

New species of *Gastrocopta* from Argentina (Mollusca Eupulmonata Gastrocoptidae)

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Abstract: The species of *Gastrocopta* here described share the angular lamella united with the parietal lamella at the inner end of the former, giving the shape of a “Y”. We describe two new species inhabiting the central and northern part of Argentina, and we report *G. iheringi* (Suter, 1900), which has the same structural feature, for the first time in the country. Present species of *Gastrocopta* live in Argentine temperate and tropical areas, but previous records indicate that the most ancient fossil record with such a characteristic anguloparietal lamella is from the Early Miocene of Santa Cruz Province (southern Patagonia).

Key words: South America, Stylommatophora, Pupilloidea, recent species, fossils.

Resumen: Nuevas especies de *Gastrocopta* de Argentina (Mollusca Eupulmonata Gastrocoptidae).

Las especies de *Gastrocopta* que se describen aquí comparten la lamella angular unida a la parietal en el extremo interior de la primera, dando entre ambas una forma de “Y”. Describimos dos nuevas especies de *Gastrocopta* que habitan en el centro y norte de la Argentina y reportamos a *G. iheringi* (Suter, 1900), con igual rasgo estructural, por primera vez para el país. Las especies actuales de *Gastrocopta* viven en áreas templadas y tropicales de la Argentina, pero registros previos indican que el fósil más antiguo, con esa característica lamela anguloparietal, corresponde al Mioceno temprano de la provincia de Santa Cruz (Patagonia Austral).

Palabras clave: América del Sur, Stylommatophora, Pupilloidea, especies actuales, fósiles.

INTRODUCTION

Argentina is situated in southern South America, with a surface of about 2.800.000 km². The country has a wide variety of biomes and soil types, including several arid, semiarid, wetland, forest and pasture areas. Many environments show marked degradation signs due to the advancement of human activities as agriculture, livestock, mining and forestry (Bertonatti & Corcuera, 2000).

The genus *Gastrocopta* Wollaston, 1878 has an almost worldwide distribution, except Europe. Most of the species in the genus inhabit in North America (Pilsbry, 1948; Bank, 2017). They are differentiated by shell morphology, in particular by the variety of apertural callous barriers, which are well developed only in fully grown specimens (Pokryszko, 1997; Miquel & Brito, 2019).

Gastrocopta has been scarcely studied in Argentina, where only eight recent species were reported during the last century, all of them from

subtropical and temperate areas (Doering, 1879; Hylton Scott, 1945, 1948; Miquel & Parent, 1996). Fossil species were studied from the Early Miocene of Santa Cruz province (Miquel & Rodríguez, 2015), Early Pliocene of Mendoza (Turazzini & Miquel, 2014), and Late Holocene of Entre Ríos (Miquel & Aguirre, 2011).

In this paper we describe two new species inhabiting the central and northern part of Argentina, and we report *G. iheringi* (Suter, 1900) for the first time in the country.

MATERIAL AND METHODS

The material studied here was collected in Argentina and southern Brazil, and is housed at the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (Buenos Aires) and Museo de La Plata (La Plata). The acronyms of these collections are MACN-In (Invertebrate Division, Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”), MLP (Museo de La

Plata) and MPM (Museo Regional Provincial “Padre Manuel Jesús Molina”, Río Gallegos).

All the available specimens are adult shells. The methodology to study the apertural barriers follows Miquel & Brito (2019). The abbreviations used to identify the barriers are: apl: anguloparietal, ipl: infraparietal, cl: columellar, scl: subcolumellar, for lamellae; bf: basal, lpf: lower-palatal, upf: upper-palatal, for folds. After each description, a formula, e.g., [ap + c + sc/0] l + [b + lp + up] f, is given. Outside the first brackets an “l” indicates these are lamellae, while an “f” after the second brackets means folds. When a barrier may be either present or absent it is coded as sc/0.

Shells were observed and measured under a stereoscopic microscopy; some specimens were coated with gold-palladium and imaged by Scanning Electronic Microscopy (MACN).

RESULTS

Gastrocopta Wollaston, 1878

Type species. *Pupa acarus* (Benson, 1856), by subsequent designation of Pilsbry (1916: 6).

