

# LEONARD BLASCHEK

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## EDUCATION

PHD, PLANT PHYSIOLOGY 2017–2022 (expected)

Stockholms Universitet, Sweden

Project: Functional and Genetic Analysis of Laccase Isoforms during Lignification

Supervisor: Dr. Edouard Pesquet

Co-Supervisors: Prof. Vincent Bulone, Prof. Jonas Gunnarsson

My project aims to determine whether differences in lignin amount and composition on the cellular and organismal scale are due to distinct roles of laccase paralogues during lignification. Biochemical and genetic analyses of laccases from *A. thaliana*, *Zinnia violacea* and *Populus* will be used to elucidate the basis of laccase specificity as well as the evolutionary conservation of the roles of laccases in lignification.

LICENTIATE, PLANT PHYSIOLOGY 2017–2020

Stockholms Universitet, Sweden

Project: Cellular Lignin Distribution Patterns and their Physiological Relevance

Supervisor: Dr. Edouard Pesquet

Co-Supervisors: Prof. Vincent Bulone, Prof. Jonas Gunnarsson

Examination Committee: Dr. András Gorzsás, Dr. Annelie Carlsbecker, Prof. Ulla Westermark

In my licentiate thesis, I biochemically validated the Wiesner test and Raman microspectroscopy for reliable *in situ* quantification of lignin composition, and subsequently used these techniques to characterise the distribution and genetic regulation of specific lignin subunits in different lignified cell types. Lastly we related this *in situ* lignin composition data to single cell, tissue and whole plant morphology and bio-mechanics, showing that tracheary element functionality is dependent on specific compositions of *post-mortem* deposited lignin.

MASTER OF SCIENCE, GENETIC AND MOLECULAR PLANT BIOLOGY 2015–2017

Uppsala Universitet, Sweden

Thesis: Distinct Roles of Laccase Isoforms During Lignification in *A. thaliana*

Supervisor: Dr. Edouard Pesquet

In this thesis work, I provided evidence that laccase paralogs in *A. thaliana* have distinct and non-redundant roles during lignification. Phenotypic analysis of *laccase* loss-of-function mutants, *in situ* activity assays and biochemical lignin characterisation showed that different laccase paralogs were active in a non-redundant, cell-type specific manner.

BACHELOR OF SCIENCE, BIOLOGY 2013–2015

Ernst-Moritz-Arndt-Universität Greifswald, Germany

Thesis: Plasma Membrane-Bound Proteases in the Roots of *H. vulgare*

Supervisor: Prof. Christine Stöhr

In my bachelor's thesis I investigated proteolytic activity in the plasma membrane of *Hordeum vulgare* roots. Plasma membrane purification and SDS-PAGE analysis followed by zymographic and chromogenic activity assays provided evidence for the presence of an undescribed oligomeric membrane-bound aminopeptidase.

## PUBLICATIONS

————— 2020 —————

Yamamoto M, **Blaschek L**, Subbotina E, Kajita S and Pesquet E (2020). Importance of Lignin Coniferaldehyde Residues for Plant Properties and Sustainable Uses. *ChemSusChem*. [10.1002/cssc.202001242](https://doi.org/10.1002/cssc.202001242)

**Blaschek L**<sup>†</sup>, Nuoendagula<sup>†</sup>, Bacsik Z, Kajita S, Pesquet E. (2020). Determining the Genetic Regulation and Coordination of Lignification in Stem Tissues of *Arabidopsis* Using Semiquantitative Raman Microspectroscopy. *ACS Sustain. Chem. Eng.* 8: 4900–4909. [10.1021/acssuschemeng.0c00194](https://doi.org/10.1021/acssuschemeng.0c00194)

**Blaschek L**, Champagne A, Dimotakis C, Nuoendagula, Decou R, Hishiyama S, Kratzer S, Kajita S, Pesquet E (2020). Cellular and Genetic Regulation of Coniferaldehyde Incorporation in Lignin of Herbaceous and Woody Plants Using Quantitative Wiesner Staining. *Front. Plant Sci.* 11: 109. [10.3389/fpls.2020.00109](https://doi.org/10.3389/fpls.2020.00109)

————— NOT PEER-REVIEWED —————

Ménard D<sup>†</sup>, **Blaschek L**<sup>†</sup>, Kriechbaum K, Lee CC, Zhu C, Nuoendagula, Bacsik Z, Bergström L, Mathew A, Kajita S, Pesquet E. (2021). Specific and dynamic lignification at the cell-type level controls plant physiology and adaptability. *BioRxiv*.

**Blaschek L**, Pesquet E (*in preparation*). All under one roof: functional redundancies and specificities of phenoloxidases.

**Blaschek L**, Murozuka E, Ménard D, Pesquet E (*in preparation*). Laccase paralogs non-redundantly control lignin composition and amount in the different xylem cell types of herbaceous and woody plants.

Ménard D, Serk H, Gorzsás A, **Blaschek L**, Jauneau A, Fukuda H, Demura T, Goffner D, Pesquet E (*in preparation*). The *post-mortem* spatial restriction of lignification in protoxylem and metaxylem vessels in *Zinnia elegans* is controlled by laccases and peroxidases.

<sup>†</sup>: contributed equally

## PRESENTATIONS

**Blaschek L** (2019). The Structural Importance of Lignin in Xylem Vessels. *3<sup>rd</sup> Stockholm Cell Wall Meeting*, Stockholm University, Stockholm.

**Blaschek L** (2019). Spatial Distribution of Coniferaldehyde Lignin. *28<sup>th</sup> Congress of the Scandinavian Plant Physiology Society*, Umeå.

**Blaschek L** (2018). Determining the Spatial Distribution of Aldehyde Units in Lignin. *2<sup>nd</sup> Stockholm Cell Wall Meeting*, KTH Royal Institute of Technology, Stockholm.

## GRANTS & SCHOLARSHIPS

**Blaschek L** (2019). Travel grant of the Department of Ecology, Environment and Plant Sciences, Stockholm University to attend the 28<sup>th</sup> Congress of the Scandinavian Plant Physiology Society.

**Blaschek L**, Pesquet E (2018). Kungliga Vetenskapsakademien Scholarship BS2018–0061 for the sequencing of the *Zinnia violacea* genome.

## EXPERTISE

### WET LAB

Cell suspension cultures, cloning, enzyme activity assays, histology, plant growth, transformation & crossing (*Arabidopsis*, *Populus*, *Zinnia*), quantitative bright field, fluorescence and vibrational microscopy

### DRY LAB

Automated image analysis (python, ImageJ), data analysis and plotting (R, bash), molecular bioinformatics and phylogenetics, reproducible reporting (markdown, git), text processing (Office, LaTeX)

## COURSES & WORKSHOPS

Piecewise Structural Equation Modelling (2019). *Stockholm University*

Advanced Imaging of Cells *in vitro* and *in vivo* (2018). *Stockholm University*

Optical Clearing and Expansion Microscopy (2018). *SciLifeLab, Stockholm*

Advances in Enzyme Regulation (2018). *Swedish University of Agricultural Sciences, Uppsala*

## TEACHING

Molecular plant microbe interactions (MSc level). 2017–2020. Project design and TA. *Stockholm University*

Green biotechnology (MSc level). 2018–2021. Project design and TA. *Stockholm University*

## SERVICE

Member of the departmental equality group, *Stockholm University* 2019–2021

Course representative in the department for evolutionary biology, *Uppsala University* 2015

Student representative in the board of the botanical institute, *Universität Greifswald* 2014–2015