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The Evolution, Adaptation and Behavior group aims at studying the evolution of phenotypic and behavioral traits through a combination of long-term monitoring of natural populations, of field and lab experiments, of molecular analyses, and of mathematical and computational modeling. Our research mainly focuses on animals, in particular mammals (alpine marmot, giraffe), birds (white-throated dipper, collared flycatcher, great tit) and insects (various *Drosophila* species, the parasitoid wasp *Venturia canescens*).

We study the evolution of fitness-related traits in interaction, either selective or plastic, with an individual's biotic and abiotic environment. Interactions between individuals have a special importance in our reasoning and are thus the object of a first axis of research on **group dynamics and social interactions**. We also consider the environment as providing resources and informative signals through two other axes, one on **phenotypic plasticity** and the other on **resource allocation and the sensitivity to environmental variables**. In both, we consider the impact of stress factors caused by human activities — such as global warming, artificial lighting or invading species — or by the presence of pathogens.

Group dynamics and social interaction. The environment encountered by numerous animals contains, on top of resources and other elements, other individuals. Social interactions vary immensely between species, from a solitary lifestyle to such an extreme degree of cooperation that a part of the group sacrifices their reproduction at the benefit of others, specialized in this task. In this axis, we try to understand how groups form and how social structures are maintained, at various scales extending from unicellular organisms to cooperative mammals.
Here are a few examples of questions that we address:

- Evolution of sociality: what are the consequences of climate change on the benefits of group living (in the alpine marmot)? How does that impact group composition and the probability and age of dispersal?
- Group dynamics: how does the size and composition of familial groups evolve in the context of climate change? In giraffes, how do temporary groups form, and what role do kinship play in the probability and duration of pairing?
- Which evolutionary trajectories have led to multicellular organisms expressing differentiated cell types, a part of which sacrifice their reproduction?
- What are the neurogenomic determinants that signal the presence of related individuals in solitary individuals, triggering altruistic behaviors?

Phenotypic plasticity. Evolution by natural selection can drive phenotype changes on short timescales, in the order of a few generations. Yet it remains inefficient to track more frequent environmental changes. Phenotypic plasticity is a means to buffer such environmental variations, either through informed decisions or fixed reaction norms, which are the object of study in this axis.
Here are a few examples of questions that we address:

- How do individual characteristics, in particular personality traits, shape the use of information on the environment for decision-making?
- Is there a trade-off between the speed of decision making and its accuracy? What conditions favor genotypes that make fast, error-prone decisions, or slower, more accurate genotypes?
- What types of environmental variations select for plastic genotypes?
- Do changes in gene expression observed during environmental fluctuations induce behavioral changes?

Resource allocation and sensitivity to environmental variables. Organisms make other decisions throughout their lives as they decide how much resources to allocate to various traits, such as survival, growth, reproduction or immunity. This differential allocation of resources relies on complex systems, or instance the endocrine system in animals, that we study. These systems can be disturbed by anthropogenic changes that disrupt the long-term ecological setting in which they have evolves, resulting in major phenotype perturbations.
Here are a few examples of questions that we address:

- How do endocrine systems — that allow the communication between tissues and control the differential allocation of resources — evolve?
- How do chemical pollutants affect physiological processes, ageing and thereby life-history strategies in response to environmental variation?
- What role do climatic fluctuations play in the heterogeneity of parasite infection, especially at stages that go through the external environment?

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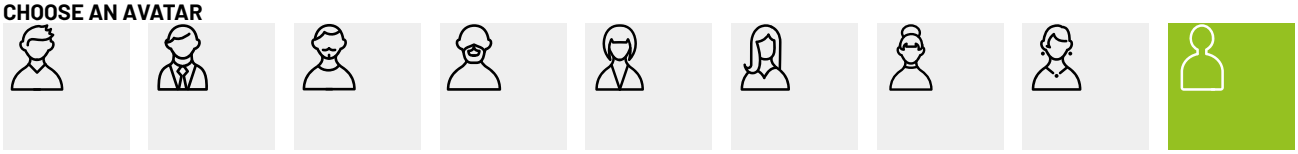

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