New neolepadine barnacles from a cold seep and two hot vents in Japan, and their origin and dispersal

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Previously known neolepadines-

The neolepadine includes Neolepas zevinae Newman from 21 N, East Pacific Rise (EPR), N. rapanuii Jones from EPR off Easter Island, and N. osheai Buckeridge from Brothers Caldera, Kermadec Ridge. All three are bilaterally symmetry in arrangement and size of their peduncular scales.

The first neolepadine from the cold seep off Hatsushima Island, Izu, Japan-

Neolepadines were previously only known from hot vents of East and West Pacific and Indian Oceans. A new neolepadine was found inhabiting a cold seep at 1175m in depth off Hatsushima Island near Izu Peninsula, Central Japan. This is the first neolepadine from the cold seep. Unlike other neolepadines this new one has a bilaterally asymmetric arrangement in the peduncular scales unlike the previously known neolepadines from hot vents.

Bilaterally asymmetry in arrangement and size of scales in the peduncle-

In addition to new neolepadine from cold seep, bilaterally asymmetric peduncular scales have been found in neolepadines from two hot vents (Iheya Ridge and Hatoma Knoll) of the Okinawa Trough, Southwest Japan and a hot vent of the Myojin Caldera in the Izu-Bonin Arc, Central Japan. This asymmetry in peduncle distinguishes them not only from other known symmetric neolepadines, but also from previously known scalpellomorphs. The difference between symmetry and asymmetry in the peduncle is distinct at the generic level. A new genus will be described for those neolepadines. Thus the genus has been found in both hot vent and cold seep around Japan.

The peduncle is characterized by bilaterally asymmetry in size, number and arrangement of the scales, and is usually bending to either the left or right side. The scales along the lesser curvature of peduncle are small in size, greater in number and show a different arrangement of the scales in comparison to those on the greater curvature. The right and left-sidedness seems to be ecotypically determined, as it is likely the case in asymmetrical verrucomorphan barnacle Neoverruca and others even in same species (Newman & Hessler 1989).

The specific relationship among specimens from the Hatsushima, Iheya, and Myojin Knoll-

The new neolepadines from between the Hatsushima and Iheya, and between the Iheya and Myojin is distinct morphologically and seems to be different species, however, that from between the Hatsushima and Myojin is similar and seems to be conspecific.

The molecular difference between the new genus and Neolepas-

Phylogenetic relationships between two species of symmetric Neolepas of the Manus Basin (PACMANUS site) and the Hakuho Knoll of the Indian Ocean (Kairei Field, Rodriguez Triple Junction) and the two new species of asymmetric neolepadines of the Hatoma Knoll, Okinawa Trough and the Myojin Knoll based on the 16S rRNA gene sequence.

The tentative result of molecular phylogeny is that Neolepas of the Manus is the most primitive in the four taxa and that the Indian population and the two new neolepadines in the northwest Pacific have derived from the Neolepas of the Southwest Pacific.

The evolution and dispersal of fauna at the deep-sea hydrothermal vents and seeps-

All four major taxa in the Scalpellomorpha, Brachylepadomorpha, Verrucomorpha, and Balanomorpha were found in the deep-sea hydrothermal vent of the Lau Basin, Southwest Pacific, and are the most primitive representatives. In the North Fiji and Manus Basins closed to the Lau, three major groups in barnacles except for Brachylepadomorpha were found. The Lau Basin, Southwest Pacific is the highest diversity in the deep-sea hydrothermal vent barnacles and seems to be center of the evolution as well as the tentative result of biogeography and molecular phylogeny.