

## **Do ampharetids take sedimented steps from vents to seeps? Phylogeny and habitat-use of Ampharetidae (Annelida, Terebelliformia) in chemosynthesis-based ecosystems**

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A range of animal taxa are shared across various chemosynthesis-based ecosystems (CBEs), which emphasizes the evolutionary link between these habitats, but on a global scale the number of species inhabiting multiple habitats is low. The description of intermediate habitats, such as hydrothermal seeps and sedimented vents, gave rise to the hypothesis that CBEs should be considered a continuum of environmental conditions rather than discrete ecosystems. However, the role of sedimented vents and hydrothermal seeps in the diversification of taxa within CBEs has not previously been assessed in a phylogenetic framework. Ampharetid annelids are tube-dwelling deposit feeders and commonly found in chemosynthesis-based ecosystems, but most species are restricted to one habitat. Here we present a multigene phylogeny of Ampharetidae with increased taxon sampling compared to previous work, and we also include a review of their microhabitats. The phylogeny revealed that ampharetids have adapted into CBEs at least five times independently, with subsequent diversification, and shifts between ecosystems have happened in each of these clades. A pattern of evolution from vent-to-seep is apparent, contrary to findings in other taxa, and we hypothesize that sedimented vents have played a role in the colonization of seeps. The review of microhabitats showed that many species have a wide niche in terms of temperature and substratum, especially at hydrothermal vents. Depth and competition are identified as potential factors limiting a given ampharetid species to a certain habitat, but we predict that more ampharetids will be found to inhabit multiple habitats as CBEs are explored further.