

## OBITUARIES

## Mr. D. L. Chapman, F.R.S.

DAVID LEONARD CHAPMAN, who died on January 17 at the age of eighty-eight, was little known personally outside the Universities of Manchester and Oxford, but the scientific work he quietly pursued for so many years was of the highest quality.

From Manchester Grammar School he went as an Open Exhibitioner to Christ Church, Oxford, and graduated with first-class honours in natural science in 1893. After teaching for a period at Giggleswick, he was appointed lecturer and demonstrator in chemistry under Prof. H. B. Dixon at the University of Manchester. In 1907 he was elected a Fellow of Jesus College, Oxford, to take charge of a new laboratory built by the College, which, because of the inadequacy of University laboratory accommodation, played a full part in the general teaching of chemistry in the University. The College laboratory remained open until his retirement in 1944.

In 1899 Chapman, who had excellent mathematical ability, published a paper of fundamental importance on maximum explosion-rates. Five years later similar results were obtained by Jouguet, and the two names have usually been associated in this field. The theory was a development of the mathematical results of Riemann and of Hugoniot, which showed that a discontinuity or 'shock wave' of very high velocity is set up in an explosion. This theory has proved both sound and valuable, and is still basic for modern work on explosion velocities. Chapman used it for calculating velocities for mixtures of nitrogen with electrolytic gas which were in excellent agreement with the experimental findings of Dixon; but since the theory required the knowledge of the magnitudes of high-temperature specific heats, which were then not obtainable directly, it did not for some years receive adequate recognition of its importance.

Early in the present century Chapman took up the study of the photochemical combination of hydrogen and chlorine, where investigators had found confusing results due to mysterious inhibiting effects. Long 'induction periods' were observed which appeared to vary in a very capricious manner from experiment to experiment. These were traced by Chapman to the presence of minute amounts of ammoniacal or other nitrogenous compounds in the water used in the reaction vessels, and a technique of high-temperature chlorine treatment was devised to minimize the irregularities. During the following forty years he continued a systematic study of this very difficult reaction, assisted by his wife Muriel (*née* Canning) and his research pupils. The effect of surface-area of the reaction vessel in affecting the dependence of the reaction-rate on the light intensity was carefully analysed. He also worked out the 'sector-technique' for finding chain-carrier lives by measuring the change of rate with sector speed, and applied it to the photochemical combination of hydrogen with bromine. In all this photochemical work he showed very great experimental skill in the planning and technique.

His approach to research was one of equal parts of penetration and caution; he was intensely honest and fair-minded, with a very clear vision of what

had and what had not been proved. Although almost a recluse in scientific work, and indifferent to its reception by others, he was personally most friendly and approachable, and beloved by all his students. His high mathematical and experimental powers were recognized by his being brought into secret work on gaseous diffusion during the Second World War as part of the 'Tube Alloy' programme.

Chapman's absorption in scientific work did not prevent him from taking a part in College and University affairs. He never sought office or power, but in such positions he showed himself a practical administrator of great ability and common sense. For ten years he undertook bursarial duties in Jesus College, and acted as vice-principal from 1926 until his retirement. He also served as senior proctor and was from time to time a member of University boards and committees, including the Hebdomadal Council.

E. J. BOWEN

## Prof. Bjørn Helland-Hansen

BORN in Oslo on October 16, 1877, Bjørn Helland-Hansen's advent to oceanographical science, in which he soon became a leading international figure, was almost fortuitous. The loss of most of his fingers by frostbite, while he was still a medical student in Oslo, induced him in 1898 to turn to the natural sciences. These he pursued in Oslo and, with oceanographical bias, particularly towards physical oceanography, also in Stockholm, where he sat under Wilhelm Bjerknes on dynamic meteorology and hydrography and where he met his life-long friend, V. W. Ekman, and in Copenhagen, where he worked with the already well-known Danish oceanographer, Martin Knudsen. Thus early, too, began his friendship and collaboration with Fridtjof Nansen, which produced two notable treatises on "The Norwegian Sea" and "The Eastern North Atlantic", in 1909 and 1927, respectively.

In 1900, Helland-Hansen was appointed assistant at the Norwegian Fishery Directorate in Bergen and for ten years participated in the cruises of its research ship, *Michael Sars*, the outcome of which, in 1912, was the oceanographical classic, "The Depths of the Ocean". In 1903, however, he made his own significant contribution to the developing science when, in collaboration with J. W. Sandström, he derived the method which has since been extensively used for the dynamic computation of ocean currents.

In this same period, until 1914, Helland-Hansen was the brilliant leader of international courses in ocean researches which attracted marine scientists from far and near to Bergen; and in 1906, although primarily a physicist, he became director of the Marine Biological Station in Bergen. Four years later he was given the status of a university professor and approval to build a new research ship according to his own ideas. The *Armauer Hansen*, superseded only in 1957 by the appropriately named *Helland-Hansen*, was paid for entirely by the people of Bergen.

In 1917, as the result of his advocacy, the Geophysical Institute of Bergen, now part of the University of Bergen, was founded, and it is further significant of Helland-Hansen's sterling qualities

that once again the new building occupied by the Institute in 1928 was paid for by citizens of Bergen. Besides being professor of oceanography, Helland-Hansen, until he resigned his professorship in 1946, was head of the Institute, which houses also Departments of Meteorology and of Cosmic Physics and Terrestrial Magnetism.

