living organism, and that decision guided him throughout the rest of his career. Protein chemists were relatively rare in those days. Cohn studied with two of the greatest—Thomas B. Osborne in New Haven in 1917, and S. P. L. Sørensen in Copenhagen in 1920. During the Second World War he worked with Henderson on the physical chemistry of bread-making—a problem then of urgent practical importance. He returned from Europe to Harvard in 1920, when Henderson offered him a position in the newly created Department of Physical Chemistry in the Medical School. This Department, of which he shortly became the head, was the centre of his activity for the rest of his life.

Prof. Cohn's early researches were concerned with the factors affecting the solubility and the acid-base equilibria of proteins; he was one of the first to recognize the importance for protein chemistry of the Debye–Hückel theory of interionic forces, and to apply it in his solubility studies. The discovery of the liver treatment of pernicious anæmia by Minot and Murphy led him to undertake the purification of the active principle. Isolation of the active component—identified twenty years later as vitamin B_{12}—was not achieved; the human patient was at that time the only available experimental animal for testing the liver fractions, and all available patients were rapidly cured. However, the practical advance achieved was great; the extracts prepared by Cohn's methods promptly replaced whole liver in treating the disease.

These studies never deflected him from his concern with protein chemistry. However, about 1928 he turned to the study of the amino-acids, peptides and related substances as simple models of known structure which might be employed to elucidate obscure aspects of the physical chemistry of the proteins. The recognition by E. Q. Adams and N. Bjerrum that amino-acids, when electrically neutral, were dipolar ions (*Zwitterionen*) served as a clue of fundamental importance in these studies. Cohn became the centre of an active group of investigators, who explored the far-reaching implications of dipolar ion structure of proteins, amino-acids, and peptides. Among other accomplishments, much was achieved in relating solubility to structure in compounds of this class, in terms of electric charge distributions within the molecule, of the presence of polar and non-polar groups, and of the effects of the dielectric constant and the ionic strength of the medium.

The work of the laboratory began again to centre on the proteins about 1938; and this tendency was accelerated by the outbreak of the Second World War. Cohn was early aware of the gravity of the problem of blood transfusion, and he recognized that concentrated serum albumin would have many advantages over whole plasma as a transfusion medium. Moreover, the other fractions of blood plasma proteins could then also be separated from the same blood, and made available for clinical use, each for a particular function. With support from the Office of Scientific Research and Development, and with the great war-time blood-donor programme of the American Red Cross, this vision was carried into practice with extraordinary success. More than half a million transfusion units of serum albumin, derived from about two million blood donations, were prepared in the United States during 1942–45, in addition to the vast number of donations used as whole blood or for dried plasma. Gamma-globulins, fibrin foam and film, and isoagglutinins for blood typing were other practical products of the fractionation programme. The large-scale methods of separation developed, involving precipitation with ethanol at low temperatures, with careful control of pH and ionic strength, were profoundly influenced by the earlier studies on amino-acids and peptides; the rapid progress made in the war-work would indeed have been impossible without the theoretical background developed over the earlier years.

The scale of operations in the war-time programme was indeed large, requiring close collaboration between chemists, clinicians, immunologists and others, and rapid industrial application of the processes worked out in the Harvard pilot plant. Cohn was the driving force behind the programme; his extraordinary gift for directing and co-ordinating a great organization, which he himself had largely created, was for the first time called fully into play. The concentrated attention which he devoted to every detail of every process was astonishing; plans for improvements and modifications poured forth from him in a never-ending stream, and the enthusiasm with which he pressed his colleagues to put every new idea immediately into practice was at times somewhat overpowering. Yet, with all his passion for detail, he never lost his vision of the situation as a whole.

After the War, the laboratory drew visiting investigators from all over the world—more than thirty came from foreign countries between 1946 and 1953, as well as many from within the United States. The emphasis in research shifted toward fundamental studies on proteins, especially blood proteins, but a close relation to problems of medicine and public health remained. Indeed, Cohn drew no distinction between pure and applied science; he devoted himself with equal zeal to abstract questions of protein structure and to the problems of making albumin and gamma-globulin available on a large scale, and with proper safeguards, to the public. During the last years of his life he developed a machine for making blood fractionation largely an automatic procedure; this is now being manufactured on a small scale for trial use in blood donations, and may lead to further far-reaching developments.

Cohn was twice married: to Marianne Brettauer in 1917, and, after her death, to Rebekah Higginson in 1948. His home was always a centre of hospitality for numerous friends and colleagues. Besides the passionate intensity with which he devoted himself to his research interests, he retained a keen interest in art and literature, and was an active student of the history of science. The numerous workers who came to undertake research with him underwent a discipline both exacting and imaginative, and many will retain vivid memories of an intensely active laboratory headed by an extraordinary man.

JOHN T. EDSALL

Prof. Stefan Pieńkowski

THE death on November 20 of Prof. S. Pieńkowski, coming so soon after that of Prof. C. Białobrzeski, has dealt a grievous blow to Polish science, which has thus lost its acknowledged leaders in both experimental and theoretical physics.

