
Endemism within island ecosystems - Functional drivers of speciation

Carl Beierkuhnlein*†¹

¹University of Bayreuth – Universitaetsstr. 30, 95440 Bayreuth, Germany

Abstract

Islands and archipelagos are considered as classic showcases to study speciation and diversification. Established approaches relate these processes to biological aspects such as phylogenies of taxa or diversity within taxonomic groups and to geographical aspects such as distances to other habitats or island size and elevation. In this study, we disentangle the patterns of endemism for single island endemics as well as for archipelago endemics at the scale of individual ecosystems. We consider ecosystems as functional units within islands that differ considerably in site conditions and processes. The aim is to achieve a better understanding on the contribution of ecosystem functioning and dynamics for the development and establishment of endemic species. The increasing proportion of endemism with elevation hints at diversifying processes within islands resulting from ecological isolation. However, ecological isolation can also become effective between ecosystems. Species are not distributed individually along spatial or ecological gradients, but organized through long-term evolved biotic interactions in communities and ecosystems. Here, we focus on plant species in the Canary Island archipelago and their attribution to ecosystems that are established on this set of islands. We calculated the spatial extent of major ecosystem types on all islands, and assigned all plant species to ecosystems for every single island. Many species have been recorded in several ecosystems, others are strictly tied to a particular ecosystem. Many species occur on several islands, some are archipelago endemics, others are single island endemics. We classify plant species into native (non-endemic), archipelago endemics, single island endemics, and alien (including invasive) species. By combining these levels of information, we construct a new view on the importance of ecosystems within islands for speciation. We find that the spatial extent of ecosystems within islands plays a minor role. Extensive ecosystems such as Canary Pine forest can host less species than the laurel forest, but surprisingly show a higher proportion of endemism. It is rather the type of ecosystem (e.g. fayal-brezal) that is linked on all islands with a high proportion of endemism. Harsh environments at the coast exhibit a high proportion of native species, but less endemics and alien species.

Keywords: archipelago endemics, biodiversity, Canary islands, plants, turnover

*Speaker

†Corresponding author: carl.beierkuhnlein@uni-bayreuth.de