

Life on the dark side: Fossil record and evolution of deep-sea chemosynthetic ecosystems

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Hydrothermal vents and methane seeps in the deep sea harbor unique ecosystems dominated by animals relying on geochemical energy sources, mainly sulfides and methane, rather than photosynthesis, as used by earth surface ecosystems. Due to the extreme environments they inhabit and their *in situ* food source, the adaptational pathways, origin, and evolutionary history of these faunas are the matter of controversial debates. The fossil record provides direct evidence for the history of these faunas and recent paleontologic work has improved the dating of the origin of many of the modern groups that inhabit these ecosystems. And not only that; it shows that Paleozoic and Mesozoic seeps were dominated by giant brachiopods with as-yet unclear lifestyles, what types of substrates the bone-eating worm *Osedax* colonized in the past, and the geologic record provides insights into the causes of major evolutionary events in the history of chemosynthetic ecosystems.



Fossil seep deposits, clockwise from top left: northern Japan (Cretaceous); California (Paleocene); northern Italy (Miocene); southern France (Jurassic).