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A revision of the genus *Savatieria* Rochebrune & Mabille, 1885: an endemic group of buccinulid gastropods from the Magellanic region

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ABSTRACT

The buccinulid genus *Savatieria*, endemic to the Magellanic region, is revised. New descriptions of shell, opercular and radular characters are provided for all valid taxa. Type material of all species ever included in *Savatieria* are illustrated, most of them for the first time. Five of those species are considered valid, but only three belong to the genus *Savatieria*: *S. frigida* Rochebrune & Mabille, 1885, *S. coppingeri* (Smith, 1881) and *S. areolata* Strebel, 1905. *Savatieria bertrandi* Melvill & Standen, 1914 is considered a probable synonym of *S. areolata*. '*Savatieria*' *meridionalis* (Smith, 1881) and '*S.*' *chordata* Castellanos, Rolán & Bartolotta, 1987 are excluded from *Savatieria* based on their radular, opercular and/or shell characters. The subgenus *Lisosavatieria* Castellanos & Fernández, 1975 is considered a synonym of *Savatieria*.

INTRODUCTION

Knowledge on the Magellanic malacofauna has improved during the last two decades as a result of the publication of many taxonomic works. Although the contributions in neogastropods are numerous (e.g. Harasewych, Kantor & Linse, 2000; Pastorino & Harasewych, 2000; Kantor & Pastorino, 2009; Fraussen, Sellanes & Stahlschmidt, 2014; Pastorino, 2016), they have mostly treated large or medium-sized species, while papers about smaller taxa are rare. Among the latter, the genus *Savatieria* Rochebrune & Mabille, 1885 includes eleven nominal species (Table 1), all smaller than 10 mm in maximum shell length (SL). They generally inhabit intertidal environments, frequently associated with algae and rocks, although they can be found at considerable depths (up to 170 m). Previous reports (e.g. Strebel, 1905; Thiele, 1912; Dell, 1972; Castellanos & Fernández, 1975; Ramírez Bohme, 1990) are mainly based on shell characters and rarely included study of type material.

The taxonomic position of *Savatieria* species was initially controversial. Based on shell characters, early works assigned *Savatieria* to some groups now considered as conoideans (Pleurotomidae) (Smith, 1881; Rochebrune & Mabille, 1885; Strebel, 1905; Melvill & Standen, 1912, 1914) or to Columbellidae (Dall, 1918). Thiele (1912: pl. 16, fig. 16) reported for the first time the radula of *S. frigida* (as *S. dubia*) placing the genus in the Buccinoidea, generating a new insight. Strebel (1905) and Dell (1972) suggested that shell characters of *Chauvetia* Monterosato, 1884 and *Lachesis* Risso, 1826 are similar to *Savatieria*. However, Gofas & Olivier (2010) illustrated the radula of *Lachesis mamillata* Risso, 1826, type species of *Chauvetia*, which clearly indicates a different taxon. The same authors considered *Chauvetia* (= *Lachesis*) to be restricted to the Mediterranean Sea and the adjacent Eastern Atlantic Ocean.

In this work we review the species-level taxonomy and establish the diagnostic features for the genus *Savatieria* and all the included species.

MATERIAL AND METHODS

The main source of the material here studied is the Museo Argentino de Ciencias Naturales, Buenos Aires (MACN). Further specimens were obtained on board the Argentinean *R/V Puerto Deseado* during the '*Campaña Antártica de Verano*' (CAV) and other cruises in 2013, 2014 and 2017. Material is from Argentina unless otherwise mentioned.

Type material of all nominal species was studied and illustrated; these specimens are located at the following institutions: Natural History Museum, London (NHMUK); Muséum national d'Histoire naturelle, Paris (MNHN); Zologisches Institut und Zoologisches Museum der Universität, Hamburg (ZMH); National Museum of Scotland, Edinburgh (NMSZ); National Museum Wales, Cardiff (NMW) and Museo de La Plata (MLP).

Radulae were dissected and cleaned using the method of Solem (1972) and penes were critical-point dried. Most of the images were taken with a Phillips XL 30 Scanning Electronic Microscope (SEM) at the MACN. Large specimens were photographed with a camera Nikon D100, with a 60 mm micro Nikkor lens. Specimens collected alive (an.) are distinguished from empty shells (sh.).

Table 1. Species that have previously been included in *Savatieria* and their taxonomic status as revised herein.

