MWP | THE MARCUS WALLENBERG PRIZE

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Press release from the Marcus Wallenberg Prize

Professors Wout Boerjan and John Ralph receive the 2024 Marcus Wallenberg Prize

Pioneering research for advanced understanding of lignin

The 2024 Marcus Wallenberg Prize is awarded to Professors Wout Boerjan and John Ralph for their groundbreaking research leading to a fuller understanding of lignin biosynthesis and structural diversity. King Carl XVI Gustaf presented the prize on Monday 11 November in Stockholm. The Prize sum is 2.5 MSEK.

This is the first time that the MWP is rewarding research on lignin. Lignin is a wood component important for the strength of the tree and its resistance to microbial decay. It can be understood as the natural glue in wood. The chemical structure of lignin is interesting for material scientists and chemists when developing new biobased applications. To be successful in utilizing lignin it is necessary to understand how it is built, and also how its varied chemical structure and functionality provide a basis for using lignin in chemical formulations and materials. The understanding of how the different lignin structures are formed during tree growth give important guidance on how best to take the wood components apart when separating wood fibers and lignin.

Professor Boerjan has provided deep insights into the biosynthesis of the lignin building blocks. Using a comparative mass-spectrometry-based method, his innovative systems biology approach has led to the discovery of key enzymes involved in lignin biosynthesis.

Professor Ralph has developed breakthroughs in understanding lignin structure, its subunits, linkages, and composition using advanced Nuclear Magnetic Resonance (NMR) methods. His characterization of a broad selection of plants revealed new classes of monomers and the large variation and novelty in the composition of lignin subunits.

The work of the laureates provided essential information for scientists optimizing lignin extraction from wood through traditional pulping (with wood fiber as the main product) as well as for the development of biorefinery concepts to produce chemical building blocks from wood. The work by the laureates also brings even greater importance to the development of new lignin-based applications — when new materials or chemicals are developed based on processing and modification of lignin, it's essential to understand the structures and variations in the component. Established industrial companies of various sizes and start-ups close to research are developing renewable solutions based on lignin in order to reduce the need for fossil raw-materials.

Key facts about the laureates

Both laureates have mentored creative young researchers passionate about science and research, all contributing to an improved knowledge of plant processes aimed at using biomass for a more sustainable and climate-friendly economy.

Wout Boerjan was born in 1963, he completed his undergraduate studies in Ghent University, Belgium in 1985 and his PhD in Plant Biotechnology in Ghent under the supervision of Prof. Marc Van

Montagu and Prof. Dirk Inzé in 1993. In January 1994, he became a group leader in the Lab of Genetics at Ghent University, and from June 1996, group leader in the Department of Plant Systems biology, VIB, Ghent University. He is also a professor at Ghent University.

John Ralph was born in 1954 and studied Chemistry at Canterbury University, New Zealand, graduating in 1976. In 1982 he earned his Ph.D. in the topic of Chemistry/Forestry, University of Wisconsin-Madison, USA. He is Full Professor in the Departments of Biochemistry and Biological Systems Engineering at University of Wisconsin-Madison. He is a Distinguished Professor, Tokyo University of Agriculture and Technology, Japan.

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