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## The evolution and pollination of oceanic bellflowers (Campanulaceae)

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**Abstract:** We focus here on the evolution of pollination modes of oceanic island bellflowers (Campanulaceae), examining the degree of parallel evolution in different lineages of this family. Plants colonizing islands might either have experienced selective pressures on floral traits from vertebrate pollinators such as birds and lizards or have been pre-adapted to pollination by vertebrates prior to their colonization. The reconstruction of the ancestral pollination biology of Campanulaceae suggests that pollinators of the ancestors of bird/lizard-pollinated bellflowers were insects. Moreover, in four island Campanulaceae lineages, only one was pre-adapted on the continent (“relict” hypothesis), and three made de novo shifts on the islands. Evolution towards bird pollination from insect-pollinated ancestors is also common in other island-groups, possibly because opportunistic birds are more efficient than insects. We review to what extent related species converge in their pollination ecology in related habitats on oceanic islands. Whereas a relict condition was interpreted for taxa such as *Canarina*, *Lavatera*, *Aloe*, *Sophora*, or *Cuminia*, etc., many studies are increasing the list of island ornithophilous taxa that are better explained by the “de novo” hypotheses (e.g. *Musschia*, *Heterochaenia*, *Nesocodon*, *Lotus*, *Angraecum*, *Roussea*, etc). Evolution towards bird pollination from insect-pollinated ancestors seems to be the norm in oceanic islands, possibly because opportunistic birds (when they are present) are usually more efficient pollinators than insects. However, a discrimination between the two de novo hypotheses on the origin of each pollination syndrome (e.g. the island de novo specialist hypothesis, and the island de novo opportunistic hypothesis), is difficult, because we neither know the complete history of each relationship, because many sisters to current species are extinct nor do we know the degree of specialization of the relationship.

