

# Alexander Robertus Todd Biography

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# Biography

Alexander Todd devoted his career to understanding the structure and functions of organic chemicals found in living cells. He received the 1957 Nobel Prize in chemistry for discovering the structure of nucleotides.

Todd was born in a suburb of Glasgow, Scotland in 1907. His parents had only elementary schooling, and saw to it that their children were well-educated. Todd attended the equivalent of a high school of science. After graduating from the University of Glasgow in 1929, he obtained a doctorate in 1931 from the University of Frankfurt-am-Main, Germany. He received a second doctorate two years later from Oxford University in England, where he studied with the organic chemist Robert Robinson and learned how to analyze the structure of a using synthesis techniques.

Working at the University of Manchester, he began studying the structure of nucleotides, first discovered in 1869 by the Swiss biochemist Johann Miescher. Each three-part nucleotide has a nitrogen-rich base, a sugar, and a phosphoric acid. Todd continued the investigation of nucleic acid nucleotides begun by the American chemist Phoebus Levene, who had found that they have either a purine or a pyrimidine base, a ribose or deoxyribose sugar, and a phosphoric acid.

By the late 1940s Todd, while at the University of Cambridge, discovered exactly how each sugar is connected to the base on one side and the phosphoric acid on the other, forming a linear (not branched) polymer chain. This allowed Maurice Wilkins, James Watson, and Francis Crick to determine the precise three-dimensional structure of DNA (deoxyribonucleic acid) in 1951. In fact, Todd was called on to verify their structure.

Todd also synthesized two non-nucleic acid nucleotides with ribose sugars and adenine bases, ATP (adenosine triphosphate) and ADP (adenosine diphosphate), which manage the body's energy use. In addition, he synthesized the nucleotide FAD (flavin adenine dinucleotide), which is a coenzyme (a substance needed by some enzymes before they can initiate cellular processes).

Todd's other work included finding the structure and functions of vitamins B1, B12, and E. He has also been involved in science policy for the British government. He was knighted in 1954 and made a member of the Royal Order of Merit in 1977. In the 1970s he also served as president of the Royal Society (London). His autobiography, entitled *A Time to Remember: The Autobiography of a Chemist*, was published in 1983. Todd died on January 10 1997.