

gravity are rejected or accepted. In either case, contrary to what I had expected, it remains the most accurate single equation for the ellipticity.

The lunar parallax has been measured visually, and can also be calculated. Very crudely, $g = fE/a^2$, $n^2 = fE/r^3$; whence $an^2/g = a^3/r^3$. (f is the constant of gravitation; E is the mass of the earth; a is the radius; n is the moon's angular velocity; r is the moon's distance.) Several corrections are needed, and when they are made the result is the dynamic parallax. There has been a slight discrepancy between the visual and dynamical values, but as it was only about 1.4 times the standard error it does not, in any event, appear serious. Here again the possible deflexions of the vertical at Greenwich and the Cape must be taken into account. The final result is that all the data, survey (a and e), the main ellipticity term in gravity, the lunar parallax, and the estimate of the ellipticity from the precessional constant fall nicely into agreement with regard to the uncertainties, whether the longitude terms of low degree in gravity are accepted or not. All the discrepancies can be explained as due to the earth's having been treated as more symmetrical than it is.

The data for the moon's motion have been combined with those for the earth. Again no discrepancy was found; altogether $\chi^2 = 6.3$ or 8.7 on 14 d.f. The final results in a compromise solution are

$$a = 6378.099 \pm 0.116 \text{ km.}; e^{-1} = 297.10 \pm 0.36.$$

$$g = g_0(1 + \beta \sin^2\phi + \gamma \sin^2 2\phi);$$

$$g_0 = 978.0373(1 \pm 0.0000024); \beta = 0.0052891 \pm 0.0000041; \gamma = -0.0000059;$$

$$\text{Lunar parallax} = 3422.419'' \pm 0.024'';$$

$$\text{Mass of earth/mass of moon} = 81.278 \pm 0.025;$$

$$\text{Precessional constant} = 0.00327260 \pm 0.00000069.$$

Except for a and g_0 , there is no serious change from accepted values, but the uncertainties are based on additional evidence and more satisfactorily determined.

OBITUARIES

Mr. Richard Elmhirst

RICHARD ELMHIRST died very suddenly on November 13 at Millport after forty-two years of service to the Scottish Marine Biological Association and within a few months of the date when he would have retired. He was the youngest son of the Rev. Robert Elmhirst, vicar of Brotherton, in Yorkshire, and was educated at St. George's School, Harrogate, and at Rossall School. There the bent of his mind was early displayed; he was twice natural history prizeman and was assistant curator of the School museum. In 1902 he proceeded to the Yorkshire College, which had become the University of Leeds before he left in 1905. He took no degree, maintaining throughout life an objection to degrees or appendages of any kind, but with his natural gifts fortified by study under that great teacher and zoologist, L. C. Miall.

Elmhirst had already had experience of museum work at Leeds and at Keighley when he went to Plymouth in January 1906 to undertake, for the Marine Biological Association, the preparation of a collection of marine exhibits for the exhibition held that year at Marseilles. He returned from France to take up an appointment in September as naturalist at Millport on the recommendation of E. J. Allen. It

was at Millport that he was to do his life's work. On the resignation of the director, S. Pace, in 1907, he was appointed interim curator, promoted superintendent in 1908 and finally director in 1933. He served with distinction in the First World War as lieutenant, R.N.V.R., in the Dover Patrol.

From 1907 until 1922 Elmhirst was the sole member of the scientific staff at Millport. He had little to maintain him but his enthusiasm as a naturalist in the midst of a wonderful collecting area of sea and shore. Later he had the satisfaction of seeing the Station develop with a fine extension to the buildings in 1939, and even the setbacks of the Second World War made good by major increases in staff and equipment.

Richard Elmhirst was a born naturalist and a most lovable man; and because he was so interested in all living things, his fellow creatures as well as the inhabitants of the shores of the Great Cumbrae and of the waters of the Clyde Sea area, he was a fine teacher. He enjoyed the annual Easter classes where so many students had their introduction to marine biology. I myself must be one of many whose interests were permanently influenced by studying the seashore and its life under his guidance. It was the same with all visitors. He welcomed them with natural hospitality and would go to endless pains to secure the most unlikely of animals, and with a success that brought him as much pleasure as it did the recipient. The Millport laboratory has a tradition of popular teaching, and annually all manner of parties from natural history societies, colleges and schools came—and usually on Saturday afternoons—to be welcomed by him and given lectures and demonstrations or taken for expeditions on the shore. He was known throughout the west of Scotland as a willing and always interesting lecturer.

He never confined himself to any particular group of animals. He knew them all, and the plants as well. The very diversity of his interests was in one sense a drawback. There were so many fascinating things to observe and to investigate that when he had examined one thing he must proceed at once to another and then another. So his published papers, though far-reaching and all of real value, were never so full or so detailed as they would have been had he confined his interests more rigidly. But if he had done so he would never have acquired his amazing breadth of knowledge—and he would not have been Richard Elmhirst.

It was as a man that we remembered him when he was laid to rest on November 16 at Millport, with which his name will be associated so long as the marine station which he built up survives. Our heartfelt sympathy goes out to Mrs. Elmhirst and to his son.

C. M. YONGE

Dr. S. C. Bradford

THE death on November 13 of Dr. S. C. Bradford, following so closely on that of Prof. A. F. C. Pollard, suggests that the elder generation of those who built up the modern scientific information network is passing away, its contribution made.