Species	Status
Savatieria coppingeri (Smith, 1881)	Valid
'Savatieria' meridionalis (Smith, 1881)	Valid, but does not belong in *Savatieria*
Savatieria frigida Rochebrune & Mabille (1885)	Valid
Savatieria areolata Strebel (1905)	Valid
Savatieria dubia Strebel (1905)	Synonym of *S. frigida*
Savatieria molinae Strebel (1905)	Synonym of *'S.' meridionalis*
Savatieria pfefferi Strebel (1905)	Synonym of *S. coppingeri*
Savatieria concinna Melvill & Standen (1912)	Synonym of *'S.' meridionalis*
Savatieria bertrandi Melvill & Standen (1914)	Probable synonym of *S. areolata*
Savatieria deseadensis Castellanos & Fernández (1975)	Synonym of *S. coppingeri*
'Savatieria' chordata Castellanos *et al.* (1987)	Valid, but does not belong in *Savatieria*

SYSTEMATIC DESCRIPTIONS

Family BUCCINULIDAE Finlay, 1928

Subfamily PROSIPHIINAE Powell, 1951

Genus *Savatieria* Rochebrune & Mabille, 1885

Savatieria Rochebrune & Mabille, 1885: 101 (type species *Savatieria frigida* Rochebrune & Mabille, 1885, by monotypy).

Savatieria (*Lisosavatieria*) Castellanos & Fernández, 1975: 57 (type species *Savatieria deseadense* Castellanos & Fernández, 1975, by original designation).

Diagnosis: Shell small, thick. Spire at least 40% of SL. Axial ornamentation of ribs of variable size and shape; spiral ornamentation of furrows that intersect ribs. Operculum unguiform, with nucleus strongly projecting. Radula rachiglossan; rachidian short, thin, base narrow, with 3 small similar cusps; lateral with *Prosipho*-like posterior projection and 4–6 cusps, outer 2 larger and in a different plane.

Description: Shell small, to 8.8 mm SL, thick, fusiform. Spire at least 40% of SL. Protoconch large, 2–2¼ convex whorls, weakly ornamented with numerous spiral threads; transition to teleoconch well or weakly defined. Teleoconch up to 6½ markedly convex to almost straight whorls, ornamented with axial ribs that vanish on base of last whorl, and spiral furrows of variable development that intersect the ribs. Growth lines present on whole shell. Last whorl rounded in mature specimens, angulated in young. Base with variable number of spiral furrows. Aperture ovate; lip thick in mature specimens, thin in young; columellar callus narrow, variable thickness; siphonal canal short, wide, somewhat oblique. Periostracum thin, translucent, persistent. Operculum ovate, unguiform, brown, strongly thickened, with thick rim bordering attachment area; nucleus terminal, strongly projecting. Radula rachiglossan; rachidian small, base markedly narrow, 3 short similar cusps, central longer; lateral with 4–6 cusps and posterior projection of *Prosipho*-type as long as rachidian, 2 outer cusps larger, in a different plane and separated from 2–4 inner cusps.

Savatieria frigida Rochebrune & Mabille, 1885

(Fig. 1A–O)

Savatieria frigida Rochebrune & Mabille, 1885: 101 (E. Patagonia; 2 syntypes MNHN-IM-2000-6535). Rochebrune & Mabille, 1889: 65, pl. 2, fig. 5 ("*Baie Orange; Awaïakihr (canal du Beagle), à des profondeurs variant entre 22 m, 26 m et 143 m*"). Wenz, 1943: 1209, fig. 3446. Castellanos, 1970: 96, pl. 6, fig. 11. Castellanos, 1992: 29, pl. 2, fig. 22. Linse, 1999: 402.

Savatieria frigida Rochebrune & Mabille, 1891(*sic*)—Carcelles, 1950: 62, pl. 2, fig. 38. Carcelles & Williamson, 1951: 297. Ramírez Bohme, 1990: 71, fig. 82.

Savatieria (*Savatieria*) *frigida*—Castellanos & Fernández, 1975: 58.

Savatieria frigida Rochebrune & Maville, 1891(*sic*)—Valdovinos, 1999: 137.

Savatieria dubia Strebel, 1905: 641, pl. 21, figs 18–18c (several localities at Malvinas Island and Tierra del Fuego; 4 syntypes ZMH unnumbered). Strebel, 1908: 21. Thiele, 1912: pl. 16, fig. 16 (radula). Carcelles, 1950: 62. Carcelles & Williamson, 1951: 298. Powell, 1960: 149. Valdovinos, 1999: 137.

