

was germinating. The massive cotyledonary tube emerges from the nut, carrying the plumule and radicle out of the seed, and later the plumule pushes through the tube and grows up into the air. Specimens of the tubers of Ecanda rubber (*Raphionacme utilis*, Brown and Stapf) from Angola, which sometimes weigh as much as 15 lbs., and contain valuable rubber, were also shown.

Mr. W. Barlow exhibited some models of organic substances which are based on the law of valency-volumes and are in harmony with the Bragg structure found in the diamond. The valency-volume unit-cell appropriate for the carbon compounds is a rhombic-dodecahedron. The fundamental valency of carbon is expressed by a close tetrahedral group formed of four of the cells—that of nitrogen by three cells triangularly arranged, that of oxygen by two cells in face-contact, and that of hydrogen by a single cell. By fitting together appropriate numbers of these cells representing the composition and constitution of various compounds, structures can be made representing molecules which present internal symmetry closely corresponding with that of the crystal forms of these organic substances.

The Research Department, Woolwich, had an exhibit showing the time reaction in the colour change of Congo red in organic solvents. The change from red to blue which occurs during titration is associated with its flocculation from the colloidal condition and forms a time reaction related to the concentration of H ions and other properties of the solvent. There were also exhibits from the Air Ministry (Instru-

ment Section), among which was a radiator temperature outfit: designed to determine the temperature distribution at different points on an aero-engine radiator and its connecting pipes. A six-junction thermocouple is used, and each set of junctions measures the temperature relative to that of the atmosphere. Another exhibit was a Filon aneroid dial for indicating to the pilot the height of an aeroplane above the ground. The scale is coiled into a spiral groove so that it can be adjusted to meet daily changes in temperature and barometric pressure. A metallic oxygen container was also shown in which a small quantity of silica-gel has been used successfully for cleaning up residual gases.

Mr. A. A. Campbell Swinton demonstrated the recording of wireless telegraphic messages. A short aerial on the roof of the building was connected through a tuner to a thermionic three valve amplifier, which in turn was connected to a 1 to 3 valve note magnifier. A moving coil siphon recorder was used, connected to the note-magnifier, either through a Brown relay, or through a very low frequency thermionic amplifier tuned to respond to the frequency of Morse signals. For the reception of continuous wave signals a separate thermionic heterodyne oscillator is employed which renders the high frequency signals audible by means of musical "beats." Dr. H. E. Hurst and Mr. D. A. Watt exhibited an interesting model, on a scale of 1:50, of the sluice of Aswan dam which is used for calibration purposes. The relation between  $Q$ , the discharge of the actual sluice, and  $q$  the discharge of the model is given very closely by  $Q/q = n \cdot 5/2$ , where  $n$  is the scale ratio.

### Psychical Monism.

THE Journal of the Washington Academy of Sciences of March 19 contains a communication from Mr. L. T. Troland of Harvard University entitled "Psychophysics as the Key to the Mysteries of Physics and Metaphysics." The article is interesting as a revival of the once famous theory of mind-stuff put forward by W. K. Clifford in his lecture on "The Nature of Things in Themselves." Mr. Troland connects it with several recent philosophical theories of psychical monism and brings it forward with particular reference to the consequences of adopting the principle of relativity and the quantum theory in physics, both of which, he contends, demand the recognition of the ultimate psychical nature of physical reality.

The essence of the mind-stuff theory is that it supposes mind to be constituted and articulated, not merely on the analogy of physical reality but on one and the same principle, so that a parallelism runs throughout the universe between mind and matter. Every electron or proton has not only a psychical aspect but in its ultimate nature is a constituent of mind, a bit of mind-stuff. Just as the unit of physics, the electric charge, enters into combination in atoms, molecules, and their more or less stable compounds, acquiring thereby the various

physical and chemical properties of things, so the mind-stuff combines to acquire the various sensational, emotional, and intellectual properties of personalities.

Mr. Troland's argument is interesting but scarcely convincing. He thinks by the theory to get over Berkeley's difficulty that no qualities of things, primary or secondary, are independent of the observing individual. The new realists, though they have recently attached Berkeley, have not, he thinks, succeeded as yet in developing an explanation of the universe which is either simple or plausible.

The difficulty of Mr. Troland's theory, however, if offered as a support of Einstein, would seem to be that it misses the essential difference between the activity of the observer co-ordinating events in space-time systems and the intersecting world-lines which present the events co-ordinated. The theory of knowledge we are waiting for in science as well as in philosophy is one which will give full meaning to the subjective and objective factors without sacrificing either to the other. Psychical monism seems to be no more successful than physical monism as a key to the mysteries of physics and metaphysics, but we commend Mr. Troland's argument, which includes in its scope recent physiological research as well as the new physical theories.

### Technical Education.

THE annual conference of the Association of Teachers in Technical Institutions was held on June 5-7 in London, and in the course of his presidential address, Mr. J. Paley Yorke claimed very strongly that technical education is definitely education and is as essential as any other branch of educational activity. He said that technical education is essentially scientific education, and urged

that the advance of scientific knowledge and the development of the applications of science to industry and manufacture have been so tremendous that the time has arrived when a special committee of inquiry should be appointed to investigate the whole field of technical education in relation to industry and to education generally. It is now forty years since there has been any national inquiry on technical

education, and during that time it has developed beyond the recognition of many of those who imagined themselves to be its guardians.

