Symbiodinium and giant clams (genus: *Tridacna*): Patterns of distribution across three host species in the biodiverse Bird's Head region of Indonesia

Timery S. DeBoer*[1], Andrew C. Baker[2,3], Mark V. Erdmann[4], Ambariyanto[5], Abdul Hamid Toha[6], and Paul H. Barber[7]

1 Boston University, Biology Department, 5 Cummington St, Boston, MA 02215, USA
2 Division of Marine Biology and Fisheries, Rosenstiel School of Marine and Atmospheric Science, University of Miami, 4600 Rickenbacker Causeway, Miami, FL 33149, USA
3 Wildlife Conservation Society, Marine Program, 2300 Southern Blvd., Bronx NY 10460, USA
4 Conservation International, Indonesia Marine Program Jl. Dr. Muwardi No. 17 Bali, Indonesia
5 Diponegoro University, Faculty of Fisheries and Marine Sciences, Kampus Tembalang, Semarang, Indonesia
6 State University of Papua, West Paupua, Indonesia
7 University of California, Los Angeles, Dept. of Ecology and Evolutionary Biology 621 Charles E. Young Dr. South, Los Angeles, CA 90095, USA

* Corresponding author: tsdeboer@bu.edu

ABSTRACT

Reef corals, other marine invertebrates, and protists are hosts to a group of exceptionally diverse dinoflagellate symbionts in the genus *Symbiodinium*. Numerous studies have documented ecologically-important differences among *Symbiodinium* types in depth zonation, photoadaptation to different irradiance levels, heat tolerance, and susceptibility to bleaching. Many host species are able to maintain associations with multiple symbiont types simultaneously, which may permit rapid adaptation to local environmental change. This study focused on *Symbiodinium* diversity in giant clams (genus *Tridacna*) from the biodiverse Bird's Head region in eastern Indonesia. We identified 12 unique *Symbiodinium* types in 250 host individuals from three Tridacnid species, based on denaturing gradient gel electrophoresis (DGGE) and sequencing of internal transcribed spacer-2 (ITS-2) rDNA. All types were from Clades A, C, and D and were detected in each of the three host species. Individuals with multiple symbionts from different clades were common (42% of all individuals). Symbiont type and host species were significantly associated. *T. crocea* had more individuals with only Clade C symbionts and fewer individuals with mixed clade symbionts than expected. *T. maxima* had fewer individuals with only Clade A symbionts than expected, but more Clade C only and mixed clade symbionts. *T. squamosa* had more individuals with mixed clades than expected. A total of 45 data loggers recorded water temperature at 3 meters within the study area. Giant clams sampled from the warmer waters of the Bay of Cenderawasih had a greater proportion of Clade C symbionts and fewer Clade A symbionts than expected. This is consistent with previous research on Tridacnid symbionts that showed Clade C types to be more heat tolerant than Clade A. Our results are consistent with those reported

for coral hosts and point to the possibility that giant clams may associate with different symbiont types based on local environmental conditions. Further research is necessary to understand the implications of climate change on internationally-protected giant clams and their symbionts.

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