Savatieria coppingeri—Forcelli, 2000: 93, fig. (not Smith, 1881).

Examined material: 2 syntypes of *S. frigida*. 4 syntypes of *S. dubia*. Inútil Bay, Magellan Strait, Chile, bottom of empty shells, 8 sh. (MACN-In 35381); 54° 55.82′ S, 67° 03.68′ W, CAV 2014, 57 m, 5 sh. (MACN-In 41363); 55° 04.21′ S, 66° 02.46′ W, CAV 2014, 172.9 m depth, 8 sh. and 1 an. (MACN-In 41364); Ushuaia, Tierra del Fuego, 1 sh. (MACN-In 10050); Ushuaia, Tierra del Fuego, 2 sh. (MACN-In 41365); Becasses Is., Beagle Channel, Ushuaia, Tierra del Fuego, intertidal, 1 sh. (MACN-In 35215); St. 20, 1 sh. (MACN-In 23930–1).

Diagnosis: Shell with 12–16 strong axial ribs per whorl, intersected by spiral furrows, 4 or 5 on first teleoconch whorl generate a wavy pattern by intersection with ribs. White.

Description: Shell (Fig. 1A–J) medium sized, thick, fusiform, to 7.8 mm SL. Spire about 40% of SL. Protoconch (Fig. 1K, L) large, 2–2¼ convex whorls, ornamented with subtle spiral threads and faint growth lines; transition to teleoconch well defined. Teleoconch up to 5½ markedly convex to almost straight whorls; suture impressed, irregular. Axial ornamentation of 12–16 strong, regularly spaced ribs per whorl; ribs vanishing progressively on base of last whorl and close to aperture in large specimens; growth lines over entire shell. Spiral ornamentation of 4 or 5 well-marked furrows on the first whorl, vanishing progressively, generating a wavy pattern by intersection with ribs. Subsequent whorls generally with one well-marked subsutural furrow. Base of last whorl (Fig. 1M) with 12–16 spiral furrows. Aperture ovate, sometimes slightly elliptic; lip thick; columella with moderately thick, narrow callus; siphonal canal short, wide, somewhat oblique. Colour chalky white to yellowish. Periostracum persistent, thin, smooth, translucent. Operculum (Fig. 1N, O) ovate, unguiform, with thick rim bordering attachment area; nucleus terminal, strongly projecting.

Distribution: Argentina: Tierra del Fuego, Beagle Channel and Malvinas Is; Chile: Magellan Strait.

Remarks: The shell of *S. frigida* is characterized by a strong axial ornamentation and 4 or 5 spiral furrows at the beginning of the first teleoconch whorl. *Savatieria dubia* has no significant differences and is here considered a synonym, as was previously suggested by

Strebel (1905) and Castellanos & Fernández (1975). *Savatieria coppingeri* (Smith, 1881) was treated as a synonym by Castellanos & Fernández (1975) and Castellanos, Rolán & Bartolotta (1987). However, *S. coppingeri* is considered here as a different and valid species. It can be distinguished from *S. frigida* by the presence of only 1 or 2 spiral furrows above the suture instead of 4 or 5 in the whole whorl. In addition the shell is usually reddish in colour rather than white. It should be noted that Smith's species would have priority over Rochebrune & Mabille's (1881 *vs* 1885), if the two were to be considered synonyms. There is no mention of the name *S. coppingeri* in Castellanos's catalogue (1992).

Savatieria coppingeri (Smith, 1881)

(Figs 2A–P, 3A–E)

Pleurotoma (*Mangilia*?) *coppingeri* Smith, 1881: 27, pl. 4, fig. 2 (Wolsey Anchorage, Patagonia, 17 fathoms [30.6 m]; holotype NHMUK 1879.10.15.6).
Mangilia coppingeri—Tryon, 1884: 255; pl. 22, fig. 58.
Mangelia coppingeri—Carcelles & Williamson, 1951: 308.
Pleurotoma (*Mangelia*) *coppingeri*—Powell, 1960: 161.
Savatieria coppingeri—Ramírez Bohme, 1990: 71, fig. 81. Valdovinos, 1999: 137.
Savatieria pfefferi Strebel, 1905: 642, pl. 21, figs 17–17c (Magellan Strait; 2 syntypes ZMH unnumbered). Carcelles & Williamson, 1951: 298. Valdovinos, 1999: 137.
Savatieria (*Lisosavatieria*) *deseadense* Castellanos & Fernández, 1975: 60; figs 1–4 (Puerto Deseado, Santa Cruz, Argentina, on kelp; 27 syntypes MLP-In 11.436). Castellanos, 1992: 31, pl. 2, fig. 23. Signorelli, Urteaga & Teso, 2015: 64. fig. 6A, B (syntypes).
Savatieria deseadensis—Forcelli, 2000: 93; fig.

