A new *Orbitestella* (Gastropoda: Heterobranchia: Orbitellidae) from Tierra del Fuego, Argentina

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**ABSTRACT**

A new species of *Orbitestella* is described from Tierra del Fuego, Argentina. The morphology of the jaws is the main character used for the generic allocation. *Orbitestella patagonica* new species is characterized by a widely umbilicate shell with low spire, ornamented with numerous, regularly distributed, spiral threads and weak sinuous commarginal growth lines. The entire surface of the protoconch is covered with crisp spiral threads. Examination of the anatomy revealed the presence of a relatively small stomach and the posterior region of genital system bulging into hemocoel space as main distinguishing characters.

**INTRODUCTION**

The Orbitellidae are extremely minute, discoid, and widely umbilicate gastropods, living mainly in the Southern Hemisphere (Ponder, 1967, 1990; Powell, 1979). The genus *Orbitestella* Iredale, 1917 has a virtually worldwide distribution, although most of the known species occur in Australia and New Zealand (Ponder, 1980; Ponder and Keyzer, 1998). In the north Atlantic, two species have been described by Rolán and Ruhl (1992): *O. similis* from Cape Verde and *O. cubana* from Cuba. The only species of the genus presently known from off South America is *Orbitestella ponderi* Linse, 2002. A species described from the East Beagle Channel (Tierra del Fuego). Linse (2002) identified as *O. ponderi* specimens from southern Chile previously reported by Ponder (1980) as *Orbitestella* sp.

*Orbitestella* has previously been placed in the Trochoidea or Truncatelloidea, either in the Omalogyridae or Orbitellidae (Iredale, 1917; Thiele, 1929; Knight et al., 1960). Ponder (1967), based on the structure of the animals and radula, placed *Orbitestella* in the Rissooidea [as Rissoacea]. This point of view was followed by several subsequent authors' (Ponder, 1979; Ponder, 1983; Marshall, 1988; Hickman and McLean, 1990). Later on, Ponder (1990) after having studied the anatomy of two orbitellid species [*Orbitestella wareni* Ponder, 1990, and *Microdiscalus charopa* (Tate, 1899)] suggested that Orbitellidae should not be considered as Rissooidea but as primitive Heterobranchia, related to the northern-hemisphere freshwater family Valvatidae. Ponder and Waren (1988) placed Orbitellidae in the Valvatoida.

In the present paper a new species of *Orbitestella* from the Magellanic Region is described on the basis of shell morphology and general anatomy.

**MATERIALS AND METHODS**

The studied specimens were collected at the Beagle Channel, Tierra del Fuego, Argentina (Figure 1). Samples were taken with a drag net, fixed in 10% buffered formalin and transported to the laboratory where mollusks were sorted from sediments using a stereoscopic microscope, and preserved in 70% ethanol. Shell, radula, jaws, and operculum morphology were studied and illustrated using scanning electron microscopy (SEM). For anatomical studies specimens were decaledified in Railliet-Henry's solution. Two specimens were processed for histology. Semi-thin sections (0.3 μm thick) were stained with Mallory's trichrome (Gabe, 1968). Additionally, 5 specimens were dissected under stereomicroscope. It was not possible to study the right side of these specimens (i.e. pallial tentacle, penis, and propodial flap).

Voucher specimens were deposited in the Museo de La Plata (MLP) and Museu de Zoologia da Universidade de Sao Paulo (MZSP).

Abbreviations used in the figures: ad, anterior lobe of digestive gland; an, anus; ca, capsule gland; cc, cerebral ganglion; cg, pallial genital gland; cm, columnar muscle; cs, crystalline style sac; dg, digestive gland; es, esophagus; ey, eye; fs, foot sole; ft, foot; h, heart; go, hermaphrodite gonad; gp, pedal ganglion; hy, inner shell organic layer (hypostracum); in, intestine; jw, jaw plate; mb, mantle border; mf, mantle U-shaped fold; mg, mantle gland; mo, month; od, odontophore; ol,
Description: Shell minute, discoid, with low spire, widely umbilicated, ornamented with weak spiral com-marginal growth lines and numerous, regularly distributed spiral threads. Protoconch with crisp spiral threads covering entire surface. Radula with wide, pectinated rachidian tooth with sharply pointed cusps; lateral tooth plate-like, with a main cusp and sparsely serrated outer margin; marginal tooth slender, sickle-like. Stomach relatively small.

SHELL ULTRA-STRUCTURE: Only one well-defined crossed-lamellar layer, about 25 μm thick (Figure 9). Organic layer (hy), a third of periostracum thickness, made more evident in decalcified shell (Figure 16).

Head-foot (Figures 11, 16): Color cream-yellowish, uniform in preserved specimens. Head inlaid into foot (Figure 11). Pair of cephalic tentacles well developed. Eyes relatively large, sunken into integument medially between bases of cephalic tentacles: lens solid, volume about half that of eyes (Figure 16). A pair of tentacle-like flaps (sometimes referred to as a "snout") lying between tentacle bases, flanking mouth. Foot somewhat massive, cylindrical when retracted, occupying 1/4 whorl; sole entirely covered by long cilia. Columellar muscle thick. Posterior muscular gland occupying posterior and middle region of foot.

Operculum (Figure 7): Nearly circular, panceirspiral, up to 3.5 slightly overlapping whorls, horny, thin, translucent, yellowish; nucleus subcentral.

Visceral mass (Figures 11, 16, 17): Comprising two whorls. Digestive gland almost fully developed on last whorl. Stomach and gonad located in first half of visceral whorls, stomach in right side, gonad in left (Figure 16).

