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## Evolutionary dynamics in wild birds: from single populations to multiple species

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Natural selection is the main mechanism driving evolution and therefore the hub for understanding biodiversity. Natural selection operates on phenotypes when its variance and fitness are associated at the across-individual level. As an outcome, evolution is detected when the frequency distribution of a given trait or genes changes over time or space. However, environmental conditions are permanently changing across time and space, often in an unpredictable manner, which dilutes genetically fixed phenotype/fitness correlations. In this talk, I will show some insights on the evolutionary dynamics of secondary sexual, morphological and life-history traits, jumping from a single population of a long-term monitored population of pied flycatchers (*Ficedula hypoleuca*) in a Mediterranean region, to a biogeographical and multi-species perspective. Our results suggest that population density and variance in temperature during laying date can be the main agents of selection acting on the expression of secondary sexual traits and laying date, respectively. In addition, not only micro-evolutionary processes but dispersal can promote population differentiation at micro-geographical scales through a phenotype-dependent dispersal within our population of pied flycatchers. At a biogeographical scale, biogeographical tools can help us out to understand the evolutionary dynamics of phenotypic traits in wild bird populations. Our findings suggest that the evolutionary potential of morphological traits decreases at maximum and minimum values of environmental favourability. Overall, the aim of this talk is to describe the role that environmental conditions may have on the evolutionary dynamics of different phenotypes, not just in specific populations, but in multiple populations and species, making use of analytical tools from the field of biogeography.