Examined material: Holotype of *Pleurotoma* (*Mangilia*?) *coppingeri*. 2 syntypes of *S. pfefferi*. 27 syntypes of *S. deseadense*. 53° 31.47′S, 67° 22.19′W, CAV 2014, 62 m depth, 4 an. (MACN-In 41366). 54° 11.48′S, 66° 35.28′W, PDBB 17, 54 m depth, 1 sh. (MACN-In 41367). 54° 26.50′S, 64° 53′W, 61 fathoms [109.8 m] depth, 2 sh. (MACN-In 24027–1).

Diagnosis: Shell ornamented with strong, barely insinuated or absent axial ribs; usually 1 or 2 marked spiral furrows above suture. Shell reddish in preserved specimens, purplish in living ones.

Description: Shell (Fig. 2A–M) medium sized, thick, fusiform; to 7.1 mm SL. Spire about 40% of SL. Protoconch (Fig. 2N, O) large, 2–2¼ convex whorls, with subtle spiral threads (barely visible with SEM); transition to teleoconch well defined. Teleoconch up to 5½ markedly convex to almost straight whorls; suture impressed, irregular. Axial ornamentation of 12–14 ribs per whorl, strongly developed to weak or absent, ribs vanishing progressively on base of last whorl; growth lines over entire shell. Spiral ornamentation of 1 or 2 furrows above suture; additional minor furrows sometimes present. Base of last whorl (Fig. 2P) with 5–9 spiral furrows. Aperture ovate; lip thick; columella covered with narrow callus; siphonal canal short, wide, somewhat oblique. Old shells reddish-brown, chalky, some living specimens purplish. Periostracum and operculum (Fig. 3A, B) similar to *S. frigida*. Radula similar to *S. frigida* (Fig. 3E), rachidian thin, small, 3 cusps, the inner somewhat larger; laterals with *Prosipho*-like projection and 4 cusps, the 2 external larger and in a different plane from other 2 smaller, internal cusps. Penis (Fig. 3C, D) large, long, flat, thick, with small subterminal papilla.

Distribution: Argentina: Santa Cruz, Tierra del Fuego; Chile: Magellan Strait.

Remarks: The shell of *S. coppingeri* has a variable development of axial ribs that change from strong to absent (Fig. 2A–M). Therefore, *S. pfefferi* and *S. deseadense* are considered as synonyms. Synonymy of the former species was previously suggested by Strebel (1905). Signorelli *et al.* (2015: fig. 6A, B) illustrated the supposed holotype of *S. deseadense*, however, none of the shells in lot MLP-In 11436 agree with the measurements given by Castellanos & Fernández (1975). Castellanos (1983) reported that *S. deseadense* could be dispersed on kelp (*Macrocystis pirifera*), suggesting a possible explanation for its presence at considerable depths (around 170 m) in lower latitudes. Forcelli & Narosky (2015) reported the northernmost distribution to be the mouth of Rio de la Plata, but no specimen identified here as *S. coppingeri* ranges further north than Santa Cruz province (at 47°45′S).

Savatieria areolata Strebel, 1905

(Fig. 4A–L)

?*Savatieria areolata* Strebel, 1905: 645, pl. 21, figs 19–19b (Beagle Channel, Ushuaia, at low tide; 2 syntypes ZMH unnumbered). Carcelles & Williamson, 1951: 298.
Savatieria areolata—Melvill & Standen, 1914: 124. Powell, 1960: 149. Linse, 1999: 402. Valdovinos, 1999: 137.
Savatieria (*Savatieria*) *aerolata* (sic)—Castellanos & Fernández, 1975: 58.
Savatieria aerolata (sic)—Castellanos, 1979: 137, fig. 1. Castellanos, 1992: 28, pl. 3, fig. 24. Forcelli, 2000: 93, fig.