Stefan Pieńkowski was born in 1883 in a small Polish town, then under Russian occupation. After his early education at home he went to study at the Universities of Heidelberg and Liège, where he later was a member of the teaching staff. Immediately after the liberation of Poland in 1919 he returned to Warsaw, where he was appointed to the chair of experimental physics at the University, a position he held until his death. When he took office the Physics Department was practically non-existent; but within a few years he built it up into one of the most up-to-date and best-equipped institutions for research and teaching on the Continent of Europe. He also created a very large and active school, from which have come many of the present leading physicists in Poland.

During the Second World War, the Physics Institute at Warsaw was almost completely annihilated; most of the equipment was taken away to Germany and the buildings seriously damaged. Undaunted, Prof. Pieńkowski carried on with teaching and scientific activities in the underground University. Immediately the War ended, he began to rebuild the Institute, and despite difficult conditions he managed to bring it back to its former splendour.

His research work was mainly concerned with spectroscopy and photoluminescence; he was particularly interested in molecular structure, in which work he also employed X-ray spectroscopy. Later, he developed an interest in nuclear physics and installed in his Institute the first proton accelerator in Poland. Plans for the building of other accelerators had to be abandoned because of the War; but he encouraged work on nuclear physics and cosmic rays and has sent some of his most promising pupils to study in laboratories in Great Britain.

Apart from research and teaching, Prof. Pieńkowski took a very active part in the organization of science in Poland. For several years he was rector (vice-chancellor) of the University of Warsaw, and he resumed this office immediately after the War with the formidable task of rebuilding the University from the ruins. He also took a leading part in the work of the Polish Academy of Science and in recent years was put in charge of its Physics Section, which included the development of atomic energy.

All these outside activities did not diminish his devotion to his own Institute, in which he took the greatest interest and where he was revered by every worker. His was the rare personality which combined a genius for organization and exceptional administrative skill with a remarkable talent for teaching and a youthful zeal and enthusiasm for scientific investigation. J. ROTBLAT

Mr. T. H. Withers

THOMAS HENRY WITHERS, an authority on fossil crustaceans, died on October 2 at Bournemouth, where he had been living since his retirement in 1944 from the staff of the British Museum (Natural History). Born in London in 1883, he became in 1898 a boy attendant in the Geological Department of the Museum, where his natural ability and enthusiasm soon received encouragement from F. A. Bather, who eventually, in 1925, established him on the scientific staff.

In 1910 Withers published the first of a long series of papers on fossil cirripedes. Among these contributions were extensive accounts of the cirripedes of the Rügen Chalk (1923) and of New Zealand (1924); but at an early stage in his career he had planned a monographic account of the whole group, which had not been revised since Darwin's day. Starting with the Palæozoic, he was able to show that certain problematical organisms (including *Turrilepas*), then usually referred to the cirripedes, were in fact not arthropods at all, but belonged to an isolated group allied to the echinoderms which he named, in a volume published by the Trustees of the British Museum (1926), the Machaeridia. His "Catalogue of Fossil Cirripedia" appeared in three volumes: the first, on Triassic and Jurassic forms, in 1928; the second, on the Cretaceous, in 1935; and the third, on the Tertiary, in 1953, just over a century after the appearance of Charles Darwin's monograph. In 1851 Darwin knew only four Tertiary species; Withers dealt with ninety-three, no less than forty-three of which he had himself instituted. He was interested, however, not so much in the mere description of material as in the phylogeny of the various forms and in the evolutionary significance of structural changes. The same approach inspired his studies of Mesozoic crabs, in which he discussed the origin and evolution of the Brachyura.

Although hampered by ill-health after his retirement, Withers continued his scientific work to the end, and at the time of his death had almost completed an account of the cirripedes for a forthcoming treatise on invertebrate palæontology.

W. N. EDWARDS

Dr. H. E. Ives

DR. HERBERT EUGENE IVES was the distinguished son of a distinguished father. Born in 1882 in Philadelphia, he had his early education in physics at the University of Pennsylvania, followed by two years at Johns Hopkins University as a Fellow. He worked in turn at the U.S. Bureau of Standards, the National Electric Lamp Association, the United Gas Improvement Co., the Western Electric Co., and finally at the Bell Telephone Laboratories. He had one break, as an officer in the United States Army in 1918, when he was in charge of research on aerial photography, and another during 1941–45 when he was head of a section of the National Defense Research Committee.

He was a member of many scientific societies, and served as president of the Optical Society of America and of the American Numismatic Society. He was a corresponding member of the British Illuminating Engineering Society, and a Fellow of the Physical Society, before which he delivered the Thomas Young Oration in 1933. In the same year he gave the Traill–Taylor Memorial Lecture before the Royal Photographic Society. Among other honours he received the Frederic Ives Medal (founded in memory of his father) from the Optical Society of America.

Ives's work was mainly in the field of applied optics, but in this field he roamed widely. His earliest work concerned colour photography, and this led him to examine the efficiency of illuminants, a subject to which he frequently returned. The width of his approach is shown by the inclusion of the firefly among illuminants. In studying illuminants, he improved the practice of photometry, showing among other matters the origin of some discrepancies found in flicker photometry. In considering illumination, it was natural to him to study spectrophotometry and various receivers of radiation such as photoelectric cells, thermopiles, and—as a special case—the eye.