

wrapped in duffle-coats and working cheerfully in icy cavernous gloom with giant fans, rows of burners on the floor, and arrays of electrical thermometers to record the three-dimensional temperature distribution. It was a task for which his earlier researches on the viscosity of air had prepared him very well.

After service as visitor and manager, he was appointed in 1945 honorary secretary of the Royal Institution, a post which was to involve him, a few years later, in acutely controversial personal issues. Few will be disposed to deny the courage and tenacity with which he successfully maintained his position and views in the face of increasing difficulties and deteriorating health. The key to his general position on social issues lay in his early upbringing, and an instinct to support humbler ones against power and privilege. He had, as he said, a natural sympathy with the rebel, though he took his place easily and naturally in any *milieu*. His rare gift of friendship will make his loss widely mourned.

He married, in 1907, Ruby Irene, daughter of the late Mr. Samuel Short, of Reading, and had two sons and two daughters.

L. C. MARTIN

Dr. A. L. Hall, F.R.S.

ARTHUR LEWIS HALL, one of the foremost contributors to South African geology, died on August 13, 1955, at his home in Pretoria.

Hall was born on January 10, 1872, at Birmingham. A scholar of Gonville and Caius College and Harkness Scholar in geology at Cambridge, where later he also took his doctorate, he was appointed field geologist to the Geological Survey of the Transvaal in 1903. In 1915 he became assistant director of the Geological Survey of the Union of South Africa and in January 1932, on reaching the age limit, he retired from official duties after thirty years of devoted service to the State and to South African geology. He then busied himself as a consulting geologist, until his eyes began to trouble him and he was forced to withdraw from further active work in the profession in which he took such a lively interest and achieved so much.

Apart from general features, little was known of the geology of the Transvaal in 1903. Consequently, almost wherever his work led him, Hall found himself breaking fresh ground, and he can justly be counted among the able pioneers of South African geology. Most of his work was done in the eastern and north-eastern Transvaal in a much diversified country of rugged mountains and low-lying bush-veld. In the early days, field-work there was accompanied by many obstacles as well as a vast amount of fatiguing work that called for ingenuity, courage and the ability to overcome difficulties in order to achieve success. Hall, a great enthusiast and an energetic worker, possessed these qualities to a marked degree. His strong constitution and tenacity of purpose enabled him to produce the fine geological maps for which he is noted.

By his strenuous field-work, his detailed microscopical studies of large amounts of petrological material and other research work, Hall was able to make many important contributions to geology in the fields of pure as well as applied science, and thus exerted a lasting influence on geological development over a wide part of the Transvaal. He will be especially remembered for the leading part he played in the delineation of the Transvaal System and its relationships to other formations, his studies of the

Archæan formations, his investigations of the country's mineral resources and, above all, his elucidation of that great igneous assemblage known as the Bushveld Igneous Complex, with its wide, contact metamorphic aureole. He conducted the Shaler Memorial Expedition and also the Bushveld excursion of the International Geological Congress through the northern and eastern parts of the Complex, when he was able to present "much important field-evidence to a phalanx of geologists that included the élite of international petrographical thought".

International geology was advanced by Hall's share in the deliberations during the sessions of the International Geological Congress held in Spain, the United States and Russia. The success of the Congress in South Africa in 1929, of which he was the secretary-general, was largely due to his organizing abilities.

The Geological Museum of the Geological Survey owes a very large part of its utility and attractiveness to his energy and care.

Hall was a past-president of the Geological Society of South Africa, a Fellow of the Royal Society of South Africa and of the Geological Society of London, a council member and president of the South African Geographical Society, a corresponding member of the Geological Society of America, and a regional vice-president of the Society of Economic Geologists, United States of America. His distinguished services to geology were recognized by his election as a Fellow of the Royal Society and as an honorary member of the Geological Society of South Africa, and in the award to him by the Geological Society of London of the Murchison Medal, and by the Geological Society of South Africa of the Draper Medal.

Socially, Hall was a man of distinct personality whose sterling worth and ability aroused the deepest respect and admiration among those who worked with him. He will be remembered as much for his intense humanity as for his geological prowess.

LOUIS T. NEL

Dr. E. C. S. Megaw, M.B.E.

By the sudden death of Dr. E. C. S. Megaw on January 25 at the early age of forty-eight, the nation has lost one of its most prominent scientists in the field of applied radio-physics.

Eric Christopher Stanley Megaw, the eldest son of a Belfast solicitor, was educated at Campbell College and The Queen's University, Belfast; and, after obtaining his B.Sc. degree in electrical engineering, he was elected to a research fellowship at the Imperial College of Science and Technology, University of London. While still a schoolboy, he became prominent among radio amateurs, and was reputed to be the first amateur in Ireland to receive signals from New Zealand on his home-made apparatus.

It was at the Imperial College that his scientific interest in the generation and use of very short radio waves was aroused; and, under the direction of Prof. C. L. Fortescue, he studied electronic oscillations in valves. He joined the staff of the Research Laboratories of the General Electric Co., Ltd., in 1930, and rapidly acquired a reputation as a result of his research on the magnetron short-wave oscillator. A paper on this subject read before the Radio Section of the Institution of Electrical Engineers in 1933 was awarded the Duddell Premium of the Institution. He also received the diploma of the Imperial College and later the D.Sc. degree of Belfast.

