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A new deep-water *Astyris* species (Buccinoidea: Columbellidae) from the southeastern Pacific

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Marine mollusks from northern Chile and from the Región de Atacama in particular have been sparsely documented, and only a few works have reviewed the area (see Araya & Araya, 2015; Labrín *et al.* 2015; Araya & Valdés 2016). Mollusks from deep water and offshore areas are one of the least known groups and, apart from some classic works from the 19th century, only McLean (1970), Bernard (1983), Véliz and Vásquez (2000), Fraussen & Haddorn (2000), Houart (2003), Vilvens & Sellanes (2010), and Araya (2013) have included deep-water molluscan species from northern Chile. Among the Neogastropoda, the Columbellidae constitute a quite diverse and well-distributed family of small snails, with about seven hundred extant species distributed in 70 genera (deMaintenon, 2014). Most columbellids are active epibenthic carnivores or scavengers; their shells are small, normally between 3 and 20 mm in height and they can have determinate growth, with many adult shells presenting a thickened outer lip with denticles on the interior surface (Squires, 2015). In the southeastern Pacific off Chile this family is represented by only 14 species, all from shallow water, mostly found in the northern and central parts of the country (Valdovinos, 1999).

In this study, as part of ongoing surveys documenting the deep-water invertebrates from the bycatch of commercial fisheries in northern Chile (Reiswig & Araya, 2014; Araya, 2015a), we present the first record of the genus *Astyris* in the southeastern Pacific, with the description of a new small deep-water species, restricted to the continental slope off northern Chile.

Material and methods

103 specimens (Empty or fresh shells with traces of soft parts) were sorted from greenish mud collected at several locations off northern Chile. Dimensions of the shells were measured with Vernier calipers (± 0.1 mm) and from light microscopy (LM) images; measurements follow Araya (2015b, fig. 1).Abbreviations used are: D, diameter of the shell: maximum dimension perpendicular to H, including lip; H, shell height: maximum dimension parallel to axis of coiling, including lip; LW, height of last whorl, including lip; NW, number of whorls. Institutional abbreviations are: SBMNH, Santa Barbara Museum of Natural History, Santa Barbara, California, USA; MPCCL, Museo Paleontológico de Caldera, Caldera, Chile; MZUC, Museo de Zoología de la Universidad de Concepción, Concepción, Chile. MNHNCL, Museo Nacional de Historia Natural, Santiago, Chile.

Systematics

Superfamily Buccinoidea Rafinesque, 1815

Family Columbellidae Swainson, 1840

Genus *Astyris* H. Adams & A. Adams, 1853

Type species: *Buccinum rosaceum* Gould, 1840; subsequent designation, Fischer (1887: 638).

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***Astyris atacamensis* new species**

Fig. 1

Type material. Holotype: SBNHM 460092 (H: 10.6, D: 6.7 and LW: 8.3 mm); paratypes: SBNHM 460093 (1 specimen), MPCCL 01062016 (4 specimens), MZUC 37641 (4 specimens), MNHNCL 202493 (7 specimens); all from the type locality.

Type locality. 20 km NW off Huasco (28°14'93" S; 71°17'50" W, 404–409 m), Región de Atacama, northern Chile. Leg. Ricardo Catalán, February 3, 2000.

Etymology. The specific name of *Astyris atacamensis* refers to presence of this species on the continental shelf of the Región de Atacama, northern Chile.

Diagnosis. Shell small (up to 11.1 mm long), thick, stout, with 4 to 5 rounded and slightly angulated whorls, often decollate; with sculpture of fine growth lines; spiral sculpture of very fine spiral grooves most noticeable on base of shell. Aperture wide, oval; outer lip sharp, in mature specimens with minute internal lirae; siphonal canal broad and straight.

