

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/309072220>

Bostryx hennahi (Gray, 1828) the Largest Chilean Bulimulid (Mollusca: Pulmonata), Rediscovered among Tillandsia communities in Northern Chile

Article · August 2016

CITATIONS

5

READS

312

3 authors, including:



Juan-Francisco Araya

University of Concepción

62 PUBLICATIONS 367 CITATIONS

[SEE PROFILE](#)



Bram Breure

Naturalis Biodiversity Center

375 PUBLICATIONS 867 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Chilean Terrestrial Molluscs [View project](#)



Revision of the Lesser Antillean genera Amphibulima and Pellicula [View project](#)

BOSTRYX HENNAHI (GRAY, 1828) THE LARGEST CHILEAN BULIMULID (MOLLUSCA: PULMONATA), REDISCOVERED AMONG TILLANDSIA COMMUNITIES IN NORTHERN CHILE

JUAN FRANCISCO ARAYA^{1,2}, MATÍAS MADRID³ & ABRAHAM S. H. BREURE^{4,5}

¹Departamento de Geología, Universidad de Atacama, Copayapu 485, Copiapó, Región de Atacama, Chile.

²Programa de Doctorado en Sistemática y Biodiversidad, Departamento de Zoología, Facultad de Ciencias Naturales y Oceanográficas, Universidad de Concepción, Barrio Universitario s/n, Concepción, Chile.

³Programa de Ingeniería en Biotecnología, Facultad de Ciencias, Universidad de Chile, Las Palmeras 3425, Ñuñoa, Santiago, Chile.

⁴Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, the Netherlands.

⁵Royal Belgian Institute of Natural Sciences, Vautierstraat 29, 1000 Brussels, Belgium.

Abstract The majority of the terrestrial molluscs of Chile have been scarcely studied, and several of them are only known from their original descriptions. In this work we present new records of the bulimulid land snail *Bostryx hennahi* (Gray, 1828), rediscovered in sand among *Tillandsia* communities (*Tillandsiales*) in northern Chile. This extant land snail is the northernmost terrestrial mollusc found in the country and the largest documented Chilean *Bostryx* species.

Key words *Bulimulidae*, Atacama Desert, Lomas formations, Peru.

INTRODUCTION

The majority of the terrestrial molluscs of Chile are still scarcely studied and, apart from some early works from the nineteenth century, only a few recent works have reviewed the species from central or northern Chile (Rehder, 1945; Breure, 1978; Stuardo & Valdovinos, 1985; Valdovinos & Stuardo, 1988, 1989; Miquel & Araya, 2013, 2015; Araya, 2015a; Araya & Catalán, 2014; Araya & Aliaga, 2015). The land snails present in northern Chile belong to seven families (Bothriembryontidae, Bulimulidae, Charopidae, Ellobiidae, Pupillidae, Strophocheilidae and Systrophiiidae) with only 19 non-bulimulid indigenous species. The family Bulimulidae is represented solely by the speciose genus *Bostryx* Troschel, 1847, of which most species have narrow distribution ranges in the country, some of them only known from their respective type localities, and all of them (about 34 species) found exclusively in the arid coastal areas of the northern part of the country, from Arica (18°29' S; 70°20' W), Región de Arica y Parinacota, to Coquimbo (29°57' S; 71°20' W), Región de Coquimbo (Araya, 2015b).

Bostryx hennahi Gray, 1828 was described, and later re-described as *Helix cactorum*, from specimens collected from "Plains near Arica"

(Gray, 1828; d'Orbigny, 1838 [1834–1847]) and, as *Bulimus virginalis*, from shells collected at Tacna, Peru (Morelet, 1860); it was recorded subsequently from further northern Peruvian localities up to near Pisco, Ica, Peru (Dall, 1909). Further records have only mentioned *Bostryx hennahi* as part of a synonymic list of Chilean bulimulids by Stuardo & Valdovinos (1985), in a synopsis of the land Mollusca of Chile (Stuardo & Vega, 1985), in a general revision of bulimulid species (Breure, 1979), and it has been depicted in annotated type catalogues for the Natural History Museum, London (Breure & Ablett, 2014) and for the Muséum d'Histoire Naturelle, Geneva (Breure, 2016). This species, since its description as *Helix cactorum* as well as *Bulimus virginalis*, does not appear to have been collected again in the field since Dall (1909) and Breure (1978), who mention specimens from Peru. This species is the northernmost land snail and the largest (or tallest) *Bostryx* species found in Chile, differing from most of their congeneric Chilean species in details of shell morphometry and sculpture; and it can be distinguished by its thick chalky shell and by the lack of shell colour patterns (or the stripped or variegated shell in some cases). In this work, as part of ongoing studies documenting the land snails of northern Chile, we provide new records and a redescription for this species, and highlight its association with communities

