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EVOLUTION OF FLOWERS UNDER POLLINATOR CHANGE

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ABSTRACT

Plants that rely on animal pollination might require to rapidly adapt when exposed to new pollinator conditions. Change in pollination environments happens often as humans influence the ranges of plants and pollinators and is also a common feature in the long-term evolution of flowering plants. In this talk I will present a series of studies where we examine the capacity for rapid floral trait evolution under contrasting pollination situations. We focus on pollination biology, and measure natural selection as well as plasticity and quantitative genetic parameters of floral traits (heritability and evolvability) to understand their potential for evolution in response to change. In the recent trans-continental range expansion of common foxgloves (*Digitalis purpurea*) we demonstrate that populations naturalised in two regions of the Americas, after independent introduction only 85 generations ago, show evolution in corolla morphology that is consistent with the new pollinator guild that includes hummingbirds in addition to bumblebees. We explore why nectar traits do not show rapid change even though they can be expected to be under strong selection by hummingbirds. The tree tobacco (*Nicotiana glauca*) has lost all pollinators after another trans-continental expansion. In this case, we show how high levels of environmentally induced plastic variation in corolla traits in wild populations overrides potential evolution in response to selection for increased selfing. Finally, the Mediterranean gorse (*Ulex parviflorus*) has a stable pollination environment dominated by a single pollinator. We found how stabilizing selection and low trait heritability can explain lack of change in flowers in this species. Our results on the causes and constraints in floral evolution when exposed to novel or the loss of pollinators are particularly relevant in the current changing conditions, as well as important to understand the mechanisms behind the extraordinary diversity of flowers.