Pennsylvania in 1926, and Franklin medallist in 1933.

Sabatier's early work was in physical and inorganic chemistry, some of it in collaboration with his pupil, Jean Baptist Senderens. He first obtained pure hydrogen disulphide by vacuum distillation in 1886, discovered new metallic nitrides, and studied nitroso-disulphonic acid. He also made thermochemical measurements. His most famous work, begun in 1897 and occupying him for thirty years, was a study of the applications of heterogeneous catalysis in organic chemistry, of which he published a summary in his book, "*La Catalyse en Chimie Organique*", 1912. Although platinum had long been used as a contact mass, and the associated Dutch chemists in 1796 had found that alcohol vapour when passed over heated alumina is decomposed into ethylene and steam, little or no application of catalysis in organic reactions had been made. Sabatier became interested in this field by Mond's work on nickel carbonyl, and he used nickel, as well as other finely divided metals such as copper, as catalysts.

At that time there were two theories of heterogeneous catalysis. Faraday in 1833 had suggested a physical theory that one or more of the reacting gases was condensed by attraction on the surface of the metal. William Charles Henry in 1836 and de la Rive in 1838 had proposed a chemical theory that intermediate compounds, for example, oxides of metals, were formed and decomposed. Sabatier soon proved that the specific action of catalysts strongly supports the chemical theory. He showed that different contact masses produce different reactions. Formic acid vapour passed over heated zinc oxide gives only hydrogen and carbon dioxide, but when passed over heated titanium oxide it gives only steam and carbon monoxide. Chromic oxide can act both in oxidation and in dehydrogenation and dehydration reactions. Heated alumina decomposes alcohol into ethylene and steam, metallic molybdenum and zinc oxide decompose it into acetaldehyde and hydrogen. Sabatier postulated the formation of different intermediate compounds, each with its own mode of decomposition, and he also clearly recognized that some organic reactions are reversible; and in cases where intermediate compounds cannot be isolated, there may be a production of surface compounds (chemisorption), thus linking the two theories of catalysis, the physical and chemical. Recent work has largely confirmed his views.

Sabatier's catalytic hydrogenation technique, carried out with relatively simple apparatus, was applied to the preparation of a large number of organic compounds. He clearly saw the technical importance of his work and took out several patents; but for some reason he did not extend the method to hydrogenation in the liquid phase. This was first studied by Ipatiev and led to a revolution in the fat industry by the hydrogenation of oils with a nickel catalyst.

Sabatier was responsible for opening out a new field in organic chemistry, and his clear appreciation of the importance of physical and inorganic chemistry in that branch of the science was most fruitful. The influence of his great master, Berthelot, with his wide interests, was clearly apparent in all Sabatier's work, and infused new life into organic chemistry at a time when it was becoming stereotyped.

Sabatier's personal qualities were greatly appreciated by his colleagues. Although able to lecture only in French, he was always welcome abroad. He was

one of the great school of French chemists, and his contributions to the science were both extensive and important. The centenary of his birth was marked by commemorative meetings held in Toulouse during November 4-5.

OBITUARIES

Mr. J. P. Bushe-Fox, C.B.E.

JOCELYN PLUNKET BUSHE-FOX died on October 15 at the age of seventy-four, having been ailing for some time and unable to take part in archaeological affairs. Archaeology had been his great interest in life and the subject of his life-work. His education at St. Paul's School, with its fine classical tradition, influenced his choice of field, and it was to Romano-British archaeology that he turned, after a brief interlude in Egypt.

He was one of the ablest of the young men whom Haverfield gathered about him for the initial exploration of the Roman site at Corbridge, Northumberland, and, strongly influenced by the then recent work of James Curle at Newstead, he began the study of stratified pottery of all kinds as a criterion for dating the sites upon which it was found. His Corbridge contribution was not so weighty as those which came later, but it still remains of value to students of the site and subject.

Under the ægis of the Society of Antiquaries, his excavation of two Iron-Age sites, at Swarling and Hengistbury Head, and of the Roman town at Wroxeter (*Viroconium*), laid foundations which have often been obscured by the important superstructures built upon them and have never failed. His work has stood the test of time and the challenge of later developments remarkably well.

His largest task, however, was undertaken after the First World War, in which he served with the distinction and ability of one who came of Irish military stock. He entered the Ancient Monuments Department of H.M. Office of Works (now the Ministry of Works) and undertook on behalf of the Society of Antiquaries the excavation of the Roman site at Richborough. This was a task of unprecedented complication, involving many levels often heavily robbed. The main lines of the history of the place were sorted out in four brilliant reports, in which the most notable feature, in what may appropriately be called the Bushe-Fox tradition, was the meticulous care devoted to the stratified pottery and small objects. Structurally, the most notable achievements were the definition of the great triumphal monument and of the supply-base which preceded it and occupied the Claudian invasion bridge-head.

No other worker has nine research reports of the Society of Antiquaries to his credit; no other perhaps the genial patience and scholarly perseverance to produce their like. They mark an age, and a standard of individual effort which deserves record, admiration and respect. I. A. RICHMOND

Dr. Anthony L. Levy

ANTHONY LEWIS LEVY lost his life on August 21, in a mountaineering accident on Mt. Olympus in the State of Washington, after he had successfully rescued an injured companion from a glacial crevasse.

