OBITUARY NOTICES.

EINAR CHRISTIAN SAXTORPH BIILMANN.

1873—1946

EINAR CHRISTIAN SAXTORPH BIILMANN, whose death occurred on August 9th, 1946, was born in Frederiksberg, Copenhagen, on May 10th, 1873. He was the son of Sylvester Biilmann, a military veterinary surgeon, and his wife Atka Castberg. He matriculated in 1891 in classics, and in after life he maintained that it was an advantage for science students to have a classical education since a knowledge of Latin and Greek was useful to chemists and prevented them from having too narrow an outlook on life. He entered the University as a medical student, but in his first year his interest in the natural sciences was aroused, and in 1893 he passed the entrance examination to the Royal Polytechnical School. He did not, however, leave the University, and in 1897 he graduated with the degree of M.Sc. in chemistry.

Chemistry at this time in Denmark was dominated by two outstanding figures—Julius Thomsen, the thermo-chemist, and S. M. Jørgensen, the exponent of classical inorganic chemistry. Biilmann was much influenced by Jørgensen, and in 1898 he was appointed by him as an assistant in the Royal Polytechnical School. His first original work, obviously suggested by Jørgensen, described the preparation of sodium cobaltinitrite and its use as a reagent for potassium. His interest in organic chemistry was, however, aroused by the offer by the University of Copenhagen of a prize for a method for the preparation of acrylic acid from allyl alcohol. His thesis won for him a gold medal. He was encouraged to devote his attention to organic chemistry by Jørgensen, who pointed out to him that since the death of Zeise in 1847 no Dane had made any notable contribution to its advancement. Biilmann's next work was a continuation of Zeise's study of the thiols and xanthic acid, and in 1904 he obtained the degree of D.Phil. with a thesis entitled " Studier over organiske Svolvforbindelser."

After taking his doctor's degree Biilmann spent a year in Emil Fischer's laboratory in Berlin, but the conditions there were not congenial to him although this short stay undoubtedly influenced considerably his future career. He found little sympathy in the Berlin laboratory for the independent worker, the research worker being required to work under the close direction and supervision of Fischer's assistants. He felt also the lack of opportunity for discussion and exchange of ideas. Biilmann never worked in any of Fischer's fields of research, although later he criticised very severely his theory of the Walden inversion.

Shortly after his return to Copenhagen the chair of chemistry in the University became vacant by the death of Emil Petersen who had succeeded Julius Thomsen in 1901, and in 1907 Biilmann was appointed to the chair. His appointment led to a complete revolution in the teaching of organic chemistry in Denmark. Previously there had been no laboratory in the University for the teaching of organic chemistry, and after visits to England, Germany, and Switzerland he equipped a laboratory for this purpose. Biilmann was an inspiring lecturer, and his lectures were always well attended. He also took an active part in University administration, being elected in 1911 a member of the Consistory, and he continued to be a member until his retirement in 1943. During the years 1921—22 he was Rector Magnificus, and he filled this high office with great dignity. He took part in the organisation of international congresses, and he was one of the Danish representatives at the Rome meeting in 1920 when the International Union for Pure and Applied Chemistry was formed. His linguistic ability enabled him to take an active part in such international gatherings, and he was a Vice-President of the Union from 1922 to 1925 and President from 1928 to 1934. During his period of office the difficult question of the readmission of Germany and Austria fell to be decided, and there is no doubt that it was largely due to his tact that a satisfactory decision was reached.

In spite of heavy administrative duties Biilmann never lost his interest in research. To pure organic chemistry his main contribution was his work on the isomeric cinnamic and *allo*-cinnamic acids. By an ingenious series of experiments he was able to show that the three different *allo*cinnamic acids were not isomeric but polymorphic forms of *cis*-β-phenylacrylic acid. Many years later he returned to the subject of the spontaneous inoculation of molten substances with crystal nuclei as an experimental method for distinguishing between isomeric and polymorphic forms.

