

# Three new genera of Electridae (Bryozoa): *Arbopercula*, *Osburnea*, and *Arbocuspis*

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Three groups of cheilostome bryozoan species, formerly classified in the genus *Electra* Lamouroux, and possessing branching spines – the feature strictly discriminating them from all other electrids, are placed in three new genera based on unique combinations of features of spines, cryptocysts, and opercula: *Osburnea* gen. nov. is established for the *Electra biscuta* Osburn; *Arbocuspis* gen. nov. for *Electra bellula* (Hincks), and *Arbopercula* gen. nov. for *Electra bengalensis* (Stolizcka).

*Cheilostomata, Taxonomy, Electra, zooid*

## INTRODUCTION

The genus *Electra* Lamouroux, 1816 was established for species of cheilostome bryozoans, whose zooids bear several spines besides the long proximedial spine. Afterwards, all malacostegids which possess the proximal median spine, the protrusion of the gymnocyst, were classified in the genus *Electra*. The utility of this morphological characteristic was tested on 12 species of the Division Malacostega, from which 10 were species of *Electra* (Nikulina and Schäfer 2008). This molecular phylogenetic study using mitochondrial and nuclear ribosomal genes demonstrated that the proximedial spine is not a phylogenetically informative characteristic in this taxon (Nikulina and Schäfer 2008). Recently, a monophyletic group of species was separated from *Electra* on the basis

of both genetic and morphological characters and placed in the new genus *Einhornia* Nikulina, 2007. The main taxonomical characteristics of *Einhornia* are a calcareous operculum (other species of *Electra* have chitinous opercula) and the absence of lateral spines. Similarly, the species *Electra bellula* (Hincks, 1881), *Electra biscuta* Osburn, 1950, and *Electra bengalensis* (Stolizcka, 1869) – at least the first two of them being multi-species groups (Hincks 1881; Nikulina, Taylor 2009) – possess unique combinations of morphological features and should be excluded from the genus *Electra*. The most significant characteristics discriminating them from *Electra* as well as from all other electrids are bifurcating spines. These spines are thin, chitinous or calcareous in *E. bellula* and

*E. bengalensis*, and conical, heavily calcified in *E. biscuta*. All three species groups are morphologically very distinct and should be placed in three separate genera.

*E. bengalensis* possesses a unique feature – spines on the operculum – distinguishing it from all other known species of Bryozoa.

In *E. biscuta*, two distolateral spines are the most developed, in contrast to other species of *Electra* in which the proximedial spines are more or less dominant. Additionally, the distolateral spines in *E. biscuta* can bifurcate. There are also differences in the structure of the cryptocyst. It is broad, calcified, and ornamented with granules in *E. biscuta*, in contrast to the very thin cryptocysts in

the two other species groups.

Thus, combinations of morphological peculiarities of opercula, spines, and cryptocysts allow unambiguous discrimination between these three taxa. Additionally, the presence of bifurcating spines allows discriminating them from all other members of Malacostega.

The collections being studied are housed at the Natural History Museum, London; Paleontological Museum of the Russian Academy of Sciences, Moscow.

This publication is part of an ongoing study and revision of the genus *Electra* (Nikulina 2006-2008; Nikulina et al. 2007; Nikulina and Schäfer 2008; Nikulina and Taylor 2009).

## TAXONOMY

### Family ELECTRIDAE Stach, 1937

#### *Osburnea* gen. nov.

*Etymology:* Dedicated to R. C. Osburn.

*Type species:* *Electra biscuta* Osburn, 1950.

*Diagnosis:* The colonies are encrusting, multiserial, forming irregular fan-shaped patches. The zooids are short, ovate, and heavily calcified, distinct with deep separating grooves. The gymnocysts are non-porous, reduced or extended to about 1/4 the zooidal length. The opesia are extensive, elliptical,

slightly narrowed distally. The mural rims are granulated or crenulated. The cryptocysts are usually granulated, crenulated or laminated, well-developed excepting distally. The spines are non-articulate, conical, heavily calcified, and sometimes bi- or trifurcate. The number of spines is irregular. Two types of spines are present: usually 2-5 spines, which are bordered by the mural rim (marginal spines) and rarely, spines placed on the gymnocyst (additional gymnocystal spines). The most distal pair of marginal spines (distolateral spines) is placed near to the operculum basis and projected at a slight angle in the direction of the center of the opesum. These spines are most-

ly thick, conical, sometimes flattened or branched and bend across the opesum like a shield. Distally to them is placed the next pair of spines. These are medial spines of distal zooids or their additional gymnocystal spines.

*Species composition:* *O. biscuta* (Osburn, 1950), *O. aquitanica* (Nikolina and Taylor, 2009).

### ***Arbocuspis* gen. nov.**

*Etymology:* In reference to its arborous spines.