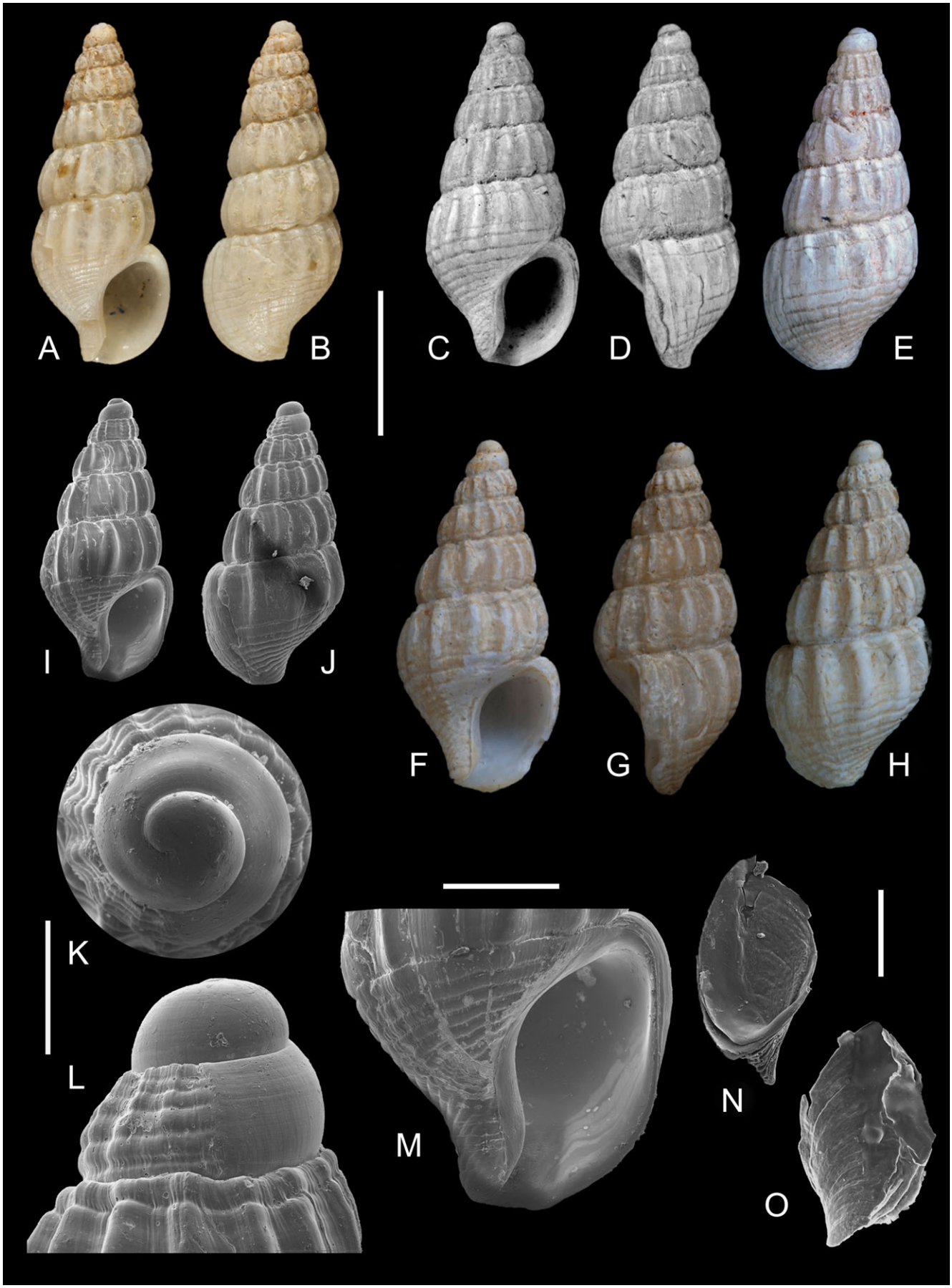
Examined material: 2 syntypes. Ushuaia, Tierra del Fuego, intertidal, 1 an. and 10 sh. (MACN-In 41368).

Diagnosis: Shell largest in genus, ornamented with 12–15 strong axial ribs per whorl that intersect with 2 wide, regularly spaced, spiral furrows, generating strong, quadrangular nodes at intersections. Shell reddish in fresh specimens.

