1911 Encyclopædia Britannica, Volume 10 — Fischer, Emil

Exported from Wikisource on August 5, 2024

FISCHER, EMIL (1852–), German chemist, was born at Euskirchen, in Rhenish Prussia, on the 9th of October 1852, his father being a merchant and manufacturer. After studying chemistry at Bonn, he migrated to Strassburg, where he graduated as Ph.D. in 1874. He then acted as assistant to Adolf von Baeyer at Munich for eight years, after which he was appointed to the chair of chemistry successively at Erlangen (1882) and Würzburg (1885). In 1892 he succeeded A. W. von Hofmann as professor of chemistry at Berlin. Emil Fischer devoted himself entirely to organic chemistry, and his investigations are characterized by an originality of idea and readiness of resource which make him the master of this branch of experimental chemistry. In his hands no substance seemed too complex to admit of analysis or of synthesis; and the more intricate and involved the subjects of his investigations the more strongly shown is the conspicuous skill in pulling, as it were, atom from atom, until the molecule stood revealed, and, this accomplished, the same skill combined atom with atom until the molecule was regenerated. His *forte* was to enter fields where others had done little except break the ground; and

his researches in many cases completely elucidated the problem in hand, and where the solution was not entire, his methods and results almost always contained the key to the situation.

In 1875, the year following his engagement with von Baeyer, he published his discovery of the organic derivatives of a new compound of hydrogen and nitrogen, which he named hydrazine (*q.v.*). He investigated both the aromatic and aliphatic derivatives, establishing their relation to the diazo compounds, and he perceived the readiness with which they entered into combination with other substances, giving origin to a wealth of hitherto unknown compounds. Of such condensation products undoubtedly the most important are the hydrazones, which result from the interaction with aldehydes and ketones. His observations, published in 1886, that such hydrazones, by treatment with hydrochloric acid or zinc chloride, yielded derivatives of indol, the pyrrol of the benzene series and the parent substance of indigo, were a valuable confirmation of the views advanced by his master, von Baeyer, on the subject of indigo and the many substances related to it. Of greater moment was his discovery that phenyl hydrazine reacted with the sugars to form substances which he named osazones, and which, being highly crystalline and readily formed, served to identify such carbohydrates more definitely than had been previously possible. He next turned to the rosaniline dyestuffs (the magenta of Sir W. H.

Perkin), and in collaboration with his cousin Otto Fischer (b. 1852), then at Munich and afterwards professor at Erlangen, who has since identified himself mainly with the compounds of this and related groups, he published papers in 1878 and 1879 which indubitably established that these dyestuffs were derivatives of triphenyl methane. Fischer's next research was concerned with compounds related to uric acid. Here the ground had been broken more especially by von Baeyer, but practically all our knowledge of the so-called purin group (the word *purin* appears to have been suggested by the phrase *purum uricum*) is due to Fischer. In 1881–1882 he published papers which established the formulae of uric acid, xanthine, caffeine, theobromine and some other compounds of this group. But his greatest work in this field was instituted in 1894, when he commenced his great series of papers, wherein the compounds above mentioned were all referred to a nitrogenous base, purin (*q.v.*). The base itself was obtained, but only after much difficulty; and an immense series of derivatives were prepared, some of which were patented in view of possible therapeutical applications.[1] These researches were published in a collected form in 1907 with the title *Untersuchungen in der Puringruppe* (1882–1906). The first stage of his purin work successfully accomplished, he next attacked the sugar group. Here the pioneer work was again of little moment, and Fischer may be regarded as the prime investigator in this field. His researches may be taken as commencing in 1883; and the results are unparalleled in importance in the history of organic chemistry. The

chemical complexity of these carbohydrates, and the difficulty with which they could be got into a manageable form—they generally appeared as syrups—occasioned much experimental difficulty; but these troubles were little in comparison with the complications due to stereochemical relations. However, Fischer synthesized fructose, glucose and a great number of other sugars, and having showed how to deduce, for instance, the formulae of the 16 stereoisomeric glucoses, he prepared several stereoisomerides, thereby completing a most brilliant experimental research, and simultaneously confirming the van't Hoff theory of the asymmetric carbon atom (see STEREO-ISOMERISM). The study of the sugars brought in its train the necessity for examining the nature, properties and reactions of substances which bring about the decomposition known as fermentation (*q.v.*). Fischer attacked the problem presented by ferments and enzymes, and although we as yet know little of this complex subject, to Fischer is due at least one very important discovery, viz. that there exists some relation between the chemical constitution of a sugar and the ferment and enzyme which breaks it down. The magnitude of his researches in this field may be gauged by his collected papers, *Untersuchungen über Kohlenhydrate und Fermente* (1884–1908), pp. viii. + 912 (Berlin, 1909).

From the sugars and ferments it is but a short step to the subject of the proteins, substances which are more directly connected with life processes than any others. The

chemistry of the proteins, a subject which bids fair to be Fischer's great lifework, presents difficulties which are probably without equal in the whole field of chemistry, partly on account of the extraordinary chemical complexity of the substances involved, and partly upon the peculiar manner in which chemical reactions are brought about in the living organism. But by the introduction of new methods, Fischer succeeded in breaking down the complex albuminoid substances into amino acids and other nitrogenous compounds, the constitutions of most of which have been solved; and by bringing about the recombination of these units, appropriately chosen, he prepared synthetic peptides which approximate to the natural products. His methods led to the preparation of an octadeca-peptide of the molecular weight 1213, exceeding that of any other synthetic compound; but even this compound falls far short of the simplest natural peptide, which has a molecular weight of from 2000 to 3000. He considers, however, that the synthesis of more complex products is only a matter of trouble and cost. His researches made from 1899 to 1906 have been published with the title *Untersuchungen über Aminosauren, Polypeptides und Proteine* (Berlin, 1907). The extraordinary merit of his many researches has been recognized by all the important scientific societies in the world, and he was awarded the Nobel prize for chemistry in 1902. Under his control the laboratory at Berlin became one of the most important in existence, and has attracted to it a constant stream of brilliant pupils, many of whom are to be

associated with much of the experimental work indissolubly connected with Fischer.

1. ↑ For a brief review of the pharmacology of purin derivatives see F. Francis and J. M. Fortescue-Brinkdale, *The Chemical Basis of Pharmacology* (1908).

About this digital edition

This e-book comes from the online library Wikisource. This multilingual digital library, built by volunteers, is committed to developing a free accessible collection of publications of every kind: novels, poems, magazines, letters...

Wikisource is constantly looking for new members. During the transcription and proofreading of this book, it's possible that we made some errors. You can report them at this page.

The following users contributed to this book:

- Bob Burkhardt
- DivermanAU

- Suslindisambiguator
- Kastrel
- Slowking4