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Mollusks from late Mesozoic seep deposits, chiefly in California

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Abstract

Twenty-nine mollusk species from Late Jurassic to Eocene hydrocarbon seep deposits from California (USA), Japan, New Zealand, and Barbados are described and illustrated. Twenty species belong to Gastropoda and nine to Bivalvia. Seven new species, three new genera, and one new family are introduced. The gastropod *Hikidea* **gen. nov.** includes smooth-shelled *Cantrainea*-like colloniins from Cretaceous hydrocarbon seeps and plesiosaur falls. *Hikidea osoensis* **sp. nov.** is the oldest species of this genus. *Chilodonta? reticulata* **sp. nov.** is a distinctive vetigastropod though its supraspecific position is unclear. *Phanerolepida onoensis* **sp. nov.** is the first species of this colloniin genus from a seep deposit. We describe two new genera of Hokkaidoconchidae: *Abyssomelania* **gen. nov.** and *Ascheria* **gen. nov.**; this family includes now

four genera (including *Hokkaidoconcha* and *Humptulipsia*) and ranges from the Late Jurassic to the Eocene. *Abyssomelania* is characterized by a large, high-spined shell and unusual widely-spaced prosocline riblets (here called abyssomelaniid riblets). *Abyssomelania* is represented by two new species: *A. cramptoni* **sp. nov.** from the Late Cretaceous of New Zealand and *A. campbellae* **sp. nov.** from the Early Cretaceous of California. *Ascheria* **gen. nov.** is characterized by a large high-spined cerithiform shell, a subsutural constriction, and mostly reticulate ornament. Two nominate species are included: *Ascheria gigantea* (Kiel *et al.*, 2008) and *A. eucosmeta* (Ascher, 1906), both of Early Cretaceous age. Two further species potentially belonging to *Ascheria* from the Eocene of Barbados are reported in open nomenclature and are re-illustrated and re-described for comparison. *Humptulipsia nobuharai* **sp. nov.** is described based on specimens from the Campanian-Maastrichtian Sada Limestone seep deposit in Japan. The new family Paskentanidae **fam. nov.** is introduced for the genera *Paskentana* and *Atresius*. The species of this family are characterized by thin-shelled, broad to high-spined littoriniform adult shells and juvenile teleoconchs with a subsutural ramp. *Paskentana hamiltonensis* **sp. nov.** is described from the Early Cretaceous of California. *Ataphrus* is considered to represent a *nomen dubium* because its type species is poorly preserved and there are uncertainties regarding its type locality and age. The bivalves reported herein belong to known species, but our new material revealed additional characters, and/or their supraspecific position is revised and new combinations are proposed: *Solemya stantoni* Vokes, 1955 is transferred to *Acharax*, *Nucula gabbi* Stanton, 1895 is transferred to *Leiomucula*, *Pecten complexicostata* Gabb, 1869 is transferred to *Lyriochlamys*, *Astarte californica* Stanton, 1895 is transferred to *Neocrassina*, *Astarte trapezoidalis* Stanton, 1895 is transferred to *Oxyeurax*, and *Corbula? persulcata* Stanton, 1895 is transferred to *Cuspidaria?*

Key words: Hydrocarbon seeps, deep-sea, Gastropoda, Bivalvia, Jurassic, Cretaceous, Eocene

Introduction

The peculiar fauna of the ‘white limestones’ in the Knoxville beds in the Great Valley of California, USA, has long been recognized as an ancient deep-water methane-seep fauna (Campbell *et al.*, 1993; Campbell & Bottjer 1993). These ‘white limestones’ show geochemical signatures that are characteristic for seep deposits (Campbell *et al.* 2002; Birgel *et al.* 2006) and are embedded in turbidities with scattered *Buchia* and ammonite fragments typical for the late Mesozoic forearc basin along the American West coast (Jones *et al.* 1969; Ingersol 1982). The first fossils from these limestones were described in the late 19th century (Gabb, 1869; Stanton, 1895) but modern taxonomic work on the fauna did not start until recently and has so far focused largely on gastropods (Kiel & Campbell 2005; Campbell *et al.* 2008; Kiel *et al.* 2008b, 2010) and the bivalve *Caspiconcha* (Jenkins *et al.* 2013). Here we report new taxa, new data on known taxa, and a revision of the bivalves from these ancient seep deposits based on newly collected material, museum specimens, and a comparison to Mesozoic seep faunas worldwide.

Material

Most of the material was collected by the authors. The relevant late Mesozoic material from California published by Stanton (1895) was examined at the Smithsonian Natural History Museum in Washington, DC, USA (USNM). Material from the Eocene ‘Joes River’ seep deposits in Barbados (cf. Kugler *et al.* 1984) was borrowed at the Naturhistorisches Museum Basel, Switzerland (NMB). Newly collected material is deposited at the Geowissenschaftliches Museum, Georg-August-University Göttingen, Germany (GZG), California Academy of Sciences, San Francisco, USA (CAS), Geological and Nuclear Sciences, Lower Hutt, New Zealand (GNS), and the University Museum, University of Tokyo, Japan (UMUT). The localities (Fig. 1) were previously described in detail and are thus only briefly outlined here.

Bear Creek, California, USA: Loose limestone boulders on ridge just north of last bent of Hamilton Canyon and just E of Bear Valley Road, Colusa County, California, USA; coordinates: 39°03.201’ N, 122°24.506’ W. The original Bear Creek locality of Campbell *et al.* (1993, 2002) and Kiel & Campbell (2005) is at the cliffs of Hamilton Canyon but these were inaccessible during the visit in 2011. However, the original Bear Creek locality does not consist of a single large limestone deposit but of numerous carbonate lumps and blocks scattered throughout the section. It is thus assumed here that the present material belongs to the same general seep locality. Early Cretaceous (presumably Valanginian); see also Kiel *et al.* (2008b) for further information on this locality. Material collected by SK and James L. Goedert in 2011.

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