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Symposium 15 Specialization in island land birds

Introduction

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Many island land birds are under threat of extinction today as a result of increased human impact on their environment (Collar et al., 1994). How could such vulnerable species evolve on islands where the physical environment is hazardous and the vital resources limited? Obviously, to persist on islands for a long time, as they must have done so till now, they would have had to be well adapted to island life except against invasive species. It is generally assumed that such adaptation involves flexible use of resources, particularly food resources. There are a number of examples of colonizers becoming generalists (Grant, 1998). We also have clear examples of extreme specialization, such as found among the members of Vangidae in Madagascar (Yamagishi and Eguchi, 1996), Paradisaeidae in New Guinea (Frith and Beehler, 1998) and Callaeatidae in New Zealand (Williams, 1976). These islands are large enough to have the diversity of topography and resources to permit radiation of founding species; but interspecific interactions are unlikely to be the cause of specializations, particularly in New Zealand where species diversity has remained low. It is therefore remarkable that small islands, such as those of the Galapagos and Hawaiian chain, have produced specialized species of land birds to the extent that they have (Grant, 1999).

In this symposium we attempt to identify the evolutionary processes that enable specialization among island land birds. Are there detectable behavioral or ecological characteristics among colonizing land birds that reveal potential for specialization or anti-specialization? Such characteristics include resource partitioning, competitive release, environmental plasticity, individual specialization, density inflation, social tolerance and site tenacity. Key to evaluating these specializations is the issue of how island populations maintain the flexibility required to meet the challenges of changed environment in the face of the specialization needed for effective use of limited island resources.

One possibility is that individuals become adept at exploiting several resources, thereby maintaining flexibility to cope with environmental changes. Another is that individuals, while each specializing on different specific resources (and thereby remaining unskilled and uncompetitive in utilizing others), form a population that maintains flexibility and effective size by exploiting a greater range of resources collectively. This second scenario would see intensification of intraspecific processes, which could lead to degrees of specialization far beyond the flexible use of resources and establish special relationships with limited but reliable resources. Such specialization may then lead on to speciation and adaptive radiation on islands. One difficulty with this hypothesis is that the process specialization needs to happen frequently because occasional hazards will eliminate the majority of skilled individuals.

This symposium focused mainly on the land birds of small islands remote from neighboring continents. In archipelagos, radiation of species is assisted by geographical isolation of founder populations; but on single islands, a tendency to differentiate through efficient use of limited resources is revealed in analyses of specialization.

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