The species analyzed in this paper are members of the uncertainly defined group or subgenus *Gastrocopta* (*Immersidens*) Pilsbry & Vanatta, 1900, characterized by the angular lamella uniting to the parietal one at the inner end of the former, the two diverging forwards to shape together a Greek letter λ, or a reversed y. They also have two palatal folds, *not standing on a callous ridge*; the lower one is often deeply immersed (Pilsbry, 1948: 894).

Gastrocopta dicrodonta (Doering, 1879)

(Fig. 1)

Pupa dicrodonta Doering, 1879: 83.

Gastrocopta (*Immersidens*) *dicrodonta*: Pilsbry, 1916: 100; Parodiz, 1957: 129; Fernández, 1973: 31.

Gastrocopta dicrodonta: Hylton Scott, 1948: 247.

Translation of the Latin original description by Pilsbry (1916: 100). “Shell minute, pupoid, smooth, substriatulate, a little shining, brownish-corneous. Spire subconical, the summit tapering, rather than obtuse. Whorls 5 ½ to 6, a little convex, the last about two-fifths the length. Aperture oval-rounded, with 5 (-6) teeth: the first, on the parietal wall, largest, twisted, bifid (forked or biramosé), the right branch elon-

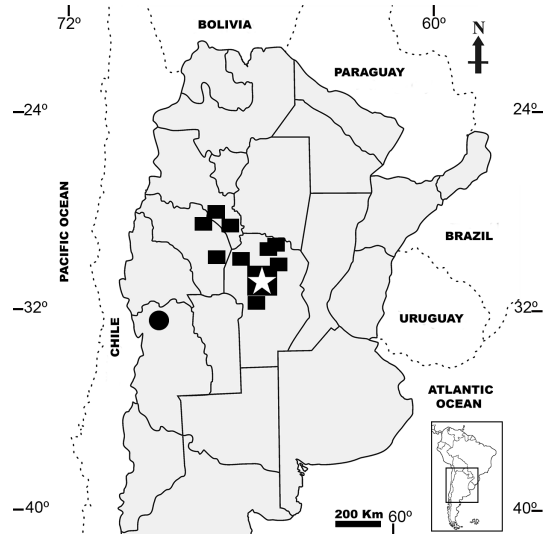


Fig. 1. Distribution of *Gastrocopta dicrodonta* (Doering, 1879) Villavicencio, Mendoza (type locality: black circle), and *Gastrocopta subandina* n. sp. (black squares; white star: Holotype MLP 8902-1. Rumi Huasi, Cabana, Córdoba).

gated to the margin of peristome, the other remote from the margin of the aperture; second tooth columella, tortuous, angulate, lengthened within, three pliciform palatal teeth. Peristome expanded, scarcely reflected, whitish, the margins nearly connected, right margin curved. Length 1.8 to 2, width 0.9 mm; aperture 0.7 to 0.8 mm. long”.

Type specimens and other materials. Unknown.

Type locality. Originally recorded from Mendoza, Córdoba and San Luis provinces; Parodiz (1957: 129) tried to restrict it to Villavicencio (Mendoza) (Fig. 1), with no indication of analyzed materials.

Remarks. The absence of either a type specimen or any original illustration hinders a comparison with other species. It is here considered a *species inquirenda*.

Gastrocopta iheringi (Suter, 1900)

(Figs. 2 A-C, 3)

Pupa (*Bifidaria*) *iheringi* Suter, 1900: 336, Pl. III, figs. 8-8a.

Gastrocopta (*Immersidens*) *iheringi* Pilsbry, 1916: 101, pl. 17, fig. 16.

Gastrocopta iheringi Ramírez *et al.*, 2003: 274; Simone, 2006: 116, figs. 346 A-B; Veitenheimer-Mendes & Pedroso de Oliveira, 2012: 181, figs. 1-4; Salvador *et al.*, 2017: 139, Fig. 8; Salvador, 2021: 62, Figs 1-3.

