

## **Mechanisms of animal behavioural individuality emergence**

The aim of the project is to explain how consistent individual differences in behaviour are shaped. These differences have been for long observed in animal populations. Some individuals take risks consistently, while others stick to the refuge. Some explore new territories, while others consistently stay in the familiar area. Increasing interest of ecologists and evolutionary biologists in these so called animal personalities has brought some explanations of their ecological and evolutionary significance. Yet, despite recent advances, there are still major gaps in our understanding of this complex phenomenon of individuality emergence.

The most important questions remain: (i) to what extent the evolutionary history of an animal, written in their genes, determines their behaviour, (ii) what is the role played by the information coming from proximate ancestors – of so called parental effects, (iii) how much of the individuality is shaped during early development and by the early experiences, and (iv) how its articulation depends on the current environment and (v) physiological or morphological state of the animal. And then, (vi) how all the above integrate and interact to produce the unique individual. In this project we will also check if an animal receiving consistent and reliable cues from the environment develops more consistent behaviours than an animal receiving contradictory or unreliable information. Also, we will answer if the behavioural type – or personality – is maintained across metamorphosis. That is, if adults stick to their behavioural tendencies from the time they were a larva.

Our study will encompass three species. We will study the behavioural consistency through development in the moor frog (*Rana arvalis*) testing boldness first in the tadpoles and then after metamorphosis in the same individuals. Similarly, we will also check if bold larvae develop into bold pupae and then bold adult phantom midges (*Chaoborus flavicans*). In both animals we will study how cues of predation affects this consistency. Finally, as one of the first teams, we will approach the problem of personalities emergence in a clonal, parthenogenetic animal. We will perform experiments using small planktonic crustacean *Daphnia* in order to answer several questions presented here.

We approach this topic as these consistent individual differences in behaviour scale up: these are the unique phenotypes that undergo selection, constitute populations, interact with other species, and thus shape biological reality. Understanding how behavioural personalities emerge leads us to a better understanding of how higher level systems, such as food webs, communities, or ecosystems, function. It will also have far-reaching practical implications for conservation issues. Both vulnerability to anthropogenic impacts and pliancy to conservation measures depend on individual personality. Appreciation that individual history matters also in non-human animals, even in invertebrates, might have deep consequences and constitute a strong message for fields such as human health and education, which need to look for individual solutions rather than apply general measures seemingly fit-for-all. Understanding individuality in non-human animals might also even change our approaches to animals in general.