Although essentially an organic chemist, Biilmann recognised the valuable part which physical measurements could play in solving the problems of organic chemistry. During his study of the addition of mercury salts to unsaturated organic compounds he made use of electrometric measurements in determining the complexity of the substances formed, a technique not previously applied in this field. He realised that the method might have a wide application and that it might be possible to elaborate a more convenient tool than the hydrogen electrode developed by S. P. L. Sørensen in 1908 in his classical work. In 1920 Biilmann suggested making use of the equilibrium system quinol $\rightleftharpoons$ benzoquinone + 2H—the quinhydrone electrode—and this was his most outstanding contribution to science. Biilmann's quinhydrone electrode was found to be extremely convenient in use, more especially by soil chemists, for the determination of hydrogen-ion concentration, and although it has now been largely replaced by the glass electrode this does not diminish the value of his contribution. Biilmann recognised the importance of the application of his method for the determination of the oxidation potential of many systems such as alloxan–dialuric acid and azo–hydrazo-compounds, and in a series of brilliant papers he described various methods for its determination. In 1928 he summarised his work in a paper read to the Faraday Society. He was a pioneer in the determination of redox-potential, now a familiar laboratory method.

Biilmann's services to science received wide recognition. He was a member of the Royal Danish Academy and of a number of foreign chemical societies.

In 1899 he married Valborg Gyring Nielsen, who, with a son and two daughters, survives him.

STIG VEIBEL.
J. L. SIMONSEN.

FRANCIS HENRY SWINDEN CURD.

1909—1948.

FRANCIS HENRY SWINDEN CURD was born at Loughton, Essex, on June 15th, 1909. His tragic death in hospital on December 2nd, 1948, from injuries sustained two days earlier in a railway collision at Stockport, Cheshire, cut short a career of splendid achievement and continuing promise.

Curd's earlier life was spent in Essex. He went to the Colchester Grammar School during 1917—18 and then to Bancroft's School, Woodford, in 1919, matriculating there in 1926 and passing to the Honours Chemistry School at Queen Mary (then East London) College. Curd took the final honours examination in June 1929, and then began research work at the College under Dr. Alexander Robertson, now Professor of Organic Chemistry at Liverpool University. When Robertson moved to the London School of Hygiene and Tropical Medicine in 1930, Curd went with him and continued his researches until late in 1933. The initial researches on ketones derived from phloroglucinol, although relatively unambitious, led to a clarification of anomalous results obtained by the cyclisation of aromatic *o*-hydroxy-ketones and also anomalies in the application of the von Pechmann and Simonis reactions to mono- and poly-hydric phenols. The later and more important researches were concerned primarily with the chemistry and structure of usnic acid and the lichen acids, and were published in a series of papers jointly with Robertson (1933, 1935, 1936, 1937). The work culminated in the development for usnic acid and its derivatives of entirely new structures which explained fully the reactions of the compounds, and which were later confirmed by Schopf. Professor Robertson speaks with the highest praise of Curd's careful and systematic experimental work throughout that period, and confesses that there have been many occasions since then " when in sticky researches I wished I could have had Curd's help as a collaborator ". The pertinacity in face of a troublesome research problem which Robertson's tribute implies was shown on many occasions during Curd's career in industry. He was elected a Fellow of the Chemical Society in 1929, and was granted his Ph.D. by London University in 1932.

At the end of 1933 Curd joined the staff of the Dyestuffs Division of Imperial Chemical Industries Limited, and began his industrial career in their research laboratories at Blackley, Manchester, where he worked until his death. His new colleagues were soon attracted by Curd's shy modesty and charm of manner, and from the outset all were greatly impressed by the neatness and precision of his laboratory technique. After observing Curd's response to the industrial research problems of his first few months a senior colleague recorded at the time: " his resourcefulness and ingenuity with these suggests that he will prove a fruitful research worker "—an assessment which was to be amply justified.

In the first few years of his industrial career Curd carried out researches on a variety of dyestuff problems, particularly in the azine series and on the chemistry of proflavine and acriflavine. He made inventive contributions during this period, but it was primarily a time of growth in technique and increasing grasp of the relationship between pure and applied chemistry. When his Company decided in late 1937 to enter the field of chemotherapy by the hard way of pioneer research and invention, it is not surprising that Curd was chosen as a member of the initial team which was so carefully picked for this difficult task. He had already shown the appropriate temperament and skill in equally difficult but less fashionable fields of chemical research.