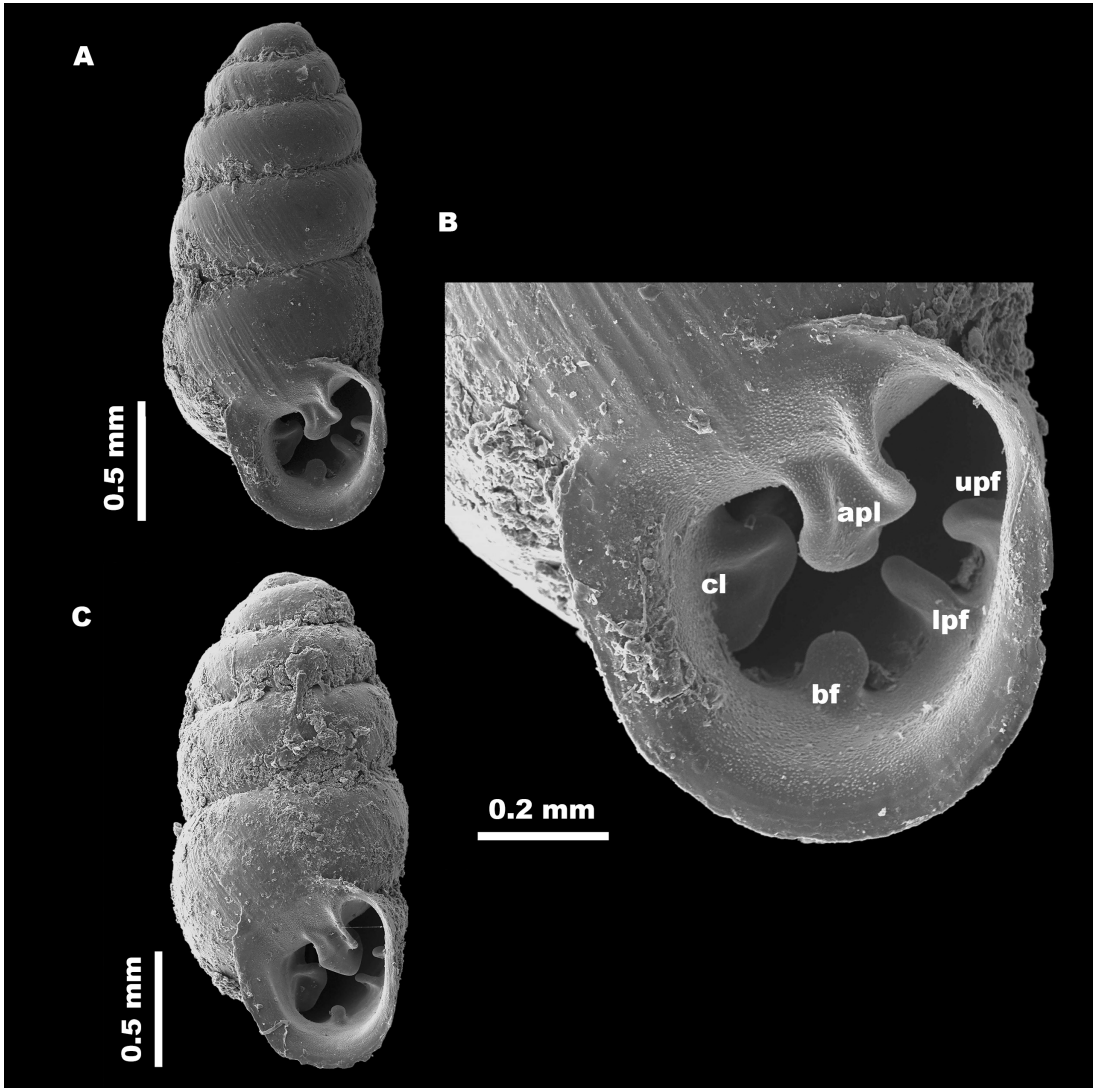


Fig. 2. *Gastrocopta iheringi* (Suter, 1900). **A-C.** MACN-In 30623-1, Carlos Pellegrini, Corrientes Province. **A, C.** General view. **B.** Apertural view. Abbreviations: anguloparietal (apl) and columellar (cl) lamellae and basal (bf), lower-palatal (lpf) and upper-palatal (upf) folds.

Diagnosis. Shell pupoid, oblong, cylindrical or conical, 5 apertural barriers: anguloparietal and columellar lamellae, and basal, lower-palatal and upper-palatal folds; barriers occupying large size in inner of peristome.