*Type species:* *Electra bellula* (Hincks, 1881).

*Diagnosis:* The colonies are encrusting, multiserial, forming irregular fan-shaped patches. The zooids are pyriform. The gymnocyts are extended to about 1/3-2/3 the zooidal length, calcified, smooth or with transverse folds of low amplitude. The opesia are elliptical or pear-shaped in outline, broader proximally than distally, and surrounded by the narrow mural rim. The cryptocysts are inconspicuous. Two types of spines are present: usually 2-5 marginal spines and additional gymnocystal spines. All spines are non-articulated, chitinous, brownish, or moderately calcified. Most distal pair of mural spines (distolateral spines) is conical, erect, other marginal spines can branch. Branching spines bend across the opesum like a shield, but do not fuse.

*Species composition:* *A. bellula* (Hincks, 1881), *A. bicornis* (Hincks, 1881), *A. multicornis* (Hincks, 1881).

### ***Arbopercula* gen. nov.**

*Etymology:* In reference to its arborous spines on opercula.

*Type species:* *Electra bengalensis* (Stolizcka, 1869).

*Diagnosis:* The colonies are encrusting and multiserial. The zooids are elongated and ovate. The rows of zooids are separated with deep grooves. The gymnocyts are reduced or slightly extended. The narrow mural rims surround elliptical opesia, which are broader proximally than distally. The cryptocysts are reduced. The opercula are well chitinized and in the middle of the front surface bear a pair of bifurcating, chitinous spines. At the distal end of the zooid there are two short, stout, non-articulated spines. Other spines are long, slender, often slightly bifurcating. The spines bend across the opesum like a shield, but not fuse.

*Species composition:* *A. bengalensis* (Stolizcka, 1869), *A. anomala* (Osborn, 1950).

*E. bellula* differs from *E. bengalensis* in the absence of spines on the operculum and from *E. biscuta* in morphology of the cryptocyst and spines, which are more chitinous than calcified.

*I am grateful to Dr. P. D. Taylor for kind support and fruitful discussions. This research was supported in part by a Synthesys Grant and DFG Grant Scha355/27.*

## REFERENCES

- Hincks, T. H. (1881): Contributions towards a general history of the marine Polyzoa. IV. Foreign Membraniporina (second series). Annals and Magazine of Natural History 5, 7, 147-161.
- Nikulina, E. A. (2006): *Electra korobokkura* sp. nov., a new species of cheilostome bryozoan from the Pacific coast of Hokkaido. Invertebrate Zoology 3, 1, 23-31.
- Nikulina, E. A. (2007): *Einhornia*, a new genus for electrids formerly classified as the *Electra crustulenta* species group (Bryozoa, Cheilostomata). Schriften des Naturwissenschaftlichen Vereins für Schleswig-Holstein 69, 29-40.
- Nikulina, E. A. (2008a): Taxonomy and ribosomal DNA-based phylogeny of the *Electra crustulenta* species group (Bryozoa: Cheilostomida) with a description of *Electra moskvikvendi* sp. nov. from the Western Baltic Sea. Organism, Diversity, Evolution 8, 215-219.
- Nikulina, E. A. (2008b): *Electra scuticifera* sp. nov.: Redescription of *Electra pilosa* from New Zealand as a new species (Bryozoa, Cheilostomata). Schriften des Naturwissenschaftlichen Vereins für Schleswig-Holstein 70, 91-98.
- Nikulina, E. A., Schäfer, P. (2008): An evaluation of the monophyly of the genus *Electra* Lamouroux, 1816 (Bryozoa, Cheilostomata) with phylogenetic analyses of ribosomal genes. In: Hageman, S. J., Key, M. M., Jr., Winston, J. E. (Eds.), Bryozoan Studies 2007: Proceedings of the 14th International Bryozoology Conference, Boone, North Carolina, July 1-8, 2007. Virginia Museum of Natural History Special Publication 15, 177-185.
- Nikulina, E. A., Taylor, P. D. (2009): Two new species of *Electra* (Bryozoa, Cheilostomata) from the Miocene of the Aquitaine Basin, France. Geobios 43, 2, 219-224.
- Nikulina, E., Hanel, R., Schäfer, P. (2007). Cryptic speciation and paraphyly in the cosmopolitan bryozoan *Electra pilosa* – Impact of the Tethys closing on species evolution. Molecular Phylogenetics and Evolution 45, 765-776.
- Osburn, R. C. (1950): Bryozoa of the Pacific coast of America, part 1, Cheilostomata-Anasca. Report of the Allan Hancock Pacific Expeditions 14, 1-269.
- Stoliczka, F. (1869): On the anatomy of *Sagartia schilleriana* and *Membranipora bengalensis*, a new coral and a bryozoan living in brackish water at Port Canning. Journal of the Royal Asiatic Society of Bengal 38, 28-63.