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 $\chi^2 = 6{\cdot}3$ or $8{\cdot}7$ on 14 d.f. The final results in a compromise solution are

$a = 6378{\cdot}099 \pm 0{\cdot}116$ km.; $e^{-1} = 297{\cdot}10 \pm 0{\cdot}36$.
$g = g_0(1 + \beta \sin^2\varphi + \gamma \sin^2 2\varphi)$;
$g_0 = 978{\cdot}0373(1 \pm 0{\cdot}0000024)$; $\beta = 0{\cdot}0052891 \pm 0{\cdot}0000041$; $\gamma = -0{\cdot}0000059$;
Lunar parallax $= 3422{\cdot}419'' \pm 0{\cdot}024''$;
Mass of earth/mass of moon $= 81{\cdot}278 \pm 0{\cdot}025$;
Precessional constant $= 0{\cdot}00327260 \pm 0{\cdot}00000069$.

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