Description. Shell pupoid, oblong or conical, light brown color; spire obtuse, not prominent, rimate, 4.5- 5.25 convex whorls with growth lines very low but marked, oblique and irregularly parallel; the last whorl about 55% the total length; shallow suture. Peristome oval and reflected; 5 apertural barriers. Angular and parietal lamellae joined at base diverging forwards; angular

lamella small and very curved to the periphery as compared with the parietal one; columellar lamella in inner of peristome, slightly inclined, strong, very concave and with slight expansion of its wall; basal fold semicircular, elevated; lower-palatal fold semicircular and slightly expanded to inner of peristome; upper-palatal fold slightly smaller than the basal fold, semicircular and elevated. Barrier formula: [ap + c] l + [b + lp + up] f.

Measurements of the illustrated material. MACN-In 30623-1: 2.33 x 1.13 mm, > 4 whorls; 2.60 x 1.20 mm, 5.25 whorls.

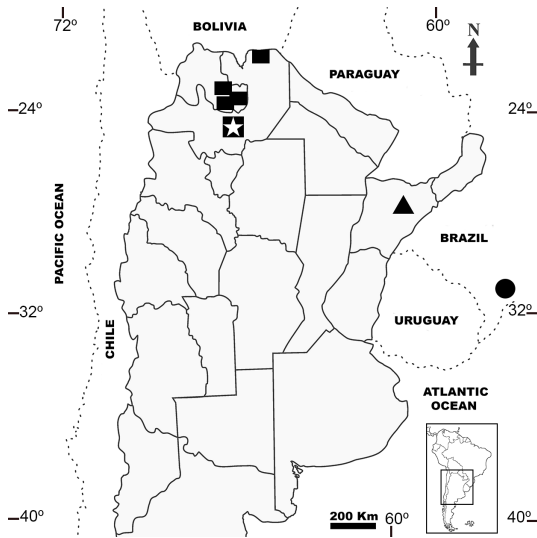


Fig. 3. Distribution of *Gastrocopta iheringi* (Suter, 1900) (black triangle; black circle: Holotype (Bollaxa city, Rio Grande do Sul, Brazil); *Gastrocopta maxbirabeni* n. sp. (black squares; white star: Holotype MLP 8910-2. Lumbreras, Salta).

Syntypes. Brazil, Rio Grande do Sul, Bollaxa city (Museum Te Papa Tongarewa, Wellington, New Zealand, NMNZ 205848) (Salvador, 2021).

Type locality. Bollaxa city, Rio Grande do Sul, Brazil (Fig. 1).

Distribution. Argentina: Corrientes Province; Brazil: Rio Grande do Sul State (Fig. 1).

Examined material. Dry. Brazil: MACN-In 36251. Bolacha, Rio Grande, Rio Grande do Sul, Brazil, in leaf litter taken under a fallen trunk, soil somewhat sandy, coll. F. Scarabino, 11-II-1995, 3 fragm. spm. Argentina: MACN-In 30623-1. Corrientes: Colonia Carlos Pellegrini, coll. I. Apóstol, X-1966, 6 spm; MLP 8899-2. Colonia Carlos Pellegrini, Laguna Iberá, coll. I. Apóstol, I-1966, 30 spm.

***Gastrocopta subandina* n. sp.**
(Figs. 1, 4 A-D)

LSID. urn:lsid:zoobank.org:act:9CBF1813-E04C-4171-9E80-829D1D2396C2

Type specimens. Dry. Holotype: MLP 8902-1, Córdoba, Cabana, Rumi Huasi, 1947, coll. M. Birabén. Paratypes: MLP 8902-2, from type locality, 2 spm, and MACN-In 9783, Catamarca, Chumbicha, Lomas del Oeste, VIII-1918, coll. E. Budin, 8 spm.

Diagnosis. Shell cylindrical or oblong-conical,

with 6 apertural barriers: anguloparietal, columellar and subcolumellar (sometimes absent) lamellae, and basal, lower-palatal and upper-palatal folds. Apertural barriers small with a horizontal columellar lamella.

