

Stepping-stone larval dispersal contributes to genetic diversity and connectivity among populations of a hydrothermal vent limpet in the Okinawa Trough

Yuichi Nakajima¹, Masako Nakamura², Hiromi Watanabe³, Satoshi Mitarai¹

¹Okinawa Institute of Science and Technology Graduate University; yuichi.nakajima@oist.jp

²School of Marine Science and Technology, Tokai University

³Japan Agency for Marine-Earth Science and Technology

Limpets of the genus *Lepetodrilus* are among the most abundant gastropods at deep-sea hydrothermal vents in the Okinawa Trough, in the northwestern Pacific Ocean. Genetic diversity and differentiation of vent populations based on individual genetic markers have not been assessed previously in this area. We examined these parameters in the vent-endemic limpet, *Lepetodrilus nux*, at five vent sites (maximum geographic distance: ~550 km, depth range: ~700 m to ~1,650 m). The study included 158 individuals, and employed 14 polymorphic microsatellite loci developed from this species. Genetic diversity based on allelic richness and expected heterozygosity has been maintained at all focal vent sites. Meanwhile, low but significant genetic differentiation was detected and F_{st} values ranged from -0.003 to 0.023 . Discriminant analysis of principal components reflected geographic locations. There was a relationship between genetic differentiation and geographic distance ($p = 0.010$), but there was no relationship with depth ($p = 0.350$). Larvae appear to ascend via the thermal plume and to wander in the water column, utilizing upper currents for long-distance dispersal. This behavior suggests that stochastic stepping-stone dispersal contributes significantly to population connectivity and maintenance of this species.