimal signature 634.9 F, to distinguish it from the heading 634.9 forestry in the Universal Decimal Classification, which differs in the details of its sub-division. One of the Flury System's main uses was to classify the title references comprising the International Forest Bibliography—a scheme organized by the International Union for the regular exchange between member countries of references to literature considered to be of international importance.

The first post-war meeting of the Bibliographical Committee was held in Zurich in 1948 under the chairmanship of Prof. H. Burger. At this meeting Mr. F. C. Ford Robertson, director of the Commonwealth Forestry Bureau at Oxford, presented a completely revised system of classification for forest literature which had been prepared by his Bureau in consultation with the chief research station (Alice Holt) of the British Forestry Commission and the Forest Products Research Laboratory at Princes Risborough. This revision was based upon ten years

of experience gained by the Bureau in the course of its day-to-day work in abstracting and classifying the world flow of forestry literature.

When a working agreement had been reached between the International Union of Forest Research Organizations and the United Nations Food and Agriculture Organization, the International Council of the former proposed to the latter the appointment of a joint Bibliographical Committee to study the new classification and to make appropriate recommendations to both. This was to supersede the previous Committee, and on it was appointed A. Oudin, director of the Nancy Forestry School, F. C. Ford Robertson and E. Saari, professor of economics in the University of Helsinki. J. D. B. Harrison and R. G. Fontaine were appointed by the Food and Agriculture Organization. Meetings of the Committee were held at Helsinki, Oxford, The Hague, Wageningen, Oxford and Rome. During this period the new classification system submitted by the Commonwealth Forestry Bureau at Oxford was carefully examined, and at various stages of revision was widely circulated to members of the International Union and research stations throughout the forestry world. Throughout the four years of revision, the Commonwealth Forestry Bureau acted as the natural clearing house for the work of correspondence and collation involved, in which Mr. P. G. Beak, assistant director of the Bureau, proved an invaluable helper.

The definitive English text of the new system of classification (which runs to 115 pages) is called the "Oxford System of Decimal Classification for Forestry"* and was finally presented to the International Congress in Rome in September 1953, when it was unanimously adopted with the recommendation that translations of the English text should be published in French, German and Spanish. The Food and Agriculture Organization, at its seventh session in Rome, approved of the system with a few resolutions on the subject of periodical revisions and so forth.

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* The Oxford System of Decimal Classification for Forestry. (Being the Definitive English Version as authorized by the Rome Congress of the International Union of Forest Research Organizations, September 1953, and published on their behalf by the Commonwealth Agricultural Bureaux.) Pp. 115. (Farnham Royal: Commonwealth Agricultural Bureaux, 1954.) 10s.

SUBMARINE ILLUMINATION AND THE TWILIGHT MOVEMENTS OF A SONIC SCATTERING LAYER

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IT has long been recognized that many zooplankton organisms exist in distinct strata during the day and that they may undergo extensive diurnal vertical migrations. The similarity of their behaviour to that of certain sonic-scattering layers in the sea, observable with echo-sounding equipment, led Johnson¹ to suggest that the origin of these layers is biological. Collections by various methods have shown that concentrations of both zooplankton and fishes are associated with these layers. Although much thought has been devoted to the composition of the layers and to the acoustic properties of the animals probably comprising them, attention to the causes of