

~~capacity, urbanity, and wonderful tact he compelled the admiration of a wide circle of intimate friends, many of whom, alas! had predeceased him.~~

~~ALFRED SMETHAM.~~

HEINRICH DEBUS.

BORN JULY 13TH, 1824; DIED DECEMBER 9TH, 1915.

HEINRICH DEBUS was born on July 13th, 1824, at Wolfshagen, near Cassel, where his father, Valentine Debus, carried on business as a dyer.* His mother died when he was about two years old, and in the following year his father married her sister. While still quite a child he left Wolfshagen, and went to live with his grandparents at Cassel. Here his education began by attendance at the *Bürger-schule*, supplemented later by private lessons in the evening. When he left school his father wished him to enter his business, but Heinrich himself did not take to the idea, wishing instead to continue his education. Accordingly he entered the Polytechnic School of Cassel. Here he came under the influence of Robert Wilhelm Bunsen, the teacher of chemistry, who soon afterwards received a call, as *Professor Extraordinarius*, to the University of Marburg, whither he was followed later by young Debus. While the latter was about eighteen and was still living with his grandparents at Cassel, an uncle who lived opposite them would often see a light burning in his room at 2 or 3 o'clock in the morning, and would shout across to him to leave his books and go to bed.

From Cassel, Debus went to the University of Marburg, where he resumed his chemical studies under his former teacher, Bunsen, for whom he retained throughout life the highest admiration, regarding him as a model to be kept in view by all cultivators of physical science. In 1847 he obtained the *Licentia Docendi* as "Privat-docent," and in the same year Bunsen appointed him his assistant. In November, 1848, he graduated as Doctor of Philosophy.

A few weeks previously he had made the acquaintance of two young Englishmen, Edward Frankland and John Tyndall, who had come to Marburg to study science. This acquaintance, which soon ripened into a lifelong and intimate friendship, had an important

* The business is still continued (or was before the war) and has become one of the largest of its kind in Germany.

influence on Debus's subsequent career, since it led to his coming to England in 1851 and to his living for thirty-seven years in this country with only occasional visits to Germany. At the date referred to both Frankland and Tyndall were masters in an important boys' school in Hampshire, known as Queenwood College, under the headmastership of Mr. George Edmonton. But in 1850 Frankland was appointed (in succession to the late Lyon Playfair, afterwards Lord Playfair) Professor of Chemistry at the Engineering College, Putney, and consequently resigned his post at Queenwood. At his and Tyndall's recommendation, Debus was appointed to succeed him, and then began his long career as a teacher of chemistry in England. In 1853 Tyndall was elected Professor of Natural Philosophy in the Royal Institution, and accordingly he too left Queenwood; he was, however, succeeded by his close friend, Thomas Archer Hirst, who also had been at Marburg, where he and Debus had learned to know and esteem each other. The four friends—Frankland, Tyndall, Hirst, and Debus—who had studied together at Marburg and taught together at Queenwood, not only remained warmly attached to each other throughout life, but were, all of them, within a few years from the time above referred to, recognised as ranking among the most distinguished scientific men of the country. Debus remained at Queenwood until 1867. In that year he removed to Clifton to become teacher of chemistry and physics in Clifton College, then under the headmastership of Dr. Percival (now Bishop of Hereford). Here he remained three years. In 1870 he was appointed Lecturer in Chemistry in the Medical School of Guy's Hospital, and henceforward he made his home in London until he returned to Germany in 1888. In 1873 he became Professor of Chemistry in the Royal Naval College, Greenwich, where his friend Hirst was Director of Studies. He retained this appointment, as well as his lectureship at Guy's, until his retirement, on reaching the age limit, in 1888. He acted as Examiner in Chemistry to the University of London for three periods, namely, from 1864 to 1869, 1871 to 1876, and from 1878 to 1882, five years being the longest time during which, according to the University regulations, an examiner could hold office continuously.

Debus was elected a Fellow of the Chemical Society in 1859 and was a Vice-President from 1871 to 1874.

He was elected a Fellow of the Royal Society in 1861, and served on the Council from 1870 to 1872 and again from 1881 to 1883.

He was President of the Chemical Section of the British Association at the Exeter meeting in 1869.

In spite of an unmistakable German accent, which he never lost,

and small peculiarities of dress and manner,* Debus always gained the respect of his pupils, whether schoolboys or naval lieutenants. He had a self-respecting manner and quiet dignity which soon convinced them that, though a foreigner, he was not a man with whom they could take liberties.

