

Coral symbiont diversity along a seawater temperature gradient

Tester's Symposium, Honolulu, HI 22-Mar-08

Lance Smith, University of Hawai'i
Andrew Baker, University of Miami
Tom Oliver, Stanford University

A gradient in seawater temperatures occurs along coral reef habitats on Ofu Island, American Samoa: In a small back reef pool, temperatures reach 34 °C with daily fluctuations of up to 6 °C, while only reaching 31 °C with daily fluctuations of < 1 °C at the same depth on the adjacent forereef. Temperature maxima and daily fluctuations are intermediate in a large back reef pool. More than 50 species of reef-building corals occur in the small pool, including many *Acropora* and *Pocillopora* species thought to be sensitive to elevated seawater temperatures. Symbiotic zooxanthellae (*Symbiodinium* spp.) are classified into several clades, and corals containing Clade D may be relatively tolerant of elevated seawater temperatures and rapid temperature fluctuations. We monitored seawater temperatures in the small back reef pool, the large back reef pool, and the shallow forereef for a 1-year period. During the summer (March), we sampled zooxanthellae from colonies of *Acropora hyacinthus*, *Pocillopora eydouxi*, and *Porites lobata* at these three sites. For *A. hyacinthus*, only Clade D was found in the small back reef pool, while a mix of Clades C and D were found at the other two sites. For *P. eydouxi*, a mix of Clades C and D was found in the small back reef pool, while only Clade C was found at the other two sites. For *P. lobata*, only Clade C was found at all three sites. Thus, Clade D may increase the thermal tolerances of *Acropora* and *Pocillopora* species in the Ofu back reef pools. However, the coral communities in the pools are dominated by *Porites* species, including *P. lobata*, yet *Porites* colonies in the pools and in other warm, shallow coral reef environments contain only Clade C zooxanthellae. These results suggest that host coral physiological processes strongly contribute to the thermal tolerances of *Porites* colonies in the back reef pools.