Mr. Paley Yorke protested against the charge of soullessness that is sometimes levelled at scientific education, and argued that it gives an extended vision and develops both imagination and that too rare gift of being able to marvel at the wonders of nature and to appreciate the beauties of life. It cannot be admitted that a good general education can be obtained only by the study of certain subjects in certain ways or that education and culture must be associated necessarily with bygone civilisations.

Reference was made to the fact that opportunity for contact with industry and for research is scant, and it was urged that directors of industry might submit some of their research problems to local Education Authorities and through them to the scientific and technical staffs of the various technical institutions in the area. It is realised, of course, that all problems would not arrive that way because of the publicity involved, but some useful work may be done.

Attention was also directed to the proposed reduction of grants for scientific research and to the reduction in the number of national scholarships for higher education. It was pointed out that not only do these reductions gravely imperil scientific and industrial development, but also that the percentage reduction in the estimates for these items is much greater than that for corresponding items in other branches of educational work.

Lord Burnham said that technical education is slowly gaining its right place in the assessment of national values. This country, with its superiority in industrial matters during the greater part of the nineteenth century, looked with supreme self-confidence upon the efforts of other nations to compete with us in industrial production. When the advance of scientific discovery showed that mere manual dexterity was not sufficient the necessity for technical education was admitted. Lord Burnham doubted whether there is any other class of teacher upon which the future prosperity of the nation depended so much. Technical teachers are striving to shape education for the public good and for the welfare of the generations which are coming to manhood.

Resolutions asking for the appointment of a committee of inquiry to investigate the whole field of technical education in relation to education generally and to industry, and expressing alarm at the reduction in the number and value of scholarships available for higher education, were carried unanimously.

### University and Educational Intelligence.

BRISTOL.—The J. S. Fry and Sons, Ltd., Colston Research Fellowship, which provides for payment of fees and a maintenance allowance of 150*l.* a year, has been awarded to Mr. F. B. Wrightson, a student in the Faculty of Engineering.

CAMBRIDGE.—Mr. W. B. R. King, fellow of Jesus College, has been elected to be fellow and lecturer in natural sciences at Magdalene College; Mr. P. M. S. Blackett to be Charles Kingsley Bye fellow of Magdalene College; Mr. L. E. Bayliss, Trinity College, to be Michael Foster student in physiology; Mr. F. Lavington and Mr. J. Line, to be fellows of Emmanuel College; and Mr. J. A. Carroll to be fellow of Sidney Sussex College.

GLASGOW.—Mr. A. D. Lindsay has been appointed to the chair of moral philosophy in succession to the

late Sir Henry Jones. Mr. Lindsay was formerly Shaw Fellow of the University of Edinburgh, and lecturer in philosophy at the old Victoria University. In 1906 he was elected Fellow of Balliol College, Oxford, and was appointed classical tutor and Jowett lecturer in philosophy.

LEEDS.—The Council has appointed Dr. W. T. David to be professor of civil and mechanical engineering in succession to Prof. J. Goodman, who retires in October next. Dr. David, who is at present professor of engineering at the University College of South Wales, was educated at Cardiff and Cambridge. He served as demonstrator in engineering under Prof. Bertram Hopkinson at Cambridge for two years, and later was appointed H.M. Inspector of Technical Colleges under the Board of Education. His research work has been concerned mostly with internal combustion engines.

The handsome gift received some little time ago from Col. Sir Edward Brotherton of 20,000*l.* has enabled the University to make an important development in the work of the department of pathology and bacteriology. Sir Edward's intention was that his gift should be devoted to the furtherance of the study of bacteriology with special reference to public health, and as a step in this direction the Council has instituted a new professorship to be called "The Sir Edward Brotherton Chair of Bacteriology." Dr. J. W. McLeod has been elected as the first holder of this chair. Dr. McLeod graduated with commendation at Glasgow University in the summer of 1908, and after acting as house physician at the Glasgow Royal Infirmary and house surgeon at the Glasgow Western Infirmary, gained the Coats research scholarship and worked for a year under Prof. R. Muir. Later he was appointed assistant lecturer and demonstrator in pathology at the Medical School of the Charing Cross Hospital, and afterwards lecturer in bacteriology at the University of Leeds. Dr. McLeod has carried out important research work in the field of bacteriology, and has published numerous papers dealing more especially with the bacteriology of influenza, dysentery, pneumonia, and the streptococcal infections.

LONDON.—At a meeting of the Senate on June 21, Mr. H. J. Waring, Dean of the Faculty of Medicine and vice-president of St. Bartholomew's Hospital Medical College, was elected Vice-Chancellor for 1922-23, in succession to Sir Sydney Russell-Wells. A cordial vote of thanks was passed to Sir Sydney Russell-Wells for the services which he had rendered to the University as Vice-Chancellor since December 1919.

Mr. J. H. Woodger was appointed to the University readership in biology tenable at Middlesex Hospital Medical School. Mr. Woodger was educated at University College, whence he graduated in zoology, and was awarded the Derby Research Scholarship. In 1917 he was appointed protozoologist to the Central Clinical Laboratory in Amarah, and in 1919 assistant in zoology at University College.

Sir Charles W. C. Oman, Chichele professor of modern history in the University of Oxford, was appointed Creighton lecturer for the year 1922-23. The subject of his lecture will be "Historical Perspective."

The Lindley studentship for 1922, of the value of 120*l.* and tenable in the Physiological Laboratory, has been awarded to Miss M. J. Wilson-Smith of Royal Holloway College; and the University studentship in physiology for 1922-23, of the value of 50*l.* and tenable in the Physiological Laboratory of the University or of one of its Schools, to Miss M. M. A. Murray of Bedford College.