Circulatory and excretory systems (Figure 16): Heart small, located between stomach and renal organ, posterior to pallial cavity. Renal organ triangular in section.

Digestive system: Mouth on a small protuberance, between tentacle-like flaps (Figure 16). Oral tube narrow, laterally expanded. Jaw plates large, rounded, laterally located and flanked by well-developed muscles (Figure 16); with five serrated rows of simple curved plates, posteriorly concave, on each side of inner surface (Figure 15). Odontophore similar to jaws in size, with several small muscles, but no cartilages (Figure 16).

Radula 1:1:1:1, somewhat longer than odontophore. (Figure 12). Rachidian tooth large, trapezoidal, with peg-like lateral edges and an excavated base: cutting edge pectinated, wide, strongly curved inwards, bearing 11-13 slender and sharply pointed cusps, gradually becoming smaller in outward direction; lateral cusps straight; lateral cusps somewhat curved, narrower than central one (Figure 14). Lateral teeth plate-like with straight base; cutting edge; with a large primary cusp, 4-5 smaller and regularly separated cusps on outer side, and a small inner side cusp, on base of primary cusp (Figure 12). Marginal teeth sickle-like, slender, gradually narrowing to sharply pointed tip; secondary cusps.

Figure 16. *Orbitestella patagonica*. Semi-diagrammatic longitudinal section. Scale bars = 100 µm. Abbreviations in Materials and Methods.

Figures 17–18. *Orbitestella patagonica*. Anatomical details. 17. Left side view of a specimen with pallial cavity sectioned and deflected. 18. Transversal section in middle region of common and genital duct. Scale bars: Figure 17 = 100 µm; Figure 18 = 50 µm.
Orbitellidae (Smith, 1875) Three species of Orbitellidae were previously reported from East Beagle Channel and southeastern Pacific Ocean, Chile (Linse, 2002). 

**DISCUSSION**

Orbitellastella ponderi was also collected during this study along the Beagle Channel at Ushuaia Bay (= 54°50' S, 68° W), on low Island (54°54.6' S, 67°21.4' W) and San Pio Cape (55°5.6' S, 66°28.8' W), at Slogget Bay (55°30' S, 66°20.6' W) and Isla de los Estados (54°46' S, 64°22' W). These new records confirm that O. ponderi is partially sympatric with O. patagonica.

**Orbitellastella patagonica** differs from O. ponderi Linse, 2002, by having a more depressed shell, with much weaker axial sculpture and rounded aperture. **Orbitellastella patagonica** differs from the Antarctic species of Microdiscus Thiele (1912) by having a more depressed, spirally ornamented shell. The ratio of the umbilicus/last whorl diameter in O. patagonica is similar to that of O. m. vanhoffeni and greater than in M. simile. **Orbitellastella patagonica** also differs from the Australian and New Zealand congeners in having a more rounded shell aperture, more rounded last whorl, and weakly defined commarginal growth lines. **Orbitellastella patagonica** also differs from the North Atlantic O. similis and O. sp. by lacking nodulose sculpture and by having a more rounded last whorl.

The South American species of **Orbitellastella** (O. ponderi and O. patagonica) differ markedly from the Australian **Orbitellastella** species (including the type species) and the North Atlantic species, by having crisp spiral threads covering the entire shell surface, including the protoconch. However, based on jaw morphology and general shell shape, we prefer to expand the generic set of characters for **Orbitellastella** instead of introducing a new generic taxon for the South American species. Beyond these genera, only **Lurifax** Warén and Bouchet (2001) has also been reported to the family **Orbitellastellidae** (Smriglio and Mariottini, 2002). **Lurifax** is very different from the other genera in having taller spire and multispiral protoconch.

**Orbitellastella patagonica** shows the general anatomical features of the **Orbitellastellidae** described by Ponder (1990). The main anatomical difference is the proportionally smaller stomach, occupying only a few regions of the visceral mass. Radula morphology also show some differences with those previously described and figured by Ponder (1990) as characteristically for **Orbitellastella**: the pectinated cutting edge of the rachidian tooth in O. patagonica is wider and not as triangular as in O. arenae Ponder, 1990; the cutting edge of the lateral teeth were described by Ponder (1990) as a wide plate with numerous small cusps in the outer margin, while in O. patagonica they are narrower and having only few cusps; marginal teeth are wide and numerous cusped in the species described by Ponder (1990) and are narrow, hook-like and without additional cusps in O. patagonica. The jaws in O. patagonica have only five rows of serrated plates, while Ponder (1990) described six and seven rows for the species he studied. Both radulae and jaws of O. patagonica are similar to those of O. ponderi.

**Orbitellastella patagonica**, as it was previously reported for O. war by Ponder (1990), has the general anatomical features of a basal **heterobranch**, such as the lack of
ctenidium, the hermaphroditic genital system mostly bulging into the haemocoele, the lack of odontophoral cartilages and the presence of a pigmented mantle gland.

ACKNOWLEDGMENTS

The authors wish to express their gratitude to C. Ituarte (or comments on the manuscript and B. A. Marshall for specimen loans of Microdiscula anhhoeffeni and other Australian orbitestellid species in the collection of the Museum of New Zealand Te Papa Tongarewa, and also for comments on the paper. Part of this study was developed with the support of funding to the senior author by Fundación de Amparo a Pesquisa do Estado de Sao Paulo (Fapesp), Process # 00/11074-5 and 00/11357-7. Diego Zelaya is a Fellow of the National Research Council for Science and Technology (CONICET), Argentina.

LITERATURE CITED


