Analysis of Intraspecific and Interspecific Variation Using Reproductive and Molecular Evidence to Interpret Evolutionary Relationships in a Scleractinian Coral Species Complex

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Morphological characters are traditionally used to define species of corals. However, defining species boundaries in scleractinian corals is impeded by the difficulty of distinguishing between ecological and evolutionary influences on the appearance of colony morphology. To facilitate accurate definition of species, I used reproductive evidence (relative timing of spawning and fertilisation potential) and molecular evidence (mtDNA intergenic region) to interpret the extent to which intraspecific and interspecific morphological variation is indicative of microevolutionary relationships in species of the *Acropora humilis* species group. The eight species of the *A. humilis* group (*A. humilis*, *A. samoensis*, *A. globiceps*, *A. gemmifera*, *A. monticulosa*, *A. digitifera*, *A. retusa* and *A. multiacuta*), six intraspecific morphs and seven intermediate morphs were used as the sampling units. Intraspecific and intermediate morphs were defined on the basis of morphological appearance, with the former appearing as distinct units within a single species and the latter sharing characters with more than one species. Samples were collected from Taiwan, Indonesia, Great Barrier Reef, PNG, Solomon Islands, American Samoa and French Polynesia. This study demonstrates that examining intraspecific and interspecific patterns of polymorphism is valuable for interpreting evolutionary relationships in corals. Combined evidence derived from the reproductive and molecular criteria suggests that the morphs are at various stages of divergence from the species with which they share morphological characters and that the morphs may indicate possible zones of speciation and hybridization. Reproductive data provided a greater level of resolution than the molecular data, suggesting that reproductive boundaries have evolved more rapidly than the mtDNA intergenic region in the *Acropora humilis* species group. Recognition of morphs also avoided the possibility of taxonomic error, from forcing colonies into incorrect or inappropriate species categories, and was therefore essential for the accurate interpretation of evolutionary boundaries.