

## OBITUARIES

## Prof. Wolfgang E. Pauli, For.Mem.R.S.

UNEXPECTEDLY to all but those near him at the time, Wolfgang Pauli died on December 15, 1958, at the early age of fifty-eight.

Born in Vienna, Pauli graduated in Munich, and worked successively at Göttingen, Copenhagen and Hamburg. Nowadays, however, his name is mainly associated with Zurich, where he was professor of theoretical physics at the Federal School of Technology for the past thirty years, broken only by five years in Princeton during the Second World War.

Though Pauli died so young, it is no exaggeration to say that he was one of the leaders of theoretical physics throughout the past forty years. At the age of nineteen he was commissioned by his teacher, Arnold Sommerfeld, to write the article on relativity for the "Enzyklopädie der Mathematischen Wissenschaften". At that time, general relativity was novel and its literature scattered and understood by few. The young Pauli succeeded in presenting the entire subject in a work which was immediately recognized as masterly and which, in its scholarly precision, remains unsurpassed to this day.

Having demonstrated so early the depth and clarity of his insight into physical theory, Pauli did not take long to prove that as an originator of new ideas he was equal to the greatest. In 1924 he enunciated his 'exclusion principle' in terms of which so much of the then existing knowledge of atomic structure fell into order: we owe to Pauli the introduction of the two-valued variable required to characterize completely the state of an electron, and when, in 1925, Goudsmit and Uhlenbeck took the important step of interpreting their variable as an intrinsic angular momentum, it was Pauli again who showed how this concept could be consistently incorporated into the scheme of quantum mechanics and how the exclusion principle could then be formulated definitively as a symmetry requirement satisfied by the wave function of an atomic system. This also became the basis of the powerful concept of the Fermi statistics governing the behaviour of electrons. In 1945 Pauli was awarded the Nobel Prize for Physics, primarily for these achievements.

Though the nineteen-twenties undoubtedly represented a peak in Pauli's creative work, he in fact never ceased to produce work of comparable depth and to exert a profound influence on the development of physics. He continued both to bring forth new ideas and to clarify and consolidate the ideas of others. It was Pauli who, in an informal letter, first threw out the suggestion that an unknown, uncharged and massless particle was emitted in every radioactive  $\beta$ -disintegration. This entity, to which Fermi gave the name 'neutrino', to-day has an assured and important place in our picture of Nature.

We can only name a few of Pauli's great contributions to theoretical physics. With Jordan and with Heisenberg he laid the foundations of the quantum theory of fields, a subject still very much the concern of pioneering theorists, and when after 1945 great advances were made in this domain, mostly by physicists of the younger generation, Pauli, almost alone among the founders of quantum theory, participated directly in these developments. Previously, in 1940, he had firmly laid one corner-

stone of field theory, by giving a proof of the long-conjectured relation between the spin and the 'statistics' of any elementary particle. This result, so closely related to his great work of the 'twenties, gave Pauli himself particularly great satisfaction.

Pauli's writings are in daily use among research workers everywhere. Perhaps the work most greatly admired is his article on the principles of wave mechanics in the "Handbuch der Physik", Vol. 24, 1933. Younger theorists may perhaps not realize how much the orientation and emphasis of research to-day owe to the guidance given by Pauli in this and his many other writings.

Those whose good fortune it was to be close to Pauli at one period or another know how much more has been lost by Pauli's death than can be put into words. As a personality, no one more deserves to be described as unique. His rotund build and characteristic gait, his gestures and mannerisms, his sharp tongue and gleeful laugh will all be remembered vividly by his friends. Anecdotes around him abound, and the legend of the 'Pauli effect', spelling disaster to any apparatus he approached, is all but believed throughout the world.

When in personal contact with Pauli it was impossible to lose awareness of all his characteristics and of the sense of the extraordinary in his nature. As many of his students discovered, communication with him did not always come easily, least of all through formal lectures. But once one was drawn into discussion, the barrier was surmounted and the experience of sharing his thoughts became infinitely rewarding. Through his large correspondence he extended his influence far beyond his own Institute. With Pauli's death many a physicist has lost a guide and critic without equal.

Not all of us had the privilege of sharing his deeper thoughts on questions transcending his own science. In his later years particularly, his studies extended into the philosophical domain and a number of writings scattered at present but shortly to be published in a collected English edition testify to this.

All those who can look back to personal contact with Wolfgang Pauli feel a deep sense of loss. He will be remembered by all as a great scientist, an unforgettable personality and a sincere friend.

N. KEMMER

## Prof. A. C. Pigou

DURING the first half of the twentieth century, the University of Cambridge had a galaxy of brilliant scholars, scientists and thinkers. Prof. Arthur Cecil Pigou was among the greatest of them, and by his death on March 7 the University, and in particular his College, King's, have suffered an irreparable loss.

Prof. Pigou will be remembered by economists so long as the development of their science is studied. The favourite pupil of the great Marshall, and chosen by Marshall to be his successor in the chair of political economy, Prof. Pigou built on the foundations which Marshall had laid. By his teaching, his books, his articles in economic and other journals, his membership of Royal Commissions, and his letters in *The Times*, he played a major part in winning for economists the wide authority which they have to-day.

