Islands, mainland and terrestrial fragments: how isolation shapes plant diversity.

Emi Martín-Queller*[1], Cecile Albert[2], Pierre-Jean Dumas[1], and Arne Saatkamp[1]

[1]Institut Méditerranéen de Biodiversité et d'Ecologie (IMBE) – Aix Marseille Université, CNRS, IRD, Avignon Université – France

[2]Institut méditerranéen de biodiversité et d'écologie marine et continentale (IMBE) – INEE, Université d'Avignon et des Pays de Vaucluse, Institut de recherche pour le développement [IRD] : UMR237, Aix Marseille Université, CNRS : UMR7263, INSB, INSU – Aix Marseille Université, Campus Etoile, Faculté St-Jérôme case 421 Av. . escadrille Normandie-Niemen 13397 MARSEILLE CEDEX 20, France

Abstract

Natural habitat fragmentation is an important threat for biodiversity. However how stronlgy and at which spatial scale isolation mechanisms act on species loss in habitat fragments is not clear. Newly formulated hypotheses propose that isolation in habitat fragments differ from the one observed in islands via the matrix permeability and the amount of reachable habitat. Based on 295 floristic relevés in a 500 km2 Mediterranean area, we built species-area relationships to test these hypotheses. In particular, we compared habitat fragments after urbanisation to continuous habitat and islands and we assumed either no dispersal, infinite dispersal, or intremediate levels of dispersal that lead to contasted amount of reachable habitat (via graph theory). Isolation mechanisms occurred in habitat fragments but differently than in islands. The effect of isolation on species richness was less strong on fragments. It occurred at a broader scale, i.e. at the landscape-level, while it occured at the patch-level on islands. It was detectable only for some of the species groups, namely the ones with longer lifes cycles and associated lower mobility. Contrastinlgy, therophyte species that have short life-cycle and a high capacity to reach new colonisable habitat in a short amount of time, were not affected by isolation. Though the amount of reachable habitat was a good predictor of local species richness in both systems, the amount of habitat, ignoring its spatial configuration, was already a sufficient predictor. These results highlight the primary role of matrix permeability in mitigating the effect of isolation on species richness in habitat fragments.

Keywords: Dispersal, species, area relationships, graph theory, fragmentation, matrix permeability, biodiversity, urbanization, amount of habitat area, isolation, functional connectivity

*Speaker