

Phylogeography and Limited Genetic Connectivity in the Endangered Boring Giant Clam across the Coral Triangle

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Abstract: *The Coral Triangle is the global center of marine biodiversity; however, its coral reefs are critically threatened. Because of the bipartite life history of many marine species with sedentary adults and dispersive pelagic larvae, designing effective marine protected areas requires an understanding of patterns of larval dispersal and connectivity among geographically discrete populations. We used mtDNA sequence data to examine patterns of genetic connectivity in the boring giant clam (*Tridacna crocea*) in an effort to guide conservation efforts within the Coral Triangle. We collected an approximately 485 base pair fragment of mtDNA cytochrome c oxidase 1 (CO1) from 414 individuals at 26 sites across Indonesia. Genetic structure was strong between regions ($\phi_{ST} = 0.549$, $p < 0.00001$) with 3 strongly supported clades: one restricted to western Sumatra, another distributed across central Indonesia, and a third limited to eastern Indonesia and Papua. Even within the single largest clade, small but significant genetic structure was documented ($\phi_{ST} = 0.069$, $p < 0.00001$), which indicates limited gene flow within and among phylogeographic regions. Significant patterns of isolation by distance indicated an average dispersal distance of only 25–50 km, which is far below dispersal predictions of 406–708 km derived from estimates of passive dispersal over 10 days via surface currents. The strong regional genetic structure we found indicates potent limits to genetic and demographic connectivity for this species throughout the Coral Triangle and provides a regional context for conservation planning. The recovery of 3 distinct evolutionarily significant units within a well-studied taxonomic group suggests that biodiversity in this region may be significantly underestimated and that *Tridacna* taxa may be more endangered than currently recognized.*

Keywords: coral triangle, genetic connectivity, Indo-Pacific, larval dispersal, marine protected areas, population genetics, *Tridacna crocea*

Filogeografía y Conectividad Genética Limitada en la Almeja Gigante *Tridacna crocea* en el Triángulo de Coral

Resumen: *El Triángulo de Coral es el centro global de biodiversidad marina; sin embargo sus arrecifes de coral están críticamente amenazados. Debido a la historia de vida bipartita de muchas especies marinas con adultos sedentarios y larvas pelágicas dispersivas, el diseño de áreas marinas protegidas efectivas requiere del entendimiento de los patrones de dispersión larvaria y de la conectividad entre poblaciones genéticamente discretas. Utilizamos datos de secuencias de ADNmt para examinar los patrones de conectividad genética en la almeja gigante *Tridacna crocea* en un esfuerzo para guiar los esfuerzos de conservación en el Triángulo de Coral. Recolectamos aproximadamente 485 pares de fragmentos de citocromo c oxidasa 1 (CO1) del ADNmt*

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