Habilitation Board Decision on the Nomination for Appointment to Associate Professor

Masaryk University	
Faculty	Faculty of Science
Procedure field	Plant Physiology
Applicant	Mgr. Markéta Šámalová, Ph.D.
Applicant's home unit, institution	Faculty of Science, Masaryk University
Habilitation thesis	Development of molecular tools for experimental biology of plants and fungi
Board members	
Chair	prof. Ing. Miloš Barták, CSc. *Faculty of Science, Masaryk University*
Members	prof. RNDr. Jana Řepková, CSc. *Faculty of Science, Masaryk University* prof. Mgr. Ondřej Novák, Ph.D. *Laboratory of Growth Regulators, Palacký University Olomouc* Prof. Hugh Dickinson *Department of Biology, Magdalene College, University of Oxford, UK* Prof. Liam Dolan *Gregor Mendel Institute of Molecular Plant Biology, Vienna, Austria*

Evaluation of the applicant's scholarly/artistic qualifications

The applicant, Markéta Šámalová, performs research of high international standard. Her results and scientific outputs in the field of plant science meet international level in terms of originality, significance and difficulty.

Her research activity is focused on several areas of plant physiology, especially on gene expression systems in plants. Her papers published in the period of 2005–2006 focused vector systems for tissue-specific transactivation or chemical induction of transgene expression in plants. Together with co-authors, she presented valuable updates on such technologies and overviewed the properties in various plant species (mainly angiosperms) for chemical induction. Her paper on dexamethasone-inducible gene expression system for Arabidopsis brought a finding that the pOp/LhGR system provides a highly sensitive, efficient, and tightly regulated chemically inducible transgene expression system for plants. The paper has met a broad international attention and belongs to the most cited papers of the applicant.

In the last 10 years, the applicant has paid her attention to a wide variety of topics in experimental biology including e.g. rice blast fungus physiological properties. Her papers focusing at this particular field of science addressed different aspects of growth, development and physiological characteristics of Trychophyton rubrum, Aspergillus fumigatus and Magnaporthe oryzae. She put main emphasis into the evaluation of formation of reactive oxygen species (ROS) in pathogen-affected plants and the activation of antioxidative mechanism in the plants. Another area of interest in the above-specified group of papers was evaluation of nitric oxide (NO) effects during pre-infection development and infection. Together with the team members from the University of Oxford, she concluded that NO production by the rice blast fungus during early infection is an important factor in plant-pathogen interaction. Experiments carried out by the team show that the initiation of infection by M. oryzae are critically dependent on fungal NO synthesis. Last but not least, her research addressed the chemical structure of fungal cell wall in the concept of structure and function during pathogen attack. Main finding of this direction of her research was that carbohydrate composition and structure of the cell wall of the rice blast fungus M. oryzae support the interaction of the fungus and host plant. Regarding this aspect, she has given a special emphasis to the family of glucan elongation proteins (Gels) that act as beta-1,3-glucan glucanosyltransferases. These outputs were published in a highly rated scientific journal included into the Web of Science (WOS) platform.

High scientific expertise of the applicant reflects the fact that Markéta Šámalová has had an opportunity to improve her professional skills in the teams of high international reputation, such as Department of Plant Sciences (University of Oxford, UK), School of Biology, University of Leeds (UK), Pasteur Institute (Department of Mycology, Paris, France), and many others. This experience undoubtedly formed her professional orientation to actual scientific topics and increased her scientific performance in the field of plant and fungal metabolism, molecular biology and genomic aspects of plant-pathogen interactions. In her recent scientific activities, Markéta Šámalová applies a wide range of methodological approaches to evaluate the role of selected proteins in metabolism of plants and fungi, and investigate the biomechanical properties of cell walls. In this field, the applicant is one of the leading experts in the Czech Republic.

Scientific publications that Markéta Šámalová has yet published reflect the above-described fields of her professional interest. The publication activity of Markéta Šámalová was reviewed by the Habilitation Board on the proposal of Vice-Dean, Prof. L. Bláha (Faculty of Science, Masaryk University, Brno). The Board evaluated the list of publications that Markéta Šámalová submitted for the purpose of habilitation procedure (Annex 5) and the list of her publications prepared by the head of the Board on April 12, 2023 (see Appendix). The Board members stated that, up to date, Markéta Šámalová has 17 publications in the following categories:

Platform		No. of publication
WOS (core collection)	Journals with IF	14
WOS (all databases)	Journals with IF	2
SCOPUS	Journals with SCI	1

Total	17

For detailed information about the publications listed in the above Table, please see Supplementary Material.

