

Institute of Environmental Sciences

**Topic:** The role of environment in maintaining polymorphism of a sexual conflict gene

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**Background information:**

The maintenance of genetic variability, that allows populations to adapt to novel environments, is one of the greatest puzzles in evolutionary biology. This is because ubiquitous directional selection should lead to depletion of genetic variation in selected traits. This is especially the case with sexually selected traits, in which directional selection is particularly strong. Yet, substantial genetic variance in these traits is maintained. A potent force proposed to maintain genetic variation is balancing selection which can take a form of a crossover genotype by environment interaction for fitness in heterogeneous environments. It causes selection to act in environment-dependent manner so that one allele is favored in one environment and the other at another one.

**The main question to be addressed in the project:**

We aim to investigate the maintenance of polymorphism in *Phosphogluconate dehydrogenase (6Pgdh)* —a sexually selected gene associated with sexual conflict in the bulb mite *Rhizoglyphus robini*. *6Pgdh* polymorphism (with two alleles, S and F) is associated with differences in male reproductive success. The S-bearers have advantage in male-male competition, but decrease fecundity of their partners. Previous studies suggest that *6Pgdh* polymorphism is maintained by environment-dependent balancing selection, but the detailed mechanisms are unknown. PhD candidate will investigate ecological factors that determine persistence of the polymorphism.

**Information on the methods/description of work:**

PhD candidate will gather field data to assess the level of *6Pgdh* polymorphism in natural populations and determine environmental factors affecting *6Pgdh* allele frequencies in the field. (S)he will conduct experimental evolution study and will be involved in phenotypic measurements in the lab that will directly test the role of potential factors in affecting *6Pgdh* frequencies. Real-time PCR with TaqMan probes will be used to genotype individuals. PhD candidate will also be involved in other molecular analyses conducted in the project.

**Additional information:**

This PhD project is within a project *Environment-dependent balancing selection in a gene involved in sexual conflict* financed by National Science Centre (PI A. Plesnar-Bielak). In addition to the regular scholarship from the PhD school the student will receive grant-funded tax-free stipend of 3000 PLN/month for 3 years. Experience in evolutionary research and molecular techniques and skills in data analysis are required.

**Place/name of potential foreign collaborator:** -

**References :**

Konior, M., Radwan, J., Kołodziejczyk, M., & Keller, L. (2006). Strong association between a single gene and fertilization efficiency of males and fecundity of their mates in the bulb mite. *Proc. Roy. Soc. Biol. Sci.*, 273, 309–314.

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Skwierzyńska, A.M., & Plesnar-Bielak, A. (2018). Proximate mechanisms of the differences in reproductive success of males bearing different alleles of Pgdh - a gene involved in a sexual conflict in bulb mite. *J.Evol.Biol*, 31, 657–664.