“tillandsiales” of the endemic bromeliad species *Tillandsia landbecki* and *Tillandsia marconae* in a fog oasis near Arica, Región de Arica y Tarapacá, northern Chile. This particular habitat is found in one of the most arid regions in the country, with a cold desert climate (Köppen Cold desert climate) with coastal fogs and negligible precipitations (Peel *et al.* 2007).

MATERIALS AND METHODS

The specimens were hand-collected from sand and under *Tillandsia* communities; voucher specimens are deposited in the collections of the Museo Paleontológico de Caldera, Caldera, Chile (MPCCL). The terminology of shell morphology is based upon Araya (2015) and the measurements follow Breure and Ablett (2012) for the whorl counts and Pizá & Cazzaniga (2003) for the spiral angle. Dimensions of the shells were measured with Vernier calipers (± 0.1 mm). Further abbreviations for depositories of material: MHNG, Muséum d'histoire naturelle, Department of Invertebrates, Geneva, Switzerland; NHMUK, Natural History Museum, London, U.K.; RMNH, Naturalis Biodiversity Center, Leiden, the Netherlands; USNM, Smithsonian Institute, National Museum of Natural History, Washington DC, U.S.A.

SYSTEMATICS

Family Bulimulidae Tryon, 1867

Subfamily Bostrycinae Breure, 2012

Genus *Bostryx* Troschel, 1847

Type species *Bulimus (Bostryx) solutus* Troschel, 1847, by monotypy.

Bostryx hennahi (Gray, 1828)

Figs 1A–1V.

Bulimus hennahi J. E. Gray, 1828: 5, pl. 5, fig. 5; d'Orbigny 1837 [1834–1847]: 283, pl. 30, figs. 3–4; Morelet, 1863: 184; Hidalgo, 1870: 52.

Helix cactorum d'Orbigny, 1835: 10; d'Orbigny, 1847: 283, pl. 30, figs. 3,4; Breure & Ablett, 2014: 36, figs. 6D, L10iv; Breure, 2016: @, fig. 74.

Bulimus virginalis Morelet, 1860: 372; Breure, 2016: @, fig. 75.

Bulimulus (Lissoacme) hennahi Pilsbry, 1896 [1895–1896]: 156, pl. 47, figs. 65–68.

Bulimulus hennahi Hidalgo, 1893: 270; Dall, 1909: 164.

Bostryx (Lissoacme) hennahi Stuardo & Valdovinos, 1985: 56; Stuardo & Vega, 135.

Bostryx hennahi Breure, 1978: 82; Breure, 1979: 54; Richardson, 1995: 27.

Diagnosis A *Bostryx* species characterized by a slender and large (up to 32mm in height), elongate-ovate, thick chalky shell, of whitish color or variegated with fine, irregular, reddish and caramel brown streaks, with six to seven slightly distorted whorls and a prominent last whorl, which encompasses about 0.7 of the shell length. Umbilicus small, shallow; last half-whorl expanding rapidly; aperture elongate, about 0.4 of shell length, lip simple.

Differential diagnosis Identified from most congeneric species by its larger, thicker and chalky shell (Except *Bostryx affinis*, which has a corneous, lighter and more spindle-shaped shell) which have slightly distorted whorls, a character state not observed in any other Chilean *Bostryx* species.

