sphere from one point to another. In this case signals passing between two stations at a short distance apart will traverse lower levels of the atmosphere than those passing between stations separated by a great distance. The eclipse probably affects the ionisation of the upper and lower layers of the atmosphere differently, and therefore we may expect to get different effects on long- and short-range signals. Moreover, it has been shown to be probable that long waves are more affected than short waves by changes of the ionisation of the air through which they travel. The elucidation of this point is one of the aims of the observations.

Anyone desirous of obtaining further information should communicate with Dr. W. Eccles, honorary secretary of the committee, City and Guilds Technical College, Leonard Street, London, E.C.2.

THE BUREAU OF STANDARDS AND THE WAR.

THE most obviously noteworthy feature of Dr. Stratton's report on the work of the U.S. Bureau of Standards for the year ended June 30, 1918, is the very extensive field of investigation covered. A large part of the work was necessarily related to the war; the expenditure increased from about 140,000*l.* in 1916–17 to more than 600,000*l.* in 1917–18, of which 220,000*l.* appears under the head of "National Security and Defence," and is made up mainly of sums expended on new buildings and laboratories, additional to the growth of ordinary expenditure due to war conditions. The value of the tests made, chiefly for the Government, is given as 20,000*l.*; and the number of persons employed as 1405, of whom 839 were engaged in research and investigations specially authorised by Congress. The figures are useful as an indication of the expansion which has taken place.

The report opens with a brief account of the functions and organisation of the Bureau, which, if space permitted, it would be interesting to review in detail. It affords a valuable study in these days of reconstruction. The functions of the Bureau are stated to be the "development, construction, custody, and maintenance of reference and working standards, and their intercomparison, improvement, and application in science, engineering, industry, and commerce"; while the standards are classified under the five headings: standards of measurement, standard constants, standards of quality (of materials), standards of performance (of machines and devices), and standards of practice. The relations of the work of the Bureau to the public and to the Government service are examined in a manner which brings out prominently the important *rôle* the institution plays in connection with the national life and industry.

The remainder of the report, some 180 pages, deals, for the most part in short paragraphs, with the innumerable items of research and test work which have received attention in the various scientific and technical divisions. These departmental reports contain little more, in many instances, than a concise statement of matters investigated; in turning over the pages, among the many points of interest, a few only can be selected for comment. A new equipment has been provided for measuring expansion up to temperatures above 900° C. The examination of mine-scales, used for weighing coal mined, led to the detection and removal of serious errors due to faulty weights, improper installation, and neglect in maintenance. The testing of gauges for the Ordnance Department was undertaken by the Bureau, as in this country by the National Physical Laboratory, though on a much smaller scale than here. Branches were established at New York and elsewhere, and the manufacture of gauges was commenced.

In the electrical department ignition in petrol engines was studied, and improved porcelains for sparking plugs, developed by the ceramic laboratory, were put into production. A special method was devised for determining the velocity of projectiles. The method of "magnetic analysis" as a criterion of the quality of steel has been further investigated and applied in practice. The photometric work included tests of field searchlights and the investigation of gas-filled standards of spherical candle-power. For wireless work a new building was nearly completed. Sound-ranging was among the problems taken up by one of the electrical sections. An account is given of the relation of the Bureau to municipalities and public service commissions in securing safety and standardisation in connection with electricity and gas supply; some particulars are included of the national electrical safety code. The subject of electrolysis of underground pipes, cables, and other metal structures from stray earth-currents is prominently mentioned, and may need to be taken up actively in this country.

In the work of the heat department may be noted the determination of refrigeration constants, including the thermal constants of ammonia. The fire-resisting properties of structural materials, reinforced concrete, etc., under load were examined. An apparatus was completed for strength tests of metals at temperatures up to 800° C. The work on aeroplane power plant included the construction of an altitude laboratory for engine tests under reduced pressure and at various temperatures, and a number of tests on engines have been carried out. The construction of radiators has also been the subject of research.

The researches in the optics department have included much spectroscopic work, dealing especially with the red and infra-red regions of the spectrum, landscape photography with red-sensitive plates, colour-filters, etc. The great value of red-sensitive plates in penetrating haze has been demonstrated, and another important characteristic of these plates is said to be their power to detect *camouflage* designed to defeat the eye. Quantitative, as well as qualitative, methods of spectroscopic analysis have been employed. Polarimetry has received much attention, especially in connection with the estimation of sugar, and interesting results have been obtained with regard to the natural rotation of quartz at high temperatures; an abrupt change was found to occur at about 574° C. In connection with the polarimetric work intense monochromatic light sources were necessary, and, after experiment with cadmium amalgam lamps, a lamp using a new alloy has been produced. A novel method for the production of artificial daylight makes use of the rotatory dispersion of quartz.

A considerable amount of attention in the optics and chemistry departments has been given to the production of optical glass. The Bureau is said to be shipping glass in quantity for the manufacture of optical instruments. Some seven or eight varieties of the most used glasses are being produced, including a dense barium crown. For this work a new glass laboratory was erected in 1917. Much investigation has necessarily been devoted in this connection to the production of pots for melting.

The work of the chemistry section has included the study of electroplating and electrotyping; the improvement of the electrolytic method of estimation of carbon in steel so that an accurate determination can now be made in 4½ minutes; the testing of balloon fabrics and the investigation of balloon gases, together with chemical work on oils, rubber, paper, textiles, ink, glue, cement, bitumen, and other materials. It

is noted that in the testing of balloon fabrics no satisfactory equivalent for exposure to weather has been found, confirming experience in this country. There was a greatly increased demand for standard analysed samples as furnished by the Bureau.

