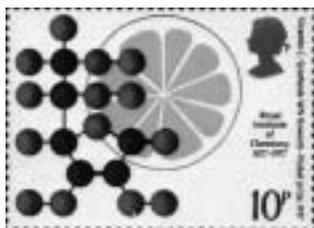


Stamp Vignette on Medical Science



Walter Haworth—Synthesis of Vitamin C

Robert A. Kyle, MD, and Marc A. Shampo, PhD

Walter Norman Haworth was born in Chorley, Lancashire, in northwestern England, on March 19, 1883. He obtained his first knowledge of chemistry from experience at the linoleum factory that his father managed. He entered the University of Manchester (northwestern England) in 1903 and studied under chemist William Henry Perkin (1838-1907). Haworth received first-class honors in chemistry and graduated in 1906. His earliest work was on terpenes, and the results were published in 1908, with Perkin as coauthor. Haworth's last paper in this field was published in 1914. His work included studies of the derivatives of menthane and sylvestrene as well as the condensations of aldehydes and ketones.

Haworth had planned to work in the chemical industry but was awarded a fellowship that allowed him to study with Otto Wallach (1847-1931) at the University of Göttingen (Germany) in 1909. After 1 year, he received a doctorate and returned to Manchester, where he continued his study of terpenes. He received a DSc degree from the University of Manchester in 1911 and became a senior demonstrator at the Imperial College of Science and Technology in London. A year later, he became a lecturer at United College of the University of St Andrews in Scotland and became interested in carbohydrate chemistry, which was being investigated at

St Andrews by Thomas Purdie (1843-1916) and James Irvine (1877-1952). Haworth began his work on simple sugars in 1915 and developed a new method for the preparation of the methyl ethers of sugars using methyl sulfate and alkali. He then began studies on the structural features of the disaccharides.

Haworth organized the laboratories at St Andrews University for the production of chemicals and drugs for the British government during World War I (1914-1918). He was appointed professor of organic chemistry at the University of Durham (northern England) in 1920. Three years later, he became Mason Professor of Chemistry at the University of Birmingham (England), a position he held until his retirement in 1948.

Haworth determined the structure of vitamin C and synthesized it in 1932. The vitamin had been isolated by Hungarian chemist Albert Szent-Györgyi (1893-1986) from the adrenal cortex and orange juice as well as from paprika. Szent-Györgyi had named the substance *hexuronic acid* and subsequently sent large supplies of it, which had been isolated from paprika, to Haworth and his colleagues. Haworth and his research team determined the structure of hexuronic acid and coined the term *ascorbic acid*. It was the first vitamin to be synthesized. Haworth then turned his attention to the polysaccharides. He recognized the importance of x-ray studies and introduced the end-group method of studying structural details.

Haworth received the Nobel Prize in chemistry in 1937, sharing it with Paul Karrer (1889-1971) for work on carbohydrates and the synthesis of vitamin C. He was the first British organic chemist to receive the Nobel Prize. He was knighted by King George VI (1895-1952) in 1947.

Haworth died suddenly on his 67th birthday (1950) in Birmingham, England, after a strenuous tour of Australia and New Zealand. He was honored on a stamp issued by Great Britain in 1977. The stamp shows the chemical structure of vitamin C and an orange, a source of the vitamin.