

A molecular census of early-life stage scleractinian corals in shallow and mesophotic zones

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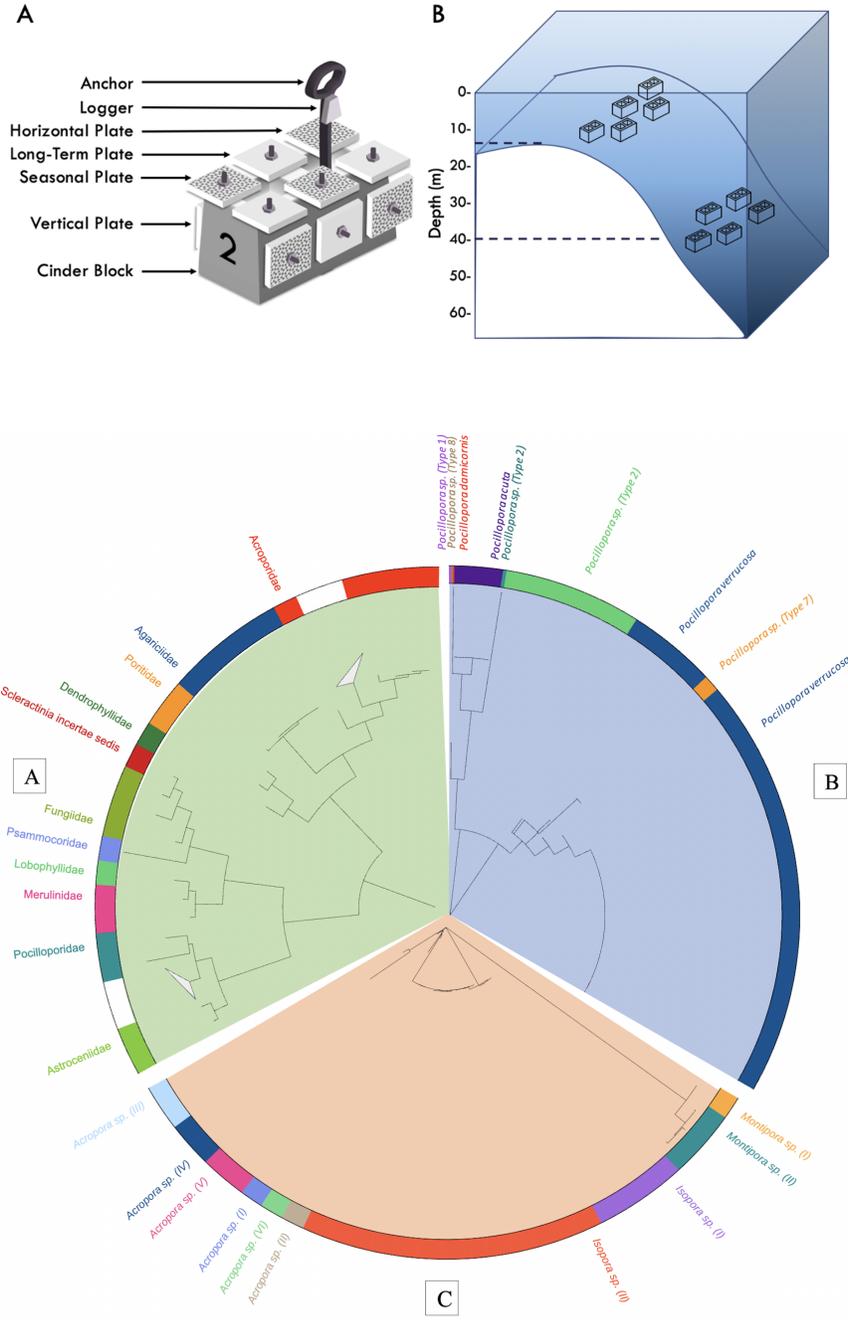
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Abstract

The decline of coral reefs has fueled interest in determining whether mesophotic reefs can shield against disturbances and help replenish deteriorated shallower reefs. In this study, we characterized spatial (horizontal and vertical) and seasonal patterns of diversity in coral recruits from Dabaisha and Guiwan reefs at Ludao, Taiwan. Concrete blocks supporting terra cotta tiles were placed at shallow (15m) and mesophotic (40m) depths, during 2016-2018. Half of the tiles were retrieved and replaced biannually over three 6-month surveys (short-term); the remainder retrieved at the end of the 18-month (long-term) survey. 451 recruits were located using fluorescent censusing and identified by DNA barcoding. Barcoding the mitochondrial cytochrome oxidase I (COI) gene resulted in 17 molecular operational taxonomic units (MOTUs). To obtain taxonomic resolution beyond the generic level, Pocillopora were phylotyped using the mitochondrial open reading frame (ORF), resolving eight MOTUs. Acropora, Isopora or Montipora recruits were identified by the nuclear PaxC intron, yielding ten MOTUs. Overall, 35 MOTUs were generated and were comprised primarily of Pocillopora, and in fewer numbers, Acropora, Isopora, Pavona, Montipora, Stylophora, among others. 40% of MOTUs recruited solely within mesophotic reefs while 20% were shared by both depth zones. MOTUs recruiting across a broad depth distribution appear consistent with the hypothesis of mesophotic reefs acting as a refuge for shallow water coral reefs. In contrast, Acropora and Isopora MOTUs were structured across depth zones representing an exception to this hypothesis. This research provides an imperative assessment of coral recruitment in understudied mesophotic reefs and imparts insight into the refuge hypothesis.

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