His most important work, "The Economics of Welfare", went through many editions, and was translated into many languages; it became, indeed, like his "Study in Public Finance" and his "Theory of Unemployment", a standard text-book in most schools of political economy throughout the world.

His title, "The Economics of Welfare", illustrates admirably his basic approach to his subject. In his introduction to the first version of his short book on "The Political Economy of War", he described it further; speaking of the "extraordinarily complex system of exchange built round the motive of private money profit", which it was his life's task to analyse, he described the "grave flaws of this system; it involves great waste; it has meant for very many human beings weariness, discontent, hunger and pain". The economists' hope, he said, was "that by carrying out well and truly this task of positive analysis, this economic anatomy and physiology, they might help other men, better trained than themselves for the practical work of government and administration, to fashion remedies or palliatives for the many evils they decry". He would never 'talk shop', if he could possibly avoid it; but those who were fortunate enough to have him as their teacher soon learnt the warm but practical idealism by which he was inspired.

They learnt, too, the splendid simplicity of his character, and the complete, uncompromising integrity of his heart and mind. Some of them, especially those with whom he climbed the rocks of Cumberland, and the mountains of Switzerland, Austria and Norway, came to know his unique gift for friendship, and his courageous determination as a leader, whatever the difficulties with which he met. In 1925, when he was only forty-seven, he strained his heart by climbing two peaks in the Alps in one morning, before he was fully trained; in spite of this 'fibulation', a week later he completed a long, unknown and difficult climb, only to collapse when he had brought his party safely off the rocks; from that point he was transported to his hotel on mule-

back; yet only a week after that he accomplished what was, perhaps, his most difficult lead up the face of the Aiguille de la Za, circumventing an iced-up chimney by a route that could only be classed as exceptionally severe. It was a great climb; but the 'fibulation' which he then defied ultimately undermined his health, and brought his mountaineering to an untimely end.

Pigou was extremely shy with strangers—unless they were under ten years old. But when a little boy of five accomplished a walk at Buttermere over Scarth Gap and the Haystacks, and back by the Miners' path, Pigou was so moved by admiration that he invited the five-year-old hero, and his parents, to tea in his lovely house, Lower Gatesgarth.

There are many of his Cambridge friends to whom King's, without him, will never seem the same. King's was, indeed, a perfect setting for a life of such blameless goodness, and of such eminent academic and practical achievement. Those who were at Cambridge before the First World War will remember the warmth and power of his eloquence in Union debates, and his vivid interest in philosophy and poetry. Everyone who knew him will remember how he despised and hated the senseless folly of war. The epilogue to the second version of his "Political Economy of War", written in 1939, has the passion and the moving eloquence of the Gettysburg oration: "We are at a start of a journey whose end we cannot foresee. Yet once again the young and gallant, our children and our friends, go down into the pit that others have digged for them. Yet once again men of greater age, we that, if it might be, would so gladly give for theirs our withered lives, we cumber the earth in vain. We wait and watch and—those who can—we pray. As an economist I have not the power, nor, as a man, the heart, to strain through a night so black to a dawn I shall not see".

Cambridge will see no more his erect and striking figure walking along the Backs; but it will be long before the memory of his noble spirit has passed away.

PHILIP NOEL-BAKER

## NEWS and VIEWS

### Imperial Chemical Industries, Ltd.:

Sir Ewart Smith, F.R.S.

SIR EWART SMITH, who is retiring from the board of Imperial Chemical Industries, Ltd., obtained first-class honours in the Mechanical Science Tripos at Cambridge. He joined Synthetic Ammonia and Nitrates, Ltd. (later the Billingham Division of Imperial Chemical Industries, Ltd.), in 1923, and later played a part in the major development of the huge Billingham complex, becoming its chief engineer in 1932. He was seconded to the Ministry of Supply in 1942 to be chief engineer and superintendent of armament design. He returned to Imperial Chemical Industries, Ltd., in 1945, when he was appointed technical director, and was knighted for his war-time services in 1946.

Sir Ewart's responsibilities as technical director, and since 1955 as a deputy chairman of the Company, have not precluded his devoting a great deal of time and energy to other organizations. As a member of the British Productivity Council—he was its chairman in the early and difficult days following its formation—he has been nationally respected and ad-

mired by management and trade union leaders alike for his progressiveness, forthright honesty and vigorous leadership.

Sir Ewart has also served on numerous other bodies, governmental and scientific, including the Advisory Council on Scientific Policy, the Committee on Scientific Manpower, the Northern Ireland Development Council, and as a vice-president of the Institution of Mechanical Engineers. He was elected a Fellow of the Royal Society in 1957 in recognition of his contribution to technology, and this year is president of Section G (Engineering) of the British Association. He is keenly interested in education, and is a governor of Christ's Hospital, his old school. Sir Ewart is to serve as chairman of the new council set up to assist the application of modern industrial techniques in the National Health Service.

### National Science Foundation Antarctic Research Programme:

A. P. Crary

ALBERT P. CRARY has been appointed chief scientist of the newly established United States Antarctic research programme within the National Science