

Highly restricted gene flow and deep evolutionary lineages in the giant clam *Tridacna maxima*

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Abstract	<p>The tropical Indo-West Pacific is the biogeographic region with the highest diversity of marine shallow water species, with its centre in the Indo-Malay Archipelago. However, due to its high endemism, the Red Sea is also considered as an important centre of evolution. Currently, not much is known about exchange among the Red Sea, Indian Ocean and West Pacific, as well as connectivity within the Indo-Malay Archipelago, even though such information is important to illuminate ecological and evolutionary processes that shape marine biodiversity in these regions. In addition, the inference of connectivity among populations is important for conservation. This study aims to test the hypothesis that the Indo-Malay Archipelago and the Red Sea are important centres of evolution by studying the genetic population structure of the giant clam <i>Tridacna maxima</i>. This study is based on a 484-bp fragment of the cytochrome c oxidase I gene from 211 individuals collected at 14 localities in the Indo-West Pacific to infer lineage diversification and gene flow as a measure for connectivity. The analysis showed a significant genetic differentiation among sample sites in the Indo-West Pacific (I broken vertical bar(st) = 0.74, $P < 0.001$) and across the Indo-Malay Archipelago (I broken vertical bar(st) = 0.72, $P < 0.001$), indicating restricted gene flow. Hierarchical AMOVA revealed the highest fixation index (I broken vertical bar(ct) = 0.8, $P < 0.001$) when sample sites were assigned to the following regions: (1) Red Sea, (2) Indian Ocean and Java Sea, (3) Indonesian throughflow and seas in the East of Sulawesi, and (4) Western Pacific. Geological history as well as oceanography are important factors that shape the genetic structure of <i>T. maxima</i> in the Indo-Malay Archipelago and Red Sea. The observed deep evolutionary lineages might include cryptic species and this result supports the notion that the Indo-Malay Archipelago and the Red Sea are important centres of evolution.</p>
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