

**PhD Thesis Acceptance Report**  
**Research Discipline Council of Biological Sciences**  
**Jagiellonian University in Kraków**

**Candidate's name and surname:** Arpan Kumar Basak

**PhD Thesis Title:** ER bodies and their impact in shaping root microbiota

**Thesis Supervisor:** prof. dr hab. Kazimierz Strzałka

**Assistant Supervisor / Second Supervisor/ Co-supervisor (if applicable):** Dr Kenji Yamada

**Reviewer:** prof. dr hab. Mohamed Hazem Kalaji

**THESIS EVALUATION**

1. **Scientific merit of the thesis**

a. Originality of the research (25-200 words):

The candidate's dissertation provides, for the first time, a comprehensive new knowledge of the field of the study. It is an original research work that provides very relevant and new data on the topic of the interaction of ER bodies with the microbiota of roots. The work focuses excellently on exploring the potential role of MEB1 and MEB2 in ER body morphology, ER body movement, and nutrient homeostasis. In addition, the work emphasizes on discovering the role of PYK10 and Trp-derived secondary metabolites in the composition of root exudates.

b. Scientific merit of the chapters / articles (25-200 words):

The dissertation is based on two wide-ranging chapters. Part of the obtained results (described in the first chapter) are published as a scientific paper in the *Plant Methods Journal*, which is highly ranked among comparable biological journals (IF= 5.827 and 140 Ministry Points). This publication is excellently prepared and the introductions and discussions are coherent and essential. To date, this article has been accessed 1009 times, although it was not published until October 26, 2021. This work ranks 31<sup>st</sup> out of 125 tracked articles of a similar age in *Plant Methods*. The preparation of the second chapter demonstrates the candidate's high potential in designing high-quality experiments and analysing and interpreting the data. Throughout the work in the lab and the field, a very careful selection was made to use the correct sophisticated techniques available worldwide.

The candidate has demonstrated the ability to write excellent scientific papers. In addition to publishing a paper based on the results obtained in his dissertation, he has also authored another paper as first author that is not included in his records (preprint):

Tryptophan specialized metabolism and ER body-resident myrosinases modulate root microbiota assembly, (**Arpan Kumar Basak**, Anna Piasecka, Jana Hucklenbroich, Gözde Merve Türksöy, Rui Guan, Pengfan Zhang, Felix Getzke, Ruben Garrido-Oter, Stephane Hacquard, Kazimierz Strzałka, Paweł Bednarek, Kenji Yamada, and Ryohei Thomas Nakano. 2022.

Beyond the scope of the thesis contents he also published a book chapter and 2 high-quality papers.



2. **Substantial merit of the thesis**

*(ability to introduce the research topic and clarity of research hypotheses, the choice of research methods and statistical tools for data analysis, presentation and critical analysis of the research data, the ability to discuss research data and the theoretical background, clarity and quality of the conclusions) (25-200 words):*

The research topic of the dissertation is current and relevant in the context of current research in the fields of biochemistry, molecular biology and plant sciences. In the chapter "Introduction", the author vividly introduces the topic of the thesis (12 pages). This chapter highlights the available knowledge about the specific components of the research conducted and points out the missing and unclear knowledge elements, such as the exact role of PYK10 in plant-microbe interactions. Then, in this section, the candidate presented very logically the proposed objectives of the work and proposed high quality hypotheses for proof. The work was concluded with final conclusions and perspectives based on the overall results obtained, which supported the hypotheses presented. The objectives of the research conducted were achieved and the research methods are appropriate for the objectives and hypotheses formulated in the work. The methods used are very advanced and clearly described, and the author presents the ideas and knowledge reviewed with sufficient theoretical background. Material and method/methodology are described separately in each chapter (2 and 3). Statistical analyses were properly performed throughout the experimental work when necessary, and the candidate's critical analysis of research data and ability to discuss research data are evident.

3. **Layout and register**

*(layout, register and the clarity of the language, the quality of the visual material etc.) (25-200 words):*

The quality of the candidate's presentation and editing is also quite outstanding. The English language used in the dissertation is generally excellent, and it is well written. The graphic content is of really high quality. The tables and figures are well designed, clearly laid out, and extremely professionally done. The figures are also accompanied by clear legends.

4. **Critical notes**

The dissertation is not structured like a standard doctoral thesis (5 Distinct Chapters):

Chapter I: Introduction.

Chapter II: Review of Literature.

Chapter III: Methodology (Research Design & Methods)

Chapter IV: Presentation of Research (Results)

Chapter V: Summary, Implications, Conclusions (Discussion)

However, it is a very minor critical note that should not affect the excellent level of the work.

5. **Final grade** (justification 25-200 words):

Overall, the dissertation of Mr. **Arpan Kumar Basak** represents an important scientific contribution to the understanding of the interaction of ER with the microbiota of roots. It should be noted that some of the results of the candidate's research have been published in well-known and highly rated scientific

journals. The dissertation delivered and the publications reported demonstrate that the candidate has achieved the intended goals, and the current results suggest far-reaching research ambitions for the future. The work meets all the criteria for a dissertation and is ready for defence and evaluation by the appropriate scientific committee.

I, hereby, declare that the PhD thesis of Mr. **Arpan Kumar Basak** meets the criteria pursuant to art. 187 of Act of 20 July 2018 The Law on Higher Education and Science (Journal of Laws of 2018, item 1668, and further amendments) and request that the Research Discipline Council of Biological Sciences of the Jagiellonian University in Krakow accepts Mr. **Arpan Kumar Basak** for further stages of doctoral proceedings in the field of exact and biological sciences, in the discipline of biological sciences.

YES/~~NO~~

I, hereby, request that the thesis is accepted with distinctions. Justification (25-200 words)

YES/~~NO~~

In my opinion, the scientific quality of **Arpan Kumar Basak's** dissertation is clearly above average. Also, due to the very high quality and originality of the work already published in prestigious journals, I would strongly encourage to award him a proper distinction.

09.08.2022  
date

  
Reviewer's signature

INFORMATION FOR THE REVIEWER:

1. Information on requirements concerning PhD thesis structure:  
[http://www.wb.uj.edu.pl/en\\_GB/stopnie-tytuly/doktoraty](http://www.wb.uj.edu.pl/en_GB/stopnie-tytuly/doktoraty)
2. A digital copy should be sent to:  
[nauki.biologiczne@uj.edu.pl](mailto:nauki.biologiczne@uj.edu.pl)

A duly signed original should be sent to:

**Rada Dyscypliny Nauki biologiczne**  
**Dziekanat Wydziału Biologii**  
**Uniwersytet Jagielloński w Krakowie**  
**ul. Gronostajowa 7**  
**30-387 Kraków**