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Chaetopterid tubes from vent and seep sites: Implications for fossil record and evolutionary history of vent and seep annelids

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Vestimentiferan tube worms living at deep−sea hydrothermal vents and cold seeps have been considered as a clade with a long and continuing evolutionary history in these ecosystems. Whereas the fossil record appears to support this view, molecular age estimates do not. The two main features that are used to identify vestimentiferan tubes in the fossil record are longitudinal ridges on the tube's surface and a tube wall constructed of multiple layers. It is shown here that chaetopterid tubes from modern vents and seeps—as well as a number of fossil tubes from shallow−water environments—also show these two features. This calls for a more cautious interpretation of tubular fossils from ancient vent and seep deposits. We suggest that: current estimates for a relatively young evolutionary age based on molecular clock methods may be more reliable than the inferences of ancient "vestimentiferans" based on putative fossils of these worms; not all of these putative fossils actually belong to this group; and that tubes from fossil seeps should be investigated for chitinous remains to substantiate claims of their potential siboglinid affinities.

Key words: Vestimentifera, Pogonophora, Siboglinidae, Chaetopteridae, tube worms, chemosynthetic ecosystems, hot vents, cold seeps.

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