Redescription Shell thick, chalky, whitish, pinkish or variegated with fine reddish streaks; large for the genus (measuring up to 32mm in height), around 3.3 times as long as wide, spindle-shaped, spire elevated (spire angle 42° to 44°), with five slightly distorted and convex whorls. Protoconch small, of about one and a half whorls, smooth, usually eroded, differentiated from the sculptured teleoconch. Teleoconch of five to seven whorls, sculptured only by irregular growth marks. Suture deep and well-marked, slightly plicated in the earlier whorls. Aperture elongate-subovate, 1.5 times as long as wide, about 0.40 of shell height; callus a mere glaze, slightly pinkish-colored; umbilicus very small, shallow, last half-whorl expanding rapidly; columellar margin straight, folding over umbilicus. Peristome simple, sharp. Soft parts unknown.

Type locality Plains near Arica, Chile (Gray, 1828).

Material examined Approximately 1km from Portezuelo de Poconchile (18°28' S; 70°05' W), Arica, Región de Arica y Tarapacá, northern Chile, collected by M. Madrid, Feb. 2013: MPCCL

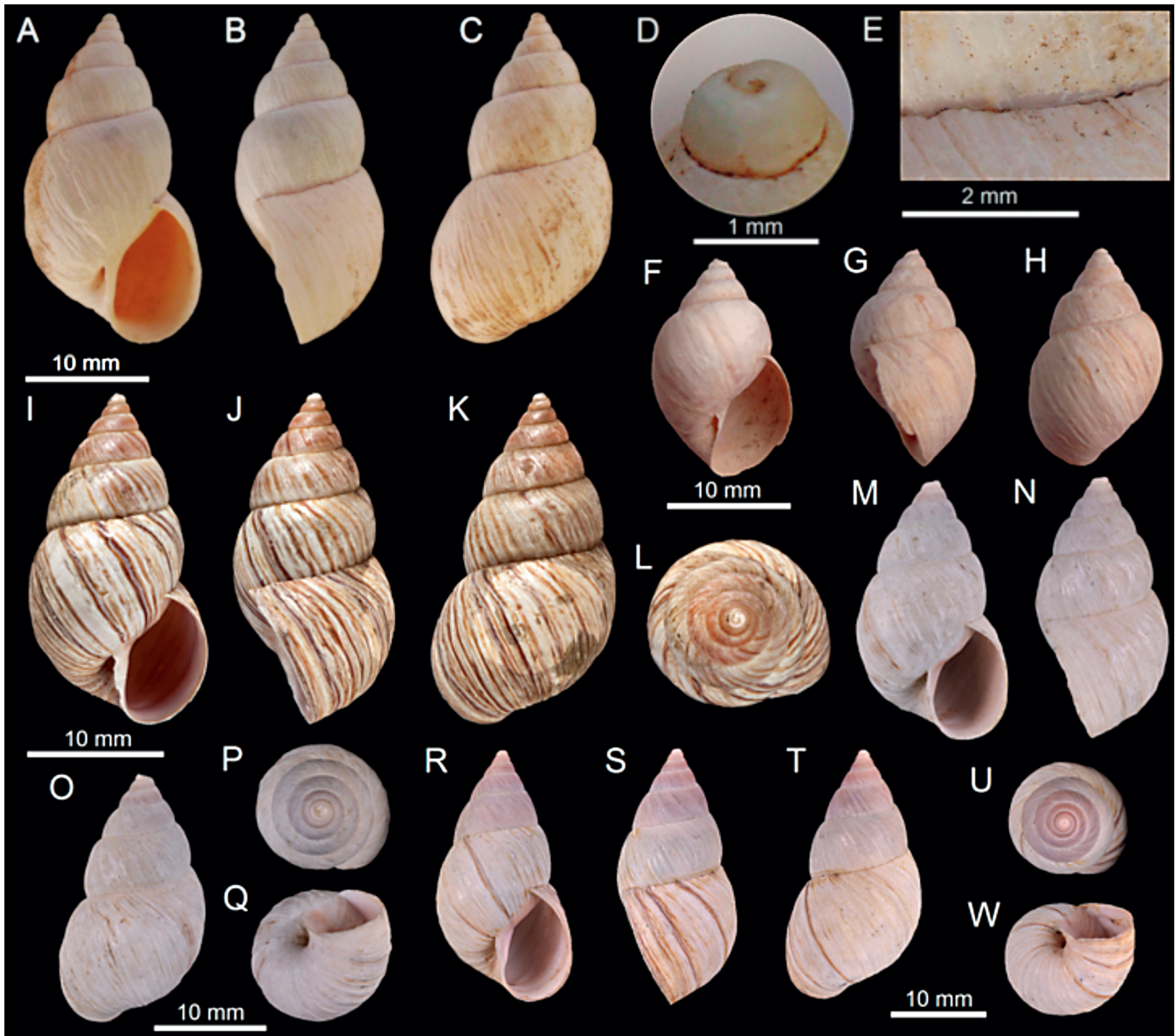


Figure 1 *Bostryx hennahi* (Gray, 1828) MPCCL 11012016. **A–H** specimens from Arica, northern Chile (MPCCL 12122016): **A** apertural view; **B** side view; **C** abapertural view; **D** detail of protoconch; **E** detail of suture; (MPCCL 12122016): **F** apertural view, **G** side view, **H** abapertural view; **I–L** lectotype of *Helix cactorum* from “Tacna, Pérou” (NHMUK 1854.12.4.189): **F** apertural view; **B** side view; **C** abapertural view; **D** apical view; **M–Q** specimen from “Cabija, Peru” (USNM 307660): **M** apertural view; **N** side view; **O** abapertural view; **P** apical view, **Q** umbilical view; **R–W** specimen from Peru (unknown location; USNM 105176): **R** apertural view; **S** side view; **T** abapertural view; **U** apical view, **V** umbilical view

11012016, 12012016 (two specimens), plus twenty specimens, all collected in the same locality. Lectotype and 6 paralectotypes of *Helix cactorum* deposited in the NHM (NHMUK 1854.12.4.189), four paralectotypes of *Helix cactorum* deposited at the MHNG (MHNG-INVE-20659 from “Pérou”). The following specimens examined from photographs; two specimens deposited at the SI NMNH (USNM 307660 from “Peru, Cabija”)

