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 nitrosodisulphonic 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 archæological affairs. Archæology 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 archæology 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