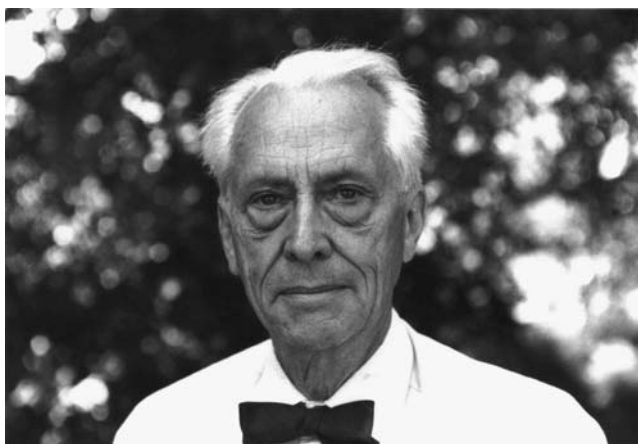


Obituary: Bengt Lindberg (1919–2008)

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Bengt Lindberg was one of the most admired and important chemists in Sweden during the 20th century.

On March 20, 2008, Professor Bengt Lindberg passed away. He was born in the southern part of Stockholm on July 17, 1919 and lived there throughout his life. Bengt is survived by his wife Ethel, daughter Elsa and his granddaughters Hanna and Emma.

Bengt Lindberg grew up in Stockholm and his father, Henry, was a lawyer. He graduated, with excellent grades, from Södra Latin, an old well-reputed high school close to his home. In contrast to his two younger brothers, Bengt was very early interested in science, especially mathematics, and he continued his education at Stockholms Högskola (nowadays the Stockholm University), where he studied mathematics, chemistry and physics. After obtaining his B. Sc., he moved to the Royal Institute of Technology and specialized in organic chemistry. Initially his supervisor was Professor Holger Erdtman, who worked with natural product chemistry.

Bengt took an early interest in carbohydrate chemistry, a virginal territory in Sweden in the forties. His first studies dealt with transformations of acetylated glycosides with strong acids. The findings were spectacular and in 1947 a review of these works was published in *Nature*. In 1950 he defended his thesis “Studies on Glycosides, especially α/β transformations” and also described the first synthesis of a α -linked disaccharide, a classical problem at that time. Lindberg’s period at the Royal Institute of Technology was very productive, some 60 papers were published.

Between 1955 and 1965 Bengt Lindberg was associate professor and responsible for research at the Swedish Forest and Products Research Laboratory. He started to take an interest in structural studies and chemical modifications of polysaccharides, mainly of wood fungi origin. Bengt Lindberg was awarded the honorary title of Professor by the Swedish king in 1959. In 1965 he was invited to take the Chair in Organic Chemistry at Stockholm University and there he started to create what later should be called the “Lindberg group” of carbohydrate chemistry by the scientific community. This name was not his invention.

Since about 1970, his major research activities dealt with the development of chemical modifications and new analytical methods for polysaccharides. Taking advantage of the methylation technology, first described by Hakomori and later elaborated by Conrad and Sandford, a streamlined procedure for methylation analysis was developed. The partially methylated monosaccharides, obtained after hydrolysis, were quantified and identified as their alditol acetates by gas chromatography/mass spectrometry. Instead of requiring several grams of polysaccharide material and months or years of hard labor, these analyses took at most a few days to perform and only milligram quantities were needed. The technique made it possible to study polysaccharide antigens from, for instance, cell walls and capsules of bacteria. Thus,

it was now possible to correlate structural elements in microorganisms to immunological properties. The method also gained wide acceptance in the field of structural elucidations of glycoconjugates. The major papers describing these works of the late sixties resulted in three papers. All were featured as *Current Contents Citation Classics*. The summary was co-authored by Björndal, Hellerqvist and Svensson, in *Angewandte Chemie* (1970). Furthermore, Lindberg's group developed several means for selective chemical modifications of polysaccharides. These methods were primarily used as tools for establishing sequences of individual monosaccharide units and involved sulfone-, keto- and uronic acid degradations, modifications of the Smith degradation, chromic acid degradation and *N*-deacetylation followed by nitrous acid degradation of glycosamines. The resulting, modified, polysaccharides were further analyzed by methylation analysis and complex sequences of monosaccharide units could be established. In the mid-seventies high resolution ^1H - and ^{13}C -NMR spectroscopy was introduced to further simplify the structural elucidations.

In 1967 Bengt Lindberg was elected to the Royal Swedish Academy of Sciences and was a member of the Nobel committee for chemistry between 1974 and 1987. He presented the prize-winners of 1979 (Herbert Brown and Georg Wittig) and the prize-winner of 1984 (Bruce Merrifield). He has received a number of Swedish awards for his scientific contributions, including the Celsius medal (1985). He got the Haworth Memorial Medal from the Royal Society of Chemistry (1981) and was the first non-American to receive the Hudson award from the American Chemical Society (1983).

Bengt Lindberg had a profound knowledge of life sciences, especially organic chemistry and carbohydrate chemistry and that combined with his sharp intellect and quick-witted tongue made him much respected and sometimes feared by both students and colleagues. He set high standards for his own and his collaborator's work and emphasized the importance of innovation and work across scientific borders. Many scientists with different backgrounds visited and worked at his laboratory for periods. They solved the structures of various complex carbohydrates. The "Lindberg group" had a unique atmosphere of creativity and hard, disciplined work. We look back on that time with gratitude and pleasure; as we feel that we were involved in something scientifically important. The lifetime achievement of Bengt Lindberg has among other things resulted in more than 40 Ph.D's with input in the carbohydrate field. A number of his students have continued his scientific work as professors in the academic society and many others have leading positions in governmental institutions and industry.

In his private life Bengt showed a keen interest in recreation in the wilderness, canoeing, hiking, skiing and cross-country skating. Many hours were spent with co-workers at coffee breaks with discussions on equipment, hard weather conditions and distances achieved, making the laboratory also to a friendly and familiar environment. Bengt was a heavy smoker, but in spite of that he was physically fit and an excellent squash player. Bengt had also a tender heart under his tough surface, but he did not like to admit it. He was a family man and loved children, especially his granddaughters.