Description: Shell (Fig. 4A–F) large, to 8.8 mm SL (largest in genus), thick, fusiform. Spire about 50% of SL. Protoconch (Fig. 4G, H) large, approximately 2¼ convex whorls (usually eroded); transition to teleoconch weakly defined. Teleoconch up to 6½ slightly convex to almost straight whorls; suture impressed. Axial ornamentation of 12–15 strong ribs per whorl; ribs less defined towards end of last whorl. Spiral ornamentation of 2 wide, regularly spaced furrows that intersect ribs to generate large quadrangular nodes; furrows less developed or absent on first teleoconch whorls. Base of last whorl with about 10 narrower spiral furrows, closely arranged. Aperture ovate; lip thick; columella covered with thick, narrow callus; siphonal canal short, wide, oblique. Colour reddish-brown. Periostracum and operculum (Fig. 4I, J) as in *S. frigida*. Radula similar to *S. frigida* (Fig. 4K, L), rachidian thin, small, 3 cusps, inner larger; laterals with *Prosipho*-like projection and 6 cusps, 2 external larger and in different plane than other 4 smaller, internal cusps.

Distribution: Argentina: Ushuaia, Tierra del Fuego. Castellanos (1979, 1982, 1983, 1992) and Castellanos & Fernández (1975) included Santa Cruz, Malvinas Is, Burdwood Bank and northern Tierra del Fuego, but the material studied in those works was not found in any collection.

Remarks: Savatieria areolata is characterized by its large shell, reddish in colour, always with 2 spiral furrows that produce large nodes at their intersections with the axial ribs. Castellanos & Fernández (1975), Castellanos *et al.* (1987), Castellanos (1992) and Forcelli (2000) considered *S. concinna* as a synonym. *Savatieria concinna* is treated here as '*S.*' *meridionalis*, and can be recognized by a shorter