and USNM 105176 (from “Peru”); the latter two lots are tentatively referred to as this species, see remarks below.

Distribution This species is restricted to coastal areas from Tacna (18°03'20" S; 70°14'54" W), Peru, to Arica (18°28'30" S; 70°18'52" W), Chile (Morelet, 1860; Breure, 1978, 2016 and the present study). See also remarks.



Figure 2 Plains near Arica, Atacama Desert, northern Chile; the type locality of *Bostryx hennahi* (Gray, 1828). Note in the foreground the communities of *Tillandsia* plants (Tillandsiales) growing on sand dunes.

Habitat This species was found buried in fine sand, with some shells scattered among communities of the desert-dwelling bromeliads *Tillandsia landbecki* and *Tillandsia marconae* in a fog oasis near the Valle de Azapa, in Arica, northern Chile (Fig. 2). The area is so extremely arid (less than 2mm of mean annual rainfall over nearly 100 years) that no other vascular plants are able to survive (Rundel *et al.* 1997). Although no live specimens of *B. hennahi* were found, some shells retained a glossy aperture and parietal callus; and it is thus very possibly that this species is restricted to humid seasons or years, such as those related with the El Niño Southern Oscillation (ENSO) events.

Remarks The specimens cited by Breure (1978) from Atico (16°12'34" S; 73°37'20" W), Arequipa Department, Peru (RMNH.MOL 241071) and by Dall (1909) for a specimen from San Gallan Island [=Isla de Sangayán] (13°50'20" S; 76°27'01" W), Peru (USNM 307660) correspond to different, unidentified species. The two USNM lots mentioned above are labelled from Peru, but originate from historical collections; we regard them tentatively as *Bostryx hennahi*. During the 19th century northern Chile has been a disputed area between Peru, Bolivia and Chile (Breure, 2011), which explains why one of the lots is labelled "Peru, Cabiija [=Cobija]". These historical records have to be considered as having imprecise localities, despite the mentioning of Cobija, northern Chile, seems the best approximation for these specimens.