Description. Shell minute, long, cylindrical or oblong-conical, light brown color; spire obtuse, not prominent, rimate, 6 convex whorls, with growth lines very low but marked, oblique and irregularly parallel; the last whorl about 57% the total length; shallow suture. Peristome oval or rounded, reflected, sometimes with a slight constriction in upper-palatal area; 6 apertural barriers. Anguloparietal lamella joined in the inner region of peristome diverging forwards; angular lamella bent towards the palatal wall; parietal lamella more elongated than angular lamella and bent towards the columellar wall; columellar lamella semicircular, horizontal, well expanded; subcolumellar lamella similar to a tubercle or callus, sometimes in the inner corner of the columellar lamella, which is sometimes absent; basal fold semicircular, slightly elongated towards inner peristome; lower-palatal fold semicircular and prolonged towards inside the peristome; upper-palatal fold small, semicircular, elevated and slightly elongated towards inside the peristome, sometimes slightly hidden due to constriction of peristome. Barrier formula: [ap + c + sc/0] l + [b + lp + up] f.

Measurements of illustrated material. Holotype: MLP 8902-1: 2.47 x 1.04 mm, 5.25 whorls. Paratype: MACN-In 9439-2: 2.86 x 1.30 mm, > 6 whorls.

Etymology. In reference to the species' distribution on the Subandean hills of western Argentina.

Type locality. Rumi Huasi, Cabana, Córdoba (Fig. 1).

Distribution. Argentina: Catamarca, Córdoba and La Rioja provinces (Fig. 1).

Other examined material. Dry. Catamarca: MLP 8867-1. Quebrada de la Cébila, 13-III-1950, coll. H. Scott, 13 spm. Córdoba: MACN-In 10129-B. Jesús María, IX-1919, coll. M. Doello-Jurado, 21 spm; MACN-In 32796-2. Barranca del arroyo de La Posta de Macha, Totoral, 1 spec. MLP 11834. Aguas de Ramón, Minas, Córdoba, 1-VI-1969, 4 spm; MLP 8855-1. Arroyo Saldán, 4 spm; MLP 2246-1. Arroyo Saldán, 12 spm; MLP 8864-1. Barranca del arroyo de Cerro Colorado, 21-III-1949, coll. M. Birabén & M.I. Hylton Scott, 1 spec.; MLP 8859-2. Cabana, VIII-1950, coll. Birabén, 88 spm; MLP 8902-3. Cabana, Rumi Huasi, 1947, coll. M. Birabén, 73

