



## Radically different scales of phylogeographic structuring within cryptic species of freshwater shrimp (Atyidae: Caridina)

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**ABSTRACT:** We compared the phylogeographic structures of four cryptic species of freshwater shrimp from the *Caridina indistincta* complex (Atyidae) in eastern Australia using sequences of the mitochondrial gene cytochrome oxidase subunit I. We found very large differences between the species in the scales of overall geographic distribution, intraspecific divergence, and population structure. These species were characterized as either: (1) species with large ranges, low intraspecific divergence, and limited phylogeographic structuring (sp. D); (2) species with large ranges, high intraspecific divergence, and a high level of phylogeographic structuring (sp. B); (3) species with limited ranges, low intraspecific divergence, and no phylogeographic structuring (sp. E); or (4) species with limited ranges, high intraspecific divergences, and a high level of phylogeographic structuring (sp. A and sp. C [from another study]). A single haplotype of sp. D has a much larger distribution than other entire species, which have divergent intraspecific phylogroups isolated from each other at very small geographic scales. These patterns likely reflect a combination of large-scale factors, such as landscape structure and climate change, and small-scale factors, such as species-specific tolerances to local conditions and differing dispersal capabilities. Life history variation (egg size) between *Caridina* species may be linked with differing dispersal abilities. Species in this study with the smallest eggs have the least intraspecific divergence and largest distribution, whereas those with the biggest eggs have the most divergence and smallest distribution, with medium-sized egg species in between.

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