This species has a complex taxonomy, having been described several times, perhaps due to its variable coloration (see Pilsbry, [1895–1896]: 157). For instance, a variegated specimen found in a *Melocactus* according to Orbigny (1837 [1834–1847]), was subsequently described as *Helix cactorum* (Figs 1I–L), and plain white specimens were described as *Bulimus virginalis* by Morelet (1860). Juvenile shells of *Bostryx hennahi* have more lightweight and wider shells; with a less elevated spire and a slanted columellar lip (Figs 1F–H). From the c. 34 species of *Bostryx* distributed in Chile, most of them differ from *Bostryx hennahi* in rough shell sculpture characteristics, including general shell proportions and sculpture; this species has a distinctive large and thick shell, with slightly distorted whorls. Further sampling in coastal and Andean areas of northern Chile will hopefully reveal more snail species to be discovered and, perhaps, even new species to be described.

ACKNOWLEDGEMENTS

We are thankful to Jonathan Ablett (London, UK) for helping with images of the type specimen of *Helix cactorum* housed at the NHMUK, and to Robert Hershler (Washington DC) for helping with images of specimens deposited at the USNM.

REFERENCES

- ARAYA JF 2015a Current Status of the Non-Indigenous molluscs in Chile, with the first record of *Otala punctata* (Müller, 1774) (Gastropoda, Helicidae) in the country and new records for *Cornu aspersum* (Müller, 1774) and *Deroceras laeve* (Müller, 1774). *Journal of Natural History* **49**: 1731–1761. <http://dx.doi.org/10.1080/00222933.2015.1006703>
- ARAYA JF 2015b. The Bulimulidae (Mollusca: Pulmonata) from the Región de Atacama, northern Chile. *PeerJ* **3**:e1383. <http://dx.doi.org/10.7717/peerj.1383>
- ARAYA JF & ALIAGA JA 2015 A new species of *Lilloiconcha* Weyrauch, 1965 (Pulmonata: Charopidae) from central Chile. *Zootaxa* **4007**: 295–297. <http://dx.doi.org/10.11646/zootaxa.4007.2.13>
- ARAYA JF & CATALÁN R 2014 A review of the non-bulimulid terrestrial Mollusca from the Region of Atacama, northern Chile. *ZooKeys* **398**: 33–51. <http://dx.doi.org/10.3897/zookeys.398.4282>
- BREURE ASH 1978 Notes on and descriptions of Bulimulidae (Mollusca, Gastropoda). *Zoologische Verhandelingen Leiden* **164**: 1–255.

