(yet not useless) pastimes. Thus, to select one instance, full sets of pieces of cardboard are required: all the pieces of a single set are to be of the same shape (usually triangular, or square, or hexagonal) and of the same size : they are to be coloured, each, for example, with three out of four colours, while no two are to be coloured in exactly the same way. By the adoption of definite rules for combining the pieces of a set, a large number of different forms can be obtained, each such form being a geometrical pattern. Each pattern can be repeated so as to provide a general symmetric design. The designs can be utilised in a variety of ways : for humble wall-paper, for mosaics and woven fabrics, for the refined ornament of architecture. In a small volume entitled " New Mathematical Pastimes ", published in 1921 by the Cambridge University Press, he gave an account of these recreations, at once light and serious : the contents are entirely his own creation.

MacMahon's investigations extended over nearly half a century. Many in number, diverse in range, they constitute a fine contribution to his science, and they assure him an honourable place among the prominent pure mathematicians of his generation.

A. R. F.

PROF. T. BRAILSFORD ROBERTSON.

NEWS has been received of the death on Jan. 25, from septic pneumonia, of Prof. Brailsford Robertson, of the University of Adelaide. His premature death, at the comparatively early age of forty-five years, removes one of the most active and valuable workers from biochemical research, and is a very serious loss to the recently instituted movement for the more rapid application of biological knowledge to the development of animal husbandry in Australia.

Thorburn Brailsford Robertson was educated at the University of Adelaide. In 1904, attracted by the work of the late Jacques Loeb at the University of California, he went there as a research student in biology and for several years worked in close collaboration with Loeb, and eventually succeeded him as professor of biochemistry and pharmacology at Columbia University in 1916. In 1918 he was called to the chair of biochemistry at the University of Toronto in succession to Prof. A. B. MacCallum, and in 1920 he returned to Adelaide as professor of biochemistry and general physiology in succession to his father-in-law, the late Sir Edward Charles Stirling.

From 1920 until the time of his death, Prof. Brailford Robertson occupied a prominent position in Australian biological science, both in pure research and in the application of the results of research to industrial problems. He was one of the founders of the *Australian Journal of Experimental Biology and Medical Science*. When the Commonwealth Council for Scientific and Industrial Research was instituted a few years ago, he was invited to become the chief officer in charge of investigations on the nutrition of animals. To enable him to devote the major part of his time to this work, he was relieved of teaching at the University,

though he continued to be a member of the Senate, so that his experience might be available in developing the school of biochemistry and physiology at the University.

Prof. Robertson was an assiduous worker and a prolific writer. He did most important work on the physical chemistry of the proteins, and later conducted long and laborious research on problems of growth and senescence. Among the problems of general physiology to which he made valuable contributions may be mentioned allelocatalysis as a factor in the multiplication of infusoria, the permeability of cells and the underlying physico-chemical principles involved in cell division. In addition to numerous papers in scientific journals, he published " The Principles of Biochemistry " and other two works, namely, " The Physical Chemistry of the Proteins " and " The Chemical Basis of Growth and Senescence ", in both of which he incorporated the results of his own original work on these subjects.

Prof. Robertson had a stimulating personality, and, as a lecturer, had the gift of imparting his new enthusiasm to his audience. His death will be deeply regretted in scientific circles, especially in North America and Australia, in both of which continents he exercised a great influence in the development of biochemistry, both as a science and in its application to practical problems. The loss of his profound scientific knowledge and great experience in organisation will be a very serious blow to the work of the Commonwealth Council for Scientific and Industrial Research.   J. B. O.

MR. F. P. RAMSEY.

THE death on Jan. 19 of Frank Plumpton Ramsey at the early age of twenty-six has cut short a life which bore exceptional promise of eminence in mathematics and philosophy. The elder son of Arthur Stanley Ramsey, now President of Magdalene College, and the author of well-known treatises upon subjects in applied mathematics, Frank Ramsey was born in 1903 and passed his boyhood in Cambridge. From King's College Choir School he became first a scholar of Winchester, and then a scholar of Trinity College, Cambridge : in 1923 he graduated in the first class of the Mathematical Tripos, with distinction, and in 1924 was elected to the Allen (University) Scholarship. At the time of his death he held a University lectureship in the Faculty of Mathematics, and was a fellow and director of studies at King's College, Cambridge.

It could not be expected that Ramsey's published work would fill a large number of pages ; yet there is enough to prove the distinction of his mind and powers. The London Mathematical Society has printed two weighty papers, " The Foundations of Mathematics " (1926) and " On a Problem of Formal Logic " (1929). The former, written after Ramsey had become acquainted with the work of Wittgenstein, is probably his most important original production. In it he aims at presenting the general method of Whitehead and Russell in a

form free from the objections raised by German critics : there can be little doubt that Ramsey would have returned to this subject and further developed it. He has written on 'universals' in *Mind* (Oct. 1925), and on mathematical logic in the "Encyclopædia Britannica" and elsewhere. Two papers in the *Economic Journal*, on the mathematics of taxation (March 1927) and of saving (December 1928) must be mentioned, on account of the high praise bestowed upon them by economists competent to judge.

