

reader in dynamical astronomy and then, in 1928, professor of mathematics, which post he held until his retirement in 1948. He became head of the Department when Prof. T. H. Havelock (now Sir Thomas Havelock) retired, and as Sub-Rector of King's College during 1942-47, he played a most valuable part in seeing the College through difficult war-time years and those of the post-war expansion which was taking place. He was awarded the C.B.E. in 1948 for his work as chairman of the Durham University Joint Recruiting Board.

Although the dynamical theory of tides was his first and continuing interest in mathematical research and his papers on this subject appeared until 1954, mostly in the *Proceedings of the Royal Society*, the work that created most interest at the time was his theory of Saturn's rings. A theory of this unique ring system had been given by J. Clerk Maxwell in 1856, who concluded that it was composed of meteorites moving in circular orbits round the planet. The divisions in the ring system had to be accounted for, and the suggestion had been made that they were due to zones of instability around the planet set up by the satellites. In a fundamental paper in the *Philosophical Transactions of the Royal Society* (1922), which was followed by two papers in the *Proceedings*, Prof. Goldsbrough examined the influence of the satellites of Saturn on its ring system, on the basis of Maxwell's theory, and he was able to account for divisions in certain zones which were in good agreement with the salient observed features. For this work he was elected Fellow of the Royal Society in 1929. He returned to the subject again in 1941, when by a different method of solving the intricate perturbation problem, he clarified some points of criticism of his earlier work, and in 1951 he showed that, under conditions satisfied by the Saturnian rings, a pair of rings forms a stable system.

Prof. Goldsbrough had a clear, straightforward approach to any problem in hand, which, combined with his absolute integrity, led to his being much sought after as a counsellor in University affairs. He had an interest in all aspects of astronomy, and on many occasions gave lectures at meetings of the Newcastle upon Tyne Astronomical Society of which he was president during 1944-61. His wife died a few years ago, and he is survived by three daughters.

C. GILBERT

Prof. W. H. Lewis

WILLIAM HENRY LEWIS, who died on May 25 at the age of ninety-four, was educated at University College, Aberystwyth, and Jesus College, Oxford. After seven years (1894-1901) as science master at Exeter School, he joined the staff of the embryonic University College, Exeter, where he held the chair of chemistry from 1901 until 1935; he was vice-principal of the College from 1925 until 1935.

In the first few years of his tenure of the chair at Exeter, Lewis carried out research in organic chemistry and published a number of papers in collaboration with the late Dr. F. D. Chattaway, then at St. Bartholomew's Hospital Medical School. However, he soon found himself fully occupied with the affairs of the struggling young college and during the last thirty years of his occupancy of the chair devoted himself entirely to promoting the interests of the College and of his Department. During the First World War, Lewis, together with his colleagues, the late Prof. W. J. Harte and Prof. A. E. Morgan, was instrumental in the setting up of a Committee for the Furtherance of University Education in the South-west; there is no doubt that it was Lewis's devoted work as a secretary of this Committee which sowed the first seeds of growth which led, in due course, to the foundation, by Royal Charter in 1955, of the University of Exeter. Between the two World Wars much hard work was needed to get the University College fully accepted and once again Lewis was a leading member of a small group of devoted

men, without whose efforts nothing lasting could have been achieved. The University College signalized its appreciation of his services by making Lewis professor emeritus on his retirement and the University by conferring on him, in 1957, the honorary degree of LL.D., a distinction which he greatly prized.

With all this, Lewis in no way neglected his Department. Starting from almost nothing, he built up a strong and active department of chemistry, with a striking record of academic successes in the external degree examination of the University of London and a sound reputation for research, which Lewis fostered by attracting good men to his staff and seeing to it that they had the facilities they needed for their work. He was responsible for the planning of new chemical laboratories, in the Washington Singer Building, opened in 1931; it would surely have pleased him to know that his old Department has now outgrown accommodation which must have seemed to many to be over-generous at the time.

Although so much involved in College affairs, Lewis found time to serve on the Council of the Royal Institute of Chemistry (1924-27) and on the External Council of the University of London (1930-35).

Lewis has rightly been called one of the founding fathers of the University of Exeter; as such he has an assured and honoured place in the history of English universities.

H. N. RYDON

Dr. G. Arnold, O.B.E.

WITH the death on August 9, 1962, of George Arnold, not only has the scientific world lost a great scientist but also we, in Africa, are deprived of a figure of outstanding merit, a redoubtable character.

Born in Hong Kong eighty-one years ago, his early education was undertaken, consecutively, in Devon, at Waldkirch in the Black Forest and at a senior school at Compiègne in France. He made full use of this early, varied education and, with his remarkably retentive memory, retained his knowledge of these languages throughout his days. After a spell of clerical work in London he commenced his scientific career at the Royal College of Science, and followed this with an appointment in the Department of Cytology and Cancer Research at the University of Liverpool.

In 1911, at the age of thirty, he was appointed to the curatorship of the ten-year-old Rhodesian Museum in Bulawayo, which eventually expanded, through his leadership, to become the National Museum of Southern Rhodesia and, largely through his investigations, an institute of international repute. Director of the Museum until 1947, he was for many years the only zoologist (in the wide sense) on the staff. Always outstandingly neat, a rare gift for a museum specialist, he was adept at casting reptiles and fish, adding all the intricate finishing touches himself.

Apart from building up vertebrate and insect collections his primary scientific interest was in the Aculeate Hymenoptera. Probably his earliest publication was a joint paper with J. E. S. Moore, director of cancer research. This was "On the Existence of Permanent Forms among the Chromosomes of the First Meiotic Division in Certain Animals", published in the *Proceedings of the Royal Society* (1905). This was followed by papers on chromosomes in *Hydrophilus*, on ovigenesis and on digestion in *Planaria*, on blood, epithelia and chondriosomes, the last of these cytological articles in 1912. Then, in 1912, Arnold read a paper to the Rhodesia Scientific Association on the "Foods of Ants" and afterwards his published works were mainly devoted to Hymenoptera. His first major entomological work was "A Monograph of the Formicidae of South Africa", published in the *Annals of the South African Museum* (1914-26). This was followed by "The Sphecidae of the Ethiopian Region" (1922-31) and "The Pompilidae of the Ethiopian Region" (1932-37) in the