

land in the winter of 1930-31 and the *Empress of Britain* in 1931-32. Successful conversations were held with London when a ship was in the China Sea and with New York when at Alexandria. Service to the *Majestic* was opened on February 14, 1930, at first for incoming calls only.

Important work on automatic direction finders was done in 1934 and onwards and an aeroplane automatic radio compass was described in 1936. This equipment was introduced in the United States in 1937, and important experiments were made and papers published on night error and mountain effects. The subject of ground direction finders avoiding polarization errors by the use of spaced vertical antennæ with high-frequency transmission line to distant receivers was studied around 1938 as was that of aerial navigation.

Less spectacular, but fundamental, were developments in automatic telephony and transmission in which field the application of machine switching to large areas, the rapid expansion of rural automatic networks and, in recent years, schemes involving complete national dialing in some of the smaller European countries, either on a timed and zoned metering basis or on an automatic ticketing basis, were outstanding examples. These national dialing schemes led to the development of a commercially practicable system for automatic toll ticketing, each ticket containing a complete record of each subscriber's telephone call. In 1937, 1939 and 1940 a series of articles appeared showing how automatic toll ticketing was developed and introduced commercially.

The wire transmission systems went through an evolution just as remarkable as that of automatic switching. References to the first carrier telephone systems in Brazil and Australia appeared in 1924 and 1925 respectively; the first loaded and repeated long-distance French telephone cable, in 1927; and the first twelve-channel carrier systems and the first coaxial cable in England in 1937. Several lines of development, continued year after year, are only now yielding their reward in connexion with war efforts, and this is especially true of much of the work done on aerial navigation, on direction finding and in the general field of ultra-high frequencies. This 43-page review contains much of historical interest, and concludes with a list of 159 references to papers, etc., published during the period surveyed.

## FORTHCOMING EVENTS

(Meeting marked with an asterisk is open to the public)

Tuesday, July 14

INSTITUTE OF PETROLEUM (JOINT MEETING WITH THE INSTITUTION OF CHEMICAL ENGINEERS AND THE CHEMICAL ENGINEERING GROUP OF THE SOCIETY OF CHEMICAL INDUSTRY) (at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1), at 5.30 p.m.—Dr. M. Ruhemann: "The Separation of Gases".

Wednesday, July 15

INSTITUTE OF CHEMISTRY (LONDON AND SOUTH EASTERN COUNTIES SECTION) (at 38 Russell Square, London, W.C.1), at 6 p.m.—Dr. J. Grant: "Chemist versus Forger".

Thursday, July 16

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE (at Keppel Street, London, W.C.1), at 2.30 p.m.—Prof. Major Greenwood, F.R.S.: "Civilian Hazard of Life in this War and in the Last—a Profit and Loss Account for 1915-16 and 1940-41".\*

Friday, July 17

PHYSICAL SOCIETY (OPTICAL GROUP) (in the Physics Department of the Imperial College, Imperial Institute Road, London, S.W.7), at 5 p.m.—Mr. F. Twyman, F.R.S.: "The Interferometer in Lens and Prism Manufacture".

## APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

HEADMASTER OF THE PORTSMOUTH GRAMMAR SCHOOL—The Chairman of the Governors, Paymaster Rear-Admiral G. Grant, 4 Old Cottages, Church Hill, Midhurst, Sussex (July 18).

TEACHER OF PHYSICS, MATHEMATICS AND ENGINEERING SCIENCE, and a TEACHER OF WORKSHOP PRACTICE, in the Doncaster Technical College—The Chief Education Officer, Education Offices, Doncaster (July 21).

VETERINARY INVESTIGATION OFFICER—The Secretary, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow (July 30).

TWO DEMONSTRATORS (MALE OR FEMALE) IN ANATOMY—The Registrar, The University, Sheffield (July 31).

LECTURER IN THE DEPARTMENT OF CHEMISTRY—The Registrar, University College, Southampton (August 4).

TEACHER FOR DAY AND EVENING ENGINEERING CLASSES, and a TEACHER FOR ENGINEERING WORKSHOP PRACTICE AND METALWORK—The Principal, County Technical College, Gainsborough.