He was a most loyal and faithful friend, genial in private intercourse and not without a sense of humour. He was a trifle obstinate in conversation, for he had fixed opinions on most subjects, and was apt to express them as though they settled all controversy, rather than as matters for discussion. "Now I will show you," was a very common phrase with him; but even his somewhat pædagogic ways were rather amusing than irritating to those who understood him. After his retirement from the Royal Naval College and his return to live in Germany, he used to pay an annual visit of a few weeks to London, always returning to the same lodgings near Clapham Common, when he divided his time between working at the Davy-Faraday laboratory and looking up his old friends. He was much given to hospitality, and kept up his membership of the Athenæum and Savile Clubs, apparently more for the sake of being able to entertain his friends than in order to have a comfortable retreat for himself.

Debus was not specially prolific in the production of original contributions to science. With the exception of three papers on "Chemical Affinity" † (1853-1854) and an investigation into the combustion of gunpowder (1883), all his published experimental papers seem to have had to do with organic chemistry. Indeed, when in 1869 he was President of the Chemical Section of the British Association he devoted his Presidential Address to a review of the theories then being discussed among organic chemists, giving as his reason that organic chemistry was the branch in which most work was being done and which was advancing most rapidly.

Debus's first paper, on a chemical investigation of madder root, was published in 1848, when the state of organic chemistry was very different from what it is now. Broadly speaking, the progress of organic chemistry may be divided into four periods or stages. In

* How little Debus himself was conscious of any such peculiarities is shown by a trifling incident that took place during the Franco-German war. He wanted to go to Germany and proposed to travel through France, and, when a friend objected that it was not likely he would be allowed to pass, his answer was "But why not? I shall travel as an Englishman?"

† The method of experiment was the partial precipitation of a mixture of baryta-water and lime-water by carbonic acid, or of mixed solutions of barium chloride and calcium chloride by sodium carbonate, and the comparison, in each case, of the composition of the precipitate with that of the original solution.

the *first* period the work of chemists consisted in the separation, identification, and examination of natural products, or of substances derived from them by familiar and often long-known processes. Chevreul's "Récherches sur les corps gras," Liebig and Wöhler's investigation of oil of bitter almonds and its derivatives, those of very many chemists into alcohol and ether, as well as into the separation of "essential oils" and natural alkaloids, may serve as illustrations of the kind of work referred to. The comparison and co-ordination of the results so obtained led, in the *second* period, to the recognition of what may be called natural families of chemical substances, the several members of one family being seen to resemble more or less closely, in their mutual genetic relations, the corresponding members of another family. What is meant will be sufficiently indicated by reference to the formic, acetic, propionic . . . groups, the benzoic group, etc., and by recalling the fact that words such as alcohol, aldehyde, acetone, etc., originally used to designate individual substances, are now applied in a generalised sense, and often to substances which show no obvious external resemblance. The generalised use of such names implies the recognition of the similarity of chemical function of the compounds to which they are applied. A natural result of the order of ideas we have tried to indicate was that much of the work of organic chemists was directed to attempts to complete chemical families by the search for members, which were represented in one family but seemed to be missing in another. This was the era of "new compounds," and with the exception of his paper on madder—which belongs to what we have above called the first stage of the science—Debus's researches in organic chemistry belonged to this second stage. It may suffice to mention in illustration his discoveries of *glyoxal* and *glyoxylic acid*, which occupy, in the C_2 group of compounds, positions of great theoretic interest.

Somewhat earlier than the middle of the last century a great deal of work was done, especially by French chemists, in studying the action of chlorine and its analogues on organic substances. This work, of which Dumas's research on trichloroacetic acid may be taken as the classical example, not only supplied chemists with an immense number of new compounds, but modified and extended their ideas as to what compounds were possible.

In the *third* stage of the science the problems which mainly occupied the attention of organic chemists were those which related to the chemical *constitution* of compounds, not in the sense of the order of combination or of the relative positions of the atoms in a molecule, but in that of the changes which gave rise to the com-

pounds under discussion, or to those to which these compounds, in their turn, can give rise by their transformation. It was shown, especially by Williamson and Gerhardt, that an immense number of facts of this nature could be concisely expressed and brought into correlation with each other by adopting, as a common standard of comparison for a large number of compounds one and the same substance of relatively simple constitution, for example, water or hydrochloric acid. Thus arose the system of classification of compounds according to "types," with the "rational formulæ" founded thereon. This system, which was carried out by Gerhardt in his famous "Traité de Chimie Organique" for the whole range of organic chemistry so far as was possible at the time, was discussed and clearly expounded by Debus in his Sectional Address to the British Association in 1867, already referred to. From the classification of compounds by reference to the types HCl , H_2O , H_3N , or H_4C , respectively, it was a natural step to recognise the so-called valency of an atom as a determining factor in the constitution of the compounds into which it enters (Cowper, Odling, Kekulé).

In the *fourth* stage methods of inquiry made possible by physical, rather than by chemical, discoveries are leading to the discovery of the actual structure of complex molecules, including the order of combination and the relative positions of their constituent atoms. These methods, however, have hitherto been applied almost exclusively to mineral compounds; moreover, they had not been discovered during Debus's working days. They therefore do not call for discussion in the present connexion.

