

History of hydrothermal activity in the Mariana Trough estimated by population structure of vent-endemic snails

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A hairy snail *Alviniconcha hessleri* is endemic to hydrothermal vent fields in the Mariana Trough and the dominant species of chemosynthesis-based communities in this sea area. We analyzed the genetic population structure of this species using specimens collected at five vent sites in the Mariana Trough, namely, the Alice Springs Field in the central Mariana Trough, the Forecast Vent Field in the southern Mariana Trough, and the Snail, Archaean, and Urashima sites in the southernmost part of the trough. A local population of the Forecast Vent Field showed the highest genetic diversity among five local populations. Individuals of *A. hessleri* were divided into two genetically deviated groups. The first group contained more individuals and showed higher genetic diversity than the second group. Although individuals of both groups were collected at all five vent sites, frequency of the second group were very low in the Alice Springs Field. Both groups were shown to have experienced rapid expansion of population size and estimated ages of the expansion is older for the first group than the second one. Within the trough, the southward gene flow (larval dispersal) was estimated to be much larger than the northward one. Based on these results, we reconstruct the population history of this species, namely, the reduction of population size and the isolation between the local populations of the central and southern regions, genetic deviation between them, the expansion of the central population, and the expansion of the southern population. In this presentation, we discuss about the correspondence between the ages of these events estimated on the basis of the molecular phylogenetic analysis of provannids, which contains *A. hessleri*, and the history of hydrothermal activities estimated by geochemical studies.

Keywords: Marina Trough, *Alviniconcha hessleri*, population structure, history of hydrothermal activity