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<sup>1</sup> Sanger, F., *Biochem. J.*, **39**, 567 (1945).

<sup>2</sup> Bell, P. H., *Ann. N.Y. Acad. Sci.*, **51**, 897 (1949).

<sup>3</sup> Partridge, S. M., and Swain, T., *Nature*, **166**, 272 (1950).

<sup>4</sup> Work, T. S. (private communication).

## RADIO RESEARCH BOARD REPORT FOR 1933-48

A REPORT entitled "Radio Research 1933-1948"\* which has recently been published, covers in broad outline the work of the Radio Research Board during 1933-47 and also contains the annual report of the director of radio research of the Radio Research Organization, together with appendixes listing scientific papers published by the Radio Division during 1933-48, and the membership of the Board and various committees. The publication of this report marks a return to former practice, for up to now no report has been issued by the Board since that submitted in 1933 reviewing the work of the previous twelve months. 1933 was a year when important and far-reaching developments were being initiated; at that time the Board formed the Radio Department (later Division) of the National Physical Laboratory, and the general features of the work have been recorded in the annual reports of the Laboratory. At the end of 1947, however, it was decided to rearrange the Radio Division into an independent Radio Research Organization, and Dr. R. L. Smith-Rose was appointed director of radio research. This recent report, therefore, is the first annual review of the new Organization.

During 1933-39 the programme of research was largely devoted to the study of radio-wave propagation over a wide range of frequencies (mainly 1-30 Mc./s.) as influenced by the properties of terrain, the troposphere, the ionosphere, and the configuration of the path of propagation. Particular attention was given to the ionosphere and the effect of the sun in producing diurnal, seasonal and longer-period variations, and this led to the setting-up of a forecasting service providing information, several months in advance, on propagation conditions over any circuit involving an ionospheric path. This service was invaluable during the War and is being continued as a regular routine. Another section of the pre-war programme was concerned with the improvement of direction-finding techniques. The Adcock-type of direction-finder was brought to a high state of precision and efficiency over a frequency-range of 100 kc./s.-30 Mc./s., and other work was done on the spaced-loop type of aerial and in the presentation of information from both types of direction-finder on a cathode-ray tube.

Further topics pursued were as follows: the study of atmospheric and its practical application to weather forecasting by the Meteorological Office in locating thunderstorms; the generation of oscillations at successively shorter wave-lengths, leading to

the development of the magnetron and also the study of temperature variation of the components of oscillatory circuits; the measurement of radio-frequency field-strengths—a subject which becomes very difficult at very short wave-lengths; and finally the development of radar, or radiolocation as it was first called. This last-mentioned field of research was intimately connected with the developments of the other work, and the success of radar can be claimed as an outstanding example of the fruits that often accrue, and often unexpectedly, from fundamental research.

During the Second World War, the general lines of work continued; but the tempo was greatly speeded up, and the emphasis was naturally switched from long-term research to the immediate short-term problems of the hour. Much progress was made, mainly in pursuing the investigations at metric and centimetric wave-lengths. In this field of very short wave-lengths the properties of materials, especially of the ground and gases in the atmosphere, were extensively studied, and work was also done on direction-finding, the deviation of waves through the ionosphere, and the influences of site and intervening terrain. Another special feature of the war-time work was the close collaboration maintained with research organizations in the United States, particularly the National Bureau of Standards.

After the War it was obvious that the scope of radio research would be considerably wider than that of the pre-1939 days, and in 1946 an estimate was made that a properly planned programme of research would cost some £225,000 annually. This estimate was accepted, and, as already stated, a Radio Research Organization was brought into being at the end of 1947 under the Department of Scientific and Industrial Research.

The work of the Organization is mainly of a fundamental nature, for a great deal of research on manufacturing processes and the development of radio services and equipment is necessarily carried out by British industry. Nevertheless, much of the work by the Organization is of direct and immediate value to those concerned with broadcasting and communications services. Briefly, the major items of research are concerned with the following fields of investigation: continuation of the study of the ionosphere and the issue of forecast bulletins; study of the mode of propagation of radio waves throughout the working spectrum (10 kc./s.- $3 \times 10^6$  Mc./s., or 30 km.-0.1 mm.) as affected by terrain, lower atmosphere and ionized portions of the atmosphere (such questions involve intensity, velocity and direction of propagation, and state of polarization); improvement of the technique of making measurements at radio-frequencies, particularly the measurement of field-strength at all frequencies and of power and impedance above 600 Mc./s.; study of random noise and atmospherics; study of the generation and detection of oscillations at the highest possible frequencies; study of the properties of materials for use in telecommunications; and provision of means of the fullest dissemination of information on all aspects of radio.