Samuel Clement Bradford was born in London in 1878, and joined the staff of the South Kensington Museum in 1899, being in the library from 1901 onwards. He worked at this time in what is now the Victoria and Albert Museum. During 1911–14 he had charge of the chemistry collections in addition

to his work in the library. During the First World War he was lent first to the National Physical Laboratory and then to the Chemical Warfare Department. He became chief librarian of the Science Library in 1925, with the rank of keeper from 1930. He married Cora Mabel Monnery, who survives him. He leaves no children.

It may well have been Bradford's experience of literature searches during the First World War which led to the activities for which he is remembered. At all events, he proceeded to develop the Science Museum Library as the nucleus of a great central information service, with a vast repository of cards classified by the Universal Decimal Classification. He became persistently active in propaganda for the decimal system, since the scheme would fall to the ground unless an international classification was widely adopted. The British Society for International Bibliography came into being largely through him. National and international meetings were held, culminating in the Oxford gathering of the International Federation for Documentation in 1938.

Meanwhile, one really successful development due to Bradford at South Kensington went on with no need of propaganda. This was the loan system, for after the First World War came the great development of research by industry and government, and this entailed a huge appetite for postal loans. This Dr. Bradford set himself energetically to satisfy. It is indeed ironical to think of the mechanized distributing centre planned from a room which in size and furnishings was one of the all too few survivals of a more spacious and humane conception of library work. It is as seated in this room that his friends will wish to think of him, the brown leather bindings behind the glass, the space bisected by a chemical bench. For Bradford was an active man of science as well as a bibliographer; colloids and the kinetic

theory of liquids being among his subjects. Another of his activities will occur to many who met him: the choice rose so often to be seen in his buttonhole marked him for the very active fancier that he was. Music, also, had been an early interest. But basically he remained one of the older museum and library world, deeply concerned with the details of his profession.

Bradford's literary work included various official catalogues, including "Classification for Works on Pure and Applied Science", second edition, 1921; third edition, 1936; "Hand-list of Short Titles of Current Periodicals in the Science Library", fourth edition, 1926; fifth edition, 1938; "Romance of Roses"; "The Science of Rose Growing"; contributions to scientific and technical journals; papers on the kinetic theory of gases and liquids; the molecular theory of solution; colloid solutions; the formation and structure of jellies; the crystallization of gelatin; the Liesegang phenomenon; the classification and indexing of scientific literature; the principles of classification; the organisation of scientific bibliography; and library cataloguing. His final contribution in this last field was the book "Documentation", which appeared not long before his death.

H. T. PLEDGE

WE regret to announce the following deaths:

Dr. J. H. van der Bijl, F.R.S., chancellor of the University of Pretoria, on December 2, aged sixty-one.

Lieut. Oliver Burd, R.N., meteorologist, and Mr. Michael C. Green, general assistant, of the Falkland Islands Dependencies Survey, on November 8.

The Right Hon. J. H. Hofmeyr, chancellor of the University of the Witwatersrand, and president in 1928-29 of the South African Association for the Advancement of Science, aged fifty-four.

NEWS and VIEWS

Industrial Health Research Board

THE following have accepted the invitation of the Medical Research Council to serve as members of the Industrial Health Research Board during the next three years: Sir Frederic Bartlett, professor of experimental psychology, University of Cambridge (*chairman*); Sir Charles Bartlett, managing director, Vauxhall Motors, Ltd.; Prof. R. V. Christie, professor of medicine, University of London; C. R. Dale, Social Insurance Department, Trades Union Congress; Dr. A. N. Drury, director of the Lister Institute of Preventive Medicine; Sir Luke Fawcett, general secretary, Amalgamated Union of Building Trade Workers; Prof. T. Ferguson, professor of public health, University of Glasgow; Sir Claude Gibb, chairman and managing director, C. A. Parsons and Co., Ltd., Newcastle-on-Tyne; Prof. A. Bradford Hill, professor of medical statistics, University of London; Prof. Esther M. Killick, professor of physiology, University of London; Prof. R. E. Lane, Nuffield professor of occupational health, University of Manchester; Dr. A. Massey, chief medical officer, Ministry of National Insurance; Dr. E. R. A. Merewether, H.M. senior medical inspector of factories, Ministry of Labour and National Service; Dr. J. M. Rogan, Medical Research Council headquarters staff; Dr. Donald Stewart, chief medical

officer, Austin Motor Co., Ltd.; Mrs. Joan M. Faulkner, Medical Research Council headquarters staff (*secretary*).

The Board is appointed by the Council to advise and assist the latter in that part of its research programme which relates to occupational health. The detailed consideration of research work is in the hands of scientific committees dealing with such subjects as occupational medicine, occupational physiology, occupational psychology, industrial pulmonary diseases, toxicology and statistics. These committees report directly to the Council for purposes of immediate action. The function of the Board itself is that of a reviewing body considering general policy with regard to research over the whole field.

Esperanto and Science

THE British Esperantist Scientific Association has been founded by a body of British scientific workers and technical experts who are interested in the use of Esperanto as an international medium for the discussion of scientific affairs. Before the War there existed an Internacia Scienca Asocio Esperantista; but this body, like so many others, disintegrated during the last ten years, and is only being reconstituted with some difficulty. 'BESA' (as the new Association is popularly called) is taking an active