Description. Shell small (H 5.8 to 11.1 mm), thick, stout, with 4 to 5 weakly convex whorls; outline conic; sutures impressed. Measurements from fifty randomly chosen specimens: H 5.8–8.3–11.1 mm, D 3.5–5.3–7.1 mm, and height of last whorl 4.5–6.5–8.7 mm (minimum–average–maximum). Taking into account that most of the shells had the first whorls eroded, we could observe at most 5 whorls in the better preserved shells, with a bit over 4 whorls remaining in most specimens. Colour pale tan; earlier whorls slightly paler, showing indistinct spiral bands. Spire short, decollate, about two-fifths of total height; spire angle a bit less than 45°. Protoconch and early whorls eroded. Teleoconch smooth and slightly glossy, except for fine, irregular axial growth lines crossed by spiral sculpture of very fine, barely visible grooves; grooves cover almost entire exterior surface, coarsest and most noticeable on base. Last whorl large, about three-fourths of shell height, slightly convex, angulated near the base, concave below; maximum width at about one third from anterior end. Aperture prosocline, oval, slightly rectangular, posteriorly acuminate; aperture height slightly more than half of shell height. Parietal callus slightly thickened, concave. Outer lip sharp, simple, outline weakly convex, weakly concave over upper third, then swinging forwards weakly to suture; about 8 to 12 lirae inside outer lip; columella without denticles, callous. Siphonal canal short, very wide, anteriorly with rounded siphonal aperture.

