OBITUARIES

Prof. T. Levi-Civita, For. Mem. R.S.

TULLIO LEVI-CIVITA was born at Padua on March 29, 1873, son of a renowned advocate who was mayor of Padua and senator of the realm. He entered the University of his native city where, after studying with Veronese and Ricci, he graduated in 1894; four years later he was appointed to the professorship of mechanics at Padua. In 1914, he married Sig.na Libera Trevisani, one of his former students. In 1918, he was called to the University of Rome, where he occupied the chair of theoretical mechanics until his dismissal, in 1938. He died in Rome, after a lingering illness, on December 29.

Levi-Civita was unquestionably one of the best-equipped and most versatile mathematicians of our time: primarily an applied mathematician, he had been strengthened by the magnificent discipline of the Italian geometrical school which, apart from inspiring his valuable researches in differential geometry proper, furnished him with powerful weapons for attacking the problems of physical science. In the latter field his interests were all-embracing, and he made important contributions to such diverse topics as potential theory, wave motion, hydrodynamics, analytical dynamics, relativity theory, thermodynamics and theoretical physics, in particular, quantum mechanics. On the more technical side, where he was often called into consultation by his colleagues, he studied various complex problems in electrodynamics, elasticity and strength of materials, devising practical methods of calculation which have since proved their worth.

In the field of pure mathematics his interest was scarcely less extended. One may mention that his first papers were on the distribution of prime numbers and the foundations of geometry; afterwards, as a natural outcome of his other work, he was drawn to the study of conformal representation—in which, as regards its applications, he was one of the pioneers—and the theory of partial differential equations. He also made one of the earliest contributions to the theory of functions of two complex variables: all this, be it observed, in addition to the work in differential geometry for which he is chiefly celebrated.

At this point it is interesting to recall that Levi-Civita's teacher, Ricci, was once refused a Royal Prize for his work on tensor calculus, on the ground that it could not conceivably be of use to anyone, even a differential geometer. An apt comment on this verdict was later to be provided by Einstein's general theory of relativity, the foundations of which were actually laid in a great memoir by Ricci and Levi-Civita themselves. However, both before and after the tensor calculus had become useful, Levi-Civita was its most assiduous cultivator; and during a long period the *Rendiconti* of the Lincei were enriched by a series of notes on differential geometry, treated by its methods. These researches culminated in the memoir of 1917, introducing the concept of parallelism with which his name is associated, and constituting perhaps his surest title to fame.

The fecundity of such a great and varied production is amply proved by the number of disciples who have followed in its wake and the schools which have found inspiration in its conceptions. This multiform activity was centred, not in the published work, but directly in its creator. For more than forty years Levi-Civita was one of Italy's greatest teachers, drawing to himself students from all over the world, aiding and encouraging them with inexhaustible patience and generosity. Part cause, part effect of these contacts was a knowledge of mathematical literature that was truly encyclopædic; until the end Levi-Civita maintained his grasp of nearly the entire range of contemporary mathematics, and with his reading went a vast scientific correspondence, to which he attended with his customary diligence and zeal. As a writer of text-books, Levi-Civita is mainly known in Great Britain by the English version of his work on the tensor calculus; but it should be added that his comprehensive treatise on mechanics (written in collaboration with Amaldi) is the leading Italian work on the subject. A course of lectures on differential systems and wave propagation has also been published in book form.

Nevertheless, however splendid his achievement, to those who have known him it must always take second place to the man himself. This cannot often be said of a mathematician; not to say it of Levi-Civita would be unjust to his memory. The exquisite courtesy, the humility carried to such lengths that it might have been judged hypocrisy in another, were typical manifestations of his generous spirit. Many will have received some special token of his kindness; many more will have enjoyed his hospitality, or carry with them the indelible souvenir of his presence in the lecture room: the characteristic figure on the rostrum expounding, with overwhelming enthusiasm, some point in the theory of mechanics or differential equations.

Levi-Civita was the recipient of many academic distinctions and honorary member of numerous societies, in particular, of almost all the scientific academies of Italy and Germany. In 1938, when dismissed from his post in consequence of the racial legislation, he was also expelled from the latter, with the sole exception of the Pontifical Academy of Sciences. In Italy itself his death occasioned no official response, save within the Vatican City, where, at a recent session of the Pontifical Academy, he was duly commemorated. His last years had been overcast by an ever-deepening pre-occupation with the future of his country; it is easy to imagine how so liberal a mind, coloured with the Garibaldian traditions of his early education, viewed the progressive decay of international relations and ethical standards. With his death there has passed away a man of science and an Italian whom we can ill afford to lose and whom we shall not soon see replaced.

L. ROTH.

Dr. A. K. Chalmers

WE regret to announce the death at the age of eighty-six of Dr. Archibald Kerr Chalmers, one of the most eminent contemporary epidemiologists. He was born at Greenock in 1856, and received his medical education at Glasgow, to which he remained faithful, and qualified in 1879. After holding resident appointments at the Glasgow fever hospital, he was appointed medical officer of health for that city in 1892, and held the office until his retirement in 1925. Throughout his life he showed a remarkable administrative and literary activity. During his term of office he was busily engaged in the management of acute infectious diseases. Besides Chalmers's principal

work entitled "Health of Glasgow, 1818–1925: An Outline" (1930), which may be regarded as a classic, he was also author of addresses on several sanitary subjects, such as "Vital Statistics of School Ages" (1898), "The House as a Contributory Factor in the Death-Rate" (1913), "Economy in Food during the War" (1915), and in 1924 delivered the Watsonian Lectures before the Faculty of the Royal College of Physicians and Surgeons of Glasgow on "Epidemic Diseases of the Central Nervous System".