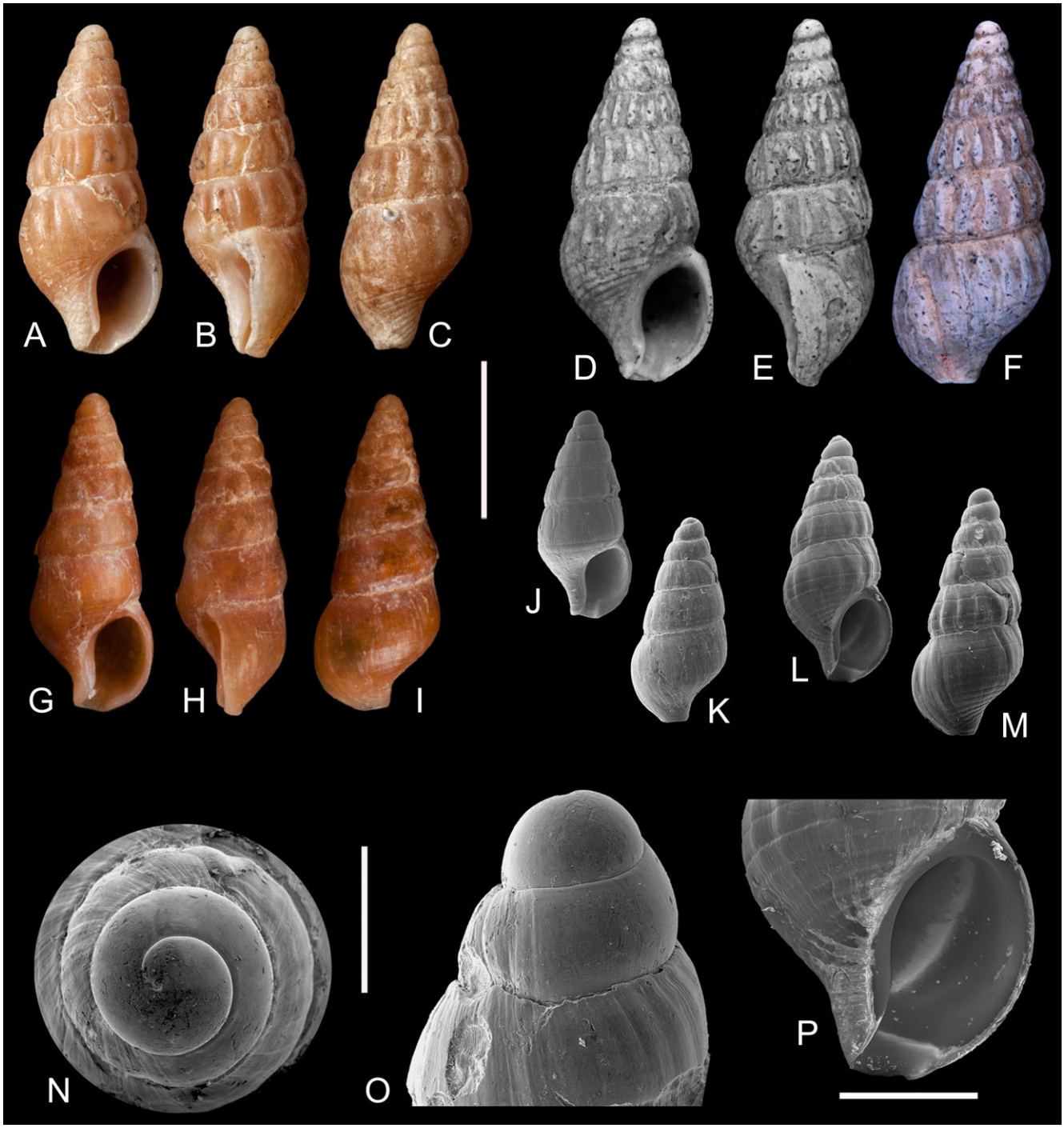


Figure 2. *Savatieria coppingeri* (Smith, 1881). **A–C.** *Pleurotoma* (*Mangilia*?) *coppingeri*, holotype (NHMUK 1879.10.15.6), three views of shell. **D–F.** *S. pfefferi* Strebel, 1905, syntype (ZMH unnumbered), three views of shell. **G–K.** *S. deseadense* Castellanos & Fernández, 1975, syntypes (MLP-In 11.436). **G–I.** three views of larger syntype. **J, K.** 2 views of a small syntype with SEM. **L–P.** 53° 31.47′S, 67° 22.19′W, CAV 2014, 62 m depth (MACN-In 41366). **L, M.** Two views of shell with SEM. **N, O.** Apical and lateral view of protoconch with SEM. **P.** Detail of last whorl with SEM. Scale bars: **A–M** = 3.0 mm; **N, O** = 500 μm; **P** = 1.0 mm.

Figure 1. *Savatieria frigida* Rochebrune & Mabille, 1885. **A, B.** Syntype (MNHN-IM-2000-6535), two views of shell. **C–E.** *S. dubia* Strebel, 1905, syntype (ZMH unnumbered), three views of shell. **F–H.** Ushuaia, Tierra del Fuego (MACN-In 41365), three views of shell. **I–M.** Ushuaia (MACN-In 10050). **I, J.** Two views of shell with SEM. **K, L.** Apical and lateral views of protoconch with SEM. **M.** Detail of last whorl with SEM. **N, O.** 55° 04.21′S, 66° 02.46′W, CAV 2014, 172.9 m depth (MACN-In 41364), internal and external views of operculum with SEM. Scale bars: **A–J** = 3.0 mm; **K, L** = 500 μm; **M** = 1.0 mm; **N, O** = 400 μm.