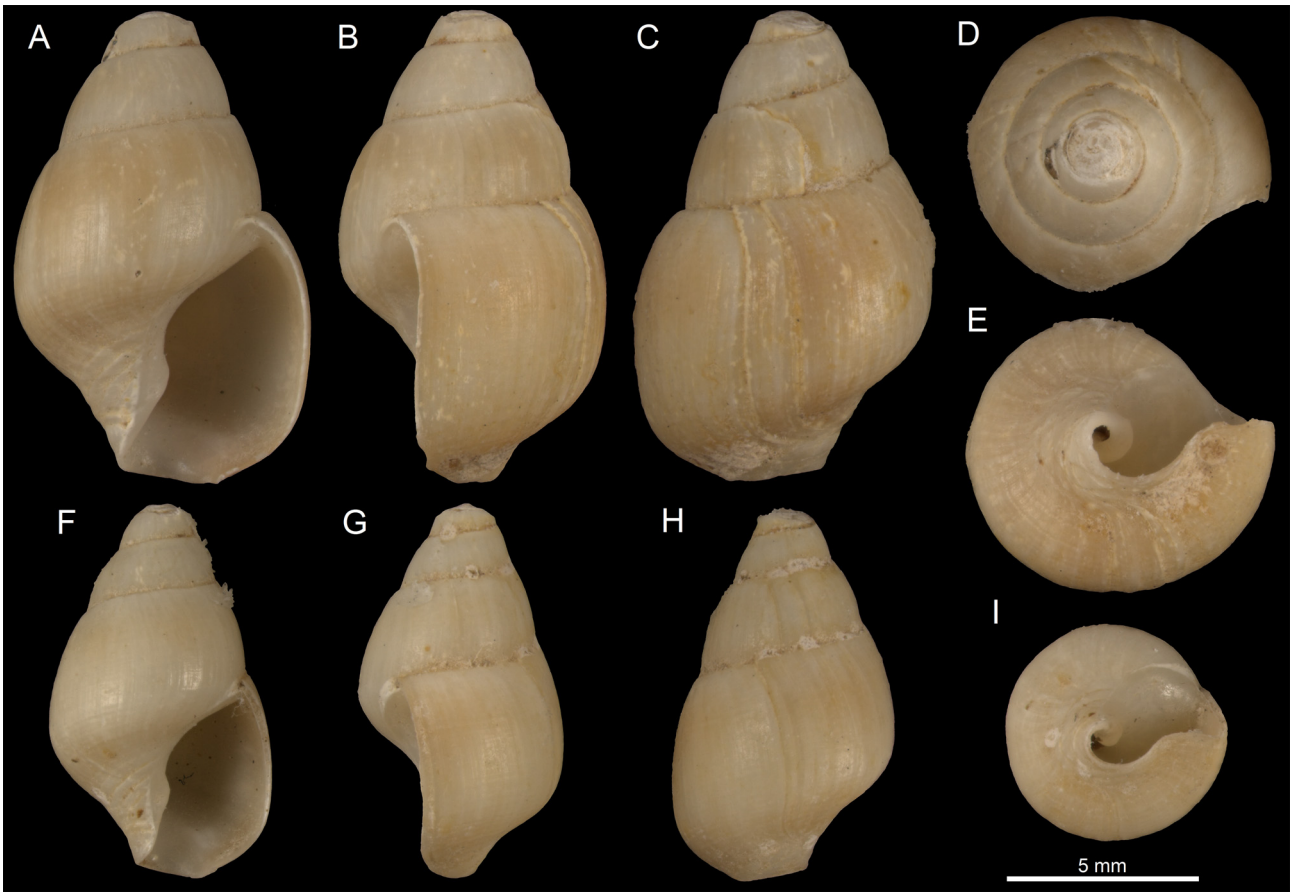

FIGURE 1. *Astyris atacamensis* **n. sp.**, off Huasco, Chile, 404–409 m depth. **A–E.** Holotype SBMNH 456358. **F–I.** Paratype SBMNH 452239.

