

## **Evolutionary shift from infaunal to epifaunal lifestyle may have enabled bamboo worms (Annelida: Maldanidae) to invade chemosynthesis-based ecosystems**

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Evolutionary ecological studies on fauna in chemosynthetic ecosystems would provide insights into adaptive radiation of marine benthic invertebrates as organisms must adapt to reduced conditions. Phylum Annelida is a major marine invertebrate group successfully adapting to chemosynthetic environments. Annelids show diverse ecological characteristics but those occurring in hydrothermal vent fields tend not to have infaunal lifestyle but to have epifaunal mode of life (e.g. crawling: Phylodocidae and Polynoidae, sessile: Alvinellidae). Although bamboo worms (Maldanidae) are representative infaunal annelids occurring mainly in muddy sediment, they have also been reported from chemosynthetic environments. We propose a hypothesis that evolutionary shifts from infauna to epifaunal life style may have enabled these maldanids to invade chemosynthetic environments. Maldanids comprise about 250 species of 40 genera, including *Nicomache* (*Loxochona*), the sole maldanid genus known from chemosynthetic environments. The *Nicomachinae* constructs tubes attaching to substrates and the vent endemic species of the subfamily are known to feed on bacterial mats. Such combination of epifaunal life styles has not been recorded from other maldanid groups and thus may allow them to evade detrimental effects of chemical and physical conditions within sediments. To confirm the monophyly of *Nicomache* (*Loxochona*), we analyzed phylogenetic relationships of 52 maldanid species based on two mitochondrial genes (COI and 16S) and two nuclear genes (18S and 28S). The results supported monophyly of the subgenus, which indicates that colonization of chemosynthetic environments occurred only once in Maldanidae.