The repeated evolution of large seeds on islands

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Several plant traits are known to evolve in predictable ways on islands. For example, herbaceous species often evolve to become woody and species frequently evolve larger leaves, regardless of growth form. However, our understanding of how seed sizes might evolve on islands lags far behind other plant traits. Here, we conduct the first test for macroevolutionary patterns of seed size on islands. We tested for differences in seed size between 40 island-mainland taxonomic pairings from four island groups surrounding New Zealand. Seed size data were collected in the field and then augmented by published seed descriptions to produce a more comprehensive dataset. Seed sizes of insular plants were consistently larger than mainland relatives, even after accounting for differences in growth form, dispersal mode and evolutionary history. Selection may favour seed size increases on islands to reduce dispersibility, as long-distance dispersal may result in propagule mortality at sea. Alternatively, larger seeds tend to generate larger seedlings, which are more likely to establish and outcompete neighbours. Our results indicate there is a general tendency for the evolution of large seeds on islands, but the mechanisms responsible for this evolutionary pathway have yet to be fully resolved.

Seed storage behavior of the native Hawaiian flora

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The O’ahu Army Natural Resources Program and the Harold L. Lyon Arboretum Seed Conservation Laboratory conduct research to determine germination, propagation and long-term storage protocols for some of Hawai‘i’s rarest plant species. The seed banks aim to create viable ex situ collections to preserve genetic representation of each plant and to provide propagules for recovery efforts. Over the last two decades, the seed banks have gathered data from 68 angiosperm families from species representing 25% of the Hawaiian flora. Seed storage behavior has been classified into two categories; desiccation-tolerant (including species that are desiccation-tolerant but sensitive to freezing) and desiccation-sensitive. Data are available for approximately 350 species, and storage classifications have been estimated for another 300 species. Approximately 94% of the 638 species have desiccation-tolerant seeds, with species found in 54 families. This proportion is higher than the worldwide estimate that 80% of species have desiccation-tolerant seeds, or seeds that can be stored under conventional seed banking methods. These data support the hypothesis that long-distance dispersal, in this example to an isolated oceanic island, selects against species with desiccation-sensitive seeds.

23: Predation

Living among invasives on small islands: complex interactions between island birds and invasive predators.

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On islands, biological invasions still represent the major cause of biodiversity loss. Predators, particularly cats (Felis silvestris catus) and rats (Rattus spp.), are among the most widely introduced species and are responsible for numerous rarefactions and extinctions of island bird species. Most islands are multi-invaded by these introduced predators that maintain complex biotic relationships with native species. The understanding of these interactions is difficult but essential to accurately evaluate predator impacts on island bird populations and to design optimal conservation strategies. Here we attempt to decipher trophic interactions between introduced predators (R. exulans, R. rattus and F. s. catus) and a critically endangered bird, the Tuamotu Kingfisher.