- BREURE ASH 1979 Systematics, phylogeny and zoogeography of Bulimulinae (Mollusca). *Zoologische Verhandelingen Leiden* **168**: 1–215.
- BREURE ASH 2011 History matters. Available online at <http://wp.me/p3cUOO-2W> (accessed 9 January 2016).
- BREURE ASH 2016 Annotated type catalogue of the Orthalicoidae (Mollusca, Gastropoda, Stylommatophora) in the Muséum d'histoire naturelle, Geneva. *Revue Suisse de Zoologie*, **123**: 57–103.
- BREURE ASH & ABLETT JD 2012 Annotated type catalogue of the Bothriembryontidae and Odontostomidae (Mollusca, Gastropoda, Orthalicoidae) in the Natural History Museum, London. *ZooKeys* **182**: 1–70. doi: 10.3897/zookeys.182.2720
- BREURE ASH & ABLETT JD 2014 Annotated type catalogue of the Bulimulidae (Mollusca, Gastropoda, Orthalicoidae) in the Natural History Museum, London. *ZooKeys* **392**: 1–367. doi: 10.3897/zookeys.392.6328
- DALL WH 1909 Report on a collection of shells from Peru, with a summary of the littoral marine Mollusca of the Peruvian zoological province. *Proceedings of the United States National Museum* **37**: 147–194.
- GRAY JE 1828 Spicilegia Zoologica, or original figures and short systematic descriptions of new and unfigured animals. Part 1, 1–8. J.E. Gray, London.
- HIDALGO JG 1870 Catalogue des coquilles terrestres recueillies par les naturalistes de la commission scientifique espagnole sur divers points de l'Amérique méridionale. *Journal de Conchyliologie* **18**: 27–70.
- HIDALGO JG 1893 Descripción de los moluscos terrestres recogidos durante el viaje al Pacífico, verificado de 1862 a 1865 por una Comisión de naturalistas enviada por el Gobierno español. In: Hidalgo, J.G. (1893–1900) Obras Malacológicas. Parte III, Descripción de los moluscos recogidos por la Comisión Científica enviada por el Gobierno Español a la América Meridional, 134–331. Aguado, Madrid.
- MIQUEL SE & ARAYA JF 2013 A new Charopidae from Chile and Argentina, *Stephacharopa calderaensis* n. gen. and n. sp., with remarks on the taxonomy of the genus *Stephadiscus* Hylton Scott 1981 (Mollusca: Gastropoda Pulmonata). *Archiv für Molluskenkunde* **142**: 227–235. <http://dx.doi.org/10.1127/arch.moll/1869-0963/142/227-235>
- MIQUEL SE & ARAYA JF 2015 New records of terrestrial molluscs of the Juan Fernández Archipelago (Chile), with the description of a new genus and species of Charopidae (Gastropoda Stylommatophora). *Archiv für Molluskenkunde* **144**: 155–167.
- MORELET A 1860 Colimacea in intimâ Peruvii regione a Cl. Angrand collecta. *Journal de Conchyliologie* **8**: 371–376.
- MORELET A 1863 Séries conchyliologiques de mollusques terrestres et fluviatiles recueillis pendant le cours de différents voyages, ainsi que la description de plusieurs espèces nouvelles, III. Pérou, 131–221. Klincksieck, Paris.
- D'ORBIGNY A 1834–1847 Voyage dans l'Amérique méridionale (le Brésil, la république orientale de l'Uruguay, la république Argentine, la Patagonie, la république du Chili, la république de Bolivie, la république du Pérou), exécuté pendant les années 1826, 1827, 1828, 1829, 1830, 1831, 1832, et 1833. Tome 5, Partie 3, Mollusques. P. Bertrand, Paris/V. Levrault, Strasbourg, 758 pp.
- D'ORBIGNY A 1835 Synopsis terrestrium et fluviatilium molluscorum, in suo per Americam meridionalem itinere. *Magasin de Zoologie* **5(61)**: 1–44.
- PEEL MC, FINLAYSON BL, MCMAHON TA 2007 Updated world map of the Köppen-Geiger climate classification. *Hydrology and Earth System Sciences* **11**: 1633–1644 <http://dx.doi.org/10.5194/hess-11-1633-2007>.
- PILSBRY HA 1895–1896 American bulimi and bulimuli. *Strophocheilus, Plekocheilus, Auris, Bulimulus*. *Manual of Conchology* (2), 10,i–iv, 1–213.
- PIZÁ J & CAZZANIGA NJ 2012 Barrels and pagodas: clarifying the identity and variability of two nominal taxa of carinated land snails in the genus *Plagiodontes* (Gastropoda: Orthalicidae: Odontostominae). *Journal of Natural History* **46**: 383–410.
- REHDER HA 1945 The Chilean species of the molluscan genus *Peronaeus* (Bulimulidae). *Revista Chilena de Historia Natural* **48**: 102–107.
- RICHARDSON CL 1995 Bulimulidae: catalog of species. *Tryonia* **28**: 1–458.
- RUNDEL PW, PALMA B, DILLON MO, SHARIFI MR & BOONPRAGOB K 1997. *Tillandsia landbeckii* in the coastal Atacama Desert of northern Chile. *Revista Chilena de Historia Natural* **70**: 341–349.
- STUARDO JR & VALDOVINOS C 1985 A synonymic list of Chilean bulimulids (Mollusca: Pulmonata). *Boletín de la Sociedad de Biología de Concepción* **56**: 55–58.
- STUARDO JR & VEGA R 1985 Synopsis of the land Mollusca of Chile. With remarks on distribution. *Studies on Neotropical Fauna and Environment* **20**: 125–146.
- VALDOVINOS C & STUARDO JR 1988 Morfología, sistemática y distribución del género *Plectostylus* Beck 1837 (Pulmonata: Bulimulidae). *Gayana Zoología* **52**: 115–195.
- VALDOVINOS C & STUARDO JR 1989 *Austrodiscus (Zilchogyra) solei* spec. nov. nuevo gastrópodo húmico de Chile. *Boletín de la Sociedad de Biología de Concepción* **60**: 239–245.

