

Geikie, that Sorby got the idea of making rock sections from examining Nicol's collection in Edinburgh in 1856, when it was in the possession of Bryson. The facts, as stated above, were given by J. W. Judd in various obituary notices, but seem to have been disregarded, or even contradicted. The misconception may have arisen because Sorby, in 1857, presented to the Geological Society an important paper on the microscopic structure of rock-forming minerals, and in it referred to Bryson's collection; but if this is the reason, then it shows how little attention Sorby's earlier paper had attracted.

It is therefore worth recalling that Sorby, in his 1851 paper, had employed methods which are now familiar to every petrographer. His sections, mounted in Canada balsam, were "not much thicker than one-thousandth of an inch". He used polarized light, and rotated his specimens between crossed nicols to distinguish between calcite and quartz. In addition to examining thin sections, Sorby separated the constituents of the calcareous grit by chemical and mechanical means. He did not describe in this paper his manner of preparing the sections, but later gave a very clear account in a lecture to the Geological Society of France, in 1860³. This latter account was also published in Germany and Spain. Two years after this lecture had been given, Sorby met Ferdinand Zirkel, and described to him his petrographic methods. This encounter was to have far-reaching consequences, for Zirkel took up this type of work with enthusiasm, and in the following year read to the Vienna Academy a memoir describing the microscopical features of thirty-nine different rocks. Subsequent work by Zirkel, Rosenbusch, Fouqué and Michel-Lévy established microscopic petrography as an important branch of geological science, although in the land of its birth it made slower progress than abroad.

In this centenary year of the first account of rock sections, it would therefore be of especial interest if attention were directed to the anniversary by the exhibition in museums of any suitable material. Sorby was so frequently a contributor to the meetings of the British Association that such an exhibit would be particularly appropriate at this year's Edinburgh meeting, where the names of Nicol and Sorby could be fittingly coupled.

¹ *Edin. New Phil. J.*, 6, 83 (1829).

² *Sheffield Lit. and Phil. Soc. Rep.* (1898).

³ *Bull. Soc. Geol. de France*, 17, 571 (1860).

OBITUARIES

Mr. H. A. Humphrey

MR. HERBERT ALFRED HUMPHREY, who died at the age of eighty-two in South Africa on March 9 of this year, was one of the most versatile British engineers of recent times. He was best known as inventor in 1908 of the Humphrey pump, which is an internal combustion engine in which the piston is replaced by a water surface. It became an effective means of pumping large volumes of water; the Chingford Station of the Metropolitan Water Board has a set of four large and one smaller Humphrey pumps of 180 million gallons a day total capacity. During the course of his consulting work as a civil, mechanical and chemical engineer, Humphrey had opportunity for exercising his inventive talents in many directions, particularly in the field of gas

engines and producers; but not only in a professional capacity, for he would also amuse himself at home in his well-equipped workshop with many devices arising from his fertile imagination.

Humphrey was a distinguished Old Centralian, having been trained as an engineer at the Finsbury Technical College and during 1885-87 at the Central Institution, South Kensington (now the City and Guilds College). There he came under the influence of Unwin, Ayrton, Armstrong and Henrici. He entered in 1887 the works of Messrs. Heenan and Froude as assistant to R. H. Heenan, later becoming manager. In 1890 he was appointed engineer and departmental manager in the Winnington works of Messrs. Brunner Mond and Co., where his ability was soon appreciated by Dr. Ludwig Mond. Until 1901 he remained at Winnington, but thereafter acted with Mond's encouragement as an independent consulting engineer. On account of his work on gas engines and the well-known pump, he soon established a reputation extending to many other countries. He was, however, chiefly concerned with the chemical engineering developments in Brunner Mond's and its associated companies, and later in Imperial Chemical Industries, Ltd., into which these companies were merged. Among other developments he was responsible for erection of coke ovens, benzol extraction plant, caustic soda works, application of gas engines to power generation, and, during the First World War, T.N.T. and ammonium nitrate plants. After that War, he was consultant in the construction of the Billingham plant for synthetic ammonia, for the designs of which he was largely responsible. It was a project on the grand scale, involving a capital expenditure of £25 millions. The boiler and power plant at Billingham, completed in 1929, was well forward of central power station design in Great Britain at that time. He retained a close consulting connexion with Imperial Chemical Industries until late in life. He was also chairman of the South Staffordshire Mond Gas Co., the plant of which he designed.

It was only about two years ago that Humphrey left England to reside at Hermanus, Cape Province, and even there at the age of eighty he was still exercised in several engineering schemes.

The First World War found Great Britain very ill prepared in the supply of explosives, and Lord Moulton, who was chairman of the Explosives Committee, early realized that a great expansion of chemical manufacturing capacity was required. Humphrey was one of the very few engineers available who had the necessary experience in chemical engineering, and through Brunner Mond's he was brought into the organization that Lord Moulton set up. He was responsible for many of the developments which saved Britain from disaster and helped to give an impetus to British chemical industry, which has ever since thrived and expanded. K. B. Quinan was leader of the Explosives Department's constructional programme; he, however, was an American subject, a chemical engineer who came from South Africa. To such men Britain owes a deep debt of gratitude. Humphrey described in the Melchett Lecture to the Institute of Fuel the activities with which he was connected in those days.

Humphrey's influence in training men as chemical engineers within the I.C.I. organization, and insisting on a fundamental approach to the engineering problems encountered, had a great effect on the efficiency of the whole industry. The benefit of his

wide experience was generously given to those working with him, and he endeared himself to them.

