

OBITUARY

Dr. E. F. Armstrong, F.R.S.

EDWARD FRANKLAND ARMSTRONG, eldest son of the late Prof. H. E. Armstrong, died at the age of sixty-seven on December 14, after a short illness. A student in his father's laboratory at the Central Technical College, South Kensington, and afterwards with Emil Fischer at Berlin, he became much interested in the constitution of glucosides and related hexose derivatives, and in enzyme action. Later, when he had entered chemical industry, he found contact with other fields of research and, while his first objects of study never lost their hold (his last publication on carbohydrate chemistry, a contribution on polysaccharides in the "Annual Review of Biochemistry", was in 1938), he was associated successively with work on fats, dyestuffs chemicals, industrial solvents, hydrogen and hydrogenation, gas and fuel. As time went on, his own contributions to research lessened and finally ceased, for his function became rather that of a stimulus to the investigations of others and, especially, that of a leader in chemical industry intimately concerned with the development and re-orientation of a number of undertakings in the period between the two world wars.

A survey of Armstrong's own researches shows that his work with E. Fischer led in 1901-2 to publications, still regarded as classical, on the selective hydrolysis of glucosides and the isomerism of their α - and β -forms. On returning to Britain, while he was Salter's research fellow at the Central Technical College during 1902-5, and for some years after when chief chemist to Huntley and Palmers, Reading, he was much occupied with the mode of action of different enzymes, partly in association with H. E. Armstrong, Caldwell, Horton and Keeble. An interesting discovery emerging from these studies was that the rate of enzyme action is not controlled simply by the concentration in solution of the compound or substrate undergoing change, but that in each successive equal interval of time the enzyme determines the change of the same amount of substrate—the action is of a 'zero', rather than a first, order. This work appeared in a number of papers in the *Proceedings of the Royal Society* during 1904-13.

When in 1914 Armstrong joined the firm of Joseph Crosfield and Sons, Ltd., Warrington (of which he became technical director in 1915), he was interested to find that I had also observed an action of 'zero' order in the hydrogenation of liquid fats in presence of nickel, and encouraged the development of this study, which was communicated in a series of papers on "Catalytic Action at Solid Surfaces" between 1919 and 1925. At the same time, with Allan, Moore and Clarke, he fostered more intensive study of the component acids of natural fats, which led to a number of papers which may be regarded as pointing the way to modern technique in this field, since much extended. In a notable address in 1924 as president of the Society of Chemical Industry, he stressed the relatively backward condition of fundamental fat-chemistry at that time and undoubtedly helped thereby to re-awaken academic interest in this subject. Thus his own researches led to definite and notable advances in knowledge of the sugars, the fats, and certain types of catalytic action.

Meanwhile, Armstrong became a prominent figure in chemical industry. After ten years as technical

director at Crosfields, covering most of the war-period 1914-18 and the immediate post-war period, and the merging of this firm with Lever Brothers, Ltd., he was appointed managing director of British Dyestuffs Corporation, Ltd., and saw in turn its transformation into a constituent of Imperial Chemical Industries, Ltd. In 1928 he returned to London as a consultant and was associated with several important chemical industries, while during the Second World War he was scientific adviser to the Ministry of Home Security and, later, to the Ministry of Works. His widening acquaintance with many different aspects of chemical industry, coupled with his scientific ability and standing, won him recognition as an important figure in industrial chemistry. He gave, moreover, keen support to the societies concerned with the interests of chemistry. Thus, naturally, he was prominent in the counsels of the Society of Chemical Industry, of which he was president in 1923 and 1924, and in the last decade of his life he was closely connected with the Royal Society of Arts, in which, after occupying the presidential chair, he was chairman of Council at the time of his death. He had also been president of the Association of British Chemical Manufacturers, and chairman of the British Standards Institution and of the Industrial Congress of Scientific Management. His association with the more academic and professional chemical bodies was equally intimate, and he was a member of council, at different periods, of the Chemical Society and the Royal Institute of Chemistry, and during 1924-25 president of the British Association of Chemists. He was elected to the fellowship of the Royal Society in 1920, and served on its Council during 1941-42 and as a vice-president in 1942-43.

Armstrong was known widely as an effective speaker and writer. In 1910 his "Simple Carbohydrates and Glucosides" was published, a standard monograph which passed through several editions until, in 1931, the glucoside section was expanded into a separate volume, in joint authorship with his eldest son, Kenneth, another brilliant chemist in the Armstrong succession who, most unhappily, died in an Alpine accident a few years later. Readers of *Nature* will recall many articles and reviews contributed by E. F. Armstrong, characterized by graceful style together with a certain freshness of outlook, always constructive and not infrequently bringing novel points of view into the subject of discussion. He rendered good service to science, moreover, in many public lectures in which he ably expounded one or other aspect of industrial chemistry.

This sketch of E. F. Armstrong's scientific and industrial career may have illustrated the many-sidedness of his mind and activities, but fails to display the nature and warm vigour of his personal character. Tall and physically well developed, he combined the paternal Armstrong's independence in thought with friendly suavity in speech and action, a blend of attributes which enabled him to travel far along the difficult path of science in industry. H. E. Armstrong was a famed and redoubtable exponent of science in education; his son, E. F. Armstrong, will be remembered for equally ardent service in a different field. A man of science by family ties, by training and by conviction, he spent most of his life in furthering the permeation of the industrial world by scientific principles and methods.

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