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,

Liverpool; Dr. Joseph Tait, resident secretary in Scotland, Pharmaceutical Society; Mr. D. R. Wilson, bacteriologist, Moredun Institute, Animal Diseases Research Association, Gilmerton, Edinburgh.

The Council of the Royal Society of Edinburgh has awarded the Keith Prize for the period 1939–41 jointly to Prof. E. T. Copson, University College, Dundee, and to Prof. W. H. McCrea, Queen's University, Belfast, for their papers in the *Proceedings* of the Society within the period of the award, and in recognition of their valuable contributions to the theory of Riemannian space and general relativity.

The Neill Prize for the period 1939–41 has been awarded jointly to Dr. P. C. Koller, Institute of Animal Genetics, University of Edinburgh, for his contributions to cytology; and to Dr. W. J. McCallien, Department of Geology, University of Glasgow, for his contributions to the tectonic geology of the Scottish Highlands.

Philosophy of the Physical Sciences

IN his recent presidential address to the Royal Society of Edinburgh on "Some Disputed Questions in the Philosophy of the Physical Sciences", Prof. E. T. Whittaker discussed the problem raised by the Greeks and at the present time vigorously debated by Eddington, Jeffreys, Milne, Jeans, Dingle and others, on the respective shares of reason and observation in the discovery of the laws of Nature. He recalled that the Greeks considered that geometry could be built up completely apart from observation, but that Aristotle at least (and much later Aquinas) held that other sciences must be built on experience. Later progress showed that geometry also must be regarded as a branch of experimental knowledge, and from the time of Newton until now, the principle that science rests fundamentally on observation and experiment has been unchallenged. Now, however, certain thinkers—notably Milne and Eddington—hold that the laws of Nature can be derived without recourse to observation. Prof. Whittaker points out that many important branches of physics can be deduced from single "postulates of impotence"; for example, the whole of relativity theory follows from the postulate that it is impossible to detect absolute motion. Such postulates are not the direct result of experiment, though they are generalizations from experiment. Milne's "cosmological principle" is in form a postulate of impotence, but it is assumed without experimental support. Eddington's "epistemological principles", however, are different, but Prof. Whittaker is not convinced that they have any basis outside experience. His verdict on Eddington's claim is: "Not Proven".

The concentration into postulates of impotence of the experimental contribution to physical laws is a very suggestive generalization, and it is an interesting conjecture that the whole of physical law might ultimately be derived by reason from a single postulate of impotence. At the same time it would be a mistake to suppose that anything significant can come out of a pure negation. A postulate of impotence is indebted to experience not only for failure to violate it but also for an indication of the positive thing which in the stated circumstances it denies. The impossibility of spontaneous passage of heat from cold to hot bodies implies the fact of experience that heat can pass between bodies; the denial of absolute motion would be without meaning if we had no experience of relative motion; and so on. It is a pity that Prof. Whittaker's address was prepared before Eddington's recent change of front. In the "Philosophy of Physical Science" he wrote: "For the truth of the conclusions of physical science, observation is the supreme Court of Appeal" (p. 9), and accepted the statement that physics is "the rational correlation of experience" (p. 185). In NATURE of October 25, 1941, however, he stated, in reply to the objection that the supreme Court of Appeal might decide against the rationally derived laws, that "the fundamental ('inviolable') laws are not assertions about experience". It appears, therefore that Prof. Whittaker has been analysing a superseded claim.

Science as a Force of Freedom

THE value of science as a force of freedom was emphasized by Mr. G. B. Lal in a recent address to the New History Society, New York. The power of science is unique. Great men of science have world-wide influence. But they have achieved such influence without the use of the slightest violence or fraud. People have killed each other for religion; but not for science. In science there is a peculiar and most important pattern of freedom. Science develops only when the scientific worker has enough social power to enable him to do his work utterly unhampered. Also, every development in science releases new forms of social energy. Most people respect science because of its practical importance, as shown by the machines of scientific inventors, the conquest of diseases, the piling up of profits in industries, the production of military weapons, rapid transportation and communication. But the most important thing about science is its method. The scientific method is the most efficient use of human intelligence for the discovery of truth.

Physics of a Transmission Line

PROF. W. M. THORNTON has published a thought-provoking paper with the above title (*J. Inst. Elec. Eng.*, **88**, Pt. II, No. 6, Dec., 1941) in which he deals with the fundamental and, in part, unknown field of electromagnetic study underlying the many technical and economic problems entailed in the design, construction and operation of electric transmission lines. He pays special attention to the electromagnetic mechanism by which electric and magnetic stresses in space combine so that the energy of electric strain passes continuously along the insulating medium around the wires. Remarking that this, the Poynting flux flow, is the least known of the physical actions in transmission, Prof. Thornton discusses the transfer of potential energy along a transmission line by strain of the insulation, extending the theory to the supply of energy to electric lamps, heaters and rotating machinery. Following a lucid explanation of Poynting's theorem, physical analogies are given to the resistance, inductance and capacitance of a transmission line, resistance being regarded as the coefficient of dissipation of energy, inductance as inertia, and capacitance as elasticity; an invisible shaft of energy which would be perfectly rigid in the absence of inductance and capacitance rotates about the conductors of a three-phase system at the supply frequency.

Suggesting that there may still be engineers who regard the purity of the copper of their machines or cables as more important than insulation quality, the paper proceeds to a discussion of the function of