

ments, to achieve settlements of our war-time lend-lease relations which will permit, generally, a sound world-wide economy and will contribute to international peace and to our own national security."

Operational Control of Electricity Supply Systems

SUPERVISORY equipment for the remote control of plant has proved to be thoroughly reliable and to facilitate efficient operation of electricity supply systems. In a paper read in London on March 14 by W. Kidd and E. M. S. McWhirter before the Institution of Electrical Engineers, the authors give the reasons for, and the steps taken to develop, the common-diagram control system, which enables an almost unlimited number of substations, etc., to be controlled completely from one diagram and control panel, and is sufficiently flexible to cater for the growth of an undertaking. It describes a wall-type system diagram which automatically indicates which substations have changed conditions, and therefore the area involved in any disturbance. The system diagram is equally extensible to accommodate new feeders and substations with a minimum of operating disturbances. Particulars of the circuits and apparatus, and comparisons of floor area, pilot and cost economies are given in the paper, together with information relating to an installation dealing initially with seventy-eight substations, to which others are being added.

The authors believe that, by the development of the ideas explained in the paper, the use of supervisory remote-control equipment has been extended on normal automatic-telephone switching practice to a wider application than was practicable with individual systems for large numbers of substations. This results in an economy of cost of equipment, of cost for control buildings, and of effort of the control staff. Operational control of large electricity supply systems will undoubtedly produce new requirements and problems as industrial, traction and domestic loads increase; but it is believed that, in the system described, a basis for meeting these requirements without adversely affecting present facilities has been provided.

Quaternion Centenary Celebration

THE centenary of the discovery of quaternions by Sir William Rowan Hamilton has already been the subject of an article in *Nature* (152, 553; 1943). The Royal Irish Academy has now published (*Proc. Roy. Irish Acad.*, 50 A, 69; 1945) a record of the celebration in Dublin on November 8, 1943, which was attended by Mr. de Valera and two of his Ministers. Owing to the War, representatives of science from outside Ireland were unable to be present in person, but some of them sent messages or articles. The late Prof. G. D. Birkhoff of Harvard stressed the part that Hamilton's ideas played in the development of mathematics in the United States. Vectorial theory could be regarded as, to a large extent, latent in quaternions, like a fine melody in a great symphony. Vectors were more useful in classical physics, quaternions in the special theory of relativity, and tensors in gravitational relativity. Mathematicians and theoretical physicists should study all three with their historical development.

Sir Edmund Whittaker gave an account of the sequence of Hamilton's ideas, pointing out the gaps and apparent lack of harmony in existing accounts. With regard to Hamilton's recognition of the necessity

for non-commutative multiplication, Whittaker says: "This was the supreme moment in the history of mathematical symbolism. It began the creative process which yielded not only quaternions, but all the other systems which broke away from the old rules—Cayley and Sylvester's matrices, Boole's symbolic logic, Grassmann's *Ausdehnungslehre*, Gibbs's dyadics, and the Heisenberg-Dirac algebra of quantum mechanics. Dr. A. J. McConnell dealt with the many distinguished members of Trinity College, Dublin, in the first half of the nineteenth century, including the mathematical physicists Hamilton, Lloyd, MacCullagh, Jellett and Haughton, the astronomer Brinkley, and the geometers Salmon, Booth, Hart, Charles Graves, Ingram and Stubbs. Dr. McConnell also printed the hitherto unpublished manuscript by Hamilton containing his first account of quaternions, written on the evening of the discovery. There are three other papers which demand more technical knowledge from the reader: "Quaternions and Matrices", by Prof. A. W. Conway; "A Modern Presentation of Quaternions", by Prof. F. D. Murnaghan, of Johns Hopkins University; and "The Icosian Calculus", by the Rev. J. R. Colthurst. The volume contains two plates: one a reproduction of an etching of Hamilton, the other a photograph of the first entry in his note-book of quaternion formulæ.

Mechanization of Sugar Beet Production

THE Ministry of Agriculture, in agreement with the Ministry of Food, is sending a small mission to North America this autumn during the sugar beet harvest season to study progress there in research and development work on the mechanization of sugar beet cultivating and harvest. The party will consist of Mr. J. Bradley, principal scientific officer in charge of the engineering side of the National Institute of Agricultural Engineering; Mr. W. J. West, senior scientific officer on the agricultural side of the National Institute of Agricultural Engineering; Mr. F. E. Thornhill, agricultural officer from the British Sugar Corporation factory at Allscott, Salop; and Mr. H. S. Taylor, agricultural officer from the British Sugar Corporation factory at Brigg, Lincs. They will visit the principal growing areas in North America during harvest and will study practical operations in the field and in the factories in addition to the research and development work being undertaken by university centres, sugar factories and agricultural machinery manufacturers. It is hoped that the information and experience gained will be of considerable value to workers in this field in Great Britain, at a time when the problem of developing suitable machinery to meet the needs of British growers at the peak periods of cultivation and harvesting is of vital urgency. Special attention will be devoted to problems connected with the segmentation of sugar beet seed, the development of beet seed drills and the mechanization of sugar beet harvesting.

