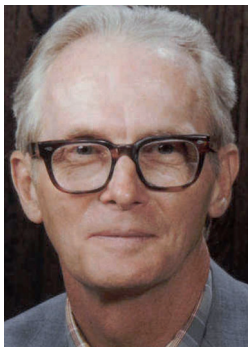

William Nunn Lipscomb, Jr.

William Nunn Lipscomb, Jr. (1919–2011)

William Nunn Lipscomb, Jr.,[*] professor emeritus of Chemistry at Harvard University, died on April 14, 2011 in Cambridge, Massachusetts (USA). Lipscomb was born on December 9, 1919 in Cleveland, Ohio but moved the following year to Lexington, Kentucky, where he received his Bachelor's degree in chemistry from the University of Kentucky in 1941. He then moved to the California Institute of Technology, where he was active until 1946. He initially registered for the physics program there, but quickly found his way back to chemistry under the guidance of his doctoral advisor, Linus Pauling. He was primarily interested in structural chemistry and chemical bonding, topics that later had a decisive influence on his research. However, until 1945 he was involved mainly in wartime projects. After receiving his Ph.D. in 1946, he taught at the University of Minnesota (1946–1959) before finally moving to Harvard University, where he remained active long after reaching emeritus status in 1990.

Apart from work on NMR spectroscopy and chemical shifts, primarily of borohydrides, Lipscomb made pioneering contributions to two very different fields: first the structure and theory of chemical bonds in boranes and later the structure and function of enzymes, especially zinc enzymes and allosterically regulated proteins.

The structure and chemical bonding in boranes such as B_2H_6, B_4H_{10}, B_5H_9, B_6H_{10}, and $B_{10}H_{14}$ had remained unclear ever since their characterization by Alfred Stock, and an explanation based on classical covalent bonds with one bonding electron pair as in carbohydrates was impossible. Lipscomb's contributions to the understanding of the structure and bonding of boranes were based primarily on X-ray crystallographic structure determination and calculations with empirical and quantum mechanical methods. His pioneering work in low-temperature crystallography around 1950 was decisive for the structural analysis of gaseous simple boranes as well as for other fundamental compounds such as hydrazine, NO, $(NO)_2$, and HF. The diminished atomic vibrations at low temperatures also allowed for a more precise determination of atomic positions. To solve the structure of the simplest borane, B_2H_6, Lipscomb used liquid helium as a refrigerant for the first time. Thanks to the development and application of quantum-chemical calculation methods, the three-center-two-electron bond in this electron-deficient compound could be elucidated. Lipscomb received the Nobel Prize in Chemistry in 1976 as the sole Laureate for his work on the structures of boranes and their implications for chemical bonding.

By that time, Lipscomb had totally reoriented the focus of his lab and had dedicated himself to another pioneering field: the exploration of the three-dimensional structure of proteins using X-ray crystallography. Lipscomb had been interested in this topic since around 1960, which was not long after the first-ever determination of a protein structure, that of myoglobin by Kendrew in 1958. When I joined his lab in 1994 as a postdoc, borane structures hung from the ceilings as large models overhead, while protein structures danced in front of us on the workstations. The first structure that Lipscomb determined was that of carboxypeptidase A, for which he, in 1968, achieved a resolution of 2.8 Å. The catalytic mechanism proposed on the basis of cocrystal structures can be found in many biochemistry textbooks as a prototypical example of a metal-mediated hydrolysis reaction. First results of crystallographic studies on the 300 kDa allosterically regulated enzyme aspartate transcarbamylase were published in 1967, but the structure was not solved with molecular resolution for another decade. The structural analysis of transcarbamylase and later the allosteric enzymes fructose 1,6-bisphosphatase and chorismate mutase resulted in fundamental new insights into the allosteric regulation of proteins.

Lipscomb was not only an exceptional scientist, he was also a talented clarinetist, and he even played regularly with members of the Boston Symphony Orchestra. Lipscomb's co-workers always called him "Colonel", which was not, however, a reflection of any sort of militaristic behavior or corresponding management style. On the contrary, Lipscomb granted his co-workers broad freedom and cultivated the creativity of his many students and postdocs. Three of his co-workers were later awarded Nobel Prizes of their own (R. Hoffmann, T. Steitz, and A. Yonath). The salutation as Colonel can supposedly be traced back to his first student. Indeed, Lipscomb became a "Kentucky Colonel" in 1973, a title of honor awarded by the State of Kentucky. I also have fond memories of Lipscomb's good sense of humor. I can still see him in front of me after each submitted paper, with a grave face: "*Norbert, your manuscript has unfortunately been … accepted!*". He is also known for his involvement with the Ig Nobel Prizes, which have been awarded yearly since 1991 for somewhat abstruse research projects.

Lipscomb died of pneumonia as the result of a fall. He is survived by his wife Jean and three children.

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[*] Photo from http://wlipscomb.tripod.com.