Curd set out with enthusiasm in early 1938 to survey and master the published literature on the chemotherapy of malaria and related aspects of tropical medicine as a preparation for original research work. The constitution of the relatively new German drugs atebrin (mepacrine) and plasmochin had not been clearly published at that time. During this phase of self-preparation Curd satisfied himself of the constitution of the German drugs by unequivocal synthesis and an exploration of various synthetic routes to these and related compounds. Thus it came about that as the war in the East developed and created the urgent need for synthetic antimalarials it was on the basis of Curd's experimental work that it became possible to begin the first British manufacture of mepacrine quickly and effectively in 1940. This necessary wartime deviation from the pioneer research work originally envisaged was only a temporary one, and at the earliest opportunity Curd and his colleague, F. L. Rose, returned to the search for antimalarial compounds having lower toxicity than mepacrine and having genuine prophylactic properties in addition to curative properties. By 1942 Curd and Rose had a considerable chemical team working with them, and the work progressed in close collaboration with their biologist colleague, D. Garnet Davey. The culmination of these efforts in the discovery of " Paludrine " has been fully recorded in the Warrington Yorke Memorial Volume of the Annals of Tropical Medicine, 1945. The contributions of these researches to the chemistry of pyrimidines, quinoxalines, and a variety of alkyldiguanides are considerable and have been published in more than thirty papers by Curd and Rose and their co-workers (1946—48). For his important rôle in these antimalarial researches Curd was awarded in 1947 the Gold Medal for Chemotherapy by the Worshipful Society of Apothecaries. His colleagues, Davey and Rose, received this considerable honour at the same time.

Following the discovery of " Paludrine ", Curd led his chemical team in 1947 to a renewed and more intensive study of the chemotherapy of trypanosomiasis, again in collaboration with his biologist colleague Davey. This work led ultimately to an investigation of 4-amino-6-(2′-amino-6′-methylpyrimidyl-4′-amino)quinaldine 1 : 1-dimetho-salts, and culminated in the discovery of the new drug " Antrycide ". It is hoped that the whole chemical background of this work will be published in due course. Meanwhile, the announcement by the Colonial Office in December 1948, following field trials in Africa, of the great promise of this new drug against trypanosomiasis in cattle is sufficient indication of the solid achievements of Curd's last researches.

It is some consolation to his colleagues that in the few weeks before his death Curd had the satisfaction of knowing from the field results coming in from Africa that success against trypanosomiasis was in sight. His tragic and early death is a severe personal blow to all those associated with him in industry, and he is mourned too in many academic laboratories where he was a frequent and welcome visitor. His charm, integrity, and ability were great, and his powers of leadership were progressively maturing. Indeed, Curd was in many ways an ideal industrial research man. Whilst he was a genuine scientist acceptable as such in any company concerned with pure science, he had a real understanding of applied chemistry and its objectives and of the manifold problems of technology associated with the development of a new discovery. That he would have continued to grow in stature and scope is not in doubt.

Curd leaves a wife and three young children to whom he was devoted. In private life he was a man of quiet but discriminating tastes, a keen gardener, and a lover of cricket. During a staff cricket match in his earlier years many of us were delighted to observe that his batsmanship had the same neat elegance as his laboratory technique. Both were indeed a characteristic expression of the man himself.

Curd was a devout Churchman and had been an active worker in the Church of England since his earliest Essex days. The Rev. Dr. Wilfred Garlick who had known him well as a churchman for many years writes : " I don't think Curd has ever been one of those who felt that the gap between religion and science was insurmountable. And he did not resolve the dilemma by a dichotomy which placed the two in separate compartments. He felt most keenly that the greater was man's knowledge, the greater was his need for a philosophy of a good life, and *that* he felt was provided absolutely by Christianity. He was a man of vision and integrity of life and purpose ". Those of us who knew him best in the industrial sphere would not quarrel with that judgment.

C. Paine.