Humphrey received a number of awards from the engineering institutions, the Willans (1906), the Watt (1913), and the Telford (1897) Gold Medals, the Franklin Medal of the Franklin Institute and the Paris Premium of the Institution of Electrical Engineers (1930). He had three sons and two daughters; one son married a daughter, and one daughter married a son, of Prof. A. V. Hill. He was a member of all three engineering institutions, Civil, Mechanical and Electrical; a Fellow and Melchett Medallist (1939) of the Institute of Fuel, and an honorary fellow of the Imperial College. A. C. EGERTON

Dr. D. F. Twiss

By the death on May 23 of Dr. D. F. Twiss, the rubber industry has lost a distinguished pioneer scientific worker and a man universally esteemed by his colleagues in the industry. Born in Birmingham in 1883, Douglas Frank Twiss studied at Mason College and its successor, the University of Birmingham, where he graduated B.Sc. in 1902, afterwards carrying out research in organic chemistry under Prof. P. F. Frankland. During 1904-14 he was lecturer in chemistry at Birmingham Technical School (now Birmingham Central Technical College), and continued research work on organic sulphides and other sulphur compounds and selenides. Dr. Twiss became, indeed, a leading authority on the sulphur group of elements, and was joint author of vol. 7 (oxygen, sulphur, selenium, tellurium) of the well-known "Text Book of Inorganic Chemistry" edited by J. Newton Friend. He was awarded research degrees by the Universities of Birmingham (D.Sc.), and London (B.Sc.).

This early interest in sulphur and its organic compounds was a fitting preparation for Dr. Twiss's real life-work, which lay in the field of rubber chemistry, including vulcanization by sulphur. The opportunity to enter this field came in 1914 when Dr. Twiss was engaged by the Dunlop Rubber Co., Ltd., as its first scientific worker. During his thirty-two years as chief chemist there grew up under his leadership a research team that has made outstanding contributions to rubber science and manufacturing techniques.

Dr. Twiss's earlier work on rubber was concerned with vulcanization by sulphur, the action of organic accelerators of vulcanization, and the important influence of zinc oxide and other metallic oxides on their activity. Of even greater importance to the development of the industry, however, has been the work pioneered by Dr. Twiss on the production of rubber articles directly from the liquid latex, without the usual intermediate stage of coagulating to produce dry rubber which then has to be worked ('masticated') on heavy machinery to render it fit for further processing. From the work of Twiss and his colleagues on latex has developed an entirely new and important branch of the rubber industry, producing vast quantities of cellular (foamed latex) rubber for upholstery, as well as rubber gloves, thread, and hosts of other articles, using methods which in essence are of elegant simplicity, though demanding a rigid physico-chemical control over that complex and sensitive material, rubber latex.

In the midst of these activities Dr. Twiss yet found time to be a willing helper and wise counsellor to many organizations connected with the rubber

industry, notably the Institution of the Rubber Industry and the Research Association of British Rubber Manufacturers. There are many who will remember with gratitude and admiration the un-failing help which Dr. Twiss's intensely logical mind was able to give on innumerable problems. Through his work for these organizations, Dr. Twiss did much to foster both technical education and co-operative research in the rubber industry. In recognition of his outstanding services, the Institution of the Rubber Industry in 1934 conferred on Dr. Twiss the Colwyn Gold Medal.

For a man of such attainments and influence, Dr. Twiss was modest and retiring to a degree, but his sincerity of purpose and his conscientious and painstaking discharge of any duty that he undertook—and these duties were many and varied—marked him out as a man above his fellows. His memory will always be an inspiration to those who had the privilege of knowing him. J. R. SCOTT

Prof. E. L. Watkin

THE death of Ernest Lucas Watkin, emeritus professor of mathematics in University College, Southampton, has severed one of the few remaining links with the difficult time when the College was struggling not only to deserve the name of University College, but even to keep in existence.

Prof. Watkin took his degree from St. John's College, Cambridge, being seventh wrangler in the Mathematical Tripos of 1898, still remembered as 'Hudson's Year' for the galaxy of distinguished mathematicians who took the Tripos then. After a short time as lecturer in the University of Bristol, he was appointed in 1904 to the chair of mathematics at Southampton, which he held until 1930. Only those closely associated with him realized the burden of organization involved in a department in which many additional courses were necessary if the College were to survive, including heavy and increasing commitments to the technical side which is still part of the work of the College. He had great administrative ability, and though handicapped by persistent ill-health, carried out unflinchingly work which in these days would be shared by at least two people. His entire disregard of self brought him enthusiastic loyalty from his Department.

After retiring from the chair, he continued to act as deputy registrar and curator of the grounds of the College until increasing age and ill-health forced his permanent retirement.

Prof. Watkin's interests were unusually wide and all were useful to college life. He was an admirable gardener with a good knowledge of systematic botany which he was able to apply as curator of the grounds. He was president of the Chess Club, a strong supporter of all musical activities, an authority on the regulations of most varied and mixed bodies with examination and entrance requirements, and a repository of information on the past history of the College. He combined with all these a gift for friendship, a patient and understanding care for the difficulties of people who often proved tiresome and captious, and a loyalty to his chosen work which is past all praise. A. M. TROUT

WE regret to announce the death of Prof. W. E. Agar, C.B.E., F.R.S., emeritus professor of zoology in the University of Melbourne, on July 14, aged sixty-nine.