Chalmers received many well-merited honours, such as those of honorary LL.D. of Glasgow, honorary fellowship of the Royal Faculty of Physicians and Surgeons of Glasgow and the Médaille du Roi Albert. He was president of the Section of Epidemiology and State Medicine of the Royal Society of Medicine in 1920.

J. D. ROLLESTON.

WE regret to announce the following deaths:

Sir Robert Chapman, C.M.G., professor of engineering in the University of Adelaide during 1907–37, president of the South Australian School of Mines, aged seventy-five.

Sir Robert Elliott-Cooper, formerly president of the Institution of Civil Engineers, on February 16, aged ninety-seven.

Prof. Max Kriss, associate professor of animal nutrition in Pennsylvania State College, aged fifty-two.

Dr. Paul S. McKibben, professor of anatomy and dean of the School of Medicine of the University of South California, known for researches on the nervous system of Amphibia, aged fifty-five.

The Very Rev. Sir George Adam Smith, F.B.A., Principal of the University of Aberdeen during 1909–35, on March 3, aged eighty-five.

NEWS and VIEWS

Prof. A. C. Hardy, F.R.S.

PROF. A. C. HARDY, whose appointment to the regius chair of natural history in the University of Aberdeen has just been announced, is well known for his distinguished work on plankton problems. The development of the strikingly new methods which he has evolved in this work may be traced to the time when, as a member of the scientific staff of the Ministry of Agriculture and Fisheries, he introduced a simple plankton recorder made to assist fishermen in the location of herring shoals. Later, as second-in-command on the scientific staff of the Discovery Committee, he spent some two years in the Antarctic in the R.R.S. *Discovery*, and here had opportunities for the invention of a much more elaborate instrument designed to give a continuous record of the plankton, while being towed at full speed. Undeterred by initial failures he finally perfected this instrument, and from the new department which he later founded at University College, Hull, he inaugurated comprehensive plankton surveys of the North Sea with plankton recorders used from commercial vessels. This work, with Government assistance, developed rapidly until the War made it necessary to discontinue operations at sea; a substation was opened at Leith and a number of very valuable reports have appeared in the *Hull Bulletins of Marine Ecology*.

It is satisfactory to learn that Prof. Hardy's fruitful work on the North Sea plankton will continue. On taking the chair at Aberdeen he will become honorary director of oceanographical investigations at University College, Hull, and the oceanographical work of that department will henceforth be in charge of Mr. C. E. Lucas, the senior member of his research staff. In addition to this profitable work on plankton, Prof. Hardy has most ingeniously adapted oceanographical methods to the study of insect distribution. Using devices similar to those employed under water, he has flown light nets, fitted with opening and closing mechanism, from kites; and in this way has shown that many species of insect, including agricultural pests, can be brought to Great Britain in the upper layers of the air.

Royal Society of Edinburgh

THE following have been elected ordinary fellows of the Royal Society of Edinburgh:

Prof. T. Alty, Department of Applied Physics, University, Glasgow; Mr. R. E. Cooper, curator, Royal Botanic Garden, Edinburgh; Dr. James Cossar, lecturer in technical mathematics, University, Edinburgh; Prof. T. Dalling, director, Ministry of Agriculture's Veterinary Laboratory, Weybridge; Dr. S. C. Das, lecturer in pharmacology, Robertson Medical School, Nagpur, C.P., India; Dr. Andrew Davidson, chief medical officer, Department of Health for Scotland; Mr. Arthur Earland, Edinburgh; Dr. G. H. Edington, Glasgow; Mr. A. H. Gosling, assistant commissioner, Forestry Commission, Scotland; Prof. A. Gray, Department of Political Economy and Mercantile Law, University, Edinburgh; Dr. R. A. R. Gresson, Department of Zoology, University, Edinburgh; Dr. K. E. Grew, lecturer in physics, Heriot-Watt College, Edinburgh; Dr. W. A. Harwood, superintendent, Meteorological Office, Edinburgh; Dr. J. R. M. Innes, pathologist, Biological Laboratories, I.C.I. (Dyestuffs) Ltd., Hexagon House, Manchester; Dr. Daniel Lamont, surgeon, Glasgow Royal Cancer Hospital, and Glasgow and West of Scotland Radium Institute; Dr. W. M. Levinthal, bacteriologist, Royal College of Physicians Laboratory, Edinburgh; Dr. James Macfarlane, medical liaison officer, Scottish Office, London; Mr. Peter N. McFarlane, Glenordie, Stanley, Perthshire; Dr. J. F. Malcolm, lecturer in bacteriology, West of Scotland Agricultural College, Glasgow; Prof. S. T. Mayow Newman, Reid School of Music, University, Edinburgh; Dr. Jocelyn Patterson, lecturer in biochemistry, Charing Cross Hospital Medical School; Dr. J. R. Peddie, secretary, Carnegie Trust for the Universities of Scotland; Mr. Douglas M. Reid, senior biology master, Harrow School; Prof. W. J. B. Riddell, Department of Ophthalmology, University, Glasgow; Dr. J. D. Robertson, Courtauld Institute of Biochemistry, Middlesex Hospital, London; Dr. William Scott, Fryern Hall, Bridgewater, Somerset; Mr. Charles Strachan, lecturer in applied mathematics, University,