

# PRANAV UNNIKRISHNAN

PhD candidate

## Contact

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## Profile

I am a PhD candidate at the **Jagiellonian University**, having submitted my thesis and currently awaiting defense. My current work focuses on environment-dependent **balancing selection** in a sexually selected gene. I have experience in working with **different study species** such as *Drosophila*, birds, squirrels and currently on bulb mites. Over time, I've developed strong analytical and research skills, and my broad foundation makes me something of a '**jack of all trades**'—comfortable adapting to new methods and ideas. In addition to my research, I have mentored undergraduate students and contributed to teaching, enhancing my ability to communicate complex scientific concepts.

Looking ahead, I am particularly interested in how environmental variation shapes individual behavior and life-history traits. I aim to explore these questions using a combination of phylogenetics, population genetics, and functional genomics to build a more mechanistic and evolutionary understanding of organismal responses.

## Education

### PHD IN BIOLOGY (2021 - PRESENT)

*Jagiellonian University, Krakow, Poland*

*Doctoral Thesis: "Testing for factors maintaining 6Pgdh polymorphism in bulb mites"*

*Supervisor: Prof hab. Dr. Wiesław Babik*

*Assistant supervisor: Dr. Agata Plesnar-Bielak*

### INTEGRATED BS-MS (2015 - 2020)

*Indian Institute of Science Education and Research,  
Tirupati, India*

*Masters Thesis: "Evolution of coat color and pattern in squirrels of the world"*

*Supervisor: Prof. Dr. Nandini Rajamani*

### SECONDARY EDUCATION

*BSS GHSS, Palakkad, Kerala, India*

## First author publications

- Title:-** 6Pgdh polymorphism in wild bulb mite populations: prevalence, environmental correlates and life history trade-offs  
**Journal name:-** Experimental and Applied Acarology  
**Year:-** 2024  
**Author list:-** Pranav Unnikrishnan, Szymon Grzesik, Magdalena Trojańska, Beata Klimek & Agata Plesnar-Bielak  
<https://doi.org/10.1007/s10493-024-00909-4>
- Title:-** The interplay of environmental and social factors influences balancing selection: 6Pgdh in bulb mites  
**Journal name :-** Currently in review (Ecology and Evolution)  
**Year:-** In review  
**Author list:-** Pranav Unnikrishnan, Anna Spaeth, Magdalena Trojańska, Wiesław Babik, Agata Plesnar-Bielak  
<https://doi.org/10.21203/rs.3.rs-4835969/v1>

## Research experience

### PHD

**Title:-** Maintenance of 6Pgdh Polymorphism in Bulb Mites: Insights from Field Studies, Experimental Evolution, and Life-History Trade-Offs

**Keywords:-** Sexual selection, experimental evolution, balancing selection

**Study system:-** Bulb mites (*Rhizoglyphus robini*)

- Investigated the **maintenance of polymorphism** at the 6Pgdh gene in bulb mites, where wild populations remain polymorphic but lab populations tend to become monomorphic.
- Combined field data with **experimental evolution** and life-history assays to show that environment-dependent balancing selection—driven by **interactions between temperature and sexual selection**—maintains the polymorphism.
- Conducted **RNA-seq** to compare gene expression between 6Pgdh genotypes, identifying distinct **expression profiles** linked to stress response and reproduction, supported by GO enrichment and *Drosophila*-based pathway analysis.

### MASTER'S THESIS

**Title:-** Explaining the evolution of color and patterns in squirrels using meta-analyses and experimental approaches

**Keywords:-** Coat color evolution, phylogenetics, meta-analysis

**Study system:-** Squirrels

- Investigated the **evolutionary drivers** of coat color and pattern diversity in squirrels, with a focus on their ecological function and macroevolutionary patterns.
- Used phylogenetic comparative methods and meta-analysis across >200 Sciuridae species to **reconstruct ancestral color traits**, revealing support for **Gloger's rule and habitat-associated pattern evolution**.
- Designed **computer-based visual detection simulations** using human participants as model predators, showing that patterned coats significantly enhance camouflage efficiency in visually complex environments.

