

of biophysics at the Central University, Caracas. His electron microscope studies have established his reputation as an authority on the sub-microscopic organization of vertebrate nerve fibres. Much of this work was due to his development of a microtome for cutting sections of nervous and other tissues (including undecalcified bones and teeth) at thicknesses of 100 Å. or less, which are necessary for good electron microscope investigations. For this machine he also designed a diamond knife which could be made from industrial diamonds. In the Institute, Dr. Fernandez-Moran will take charge of the work on fine structure of nervous tissue, and he has established a special department to continue the development work on the diamond knife and on microtomes to use with them.

During my visit to the Institute last summer, it was a revelation to see the energy and speed with which Dr. Moran tackled and coped with the innumerable details of equipping and starting the Institute in time for the opening.

Venezuela is in an extremely fortunate financial position due to the exploitation of her oil and other natural resources, and she is extremely fortunate that she has at such a moment someone like Dr. Fernandez-Moran, who was able to conceive and to execute such a remarkable scheme, and an enlightened Minister of Health and President, who were far-sighted enough to see that money invested in this way would benefit not only Venezuela itself but ultimately the rest of the world as well. The Venezuelan Institute for Neurology and Brain Research is a practical step forward in international scientific research.

## OBITUARIES

### Dr. J. W. Nicholson, F.R.S.

DR. J. W. NICHOLSON, an outstanding mathematician and man of science, died on October 10, aged seventy-three. He was the eldest son of the late J. W. Nicholson, of Redcar, Yorkshire, and began the serious study of mathematics and physical science at the University of Manchester. Later, he entered Trinity College, Cambridge, where his brilliant career began. He was 12th Wrangler in 1904 and Isaac Newton Student in 1906. In 1907 he was Smith's Prizeman. He was Adam's Prizeman twice—in 1913 and 1917. He lectured at the Cavendish Laboratory and later at The Queen's University, Belfast.

In 1912 he was appointed professor of mathematics in the University of London, King's College, and occupied this chair until 1921, when he became tutor at Balliol College, Oxford, where he was director of studies in mathematics and physics until serious illness forced him to retire in 1930.

Nicholson was one of the most brilliant mathematicians and astrophysicists of his time. In 1917 he was elected into the Royal Society. He was also a Fellow of the Royal Astronomical and the London Mathematical Societies, past president of the Röntgen Society, a former vice-president of the Physical Society and a member of the Société de Physique. He was an excellent lecturer and teacher, and probably no teacher in King's College in his time was so much appreciated and admired by his students and colleagues as he was.

Nicholson's scientific achievements are much more important than is generally realized in these days :

the elucidation of the electronic structure of atoms owes as much to Nicholson as to any other one man. Before his appointment to King's College, he became interested in certain nebular spectra (the nebula in Orion among others) and the spectrum of the solar corona ; and the first of a most remarkable sequence of papers on this subject appeared in the *Monthly Notices of the Royal Astronomical Society* (72, 49 ; 1912), entitled "The Spectrum of Nebulium". In this he attributed certain nebular spectral lines to a primitive type of atom which he named nebulium. This he imagined to consist of a small central massive positively charged nucleus with four electrons travelling around it on the same circular orbit. He was thus enabled to account for certain spectral lines which, it seemed, could not be ascribed to hydrogen or helium. His work was inspired by Clerk Maxwell's famous paper on Saturn's rings. He was, in fact, able to identify a large number of nebular spectral lines with those which his nebulium would be expected to emit. Indeed, he predicted a nebular spectral line the wave-length of which he calculated to be 4352.9 Å. before it was observed. It was later observed and measured by Prof. F. J. M. Stratton, who estimated it to be 4353.3 Å.

Perhaps the most remarkable feature of Nicholson's work was the discovery that angular momentum is an integral multiple of  $h/2\pi$ . There is no doubt that this work inspired his pupil, Niels Bohr, to explore the consequences of assuming the hydrogen atom to have a single electron travelling in a circle around a massive nucleus, and it was certainly part of the inspiration of the  $spdq = nh$  condition enunciated by one of his colleagues at King's College and which was later adopted by Bohr.

One must not omit to mention the important work in which Nicholson collaborated with the distinguished spectroscopist, Sir Thomas Merton, and which was published in the *Philosophical Transactions of the Royal Society* (A, 216, 459 ; 1916 ; A, 217, 237 ; 1917 ; and A, 220, 137 ; 1919). It dealt with the distribution of intensity in broadened spectral lines and with intensity relations in the spectra of hydrogen and helium.

Nicholson was a friendly and generous man who took great pleasure in being helpful to both students and colleagues. He was a man of high character and in that respect reminded me of our colleague, H. Stanley Allen, and of the great Max Planck. All of us who knew him were deeply distressed by his tragic illness. As a mathematician he impressed me as very sound, and I learned more from him than from any other man, with the exception, perhaps, of the German mathematician, Carl Neumann. I shall always treasure his memory.

Nicholson married Dr. Dorothy Wrinch, Fellow of Girton College, Cambridge, in 1922, and had one daughter ; the marriage was dissolved in 1938.

WM. WILSON

### Mr. Alexander Keiller

ALEXANDER KEILLER, who died at the end of September at the age of sixty-five, was one of the long line of distinguished amateur British archaeologists which goes back to Aubrey and Stukeley. Of these perhaps the greatest was Pitt-Rivers, on whom Keiller, like him with leisure and abundant means at his disposal, admittedly modelled his own work.