It need scarcely be said that, in pointing out successive stages through which the study of organic chemistry has passed, there is no idea of suggesting that such stages can be sharply marked off from one another, or that one stage came to an end and another began at a definite date. They rather merge gradually into each other, certain branches of the science having arrived at one stage while others were in an earlier, or more advanced, stage. Personal differences, too, of taste, inclination, or of opportunity work inevitably in the same direction.

It is not surprising that when his official duties in this country came to an end Debus should have decided to return to Germany. All his early associations were there. He had formed no domestic ties in England and he had outlived the group of early friends attachment to whom had been an inducement to come here in the first instance. He had plenty of newer friends among whom he was always welcome, but when Hirst and Tyndall and Spencer and Frankland were gone, there seemed to be no one with whom he lived in close and constant intimacy. A home in Germany, with

fairly frequent visits to England, seemed to afford quite appropriate conditions for his last years.

Miss Maxwell Simpson, daughter of Debus's old friend, the late Professor Maxwell Simpson, of Cork, and niece of another close friend, Dr. Archer Hirst, has most kindly supplied the writer with some recollections of Debus's mode of life at Cassel, the result of several visits she paid him there after his return to Germany in 1888. What follows is nearly in Miss Simpson's words:—

After his retirement from the Royal Naval College, Greenwich, he returned to Cassel and took up house with an only sister, to whom he was deeply attached. She died in 1891. This was a great sorrow to Dr. Debus, and many of his friends in England were anxious he should now make his home in London near them. But he could not be persuaded; he moved to another flat, No. 4, Schlangenweg, where he remained to the end of his life.

He led a most regular, simple life, doing the same things every day. He was very orderly, methodical, and punctual. Meals were to the minute, and if his visitor did not appear as the clock struck the hour, a tap would come to her door to say that the meal was "fertig." After breakfast, at which he always ate hot rolls, he went into his study and worked at scientific papers until dinner, at one o'clock. This was the chief meal of the day. There was always light German wine, of which he only took one glass, but always tried to make his visitor take two; and when she refused he would quote the Quaker who gave this advice to his son: "My boy, make your head while you are young, and when you are old you will be able to drink like a gentleman." After dinner he would take a nap until coffee came at 3 o'clock. Coffee drinking was a deliberate affair; while it went on he would talk delightfully of old friends and things that had happened more than fifty years before. After coffee he would go for a long walk, nearly always the same, and often as much as twelve miles. When eighty-six years old he walked twelve miles on end. He never sat down to rest when out for a walk, having the national fear of a draught, however hot the weather. In the house he kept his rooms very warm and seldom opened the windows, for he said it was foolish to make heat in a room and then open the windows to let it out. Supper was at seven—always tea, which Dr. Debus made himself. Unfortunately, he nearly always forgot to put the lid on the teapot after pouring on the boiling water—much to Miss Simpson's unhappiness, for she liked her tea very hot. At 10 o'clock he would say good-night, but did not go to bed until midnight.

He was most just in all his dealings, and absolutely straight. It would have been impossible for him to do anything he thought

wrong in order to benefit himself. He certainly was a "selfless man and stainless gentleman."

He was fond of music, and once a fortnight he would take Miss Simpson to the opera, always walking there and back. He had many friends and relations in Cassel, but few, if any, who shared his scientific interests. He lectured in the winter months to young men at the Chemical Institution. When scientific men, English or German, came to Cassel they always paid him a visit. He was very fond of young people, and at Christmas his little friends always found presents for them on the tree, which he enjoyed as much as any of them. He subscribed to many local charities, and constantly had visits from Sisters of Mercy, to whom he always gave help. He was very hospitable, and liked to see his friends at his dinner-table. Up to the last he always did the carving himself, and could not bear the idea of not being able to do things. All through the winter he took a cold bath and often would break the ice on the water.

He had his own fixed ideas on all subjects, great and small, and did not like anyone to contradict him or argue with him.

Miss Simpson records that when she arrived at Cassel for the last time, in 1912, he was at the station to meet her, though eighty-seven years of age. When she was leaving at the end of her visit he said he was sorry he could not see her off; they must say "Goodbye" in the house. She answered, "It must not be goodbye, but 'Auf Wiedersehen,'" and adds, "Alas! it has proved to be goodbye."

On July 13th, 1914—three weeks before the fateful August 4th—Dr. Debus completed his ninetieth year, when a number of his English friends joined in sending him an address of congratulation and good wishes. In commemoration of the same occasion Professor Anschütz, Kekulé's successor at Bonn, wrote a very genially worded sketch of Debus's career, pointing out, in more detail than has been attempted in this notice, the nature and importance of his chemical work. From the tone of his references to Debus's life in England, Professor Anschütz seems to have been as little conscious of the impending catastrophe as his English colleagues.

Dr. Debus died on December 9th, 1915.

G. C. F.