

Institute of Zoology and Biomedical Research

Topic: Effects of reproductive mode and cryptobiosis on tardigrade dispersal, speciation and extinction rates.

Supervisor: dr hab. Łukasz Michalczyk (Department of Entomology, Institute of Zoology and Biomedical Research) l.michalczyk@uj.edu.pl

Background information

Tardigrades are a phylum of microinvertebrates that dwell a wide variety of habitats throughout the globe. They are famous for their cryptobiotic abilities that allow them to withstand extreme conditions and are also thought to aid dispersal of individual species. Moreover, tardigrades exhibit a range of reproductive modes, including dioecy and parthenogenesis. Theory predicts that both asexual reproduction and cryptobiotic survival should increase dispersal potential. On the other hand, differences in dispersal abilities are hypothesised to affect speciation and lineage extinction rates. Thus, tardigrades are an interesting model to address some of the fundamental questions of modern evolutionary biology, biogeography and taxonomy.

The main question to be addressed in the project

How reproductive mode and cryptobiotic abilities affect dispersal and, in consequence, speciation and extinction rates in tardigrades?

Information on the methods/description of work

The successful candidate will be involved in fieldwork (sample collection), sample extraction, slide preparation, morphometrics and imaging in light microscope, processing specimens for scanning electron microscope, karyotyping, DNA extraction, amplification and sequencing, species identification, and taking care of tardigrade cultures. The student will also analyse data and prepare drafts of manuscripts, and will be involved in the promotion of results at seminars and conferences.

Special requirements from the student

Candidates are expected to have at least basic knowledge of integrative taxonomy methods, including morphometry (preferably using light microscope), DNA sequencing and phylogeny reconstruction. Interest in bioinformatics and a track record of scientific publications, preferably related to the project topic, are highly desirable.

Additional information

Duration: 10.2020–09.2024. In addition to the university scholarship (2.5k PLN/month), the student will receive extra 2k PLN/month from the Polish National Science Centre for three years. More information: tardigrada.edu.pl/PhD.htm

References

Fontaneto, D., Barraclough, T.G., Chen, K., Ricci, C. & Herniou, E.A. (2008) Molecular evidence for broad-scale distributions in bdelloid rotifers: everything is not everywhere but most things are very widespread. *Molecular Ecology*, 17: 3136-3146. <https://doi.org/10.1111/j.1365-294X.2008.03806.x>

Fontaneto, D., Tang, C.Q., Obertegger, U., Leasi, F. & Barraclough, T.G. (2012) Different diversification rates between sexual and asexual organisms. *Evolutionary Biology*, 39(2): 262-270. <https://doi.org/10.1007/s11692-012-9161-z>

Gąsiorek, P., Jackson, K.J., Meyer, H.A., Zając, K., Nelson, D.R., Kristensen, R.M. & Michalczyk, Ł. (2019) *Echiniscus virginicus* complex: the first case of pseudocryptic allopatry and pantropical distribution in tardigrades. *Biological Journal of the Linnean Society*, 128(4): 789-805. <https://doi.org/10.1093/biolinnean/blz147>