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49. J. Johan Lindberg

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Personalities in Polymer Science



J. Johan Lindberg

Honoring J. Johan Lindberg on his 75th Birthday

The scientific life of **J. Johan Lindberg** is closely associated with **Wood and Lignin Chemistry**. He especially pioneered the modern understanding of the **structure of lignin** and the **hierarchical structure of wood**. His special attention was directed to the interaction between cellulose and lignin in wood.

Jarl *Johan* Lindberg was born in Helsinki on September 18, 1921 as the son of major Alfons Lindberg and Sigyn Naemi Saclan.

Johan Lindberg graduated from the Swedish Normal Lyceum (high school) in 1940. After graduation, he was drafted to the army and did military service at the Russian front. In 1945 he started his studies again at the University of Helsinki where his main subject was physical chemistry. He obtained his MSc from the University of Helsinki in 1951 and the Phil. Lic. of the University of Helsinki in 1954. He received his PhD also from the University of Helsinki in 1957.

Johan Lindberg's first advisors were Professor Kurt Buch and Eero Tommila, a Professor of Physical Chemistry at the University of Helsinki. Tommila provided his students with a deep understanding of physical chemistry, especially the importance of careful and accurate measurements; this knowledge Lindberg

used effectively throughout his career in science.

Very early in his career Lindberg showed strong interest in the investigation of lignin and model substances of lignin. It was on this subject that he became associated with his third supervisor, Professor Terje Enkvist, who had become Professor of Chemistry in 1951. With Enkvist, Johan Lindberg published a number of papers on the separation and identification of degradation products of lignin, especially of sulfate lignin. In this work they used paper chromatography, electrophoresis, UV- and IR spectroscopy. All these techniques were either new, or new instrumental facilities had become available.

During a ten year period after receiving his doctoral degree, Lindberg also carried out a series of comprehensive measurements on the properties of organic solvents, such as dipole moments, dielectric constants, thermodynamic excess functions, formation of aggregates and hydrogen bonding in lignin models.

As instrumentation became available, Johan Lindberg became interested in lignin as a macromolecule and began measurements on the molecular weight and the molecular weight distribution of lignin specimens.

Johan Lindberg became an Instructor at the University of Helsinki in 1952 and a Docent in 1959. He continued as an Instructor until 1963. During the 60's Johan Lindberg worked for three years as a stipendiary of the Academy of Finland. In 1963 he was appointed a Senior Scientist of the Academy of Sciences in Finland. In 1965 he joined the Helsinki University of Technology as Associate Professor of Physical Chemistry and held this position until 1967.

In 1969 Johan Lindberg was appointed as the first Professor of Wood and Polymer Chemistry at the University of Helsinki after serving as Acting Professor from 1967–1969. He became Professor of Polymer Chemistry in 1969, a position he held until his retirement in 1987. From 1971–1975 he served as the Vice Dean of the Faculty of Science.

Johan Lindberg was very active both as a teacher and as a scientist. As head of the Department he organized a large teaching program in polymer chemistry and wrote compendia and books for his students.

During these years he was also active and successful in his research. Johan Lindberg studied polymerization of lignin models, especially that of isocougenol. He also investigated polyoxyphenylene and the mechanism of its synthesis, where he used for the first time electron spin resonance spectroscopy.

Lindberg carried out graft copolymerization of vinyl monomers and did quantum mechanics calculations of properties and reactions. Of particular significance was his investigation of the segment movement and phase transitions in polymers with "spinprobes". Later he studied polymer properties by nuclear magnetic resonance spectroscopy.

During his long research career Lindberg never deviated far from lignin research and through his efforts Finland achieved a leading place in wood and polymer research in the world.

During his 20 years as a Professor he conducted examinations for about 300 polymer chemists and supervised about 30 licentiate and PhD students. Johan Lindberg is the author of about 250 papers, 30 patents and is the co-author of 6 books.

Johan Lindberg is a Fellow of Societas Scientiarum Fennica (1961) (the Finnish Science Society), the Swedish Academy of Engineering Sciences in Finland (1972). Since 1982 he has been a member of the Finnish Academy of Sciences and a member of the Academy of Engineering Sciences of Finland (1983).

Lindberg is a member of the Royal Society of Chemistry (London) (1962), the Technical Association of Pulp and Paper (USA) (1975), the International Academy of Wood Science (1978) and the Chairman of the Association of Inventors (Finland) (1987–90). Since 1951 Johan Lindberg has been a Member of the Association of Finnish Chemical Societies and was its Chairman in 1965. He served on the Board of the Finnish Plastics Federation from 1979–1982 and the Chairman of the PCB working party of the Ministry of the Environment (1983).

In the International Union for Pure and Applied Chemistry Johan Lindberg has been active since 1971 and was the national representative of the working party of Macromolecular Chemistry. In 1972 he was the Organizer of the IX. Symposium on Macromolecules in Helsinki.

J. Johan Lindberg received a number of important Awards for his achievement in science and for his service in academic and societal activities. He received the Prize of the Association of Finnish Chemical Societies in 1984, the Prize of the University of Helsinki to Further Education and Information in 1981 and the Inventor's Prize of the Government of Finland in 1985. In 1988, Johan Lindberg received an honorary doctoral degree (h.c.) from the Åbo Academy University.

In 1951 Johan Lindberg was married to *Helena Annikki Kuningas*, whose parents were Hugo Kuningas and Saima Niiranen. They have two children: Johan Markus, born in 1954 and Klaus Johan, born in 1958; both are physicists. The Lindbergs have 2 grandchildren.

This article has been submitted by Franciska Sundholm Professor of Polymer Science, University of Helsinki, Helsinki, Finland and Otto Vogl, Herman F. Mark Professor of Polymer Science, Polytechnic University, Brooklyn NY.