The Board members were informed about her manuscript under editorial review and adopted the information that Markéta Šámalová has, apart from the papers listed in the Table above, one manuscript on Hormone-regulated expansins submitted recently to Plant Physiology (accepted, in press). Moreover, the Board members highly appreciated the fact that in majority of publications (11 of 17), Markéta Šámalová is the first author.

Conclusion: The applicant's scholarly/artistic capabilities **meet** the requirements expected of applicants participating in a habilitation appointment procedure in the field of Plant Physiology.

Evaluation of the applicant's pedagogical experience

The applicant's teaching activities are various. She has been teaching since 2003 (she started at Oxford University during her long-term stay in the UK). Recently, the main component of her pedagogical activities is teaching of the following courses at the Faculty of Science, Masaryk University, Brno: Bi1190 Biology of Plant Cell, Bi6040 Advanced Plant Physiology, Bi6040c Plant physiology for advanced students – practice, Bi8080 Plant molecular physiology, Bi8670 Principles of Plant Biotechnologies, Bi8670c Principles of Plant Biotechnologies – Practical Course, Bi1022 Introduction to the study of Experimental Biology of Plants, C7301 Genomics – practice. The listed courses have been taught by the applicant recently. In the period of 2003–2010, during her stay at the University of Oxford, she was responsible for the PhD workshop in Plant Science for the students at the Oxford University.

In her teaching, she applies modern methods and introduces recent knowledge in the field of molecular biology approaches in plant science to undergraduate students. This is most apparent in Bi8670 course (Principles of Plant Biotechnologies) in which she uses modern methods of molecular biology applicable for the preparation of genetically modified organisms (GMOs) including transgenic plants, and targeted modification of plant genome (e.g.CRISPR/Cas9). Moreover, her teaching of the above course includes the following aspects: genomic databases, primer design, PCR, isolation of plasmid DNA, its cleavage and electrophoresis, techniques for the transformation of E. coli and agrobacteria, transformation of tobacco by the in vitro methods, transformation of Arabidopsis thaliana by the floral dip method, chemically inducible systems, GUS staining, fluorescent proteins and confocal fluorescence microscopy.

She supervised three bachelor thesis students, and three master thesis students. Among the latter ones, one is still in progress. Until now, she has supervised 2 doctoral students (1 already defended, Oxford University, 1 still in progress (Masaryk University).

Conclusion: The applicant's pedagogical capabilities **meet** the requirements expected of applicants participating in a habilitation appointment procedure in the field of Plant Physiology.

Habilitation thesis evaluation

The members of the Habilitation Board have read in detail the habilitation thesis and the three reviews prepared by the reviewers: 1. Assoc. Prof. Enrique Rojo de la Viesca (National Centre for Biotechnology, CSIC, Plant Molecular Biology Group, Madrid, Spain), 2. Assoc. Prof. Lenka Burketová (Institute of Experimental Botany, Czech Academy of Science, Prague, Czech Republic), and 3. Assoc. Prof. Jan Zouhar (Mendel University, CEITEC, Brno, Czech Republic). After reading, the Board members came to the following conclusions:

(i) The topic of the habilitation thesis is actual and the thesis itself focuses on important aspects of plant physiology as well as plant-pathogen interactions.

(ii) The applicant has demonstrated her ability to identify the key points of the scientific problem. In order to gain valuable results in the two research fields, she chose an adequate experimental design and appropriate methodological approaches. The text of the habilitation thesis is well-balanced and brings a comprehensive overview of the results gained during the experiments involved into the thesis. In other words, Markéta Šámalová demonstrated the ability to analyse the results and evaluate them critically in comparison to current knowledge in the field.

(iii) The applicant demonstrated a very good knowledge of the subject and prepared the thesis very carefully with regards to the key points of the problem.

(iv) The main contribution of the thesis can be seen in the synthesis of the applicant’s results and recent knowledge in biochemical, molecular biology and genomic interactions between plant and fungal pathogen.

(v) The three reviewers evaluated the habilitation thesis very positively. The Habilitation Board members share the reviewers’ opinion and rank the thesis among those having a high scientific standard.

Conclusion: The applicant's habilitation thesis **meets** the requirements expected of habilitation theses in the field of Plant Physiology.

Habilitation Board Decision on the Nomination for Appointment to Associate Professor

Secret vote results

Voting took place: electronically

Number of board members		5
Number of votes cast		5
of which	in favour	5
	against	0

Board decision

Based on the outcome of the secret vote and following an evaluation of the applicant's scholarly or artistic qualifications, pedagogical experience and habilitation thesis, the board hereby submits a proposal to the Scientific Board of the Faculty of Science of Masaryk University to **appoint the applicant associate professor** of Plant Physiology.

In Brno on 18.04.2023

prof. Ing. Miloš Barták, CSc. .....