

Phylogenetic evidence for the origin and diversification of whale-fall fauna

*Glover Adrian¹

*Adrian Glover¹

1. Natural History Museum, London

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The first discovery of a chemosynthetic faunal assemblage on a whale-fall in 1987 was significant not just in advancing our understanding of deep-sea ecology and succession, but in also generating new hypotheses for the evolutionary origin of the deep-sea fauna. Could these remarkable habitats also provide avenues for dispersal and speciation over evolutionary time? The early phylogenetic studies provided some support for this controversial hypothesis. But more recent and comprehensive research has shown that the picture is more complicated. Here I review evidence for what I see as three possible hypotheses: the ‘evolutionary stepping-stone hypothesis’ where whale-falls have actually created a pathway for radiation into other chemosynthetic habitats, the ‘ecological stepping-stone hypothesis’ in which whale-falls play a role only in aiding dispersal in ecological time, and the ‘hotspots of adaptive radiation hypothesis’ in which whale-falls act as a biodiversity pump for fauna that originally evolved at hydrothermal vents or seeps.