Born in Romford, Essex, in 1924, Levy attended Brentwood Grammar School, Essex, and the Imperial College of Science and Technology, London, receivin

his B.Sc. in 1944 and his doctorate in 1947. During the Second World War he worked on the chemistry of penicillin, research which led him to the development of methods for the stepwise degradation and synthesis of peptides. After the War, he continued his research at the Imperial College, London, under the direction of Sir Ian Heilbron and Dr. A. H. Cook, and in 1949 he was awarded a Rockefeller Foundation fellowship to work under Prof. K. Linderström-Lang at the Carlsberg Laboratories, Copenhagen. From 1951 until his death he was an invaluable member of the Hormone Research Laboratory at the University of California, Berkeley. During this period, he developed a new solvent system for the two-dimensional chromatography of amino-acids on buffered papers, which has been widely adopted. His recent discovery of a new

method for the quantitative microanalysis of amino-acids in proteins and peptides represents an outstanding advance in the field, and had already gained him world-wide recognition. Just before his death, he was engaged in research involving the structure and possible synthesis of adrenocorticotrophic hormone.

His former teacher, Sir Ian Heilbron, in a letter of sympathy to Levy's mother, wrote, "His most recent work was quite outstandingly brilliant, and Science, the world over, is the poorer by his passing". But the loss of this young biochemist is measured in terms not only of science, but also of humanity. His quick enthusiasm, his zest for life, and his warm generosity established him firmly in the affections of all who knew him, and he is sincerely mourned by all his colleagues and friends.

C. H. LI

NEWS and VIEWS

Jōkichi Takamine (1854-1922)

JŌKICHI Takamine, the discoverer of the active principle in chemically pure form of the suprarenal glands, was born in Takaoka, Japan, a century ago on November 3, 1854. He was educated at Osaka, Kyoto and Tokyo and, after graduating in technology at the Imperial University of Japan in 1879, went with a government scholarship to the University of Glasgow, studying the chemistry of brewing at Anderson's College. On his return to Japan he was appointed chief of the Chemistry Division in the Department of Agriculture and Commerce, but resigned two years later to devote himself to industry. He developed the first superphosphate works in Japan, the Tokyo Artificial Fertilizer Company, and discovered the starch-digesting enzyme takadiastase. The remainder of his career was spent mainly in the United States where, in addition to his scientific activities, he wielded considerable political influence, being recognized as the unofficial representative of Japan. Joining Parke, Davis and Co., of Detroit and New York, in 1898, he began his search for the active principle of the suprarenal glands, a task which had been unsuccessfully attempted by some of the world's leading physiological chemists, and in 1901 he succeeded in obtaining adrenalin (as he called it) in stable and pure crystalline form. Takamine played a prominent part in developing Japanese industry and technical education and in establishing the Imperial Research Institute. A firm believer in the role of medicine as a civilizing force in Asiatic countries, he strove to promote better understanding between the country of his birth and that of his adoption. Recipient of many honours and a cultured, public-spirited and charming personality, Takamine died in New York City on July 22, 1922, at the age of sixty-eight.

Conference of Czechoslovak Archaeologists

THE "Ninth Working Conference of Czechoslovak Archaeologists", organized in Prague during September 25-30 by the Czechoslovak Academy of Sciences, included visitors from Britain, East and West Germany, Hungary, Poland and the U.S.S.R., as well as Bohemia, Moravia and Slovakia, and the themes were treated from a general Central European point of view. (Before 1945, Czech archaeology had tended to be rather excessively Bohemian, partly of

course because Moravia and Slovakia were far less well explored.) The central theme was the chronology of early Slav settlement, as determined largely by pottery. Poulik from Moravia opened with an able restatement of the traditional thesis of Pič, adjusted to accommodate the enormously augmented data, according to which early Slav pottery, and therefore its makers, is to be derived from the Lusatian urn-fields of the Late Bronze Age. But this thesis was stringently criticized in a lively debate. The visitors were also able to see several early Slav oppida, excavated with superb technical skill so as to disclose the remarkable wooden constructions in their ramparts and the plans of wooden houses enclosed therein, as well as the encampment of mammoth hunters at Pavlov, near Dolní Věstonice, later in date than the classic Gravettian site, but, like it, yielding clear hut plans, a rich industry in flint, bone, antler and ivory (not distinctively Magdalenian in character) and interesting art objects. They also visited the new archaeological institute established at Nitra by the Slovak Academy of Sciences; the institute is well equipped, and already stocked with a wealth of relics derived from scientific excavations in this rich metalliferous region that had previously been represented in the archaeological record only by stray finds.

Rumford Bicentenary: Celebrations in Boston

THE Rumford bicentennial issue of the *Proceedings of the American Academy of Sciences and Arts* (82, No. 7, 249; December 1953) is the complete record of the scientific and biographical papers presented at the symposium which marked the two hundredth anniversary of the birth of Benjamin Thompson, Count Rumford, and which was held at the Academy in Boston during March 26-28, 1953 (see *Nature*, 170, 954 (1952); 171, 538, 540 and 947 (1953)). In the introductory article by Harlow Shapley, chairman of the Rumford Bicentennial Committee, the celebrations are described and the illustrated bill of fare of the birthday banquet, which was compiled by Prof. Sanborn C. Brown, is reproduced. Prof. Brown also directed the preparation of the various models of the inventions and contrivances of Count Rumford which were on exhibit and delivered the Rumford Bicentennial Lecture, the text of which is included in the bicentennial issue and which also appears in