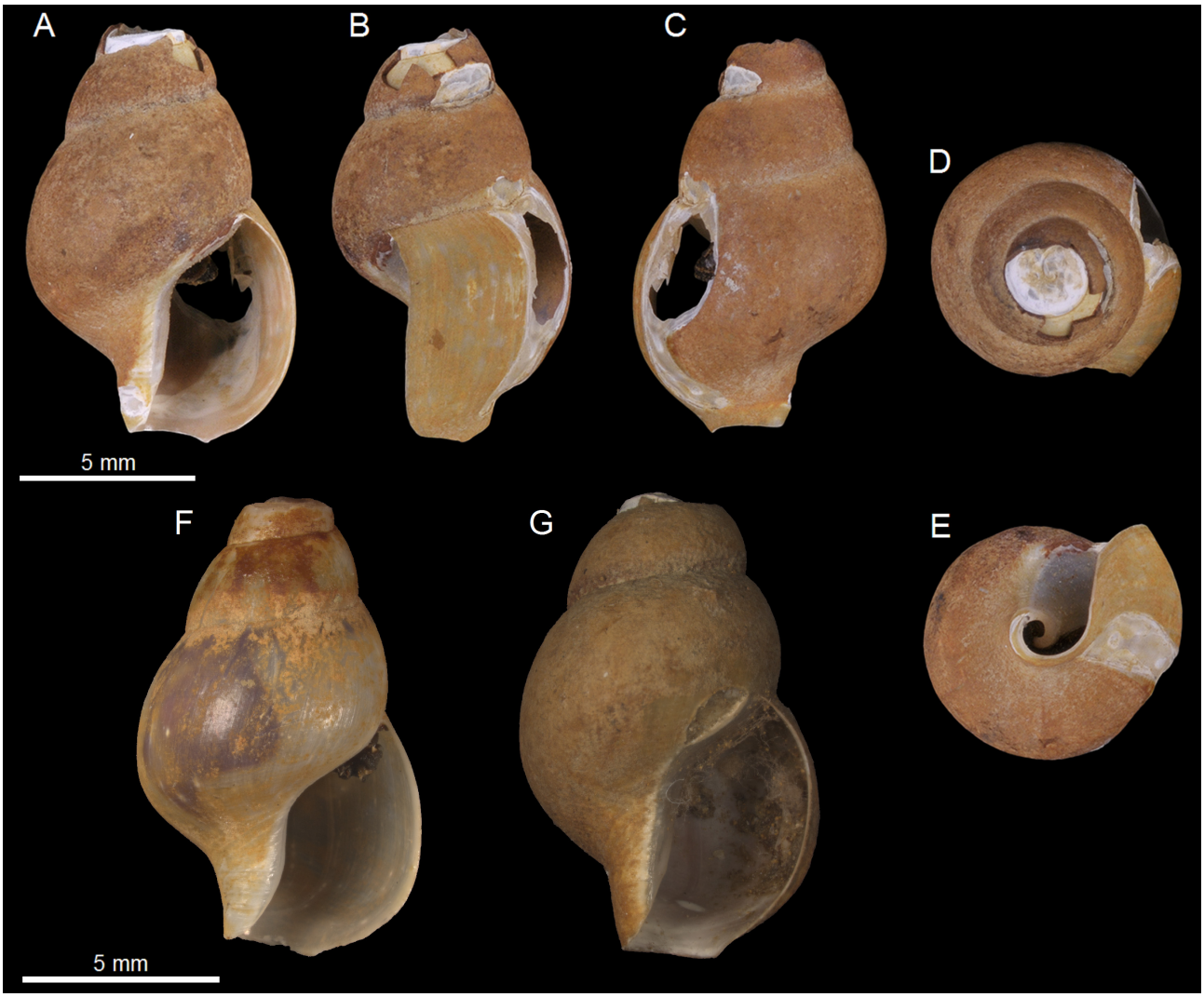

FIGURE 2. *Astyris permodesta* (Dall, 1890). A–E. Holotype, USNM 96526, north of Santa Rosa Isl., Channel Islands, California, USA, 276 fms [504.7 m], mud. F–G. SBMNH 356555, Santa Monica Basin, off California.

Distribution and habitat. Shells of this species (no live specimens) were found in greenish mud, from soft bottoms off Puerto Flamenco (28°14'93" S; 71°17'50" W), Región de Atacama to off Tongoy (30°11'36"S; 71°33'25"W), Región de Coquimbo, Chile, from depths of 180 to 470 m. A single specimen, recently collected from sediments of the Bahía Inglesa Formation (Miocene to Pliocene) at Quebrada Blanca (27°03'55" S; 70°47'30" W), near Caldera, Chile may represent the oldest record for this species (Nielsen et al., unpublished).

Remarks. All of the specimens examined have the apex eroded to varying degrees, all of them lacking the protoconch and part of the earlier whorls. The definite generic assignment is thus still preliminary, but they agree partially with the description given by Garcia (2009) for *Astyris*. The distinctive broad shell shape, with a wide siphonal canal, is quite distinctive and different from all the other known columbellid species from the southeastern Pacific. *Astyris atacamensis* sp. n. is similar in shell characters only to *Astyris permodesta* (Dall, 1890), a species described from deep water in the northeastern Pacific (Dall, 1890, Thorsson 2002). The new species differs from *A. permodesta* (Fig. 2) in shell shape (slightly angulated versus convex whorls), with a last whorl slightly concave in *A. atacamensis* and compressed below in *A. permodesta* (producing a differentiated/protruding siphonal canal in this species); in the thickness of shell and lip (thin in *A. permodesta* and thick in *A. atacamensis*; most visible at the upper end of outer lip), a slightly different aperture outline (product of the more convex last whorl in *A. permodesta*, slightly angulated in the new species), a thick columella (not callous in *A. permodesta*), in the presence of lirae in the interior border of the outer lip in the new species (absent in *A. permodesta*) and, particularly, in having a broader and less constricted siphonal canal, with a more pronounced columellar fold in the new species (absent in *A. permodesta*). Furthermore, the habitat of the new species also seems to differ from that of *Astyris permodesta,* which is unusual in that it has been described from reducing

environments, recorded along with species of large vesicomyid bivalves of the genus *Calyptogena* Dall, 1891 (McLean, 1996).

This new species thus represents the first record in Chile of the genus *Astyris*, previously unknown from the southeastern Pacific. Further sediment sampling in the area will probably reveal more molluscan species to be discovered and described, particularly micromollusks, as described by Araya & Geiger (2013).

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