While still in his early thirties, Keiller carried out a systematic survey of stone circles and allied monuments in north-east Scotland, making accurate plans and detailed descriptions of each site. A summary account of this work was presented as a paper to the British Association at its Aberdeen meeting in 1934.

In 1925, however, he embarked on the programme of excavation and field-work with which his name will be inseparably associated. He acquired and began excavations on Windmill Hill, near Avebury in north Wiltshire, and continued these annually until 1929, revealing in detail the first extensive Neolithic settlement to be explored in Britain. The material was housed in a museum in his London house, where it was at the disposal of students, and as a result the earliest Neolithic culture of southern Britain, taking its name from the type-site, was defined and clarified.

From Windmill Hill to the Avebury monuments themselves was an inevitable step, and in 1933 Keiller began a systematic excavation programme with the examination of the northern part of the West Kennet Avenue, continuing until 1938 within the Great Circle itself. He moved his residence to Avebury Manor, and re-housed his museum within its grounds, making it and the excavated portions of the monument available to the public. He adopted a policy of imaginative but judicious conservation and restoration of the Avebury monuments, and systematically purchased land to preserve these and their surroundings; as a result it was eventually possible for the whole area to be acquired by the National Trust and the Ancient Monuments Department of the Ministry of Works.

Keiller's outstanding contribution to contemporary British archaeology was his insistence on high standards of discipline and accuracy in excavation and field-work, and his realization from the first of the value of scientific techniques as applied to archaeological material. He early appreciated the potentialities of air photography, collaborating with Crawford in the "Wessex from the Air" survey, and even discussing with Eckener the possibility of using the *Graf Zeppelin* for a similar but even more ambitious scheme. At Windmill Hill he insisted on a full study of the faunal and floral remains in their archaeological context. But above all it is to Keiller that we owe the inception of the systematic study of British prehistoric stone artefacts by petrographical means, which, following his lead, is now yielding information of the highest importance on manufacture and trade in the early second millennium B.C. Alec Keiller was an enthusiast in the best sense; full of ideas, stimulating and highly individual. Archaeology, like other academic disciplines, can only benefit from the impact of such men.

STUART PIGGOTT

#### Dr. E. J. Delporte

DR. E. J. DELPORTE, who died at Uccle on October 19, was honorary director of the Royal Observatory at Brussels, where he had continued to work since his retirement from the directorship in 1947.

Eugène Joseph Delporte was born in Brabant in 1882, and after studying mathematics and physics at the University of Brussels, obtained the degree of D.Sc. with distinction in 1903, entering the Observatory in the same year. In 1923 he took charge of

the equatorial instruments and began that programme of minor planet observations which was to become his main interest. It was during this period that Delporte proposed that new boundaries should be adopted for the constellations, defined in terms of hour circles and parallels of declination. The proposal was accepted by the International Astronomical Union in 1928, and the work was completed in 1930. Originally intended to apply only to constellations north of 12.5° south declination, the scheme finally covered the sky from pole to pole, the northern boundaries merging well with those which Gould had previously defined for the southern hemisphere.

In 1936 Delporte was appointed director of the Royal Observatory at Brussels, and pursued a vigorous policy of systematic observations of the minor planets. It is impossible to estimate the number of new discoveries that were made during these years, but some dozens of these minor planets have received permanent numbers. Planet 1247 carries Delporte's name, as does the comet 1941 VII; but he will probably be best remembered as the discoverer of the two remarkable asteroids Amor (1221) and Adonis, the orbits of which are still exceptional in a list of more than 1,600.

Delporte worked enthusiastically for the International Astronomical Union from its first meeting in Brussels in 1919, and played a prominent part in Commission 20 (minor planets, comets and satellites), of which he was president during 1938-48. He received many decorations from the hands of his countrymen, and was an active member of many scientific societies with astronomical interests. He was a corresponding member of the Bureau des Longitudes and of the Paris Academy of Sciences, and in 1946 was elected an associate of the Royal Astronomical Society.

Conscious always of the needs of his Observatory, Delporte was mainly responsible for the improvements which were effected in 1930, on the occasion of the centenary of the independence of Belgium, when a 1-metre reflector, a double astrograph and a new meridian circle were added to the equipment. Always ready to praise the scientific success of his colleagues, he gave every encouragement to the younger members of his staff, who will long remember him as a remarkable observer and a wise and friendly counsellor.

J. G. PORTER

#### Prof. Robert P. Bigelow

THE death occurred on September 6 of Prof. Robert P. Bigelow, who retired in 1933 after forty years service in the Biology Department of the Massachusetts Institute of Technology; he was ninety-two years old. A native of Baldwinville, New York, Dr. Bigelow graduated from Harvard University and received the degree of doctor of philosophy at Johns Hopkins University before joining the staff of the Massachusetts Institute in 1893 as an instructor. He was appointed assistant professor of zoology and parasitology in 1912, associate professor in 1915, and professor in 1922. Following his retirement, Dr. Bigelow served as honorary lecturer in the Biology Department; and, in 1944, returned as a special lecturer. He was librarian of the Institute during 1895-1925. Dr. Bigelow was also the former librarian of the Marine Biological Laboratory at Woods Hole, and editor of the *American Naturalist* and the *Technology Quarterly*.