## REPORTS and other PUBLICATIONS

(not included in the monthly Books Supplement)

### Great Britain and Ireland

Memoirs of the Cotton Research Station, Trinidad. Series A: Genetics, No. 18: Anthocyanin Pattern in Asiatic Cottons. By R. A. Sillow and C. P. Yu. Pp. 249-284. (London: Empire Cotton Growing Corporation.) 2s. 6d. [228]

Royal Meteorological Society. Bibliography of Meteorological Literature. Prepared by the Royal Meteorological Society with the collaboration of the Meteorological Office. Vol. 5, No. 2, July-December 1941. Pp. 13-30. (London: Royal Meteorological Society.) 2s. 6d. [256]

Hertfordshire County Council. The School Child and the School Canteen. An Inquiry undertaken by F. LeGros Clark and presented to the Education Committee. Pp. 36. (Hertford: County Hall.) [256]

Annual Reports on the Progress of Chemistry for 1941. Vol. 38. Pp. xxxii+326. (London: Chemical Society.) 15s. [256]

Geological Survey of Great Britain: Scotland. Wartime Pamphlet No. 27: The Oil-Shales of the Lothians—Structure. Area 1: West Calder. By Dr. J. E. Richey; with Appendix by W. Manson and Contributions by W. E. Graham. Pp. 42. (London: Geological Survey and Museum.) 1s. 10d. [17]

### Other Countries

U.S. Office of Education: Federal Security Agency. Bulletin 1940, No. 6 (Monograph No. 5): Pupil Personnel Services as a Function of State Departments of Education. By David Segel and Maris M. Proffitt. (Studies of State Departments of Education.) Pp. vi+84. 15 cents. Bulletin 1941, No. 7: School Library Administration as Annotated Bibliography. Prepared by Nora E. Beust. Pp. vi+82. 15 cents. (Washington, D.C.: Government Printing Office.) [226]

University of Illinois: Engineering Experiment Station. Bulletin Series No. 334: The Effect of Range of Stress on the Fatigue Strength of Metals. By James O. Smith. Pp. 49. 55 cents. Reprint Series No. 22: Eighth Progress Report of the Joint Investigation of Failures in Railroad Rails conducted by the Engineering Experiment Station, University of Illinois, in co-operation with the Association of American Railroads and the Rail Manufacturers Technical Committee. By Herbert F. Moore. Pp. 38. 15 cents. (Urbana, Ill.: University of Illinois.) [226]

Proceedings of the United States National Museum. Vol. 92, No. 3139: The Chrysomelid Beetles *Luperodes bivittatus* (LeConte) and *Varicornis* (LeConte) and some Allied Species. By Doris H. Blake. Pp. 57-74+plates 5-6. Vol. 92, No. 3140: Notes on the Classification of the Staphylinid Beetles of the Groups Lispini and Osoriina. By Richard E. Blackwelder. Pp. 75-90. (Washington, D.C.: Government Printing Office.) [226]

U.S. Department of Agriculture. Farmers' Bulletin No. 1886: The Beet Leafhopper. By W. C. Cook. Pp. ii+21. (Washington, D.C.: Government Printing Office.) 10 cents. [236]

University of California Publications in Zoology. Vol. 46, No. 1: The White-crowned Sparrows (*Zonotrichia leucophrys*) of the Pacific Seaboard: Environment and Annual Cycle. By Barbara D. Blanchard. Pp. iii+178 (20 plates). (Berkeley and Los Angeles, Calif.: University of California Press; London: Cambridge University Press.) 2 dollars. [256]

Forest Bulletin No. 106 (Silviculture Series): The Control of Lantana by a Sodium Chlorate Spray. By A. L. Griffith. Pp. vi+8+2 plates. (Delhi: Manager of Publications.) 6 annas; 7d. [17]

Imperial Council of Agricultural Research. Miscellaneous Bulletin No. 37: Milk Records of Cattle in Approved Dairy Farms in India. Vol. 2 (Records received during 1937-38), Part 2: Buffaloes. Compiled by the Animal Husbandry Bureau, Imperial Council of Agricultural Research. Pp. vi+325-614. (Delhi: Manager of Publications.) 5 rupees; 8s. [17]

### Catalogues

Electric Furnaces. (Publication 51.) Pp. 4. (London: Johnson, Matthey and Co., Ltd.)

Glo-Pass Security System. Pp. 12. (London: Colloidal Research Laboratories, Ltd.)

Chance-Parsons Optical Glass. (GP.400.) Pp. 22. (Smethwick: Chance Brothers and Co., Ltd.)