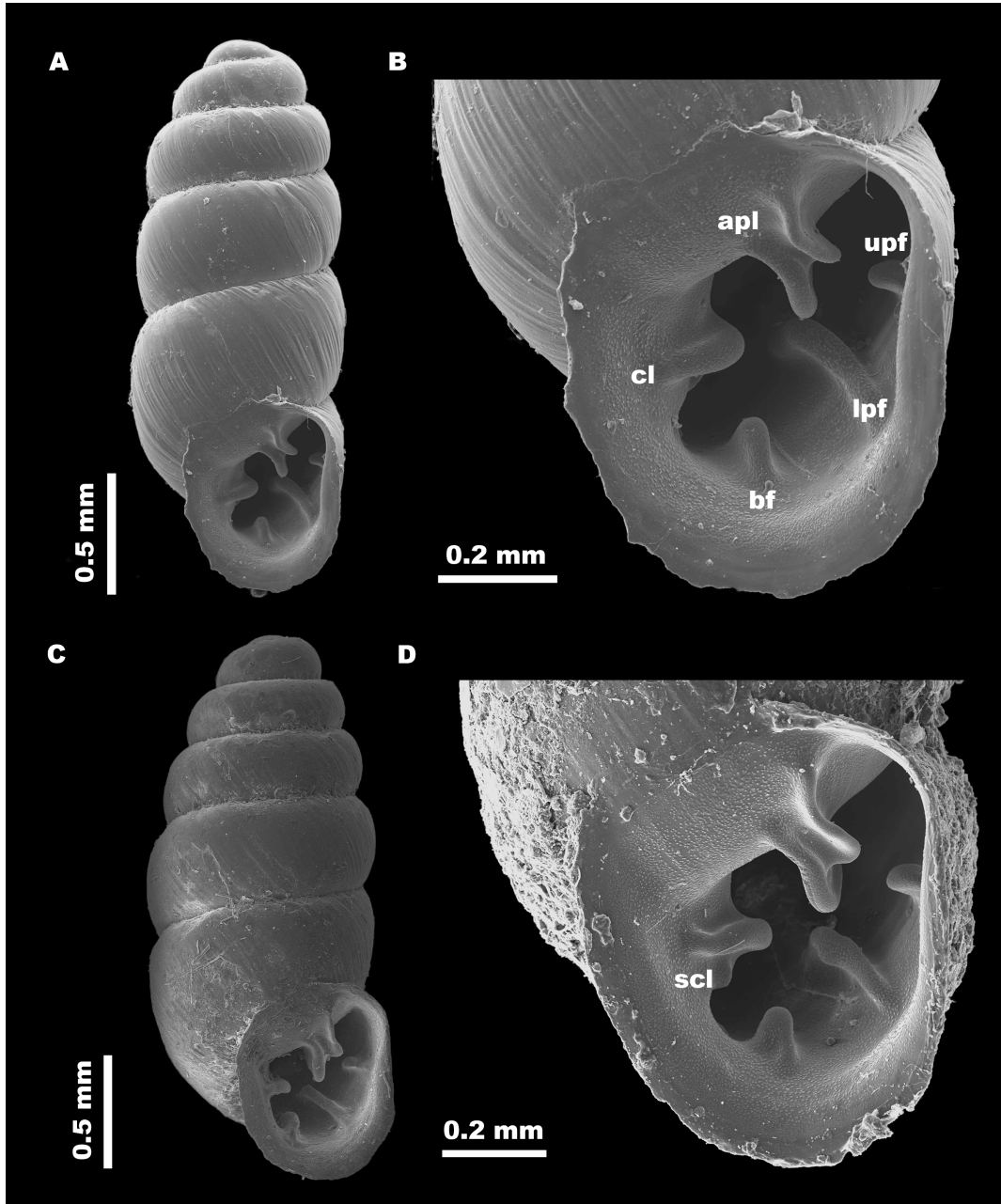


Fig. 4. *Gastrocopta subandina* n. sp. **A-B.** Holotype. MLP 8902-1. Rumi Huasi, Cabana, Córdoba. **A.** General view. **B.** Apertural view. **C.** Paratype. MACN-In 9439-2. Lomas del Potrero, Chumbicha, Catamarca. **C.** General view. **D.** MLP 11834. Aguas de Ramón, Córdoba. Apertural view. Abbreviations: anguloparietal (apl), columellar (cl) and subcolumellar (scl) lamellae, and basal (bf), lower-palatal (lpf) and upper-palatal (upf) folds.

spm; MLP 10185. Cabana, Rumi Huasi, 1947, coll. M. Birabén, 1 spec.; MLP 8863-1. El Sauce, Calamuchita, I-1962, coll. M. Viana, 4 spm; MLP 8855-1. Entre San Salvador [norte de Capilla del Monte, Punilla] y Ongamira, 6-III-1950, 7 spm;

MLP 8913-1. San Pedro Norte, Tulumba, 21-III-1949, coll. Hylton Scott, 2 spm; La Rioja: MACN-In 18361. Sierra Las Torres, Iliar, General Belgrano. Col. M. Gómez, III-1929, 1 spec. MLP 8892. Anillaco, 26-II-1939, 2 spm fragm.

