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New taxa and taxonomic revisions to the Poraniidae (Valvatacea; Asteroidea) with Comments on Feeding Biology

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Abstract

New molecular phylogenetic data and new specimens provide the basis for a revision of the family Poraniidae. We present molecular phylogenetic data for five out of 11 genera in the Poraniidae including a newly discovered taxon from the North Pacific. *Bathyporania ascendens* **nov. gen., nov. sp.**, is described from Davidson Seamount (35°43'N, 122°43'W). Another newly discovered poraniid taxon, *Clavaporania fitchorum* **nov. gen., nov. sp.** is described from south of Macquarie Island (56°21'S, 158° 28'E) but was not included in the analysis. Revision of the Poraniidae has been undertaken. We present two new genera and reinstate the previously synonymized genus *Glabraster* and return *Culcitopsis* to genus level. The genus *Porania* sensu Clark (1993) and Clark and Downey (1992) is not monophyletic. *Porania*, *Poraniomorpha* and *Poraniopsis* are revised. *In situ* feeding observations of *Bathyporania* are described and compared with other poraniid feeding accounts.

Key words:

Introduction

The Poraniidae represents a small but poorly studied group of cold to temperate water asteroids (Valvatacea) occurring throughout the Atlantic, Indian, Pacific and Southern Oceans (A.M. Clark 1993; A.M. Clark 1984). Recent research has suggested that the group possibly occupies a more significant role in the ecology of deep-sea benthos than has been reported. For example, Bowden *et al.* (2010) has observed “*Porania*” *antarctica* (see changes below) feeding on stalked crinoids on Antarctic seamounts north of the Ross Sea. Further discussion of the relevance of feeding observations is presented below.

Porania, as a member of the Asterinidae, was among the earliest asteroids described by Gray (1840). Perrier (1893, 1894) established the Poraniidae with subsequent additions summarized in Clark and Downey (1992). Superficially similar morphology in the Poraniidae and the Asteropseidae led to the two groups being combined by Spencer and Wright (1966). This classification was rejected (Hotchkiss & Clark 1976), and with the exception of *Dermasterias* most evidence has shown the Asteropseidae as having closer relationship with members of the Oreasteridae (e.g. Blake 1981, 1987; Mah & Foltz 2011). Blake (1981, 1987) provided skeletal evidence that supported the Poraniidae as a member of the Valvatida rather than the Spinulosida.

Blake (2000) discussed the difficulties of interpreting the thick dermal tissue present on the Poraniidae and the Asteropseidae. One taxon demonstrates how this character has been problematic. Prior accounts (e.g., Spencer and Wright, 1966) have placed the North Pacific *Dermasterias* into the Poraniidae and to the Asteropseidae (Blake 1987, A.M. Clark 1984, Hotchkiss and Clark 1976). Mah and Foltz (2011) support *Dermasterias* away from the Poraniidae and located distantly from nominal asteropseids *Asteropsis* and *Petricia*. *Dermasterias* was shown as a derived taxon, occurring on a long branch as the sister to a clade containing asterinids, solasterids, and ganeriids. Its position requires further study but the soft-skin like covering and associated morphology it shares with either the Poraniidae or the nominal Asteropseidae appears to be best explained as parallelism or convergence. Given the derived status it occupies, we have removed *Dermasterias* from consideration herein in order to avoid confusion with the Poraniidae.

The three-gene molecular phylogeny from Mah and Foltz (2011a) showed the Poraniidae as a sister group to the Valvatida, which was consistent with fossil occurrence suggesting the group as an early stem taxon within the greater Valvatacea. Hess (1972) described a poraniid from the Middle Jurassic. Blake *et al.* (2000) described a new early crown-group member of the Poraniidae from the Triassic, which places poraniid occurrence early in the history of post-Paleozoic asteroids. Significance of the Poraniidae as a stemward form was an important consideration in the revisions for this group.

This study was further motivated by the discovery of a small, unidentified poraniid by the Monterey Bay Aquarium Research Institute (MBARI) from Davidson Seamount in the North Central Pacific, which we have identified as a new species. A second new taxon from the NMNH-US Antarctic Research Program collections is also described herein but DNA was unavailable for the phylogenetic analysis. Results from available poraniids provided the basis for revisions to poraniid classification presented below. Species-level range extensions and revisions are listed below.

- 4 *Culcitopsis* is returned to genus level status.
- 5 *Porania pulvillus insignis* is synonymized with *P. pulvillus*.
- 6 *Poraniomorpha hispida rosea* is synonymized with *P. hispida*.
- 7 *Poraniopsis mira* is synonymized with *P. echinaster*
- 8 *Spoladaster brachyactis* is synonymized with *S. veneris*.

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