Narcotic Drugs

THE two plants from which the raw materials of all the manufactured drugs covered by the International Conventions of 1925 and 1931 originate are the opium poppy and the coca bush. The former is used for the manufacture of morphine, heroin, codeine, dionine and other drugs, and the latter for the manufacture of cocaine. Unlike opium, coca leaves are little used in the form of medicinal preparations but are used in large quantities in the preparation of non-narcotic beverages. The Central Opium Board

of the League of Nations, in a 32-page report prepared by Mr. L. F. Atzenwiler entitled "Pre-War Production and Distribution of Narcotic Drugs and their Raw Materials" (New York: International Documents Service, Columbia Univ. Press, London: George Allen and Unwin, Ltd., 1944. 50 cents.) summarizes and analyses the mass of world-wide material which the Board has received. The report shows the importance of each country as a producer, and the quantities and methods of disposal of the raw materials and manufactured drugs, by both producer and consumer countries. The world productions of raw opium and morphine, for example, were 18,504 tons and 137,360 kgrm. respectively during the period 1934-37. Although such details will chiefly interest technicians, the main facts, trends and conclusions should be of great value as basic material for those concerned with future international work in this field.

Treatment of Arterial Injuries

THE Medical Research Council's War Memorandum, No. 13 (H.M. Stationery Office, 1944), on "Arterial Injuries" has been prepared by the Vascular Injuries Sub-committee of the Council's War Wounds Committee. It is intended for those who have only a limited experience of the early treatment of arterial wounds. It carries the authority of the eleven leading British surgeons who sit on this sub-committee, and shows how far surgery has advanced in recent years. The pamphlet is divided into sections on anatomy, symptoms, treatment in forward battle areas or in hospitals where specific operative treatment is possible and on the management of limbs in which the circulation has been impaired. Appendixes deal with the technique of the suture of completely or partially divided arteries, the administration of heparin, the technique of blocking the sympathetic nervous system in the arm or leg and the writing of notes on vascular injuries. Primarily useful to surgeons, this pamphlet will no doubt interest others who may have to deal with this kind of injury in peace-time as well as in war.

Spicules on the Sun

THE March issue of *Sky and Telescope* contains a brief notice of solar spicules, which are very small spike-like prominences most commonly seen in the polar regions of the sun. They have previously been seen during solar eclipses; but the coronagraph makes it possible to carry out daily observations of their numbers and duration. Dr. Walter O. Roberts is in charge of the observations made at Harvard College Observatory's Fremont Pass station at Climax, Colorado, and he has found that the spicules last only four or five minutes from the time of detection until they fade out completely. A spicule is brightest just before it attains its full height, and after reaching its maximum elongation it begins to fade out without any perceptible motion. Their average width is about 4,500 miles and most of them are only a few thousand miles high. The largest spicule sometimes lasts eleven minutes, and some of the smaller ones about two minutes. At times as many as twenty-five spicules have been seen simultaneously in a 60° arc of the sun's polar limb. They are not seen in disturbed regions of the sun, and they show material flowing outward from the lower layers of the atmosphere; this is in contrast to the ordinary solar prominences, which show material when it is falling inward to the sun's surface.

Smithsonian Publications

THE Classified List of Smithsonian Publications Available for Distribution, May 1, 1925, compiled by Helen Munroe (Publication A.3802, Smithsonian Institution, Washington), contains only such works as can now be supplied by the Institution. It is not a complete list of all Smithsonian publications issued to date, and in particular publications of the United States National Museum and of the Bureau of American Ethnology are not included. The papers are arranged by subjects alphabetically, and the series in which they appeared are indicated. Those in the series of Contributions to Knowledge and Miscellaneous Documents are not public documents, but are available in printed editions and distributed without charge to public libraries, educational establishments and learned societies. They are supplied to other institutions and to individuals at the prices indicated. The Smithsonian Report volumes are distributed gratuitously to libraries and individuals throughout the world; but many of those of which the Smithsonian edition is exhausted can be purchased through the Superintendent of Documents, Government Printing Office, Washington. Applicants to the Institution should state the grounds for their request, as the Institution can only supply the papers as an aid to research or studies in which applicants are specially interested.

Announcements

THE Committee of Privy Council for Medical Research has appointed Prof. P. A. Buxton, professor of medical entomology in the University of London, and Sir Alexander Fleming, professor of bacteriology in the University of London, to be members of the Medical Research Council from October 1, 1945.

MR. J. STEWART COOK has been appointed organizing secretary of the British Association of Chemists as from July.

THE life and work of the late Major Charles E. S. Phillips, secretary of the Royal Institution during 1929-45, will be commemorated at a meeting at the Institution on October 1 at 5 o'clock. Lord Rayleigh, the president, will take the chair and short addresses dealing with various aspects of Major Phillips' life and his connexion with the Royal Institution will be given by Sir Robert Robertson, Sir Richard Paget, Mr. R. S. Whipple, Prof. W. V. Mayneord and Sir Henry Dale.

THE Imperial Institute is arranging a series of lectures on recent progress in geological investigation and mineral developments in the Colonies. Each lecture will be devoted to a particular territory and will be given by a recognized authority. The first of the series will be given on October 31 at 3 p.m. by Dr. F. Dixey, director of the Geological Survey of Nigeria, on "Nigeria, Its Geology and Mineral Resources". The second lecture in the series, by Dr. N. R. Junner, director of the Gold Coast Geological Survey, will be given in December, and others will follow.

THE Hertfordshire Institute of Agriculture has unbound copies of *Nature* from 1926 onwards. Those dated up to the beginning of the War are available to bombed-out research institutions and libraries on payment of cost of packing and transport. Further information can be obtained from Mr. H. W. Gardner, Hertfordshire Institute of Agriculture, "Oaklands", St. Albans, Herts.