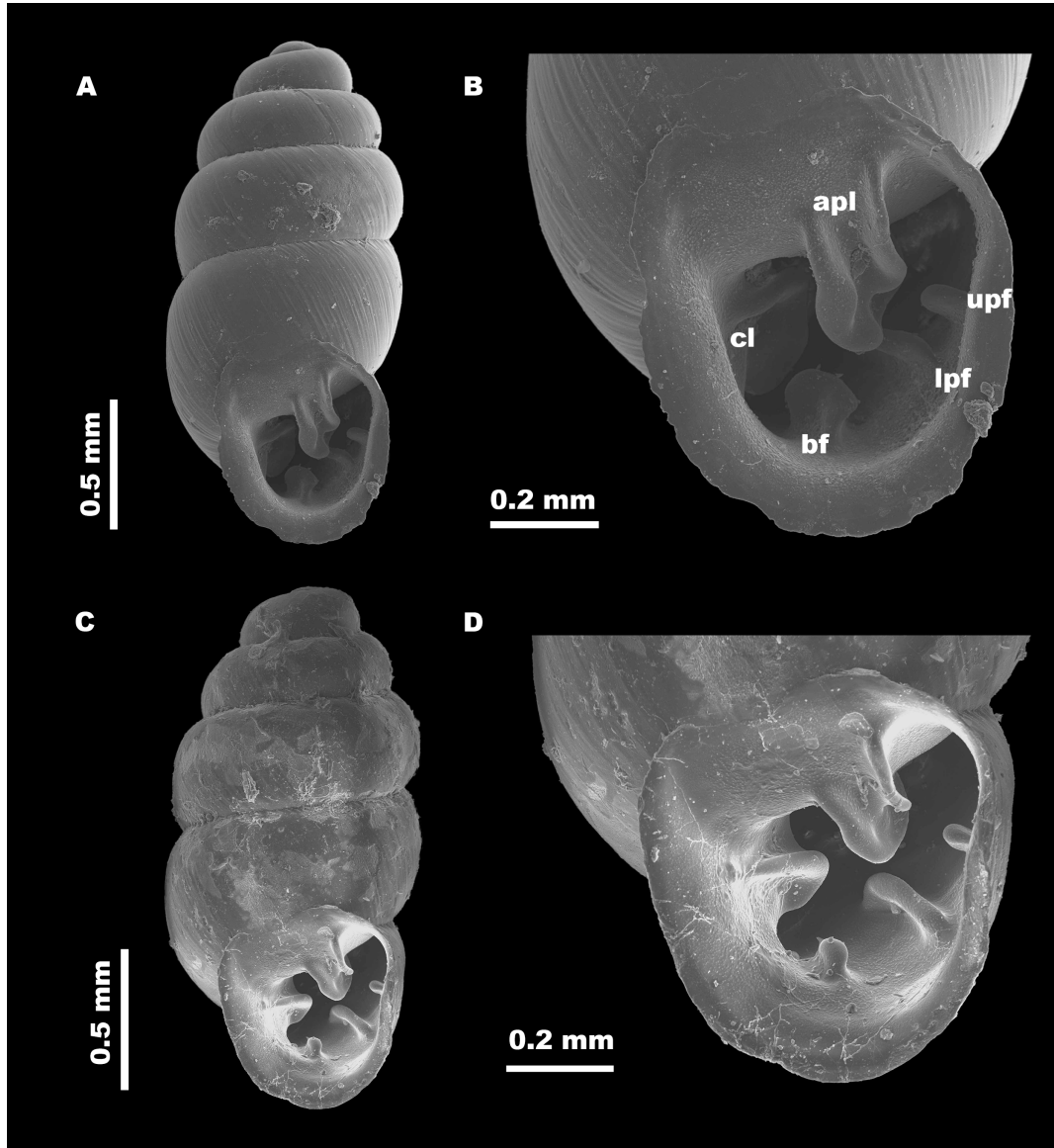


Fig. 5: *Gastrocopta maxbirabeni* n. sp. **A, B.** Holotype, MLP 8910-2. Lumbreras, Salta. **A.** General view. **B.** Apertural view. **C, D.** MLP 8860. Valle Grande, Jujuy. **C.** General view. **D.** Apertural view. Abbreviations: anguloparietal (apl) and columellar (cl) lamellae and basal (bf), lower-palatal (lpf) and upper-palatal (upf) fold.

Remarks. *Gastrocopta subandina* n. sp. shows some morphological variations: while some shells have a cylindrical form, other ones have an oblong or conical form. Shells collected from Catamarca have an infraparietal lamella and a lower-palatal fold inside the peristome, a longer parietal lamella, and they lack a subcolumellar lamella.

Comparisons. *Gastrocopta subandina* n. sp. is longer than *G. maxbirabeni* n. sp., and its apertural barriers are simpler than those of the lat-

ter. *Gastrocopta subandina* has an anguloparietal lamella shorter than in *G. iheringi* and *G. maxbirabeni*, and does not have a concave and curved columellar lamella as *G. maxbirabeni* and *G. iheringi* do. *Gastrocopta dicrodonta* (Doering, 1879) is known to be smaller, pupoid, subconical, and differnt from *Gastrocopta subandina* (Pilsbry, 1916: 100). Some specimens of *G. subandina* have a subcolumellar lamella, which is absent in the other species described in this paper.

***Gastrocopta maxbirabeni* n. sp.**
(Figs. 3, 5A–D)

LSID. urn:lsid:zoobank.org:act:3B2D8A83-5365-4B16-9C96-A8BFD3FF6004

Type specimens. Dry. Holotype: MLP 8910-2, Salta, Lumbreras, coll. M. Birabén, 18-XII-1954. Paratypes: MLP 8910-3, from the type locality (3 spm).