The facilities available for research comprise principally certain laboratories at Teddington allotted to the Radio Division of the National Physical Laboratory together with the Radio Research Station at Slough. A portion of the programme is at present carried out at the Telecommunications Research Establishment at Malvern, and a small amount is

\* Department of Scientific and Industrial Research. Radio Research 1933-1948. Report of the Radio Research Board for October 1, 1933-December 31, 1948, with a Survey of the Investigations carried out during the Years 1934-1937 and a Report of the Director of Radio Research for the Year ended December 31, 1948. Pp. 59+8 plates. (London: H.M. Stationery Office, 1950.) 2s. net.

done by direct contract at the universities; for the most part, however, radio research at the universities is not formally part of the programme of the Organization. In addition to the laboratory research in Great Britain, the Organization operates outstations in the country and overseas, of which the four principal ones are: Hillhead, near Fraserburgh, Scotland, which is mainly concerned with vertical-incidence ionospheric measurement, though, in addition, it is used for transmission and reception tests; Port Stanley, Falkland Islands, and Singapore, which also are both used for vertical-incidence ionosphere work, the latter being in close contact with Raffles College, Singapore; and Winkfield, Windsor, which is concerned with the accurate measurement of direction of arrival of ionospheric waves. The establishment of further stations is being considered.

Last but not least in the activities reported by the Radio Research Board is the short account given of the service known as "Abstracts and References", a service of very long standing, which reviews contemporary literature suitable for the needs of all radio research workers, whether engaged in fundamental research or in industrial developments and applications. For many years these abstracts have been published monthly in the *Wireless Engineer* and also, since 1946, in the *Proceedings* of the Institute of Radio Engineers in New York.

The past achievements of British research in the field of radio and radar are probably well appreciated by the layman; and "Radio Research 1933-48", in the typically prosaic and modest way that characterizes official reports, gives an outline of the technical details and enhances the reputation that has been gained. There can be little doubt that the new Radio Research Organization will carry the torch in the same way.

## RESEARCH COUNCIL OF ISRAEL FIRST ANNUAL REPORT

THE first annual report of the Research Council of Israel covers its activities from its establishment in June 1949 to March 31, 1950\*. These activities comprise the organization and co-ordination of research in all the branches of natural science and technology; the encouragement and conduct of scientific investigations with the view of the development of industry and agriculture and the utilization of the natural resources of Israel, as well as the promotion of health and welfare; and advising the Government on planning in all fields connected with natural science and technology. The Council, which consists of seven men of science appointed by the Prime Minister, and five representatives of the main scientific institutions of the country, with the Prime Minister as chairman, has established standing advisory committees for fundamental research, as well as industrial, agricultural, building and food research. Medical research is being considered by a sub-committee of that for fundamental research, and other sub-committees have been appointed for problems of general biology, enzymology and the utilization of wind-power and solar energy. For the present, research projects are being carried out in the estab-

\* Research Council of Israel. First Annual Report for the Year ending 31 March 1950. Pp. 30. (Jerusalem: Government Printer, 1950.)

lished scientific institutions, and these are being extended where necessary.

A study of the phase relationships of the important salts of the Dead Sea is reported as being carried out in the hope that the results may assist in the separation of these salts by solar evaporation. The Geological Institute was established at Jerusalem in May 1949 with the main task of mapping the country on a scale of 1:20,000 for the purpose of determining its resources in raw materials and surface water, in addition to that of advising other Government departments in the field of geology. Two industrial research associations, the Citrus Concentrates Producers' Association and the Ceramics Research Association, have so far been formed, and the textile laboratory at the Standards Institution of Israel at Tel-Aviv is expected to facilitate establishment of a textile research association. Building research is directed particularly to the requirements of the new immigrants' houses and the development of new building methods which will entail the minimum use of imported materials. Besides a systematic study of climatology in relation to building and investigations on the influence of roof structure on the indoor climate of rooms on upper floors, the respective merits of concrete and bitumen for use in road construction in different parts of Israel are being studied, as well as the mechanism of the deterioration of bitumen and the physical effects of its ageing.

The percolation of water from storage ponds, the utilization of olive residues and the rate of evaporation from water surfaces are other problems under investigation, while plant investigations have concentrated mainly on the comparative growth of different strains of fibre plants under local conditions and tests of the methods applied for the industrial utilization of these plants. Local plants containing alkaloids or essential oils have also been studied, as well as the sensitivity of summer and winter plants to herbicides. Two other projects were aimed at the elimination of the serious tick-borne diseases of cattle. Problems related to the utilization of orange peel for the growth of fodder yeasts, including a study of the micro-organisms which intervene in the fruit processing and of useful micro-organisms in the citrus industry, have also been investigated, and it is intended to publish detailed scientific reports on the projects in hand, either in scientific periodicals, including the *Bulletin* of the Council, the first issue of which is now in the press, or in the form of monographs. Three such monographs published in 1949-50 are listed in the report, together with a list of publications of the Palestine Branch for Scientific and Industrial Research, 1945-48.

## OVERSEAS FOOD CORPORATION ANNUAL REPORT FOR 1949-50

THE second annual report of the Overseas Food Corporation\*, which covers the year ended March 31, 1950, has already been rendered somewhat out of date by subsequent changes in personnel, and, so far as the groundnuts scheme is concerned, by the Corporation's acceptance last autumn of the recommendations of the 'working party' which it had appointed as a result of the disappointing agricultural results at Kongwa for the second year in succession.

\* Overseas Food Corporation. Annual Report and Statement of Accounts for the Year ended March 31, 1950. Pp. vi+121. (London: H.M. Stationery Office, 1950.) 3s. 6d. net.