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Pollinator driven speciation in plants — insights from Neotropical gingers and California Clarkias

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Flowering plants are spectacularly diverse, and flowers themselves have been implicated in species diversification because of the effects they have on plant mating patterns. Floral divergence can involve adaptation to new types of pollinators or more subtle changes in the way a plant uses the same type of pollinator. I explore both of these scenarios in the Central and South American ginger genus *Costus* and in the California wildflower genus *Clarkia*. In the first scenario, I ask how strikingly novel flowers that fit a new type of pollinating animal evolve, when often the inferred transitional states appear maladaptive, and to what extent early stages of floral divergence can contribute to speciation. I address these questions using a pair of California *Clarkia* species, in which one species has evolved novel hawkmoth pollination, while retaining some visitation by ancestral diurnal insect pollinators. In the second scenario, I examine how divergence in flower shape can allow two closely related ginger species to use the same hummingbird pollinators while risking little cross contamination of pollen. In this case, I ask whether natural selection to reduce hybridization in sympatric areas has driven the divergence, and how selection interacts with the genetic architecture underlying the flower morphology. This work helps elucidate both the early stages of divergence in pollination systems and the role of secondary contact in reinforcing floral divergence, and how both of these phenomena can promote plant speciation.