Diagnosis. Shell pupoid, cylindrical or conical, with 5 or 6 apertural barriers: anguloparietal, infraparietal (sometimes absent) and columellar lamellae, and basal, lower-palatal and upper-palatal folds. Anguloparietal and columellar lamellae and the basal fold occupy a large space. Apertural barriers small with a columellar lamella slightly concave and oblique.

Description. Shell pupoid, oblong or conical, light brown color, spire obtuse, not prominent, rimate, 4.5–5.25 convex whorls with growth lines very low but marked, oblique and irregularly parallel; the last whorl about 58% the total length; shallow suture. Peristome rounded square, reflected; 5 or 6 apertural barriers. Angular and parietal lamellae joined at base diverging forwards; parietal lamellae curved to the periphery, larger than the angular lamella; infraparietal lamella small, similar to a callus or tubercle, sometimes absent; columellar lamella concave, bent towards the parietal wall, sometimes very strong; basal fold sometimes strong, semicircular and slightly prolonged towards inside the peristome; lower-palatal fold oblique, elongate, sometimes deeper in peristome than other folds; upper-palatal fold semicircular, elongate. Barrier formula: [ap + ip/0 + c] 1 + [b + lp + up] f.

Measurements of the illustrated material. MLP 8910-2: 2.08 x 1.04 mm, 5.5 whorls; MLP 8860: 2.08 x 1.04 mm, 5.25 whorls.

Type locality. Lumbreras, Salta, Argentina (Fig. 2).

Distribution. Argentina: Jujuy and Salta provinces (Fig. 2).

Etymology. Dedicated to Dr Maximiliano (Max) Birabén, biologist, Dr M. I. Hylton Scott's husband and an important shell collector.

Examined. Dry. Jujuy: MLP 8860. Valle Grande, coll. M. Birabén, 3-XII-1950, 2 spm; MLP 8896. Sierra de Santa Bárbara (El Palmar), coll. M. Birabén, X-1947, 2 spm; MLP 8898-1. La Mendieta, Las Quinas, 1-VI-1947, 1 spec.; Salta: MLP 8886-2. Pocitos, 3 spm; MLP 8911-2. Lumbreras, coll. M. Birabén, 18-XII-1954, 47 spm.

Comparisons: *Gastrocopta maxbirabeni* n. sp. is shorter than *G. subandina* and it has stronger apertural barriers. These, mainly the anguloparietal and, sometimes, the columellar lamellae, occupy a large area of the aperture, which allow differentiate from *G. subandina*. *Gastrocopta maxbirabeni* is also distinct from *G. iheringi* as the new species is larger, with a smaller number of whorls; the latter has a longer anguloparietal lamellae. Some specimens of *G. maxbirabeni* have an infraparietal lamella, which is absent in other species described in this paper.

DISCUSSION

Recent specimens of *Gastrocopta* have been collected from humid areas of South America. Semiarid areas of the subandean region of Argentina are here added as new records. From a physiographical viewpoint, these areas are environmentally similar to those from which the genus was described from and mainly studied in North America (Pilsbry, 1948).

Gastrocopta iheringi is known from Brazil. Here, it is also recorded from the Corrientes Province (Argentina). The record for Santa Fe Province (Miquel & Parent, 1996) was erroneous (Salvador, 2021); the image of the specimen does not resemble *G. iheringi* but to an indeterminate species of *Gastrocopta*. Mentions of *G. iheringi* from Peru (Ramírez *et al.*, 2003) and Venezuela (Thompson & López, 1996) need to be confirmed.

A comparison to the type series of *Gastrocopta patagonica* Miquel & Rodríguez, 2016, a fossil species from the late Early Miocene of the Santa Cruz Formation, is problematic because the paratype (MPM PI 3315) shows the characteristic anguloparietal lamella of the here analyzed species, while in the holotype (MPM PI 3314) this area is hidden by sediment (Miquel & Rodríguez, 2016 ("2015"): fig. 3.1–3.4).

Up to now specimens have been collected from only seven out of the 23 provinces of Argentina, in scattered localities far apart from each other. We therefore consider that the spread of this genus is still understated in the country, and many new localities could be added with a larger sampling.

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