The scope and range of Helland-Hansen's enterprise and achievement embraced yet another project. In 1925 he was one of three trustees nominated by the testator to administer the residual estate of more than five million kroner of the late Christian Michelsen, a former Prime Minister of Norway and millionaire shipowner. As the Chr. Michelsen Fund, the estate endowed the establishment in 1930, and the maintenance, of a Chr. Michelsen Institute of Science and Intellectual Freedom. Besides compiling the statutes for its administration, Helland-Hansen, as chairman of the Board of Administrators, was for twenty-five years the presiding genius in its conduct.

He was the recipient of many honours, among which may specifically be cited the honorary rank of a Commander, with Star, of the Order of St. Olav, and the Portuguese Order of the Great Cross of St. Jago. He was doctor *honoris causa* of several universities and a fellow of numerous scientific and learned societies in Europe and America. Medals, in commemoration mostly of oceanographical research expeditions or investigators, were awarded him on many occasions. He was elected president of the International Association of Physical Oceanography in 1936 and president of the International Union of Geodesy and Geophysics in 1945.

Helland-Hansen died in Bergen on September 7, 1957, and the sympathy of countless colleagues, friends, and admirers the world over is offered to his widow, Anna Marie Krag, of Copenhagen, whom he married in 1902, and their family of one daughter and five sons.

J. B. TAIT

#### Prof. M. Damodaran

PROF. MANAYATH DAMODARAN, who died after a prolonged illness last December, was a graduate of the University of Madras, and after some preliminary training in research at the Indian Institute of Science, Bangalore, he was awarded a Government of Madras Research Studentship. He spent his first year in Germany with Abderhalden at Halle a.S., where he worked on the preparation and enzymic digestion of myristic acid peptides, and his last two years with me at the Imperial College of Science and Technology, London. He was then, as he always remained, a quiet unassuming scholar, and he already possessed the connoisseur's appreciation of research, a quality that his friends always found so attractive, and which inspired his own students later in Madras and Poona. Until recent years his main interest was in protein chemistry and metabolism, a field in which he was a pioneer in India and by far its best exponent. At heart he was an analyst and never happier than when applying his great experimental skill to problems concerned with amino-acid analysis of proteins.

At the Imperial College he was responsible, during 1929-32, for the isolation of asparagine and glutamine from enzymic digests of edestin and gliadin respectively, an achievement which provided the first direct proof of the 'amide hypothesis' in proteins and gained him the degree of D.Sc. (London). On his return to India at the end of 1932 he was made first

reader and then professor in his old University at Madras, a post he held for sixteen years. There, in spite of very limited laboratory equipment, he embarked on a series of researches which soon made him one of the foremost biochemists in India. One may mention his work on phosphopeptone from casein, the isolation of canavanine from many seeds, new sources of urease, and the proteins of local foodstuffs. He also demonstrated for the first time the presence of glutamic dehydrogenase in plants, which he found in germinating seedlings. The results of all these valuable researches were accepted for publication in the *Biochemical Journal*.

In 1948 came the call to the new National Chemical Laboratory in Poona, where he was invited to assume directorship of the Biochemical Department and later the deputy-directorship of the Laboratory. At first the task was rather an uphill one, as accommodation was limited and equipment scarce. But in the early 1950's, with the new building in operation, conditions improved, and during his last five years or so Damodaran had at his disposal a laboratory as well equipped as any in Europe or America. The National Chemical Laboratory had been created to fulfil a national need, and Damodaran never lost sight of this aspect of his job. In the early stages of its development, proteins had to be relegated to the background and prominence given to problems that might have economic or medical application. For example, he bred a remarkably active and reliable strain of *Aspergillus niger* for the production of citric acid from sugar, and his process based on it is now in commercial operation. The synthesis of ascorbic acid from sorbitol, with a 99 per cent intermediary yield of sorbose, has also passed the pilot stage. Another important line he introduced was a gelatin plasma substitute preparation, based on a tryptic digestion, which has already been tested clinically with excellent results. Damodaran entered whole-heartedly into the work of the National Chemical Laboratory, and his retirement through ill-health in the summer of 1956 was deeply regretted by the Director and all his staff. All who knew him in Britain and India will mourn the passing of a very lovable colleague.

A. C. CHIBNALL

#### Prof. Claude Fromageot

CLAUDE FROMAGEOT, director of the Laboratory of Biological Chemistry at the Faculté des Sciences, Paris, since 1946 and professor of biochemistry at the Sorbonne since 1954, died on January 10, at the age of fifty-eight. The unexpected loss of this distinguished scholar comes as a great shock to his many friends all over the world.

Fromageot received his early scientific education at the Institut National Agronomique. After a year at the Collège de France, he spent a further year as assistant to Victor Henri at Zurich. In 1928 he went as a Rockefeller Fellow to Berlin-Dahlem, where he worked in the laboratory of Carl Neuberg. In 1929 he became director of the Biochemical Laboratory at the Faculté des Sciences at Lyons, and there he remained (with an interruption of ten months in 1933 spent at the University of Wisconsin, in Madison) until he went to Paris in 1946.

His early work was devoted mainly to the study of bacterial fermentations, particularly to the relation between fermentation and respiration in *Propionibacterium pentosaceum*. In later years he became