

Institute: Institute of Botany

Topic: Embryology of selected species of *Utricularia* section *Utricularia*, with particular emphasis on developmental disorders

Name of supervisor: prof. dr hab. Bartosz J. Płachno
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Background information:

The genus *Utricularia* (Lentibulariaceae) includes around 250 species of carnivorous plants, which have an unusual vegetative body structure and possess traps for catching small invertebrates (Miranda et al. 2021). Most species reproduce sexually, however, some reproduce mostly vegetatively forming clonal populations, then seeds are rarely produced or are not produced at all. Extensive clonal growth and vegetative dispersal of plants can disrupt the functioning of sexual polymorphisms (Barrett 2015). Also due to miniature genomes and high molecular evolutionary mutation rates in chloroplast, mitochondrial and nuclear sequences *Utricularia* have become an interesting model for research also on reproduction and gametophyte development (Ibarra-Laclette et al. 2021).

The main question to be addressed in the project:

The aim of the project is to compare several species of bladderworts (*Utricularia*) in terms of the development of female gametophytes and the structure of the pistils, and the interaction between male and female gametophytes. The main question is whether the sterility of some species is related to a disturbance in the development of: ovules, female gametophytes, or a disturbance in the growth of pollen tubes.

Information on the methods/description of work:

We will use various embryological techniques, light, scanning and also transmission electron microscopies.

Additional information (e.g. Special requirements from the student) :

A candidate should possess basic knowledge on the plant anatomy, embryology and cell structure as well as the ability to work in interdisciplinary research teams.

Place/name of potential foreign collaborator:

References (3):

- Miranda, V.F.O.; Silva, S.R.; Reut, M.S.; Dolsan, H.; Stolarczyk, P.; Rutishauser, R.; Płachno, B.J. A Historical Perspective of Bladderworts (*Utricularia*): Traps, Carnivory and Body Architecture. *Plants* 2021, 10, 2656. <https://doi.org/10.3390/plants10122656>
- Barrett, S.C. Influences of clonality on plant sexual reproduction. *Proc Natl Acad Sci U S A.* 2015;112 (29), 8859-8866. doi:10.1073/pnas.1501712112
- Ibarra-Laclette, E., Albert, V.A., Pérez-Torres, C.A. et al. Transcriptomics and molecular evolutionary rate analysis of the bladderwort (*Utricularia*), a carnivorous plant with a minimal genome. *BMC Plant Biol* 2011, 11, 101 <https://doi.org/10.1186/1471-2229-11-101>