**Reproductive trait associations in flowering plants and their role in plant-pollinator interactions**

Flowering plants have an astonishing diversity of reproductive strategies. These strategies respond in part to the selection imposed by different animal pollinators. However, species’ reproductive strategies, defined by their different trait combinations, are limited by their evolutionary history and physiological constraints. Despite recent advances in the understanding of plant trait variation patterns at a global scale, most of the work conducted to date has rarely considered reproductive traits. For instance, there are well-established spectrums of trait variation for leaf, wood or root-related traits but not for floral related ones. Thus, an in-depth evaluation of the reproductive trait covariation patterns of flowering plants is currently lacking.

Our study explores the different reproductive trait associations of flowering plants and how they shape interactions with pollinators. For this, we gathered reproductive and vegetative trait information for over 1500 plant species from plant-pollinator networks with a worldwide distribution.

We found that over half of the plant reproductive trait variation was summarised by two different reproductive trade-offs. The first one showed a compromise between flower number and flower size. Larger plants displayed many small flowers with short styles and few ovules, while shorter plants showed few large flowers with long styles and numerous ovules. The second one indicated the compromise between floral display and pollinator dependency. Plants with a lower investment in floral display (i.e., size and number of flowers) showed low or no pollinator dependency and were able to produce seeds autonomously without the need for pollinators (i.e., self-pollination), while plants with a high investment in floral display had an obligate need for pollinators for seed production. Moreover, these two trade-offs helped explain interactions with the different pollinator guilds. However, we found that they were insufficient to fully understand plant-pollinator associations. Our findings emphasise the importance of considering reproductive traits in the global spectrum of plant form and function, and the need to explore beyond floral morphological traits to broaden our understanding of plant-pollinator associations.

Figure caption: Examples of some of the main floral morphologies encountered in our set of species: (a) tube, (b) papilonaceous, (c) open, (d) capitulum, (e) campanulate and (f) brush. Drawing made by Julia Domínguez.