The engineering section of the Bureau is responsible for the control of a large amount of routine testing work of various kinds, some of which is carried out in branch laboratories. For work in aerodynamics a new building and wind-tunnel have been provided; the latter is octagonal in section, the distance between opposite faces being 4½ ft., and a wind-speed of ninety miles per hour is obtained with an expenditure of 85 h.p. Autographic instruments for measurements on aeroplanes in flight have been designed. Much work has also been done on materials for aircraft construction and the strength of aeroplane parts. The inspection and testing of cement and concrete for the Government and the public are on a large scale, and have included investigations relating to concrete ships. Stress reversal tests on reinforced concrete beams have been carried out. Lubricating oils have been investigated. The textile division has given attention to aeroplane and balloon fabrics; a cotton fabric for wing-covering was produced with the aid of the manufacturers which was considered superior to linen, and has been widely used.

In the metallurgy division considerable developments have taken place, and a brief description is given of the new laboratories and equipment installed, which will be found of interest. As at the National Physical Laboratory, light alloys for the construction of aircraft and aircraft engines have received a great deal of attention, and evidence of co-operation appears in the adoption of a programme to supplement work done here. Stress is laid on the necessity for the systematic study of constitution to secure further progress. The properties of metals at high temperatures are being investigated. Ceramics is also a subject on which much research is in progress.

This brief survey will suffice to show that the report contains evidence of a vast amount of scientific and industrial research which will be of the greatest interest and importance to those who are working on parallel lines in this country. A special feature of the work of the Bureau is the attention given to methods of making available for ready reference throughout the country the results of the various investigations. Four separate series of publications are issued: (i) scientific papers, (2) technologic papers, (iii) circulars, and (iv) miscellaneous publications; these are widely distributed to institutions and libraries. The need in this country of more effective means for the rapid dissemination of technical information among those to whom it is of value has been very apparent during the war, and in the consideration which is now being given to this matter the methods adopted by the Bureau will be found to merit careful examination.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BIRMINGHAM.—Dr. S. W. J. Smith, F.R.S., assistant professor at the Imperial College, South Kensington, and for many years secretary of the Physical Society of London, has been elected to the Poynting chair of physics in the University.

CAMBRIDGE.—Sir Ernest Rutherford, Cavendish professor of experimental physics, has been elected to a fellowship at Trinity College.

Dr. H. Hartridge, of King's College, has been appointed demonstrator of physiology until September 30, 1921.

Mr. Bennett Melvill Jones and Mr. James Wyvill Lesley have been elected to junior fellowships at Emmanuel College. Mr. Jones was placed in Class I. of the Mechanical Sciences Tripos, 1909, and has been awarded the Air Force Cross for his work with the Royal Air Force, of which he has been a temporary lieutenant-colonel. Mr. Lesley was placed in Class I., Part I., of the Natural Sciences Tripos in 1910, and obtained the agricultural diploma. He was awarded a scholarship of the Board of Agriculture in 1911, and was a student of the John Innes Institution, 1912. He was temporary captain in the K.R.R.C., gained the Military Cross, and was a prisoner in Germany, 1917–18.

DR. BOON has been appointed to the chair of chemistry at Heriot-Watt College, Edinburgh.

MR. R. W. H. HAWKEN has been appointed to succeed Prof. A. J. Gibson as professor of engineering in the University of Queensland.

WE learn from the *Morning Post* that a donation of 10,000*l.* has been given to the Cape University by the National Bank of South Africa.

MR. W. J. JOHN, formerly a wireless telegraphy engineer under the Admiralty, has been appointed lecturer in electrical engineering at the East London College.

THE *Times* announces that Dr. James Younger and his wife have given 30,000*l.* to provide the University of St. Andrews with a memorial hall. The main hall, to be used for University purposes, is to have an organ and to accommodate a thousand. There will also be a smaller hall.

AN ingenious astronomical model for schools and colleges, devised by Dr. W. Wilson, was described in NATURE of May 2, 1918, p. 173. Demonstrations on the uses and working of this model are being given by the inventor in the show-room of Messrs. George Philip and Son, Ltd., 32 Fleet Street, and the concluding one will be on Saturday, May 10, at 11.30 a.m.

MRS. ELLEN MORGAN has bequeathed 1000*l.* to the University of Liverpool for a John H. Morgan scholarship to be awarded to students of the University who have passed the Matriculation Examination and intend to proceed to a degree of faculty of engineering, and who or whose parents are too poor to defray the ordinary expenses of pursuing an academic career at the University.

BY the will of Dr. J. Percival, late Bishop of Hereford, the following bequests will be made:—1000*l.* to Appleby Grammar School; 2000*l.* to Clifton College; 1000*l.* each to Queen's College, Oxford, and Trinity College, Oxford, all for helping scholars of distinguished ability who are in need of assistance to meet educational expenses; and 1000*l.* to the Bishop of Hereford for the education of one or two boys or girls.

THE President of the Board of Education has appointed a Departmental Committee to inquire into the position occupied by English (language and literature) in the educational system of England, and to advise how its study may best be promoted in schools of all types, including continuation schools, and in universities and other institutions of higher education, regard being had to (1) the requirements of a liberal education; (2) the needs of business, the professions, and the public services; and (3) the relation of English to other studies. The chairman of the Committee is Sir Henry Newbolt, and the secretary Mr. J. E. Hales, to whom all communications should be addressed at the Board of Education, Whitehall, London, S.W.1.