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Vincent P. Richards
Nova Southeastern University

Kevin A. Feldheim
Field Museum of Chicago

Mahmood S. Shivji
Nova Southeastern University, mahmood@nova.edu

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Contrasting Patterns of Population Structure and Dispersal for the Giant Barrel Sponge (*Xestospongia muta*) within the Florida Reef Tract and Caribbean

Vince RICHARDS*¹, Kevin FELDHEIM², Mahmood SHIVJI¹

¹The National Coral Reef Institute, Oceanographic Center, Nova SE University, Florida 33004 USA, Dania Beach, FL, ²Field Museum, Chicago, Illinois 60605 USA, Chicago, IL

Sponges are one of the dominant fauna on Florida and Caribbean reefs, with species diversity often exceeding that of scleractinian corals. Despite their importance as structural components and habitat providers on reefs, their dispersal dynamics are little understood. We utilized eight microsatellite markers to study the population structure and migration patterns of the giant barrel sponge (*Xestospongia muta*), a widespread species throughout Florida and the Caribbean. Bayesian multilocus genotype analyses clustered 157 samples from the Bahamas, Honduras, and the US Virgin Islands into three distinct groups. 159 samples from nine locations within 284 km of the Florida reef tract (Key Largo to the Dry Tortugas) formed a fourth group. Population structure among the four groups was high ($F_{ST} = 0.155$; $P = 0.001$), with no recent migration among the groups. In contrast, high levels of migration were detected within the Florida reef tract. Reefs in the Upper Keys (Long Key) appear to be sources of larvae to reefs in the north (Key Largo) and also to reefs in the south (Key West and the Dry Tortugas). This pattern of migration closely matches current pathways within the South Florida recirculation system, suggesting that currents play an important role in dispersing *X. muta* larvae within the Florida reef tract. Although there was an overall lack of isolation by distance among the four groups, a significant correlation between genetic and geographic distance was found among the Florida sampling sites indicating that mating within the reef tract is not random. Asexual reproduction appears not to be the cause as only 1.3% of individuals in Florida shared the same genotype (1.6% overall). Rather, limited larval dispersal along the reef tract and among Caribbean locations has probably led to inbreeding within reefs, explaining the significant deficit in heterozygosity detected ($F_{IS} = 0.219$; $P = 0.001$).