



## New and little known mollusks from ancient chemosynthetic environments

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### Abstract

Twelve mollusk species from late Jurassic to Oligocene cold seep deposits are described and illustrated. Nine of them are new, two have already been named, two new genera are introduced, and one species is described only in open nomenclature. *Puncturella* (sensu lato) *mcleani* **sp. nov.** and *Fissurella* (sensu lato) *bipunctata* Stanton, 1895 are the only confirmed fissurellids in fossil cold seeps. The sutilizonid *Triassurella goederti* **sp. nov.** is similar to the modern vent-inhabiting *Sutilizona* and the Late Triassic shallow-water reef-inhabitant *Triassurella carnica*. A smooth, late Jurassic neritid is the oldest neritid from fossil seeps and probably represents an independent neritid radiation into the seep environment, without close phylogenetic connection to the modern *Bathynnerita*. The four new abyssochrysoid caenogastropods *Humputlipsia macsotayi*, *Hokkaidoconcha novacula*, *Paskentana anistratenkorum*, and *P. umbilicata* significantly extend the stratigraphic and geographic ranges of these apparently seep-restricted genera. Four bivalves are described, including the new modiomorphid *Caspiconcha rubani* from the early Cretaceous and the new bathymodioline *Bathymodiolus* (s.l.) *palmarensis* from the Oligocene. Among the lucinids, the oldest seep-inhabiting lucinid (late Jurassic) is described as *Beauvoisina carinata* **gen. et sp. nov.**; the new genus *Cubatea* is introduced for an Oligocene lucinid from Cuba. It is suggested that *Caspiconcha*, *Paskentana*, and hokkaidoconchids constitute the core of a seep-restricted fauna that inhabited seeps worldwide from (at least) late Jurassic to early Cretaceous time. These taxa are, at the family level, phylogenetically unrelated to the modern vent and seep fauna.

**Key words:** Cold seeps; deep-sea; Gastropoda; Bivalvia; Late Jurassic; Early Cretaceous; Oligocene

### Introduction

The origin and evolutionary history of the animals inhabiting hydrothermal vents and hydrocarbon seeps in the deep sea is a major question in marine biology (Van Dover *et al.* 2002; Kojima *et al.* 2004; Jones *et al.* 2006; Lorion *et al.* 2008). The fossil record provides insights into the long-term history of these ecosystems and its fauna (Campbell and Bottjer 1995; Warén and Bouchet 2001; Kiel and Little 2006). A prerequisite for drawing meaningful evolutionary and ecologic implications from the fossil record, as well as the modern fauna, is robust systematic work on the taxa in question. The aim of this paper is to describe mollusks from late Jurassic to Oligocene seep sites, either as new or in open nomenclature, and to provide new data for previously described taxa. Evolutionary and biogeographic implications are discussed.

### Material and methods

The material presented herein was collected by the authors, given to them for study, or found in museum