**Institute** of Environmental Sciences**:**

**Topic:** The effects of ambient temperature fluctuations on learning performance in zebra finches

**Name of supervisor:** Joanna Rutkowska

[joanna.rutkowska@uj.edu.pl](mailto:joanna.rutkowska@uj.edu.pl)

**Background information:** Our world faces increased climate unpredictability and short-term variability, and it is unclear whether animals are able to cope with those changes. On the one hand, highly variable environmental conditions could induce physiological costs that drain resources available for cognitive functions. On the other hand, environmental fluctuations could promote cognitive mechanisms responsible for more versatile behaviours. Those two options could be reconciled if physiological costs are reduced by pre-natal effects and/or developmental plasticity, but research in this field is scarce. Because learning to get food is crucial for survival, birds raised in variable thermal conditions could develop enhanced cognitive traits related to food acquisition. Whether or not this enhanced learning ability persists into adulthood could depend upon whether the environments during development and adulthood are correlated. In such case, individuals developing in variable temperature will retain high learning performance into adulthood. Alternatively, investment in high cognitive abilities early in life might incur cost in terms of reduced learning performance at adulthood.

**The main question to be addressed in the project:** The main aim of this project is to study the effect of temperature unpredictability across different time scales on learning efficiency in a model bird species, the zebra finch *Taenipygia guttata*. The project will answer the following questions: do variable ambient temperatures affect different types of learning in the same way, anddo offspring that develop in variable conditions cope better with variable environmental conditions inadulthood?

**Information on the methods/description of work:** The study will be carried out at the Institute of Environmental Sciences of the Jagiellonian University, on a captive population of zebra finches that the supervisor established in 2000. It will involve breeding the birds, cross-fostering eggs, performing basic morphological measurements, and physiological tests such as analyses of blood parameters and hormone levels. The PhD student will carry out tests on learning performance in relation to food acquisition in juveniles and adults: (i) problem-solving tasks providing an integrative measure of perception, reasoning and decision making; and in adults only: (ii) learning associations, (iii) spatial learning and (iv) social learning.The PhD student will also help with the recordings of bird song of the males involved in the experiments. The PhD student will be trained to perform the practical part of the project, guided in skills needed for a successful scientific career, and encouraged to develop his/her own ideas.

**Additional information**: Requirements: MSc in Biology or Animal Psychology and fluency in English. Experience in any **behavioural procedures** planned in the current project, and previous research experience will be an additional asset.

The successful candidate will work in a team comprising of another PhD student and technical assistants. The project is financed by the National Science Centre, which ensures a PhD student with a monthly scholarship of at least 4500 PLN for three years and a possibility of a short foreign internship.

**References:**

Maille, A. and Schradin,C.2017. Ecophysiology of cognition: How do environmentally induced changes in physiology affect cognitive performance? Biological Reviews 92:1101-1112.

Monaghan, P. 2008. Early growth conditions, phenotypic development and environmental change. Philosophical Transactions of the Royal Society B: 363:1635-1645.