

Species-area relations and island distribution of carabid beetles (Coleoptera, Carabidae) on small islands off the coast of western Norway

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The study explores carabid beetle communities on small islands to assess distribution patterns in terms of stochastic and non-random mechanisms. The study was carried out on 14 small islands in Øygarden, an island archipelago 30 km north-west of Bergen, western Norway. The dominant vegetation was *Calluna* heath. Sampling was carried out with 83 pitfall traps operating continuously from 30 May to 14 November 1983. Log-linear regression was applied for analysing the data. The pitfall trapping yielded 29 species and 6139 specimens of ground beetles (Coleoptera, Carabidae). Island area was less significant than the habitat size in determining the species diversity. An island further away from the source area contained a higher proportion of species with the ability to fly than did islands close to the source area (i.e. nearest large island). Islands exposed to the actions of wind and waves were inhabited by species with adult hibernation. The immigration rate of *Carabus problematicus* Herbst, 1786 is probably very low, leading to a certain degree of genetic isolation, expressed by differences in size between islands. Carabid beetles from small islands off the coast of western Norway were non-randomly distributed according to habitat size and distance from source areas. Extreme areas such as small islands alter carabid beetle communities in a profound way.

Key words: Carabid beetles, Carabidae, hibernation strategies, dispersal, genetic isolation, small islands

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INTRODUCTION

The basic concepts of island biogeography presented by MacArthur & Wilson (1967) have been tested for a number of organisms, e.g. mammals (Lomolino 1984) and birds (Brown & Dinsmore 1988). The general theory put forward by MacArthur and Wilson (1967) was an important step forward in the theory of island

biogeography and has been recently extended by more refined theories (Lomolino 2000). However, empirical observations and testable hypotheses are still needed to fill in the gaps.

Successful colonization of islands is dependent of a range of factors, of which dispersal abilities and habitat availability are among the most important ones. Both aspects have received much attention in