In the early days of the Second World War, Megaw, as a member of the staff of the General Electric Company, was, with his colleagues, working on behalf of the Admiralty and was closely associated with the design and development for production of the cavity magnetron, experimental models of which had been produced by Prof. J. T. Randall and Dr. H. A. H. Boot, working at the University of Birmingham. As is well known, the cavity magnetron was widely used on both sides of the Atlantic and it has been described as the biggest single inventive contribution towards the technical superiority which the Allies achieved over their enemies. Later in the War he began to investigate the propagation characteristics of radio waves on wave-lengths from a few metres to 3 cm. over both land and sea; and his active interest in this field of research continued up to the time of his death.

Dr. Megaw was appointed M.B.E. in 1943, and three years later he accepted the post of superintending scientist of the Radar Branch of the Admiralty Signal Establishment. Later he was appointed director of physical research in the Royal Naval Scientific Service; and although this involved him in an increasing amount of administrative work, his active interest in the scientific side of radio research remained.

He was the pioneer investigator in Britain who in 1950 directed attention to the propagation characteristics of very short radio waves by scattering in the troposphere, and the advantages, which are only now being realized, of the use of scattering technique in certain fields of communication. His theoretical and experimental work on this problem were assisted by reviewing the analogous case of the fluctuations of light waves transmitted through a turbulent atmosphere; and he used the subject of "Waves and Fluctuations" in his chairman's address to the Radio Section of the Institution of Electrical Engineers in October 1952.

For several years past, Megaw was an Admiralty representative on the Radio Research Board of the Department of Scientific and Industrial Research, and a member of its Tropospheric Wave Propagation Committee. His expert advice and assistance on these bodies will be greatly missed. But his reputation was by no means limited to Great Britain. He attended several General Assemblies of the International Scientific Radio Union in various European countries; and at these he made important contributions to the sessions concerned with tropospheric wave propagation. On such visits, as on all other occasions, he was a delightful companion with an enviable command of the local language, and a flair for knowing the best, inexpensive places for good food and wine. His interest in art, architecture and stained glass were also evident by the opportunities he seized when visiting foreign capitals. He is survived by his wife and two sons.

R. L. SMITH-ROSE

DR. MEGAW'S outstanding ability was recognized in the Royal Naval Scientific Service by his promotion in one step from senior principal scientific officer to chief scientific officer, and his appointment as director of physical research in 1950. Although his previous researches had been mostly in radio, he soon showed that his skill was in no way limited to that field. He brought a freshness of outlook and keen understanding to a wide variety of problems, and his extraordinary energy enabled him not only to direct

a formidable programme of research and development but also to initiate and play a direct part in one of its most successful projects. Although security considerations prevent any detailed account of this work being given at the present time, his place in the records of naval science is already assured.

Megaw was not only gifted as a scientist. He possessed personal qualities which contributed no less to the successful outcome of his endeavours. His integrity, sincerity, loyalty and friendliness, combined with a high sense of duty, made him an ideal leader. No one who had the fortune to work with him could have failed to gain inspiration and encouragement from his example.

Megaw will be sadly missed. The loss to naval science will be particularly felt at a time when men of his kind are so scarce. My own association with him was of the happiest, and I could not have wished for a truer friend or more loyal colleague.

H. F. WILLIS

Mr. D. J. Matthews

WITH the death at nearly eighty-three years of age of Donald John Matthews, the science of oceanography has suffered the loss of a man of very distinguished standing. He was born at Surbiton in July 1873, was educated at Marlborough and University College, London, and died recently at Camberley. His long life was filled with an astonishing variety of professional activities, and was marked by great skill with wireless, photography and microscopy as hobbies. It was in 1902 that he first took up oceanography when he entered the service of the Marine Biological Association of the United Kingdom, after having been for some years an analytical chemist and research chemist with the British Aluminium Company.

In his University College days, Matthews worked under Sir William Ramsay at the exciting time when the inert gases were being isolated. Letters exist in which Ramsay gives great credit to Matthews for working up the minerals which proved eventually to contain helium, refers to him as a most capable manipulator, and remarks upon his love of studying minute marine animals under the microscope. While at Plymouth, Matthews published some notable papers on the oceanography of the waters off the south-west of the British Isles. In 1913 he was engaged aboard S.S. *Scotia* on studies of the waters around Newfoundland to provide information upon which could be based action designed to lessen shipping risks in those waters. The cause was the *Titanic* disaster and the outcome the International Ice Patrol. After a short time spent working at Rothamsted Experimental Station around 1920, Matthews entered the Scientific Service of the Admiralty in the rank of principal scientific assistant, and was, until 1936, seconded to the Hydrographer of the Navy. It was as occupant of that post that most people will remember him, and it was during that service that he published his well-known "Tables of the Velocity of Sound in Pure and Sea Water for use in Echo Sounding and Sound Ranging". These tables have been an invaluable tool in many hands, and will doubtless be the chief monument of the kindly, quiet personality who was held in great esteem in oceanographical circles far beyond the bounds of his own country. Matthews, who was a widower, is survived by a son and three sisters.

J. N. CARRUTHERS