This scanty list reveals the bent of Ramsey's mind. As a student he proved himself a mathematician of exceptional gifts, but his interest and strength lay in the application of mathematics to problems of philosophy or economics. His main interest was in the very difficult boundary region between mathematics and logic : in this he was already recognised as an authority. For a truer appreciation of him as a man we must turn to his contemporaries, his friends and colleagues. To them, Frank Ramsey seemed to tower over his fellows intellectually even as he did physically— for he stood 6 ft. 3 in. or thereabout and was of unusually sturdy build. What Ramsey might have achieved, how grave the loss to learning in his untimely death, they cannot tell ; but the memory of a friend who combined unrivalled powers of mind with an unassuming simplicity of manner and character will remain.

Ramsey married in 1925, Miss Lettice Cautley Baker, and leaves two daughters. At the end of November he was attacked by influenza, the ill-effects of which persisted. At length an operation was judged to be inevitable, and after it he died.

WE regret to announce the following deaths :

Prof. Charles Julin, member of the Belgian Royal Academy of Sciences and formerly professor of comparative anatomy in the University of Liège, known for his work on the morphology and embryology of the Tunicates, on Feb. 5, aged seventy-three years.

Dr. E. D. Roe, Jr., director of the observatory and for twenty-nine years professor of mathematics at Syracuse University, known for his interest in pure mathematics, the testing of objectives and double stars, on Dec. 11, aged seventy years.

Prof. Eduard Study, emeritus professor of mathematics in the University of Bonn, author of works on the geometry of dynamics, on ternary forms, spherical trigonometry, orthogonal substitution and elliptic functions, on Jan. 6, aged sixty-seven years.

Prof. A. V. Vasiliev, of the Universities of Kazan and Leningrad, who was distinguished for his work on the theory of numbers and mathematical philosophy and was instrumental in establishing the Lobachevski prizes for works on non-Euclidean geometry and mechanics, on Oct. 6, aged seventy-six years.

News and Views.

RATIONALISATION, especially in reference to the chemical industry, was the subject of a paper by J. Davidson Pratt, general manager of the Association of British Chemical Manufacturers, read at the University of Bristol on Feb. 6. The general principle that exact knowledge should be the basis of industrial policy was most clearly stated : and of course the principle is in practice recognised more generally in the chemical than in other industries. Imperial Chemical Industries and the German I. G. are well known. Chemistry involves so obviously the problem of research and co-ordination of results that the tendency to large scale and long range thinking in the industries dependant upon a knowledge of chemistry can scarcely be resisted. Mr. Pratt was in fact preaching to the converted. But the conversion, as he pointed out, has not gone far enough. Besides the important issues with which he dealt there are others. National 'rationalisation' on the basis of amalgamation or association of firms gives the group so united a great *political* influence, which in practice has been used for the introduction of protective tariffs and the maintenance of high prices within the tariff-wall. It is quite useless to say that the consumer should not suffer. He will, unless policy prevents it, and the policy of a national amalgamation in any trade is never in favour of the consumer at home, unless competition is feared from abroad. But even international agreements may be aimed only at keeping prices up.

IN Great Britain, however, we have still a long way to go towards standardisation and amalgamation in most industries before any danger to the consumer need be feared. For example, the coal industry seems still to be thought of, even by its reformers, as a separable industrial unit. But would not true rationalisation be based upon the *uses* of coal, not the mere getting of coal ? Chemistry has scarcely been used by those who have controlled the policy of coal-getting. They have provided productive industry and the private consumer with primitive lumps of a natural product and given no attention to research either for power supply or for by-products. If one may venture upon political issues, neither the Samuel Report nor the present Government's Coal Bill has envisaged the chemical connexions of coal. The whole industry is pre-scientific. The chemists have still a large field to enter, outside what are called the chemical industries. The danger, indicated but not emphasised by Mr. Pratt, is that the financier and industrialist will not go far enough in the application of scientific knowledge and the promotion of research. It is very tempting to 'rationalisers' to be satisfied with a collection of meaningless statistics as to existing processes or methods.

NEVER before in the history of the world have greater or more momentous issues presented themselves in the political sphere than those which now confront us. Even the greatest of all at any time, that of peace or war, though not now a direct or immediate issue, can never be far away but lurks as a sinister phantom in the background. There is thus the greater need on the part of the electorate in any democracy for intelligent apprehension of the many difficult and intricate political problems which call so urgently for solution—and the political here neces-