Marine lakes: A view of what is possible in marine islands

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Abstract

Marine lakes are bodies of seawater entirely surrounded by land. Physically, they fit the definition of habitat islands and, syntactically, they are a simple transposition from the definition of true islands. To what extent might these superficial similarities actually indicate shared biogeographic processes? And to what degree could any shared processes lead to ecological and evolutionary patterns in marine inhabitants of islands that we have long considered hallmarks of terrestrial taxa inhabiting islands? Here, I summarize our ongoing research in marine lakes of the Indo-West Pacific to explore these topics. I draw upon work conducted at scales from tens-of-meters to thousands-of-kilometers across three archipelagos, and from days to decades up to decamillenia, including representatives of most common marine phyla, to examine patterns within and among populations, communities, and species. We find evidence of a great variety of patterns: isolation and eurymixis, stasis and rapid evolution, convergence and divergence, neutral and non-neutral. Some of these are reminiscent of patterns familiar in coastal and open oceans, others are reminiscent of island biogeography and island evolution. I infer these patterns include the results of different balances of drift, gene flow, and selection that are influenced by interactions between the geographic setting, environment, and biology of species. Albeit emerging evidence, these findings raise the prospect of a continuum of process and pattern integrating marine with terrestrial perspectives, both of which may be enriched by the other. Marine island biogeography is in its infancy; it may present situations that are uncommon in the existing literature, but not rare in nature, and thus contribute substantially to a new dynamic outlook on a half century-old theme. Better understanding of the level of overlap of marine and terrestrial island and island-like systems will be facilitated by three advances: (1) development of many descriptive marine studies to reduce the current deficit, (2) design of rigorous comparative studies within and across realms, and (3) modification of conceptual models to accommodate seemingly disparate situations.

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