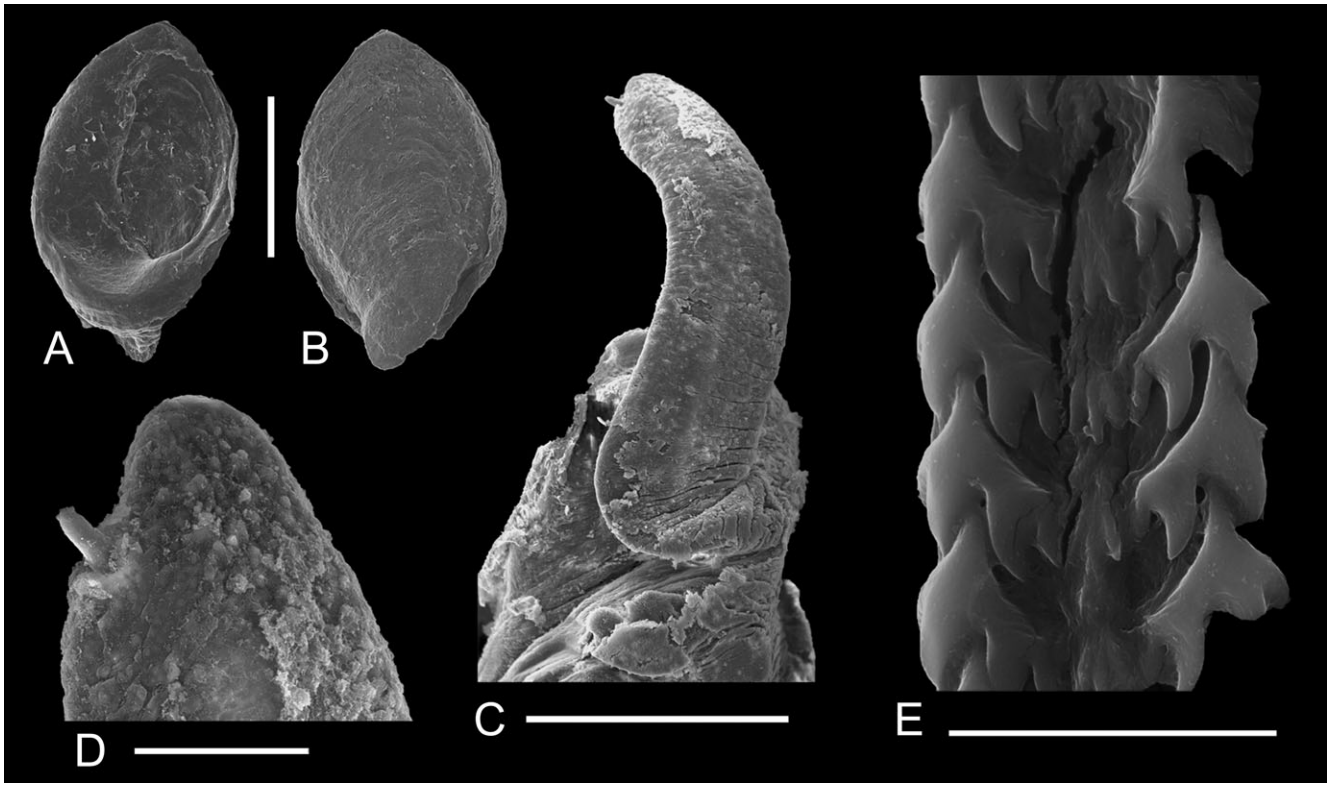


Figure 3. *Savatieria coppingeri* (Smith, 1881). **A, B.** *S. deseadense* Castellanos & Fernández, 1975, syntype (MLP-In 11.436), internal and external views of operculum with SEM. **C–E.** 53° 31.47′S, 67° 22.19′W, CAV 2014, 62 m depth (MACN-In 41366). **C.** Penis with SEM. **D.** Detail of papilla at tip of penis. **E.** Upper view of radula. Scale bars: **A–C** = 500 μm; **D** = 100 μm; **E** = 20 μm.

shell with grooved sutures and 2–5 narrower and shallower spiral cords per whorl. In addition the shell is usually white in colour.

Savatieria bertrandi Melvill & Standen, 1914

(Fig. 4M–O)

Savatieria bertrandi Melvill & Standen, 1914: 124, pl. 7, figs 1, 2 (Rapid Point, West Falklands/Malvinas Is.; 1 syntype NMW 1955.158.325). Carcelles & Williamson, 1951: 298. Powell, 1960: 149.
Savatieria (*Savatieria*) *bertrandi*—Castellanos & Fernández, 1975: 58.
Savatieria bertrandi Melville & Staden, 1913 (*sic*)—Forcelli, 2000: 94, fig.

Examined material: 1 syntype.

Diagnosis: Savatieria ornamented with moderately strong, irregularly spaced, axial ribs, gradually vanishing on third whorl; 2 spiral furrows intersect axials, generating nodes.

Description: Shell (Fig. 4M–O) small, thick, fusiform, 6.9 mm SL. Spire about 50% of SL. Protoconch large, of approximately 2 convex whorls. Teleoconch of apparently 5 slightly convex whorls; suture impressed. Axial ornamentation of 11 moderately strong ribs on first whorl, 14 on second, then vanishing on third whorl. Spiral ornamentation of 2 wide, regularly spaced furrows that intersect ribs generating nodes (apparently eroded). Base of last whorl with about 6 spiral furrows. Aperture ovate; lip thick; columella covered with narrow callus; siphonal canal short, wide, oblique. Colour creamy white.

Distribution: Only known from type locality.

Remarks: Castellanos & Fernández (1975) considered *S. bertrandi* as a possible gerontic specimen of *S. areolata* in which the axial ornamentation was reduced (eroded?) on the last whorls. The unique specimen of *S. bertrandi* shows a shell outline and ornamentation that could be part of the range of variation of *S. areolata*, but is here treated as distinct, pending further study

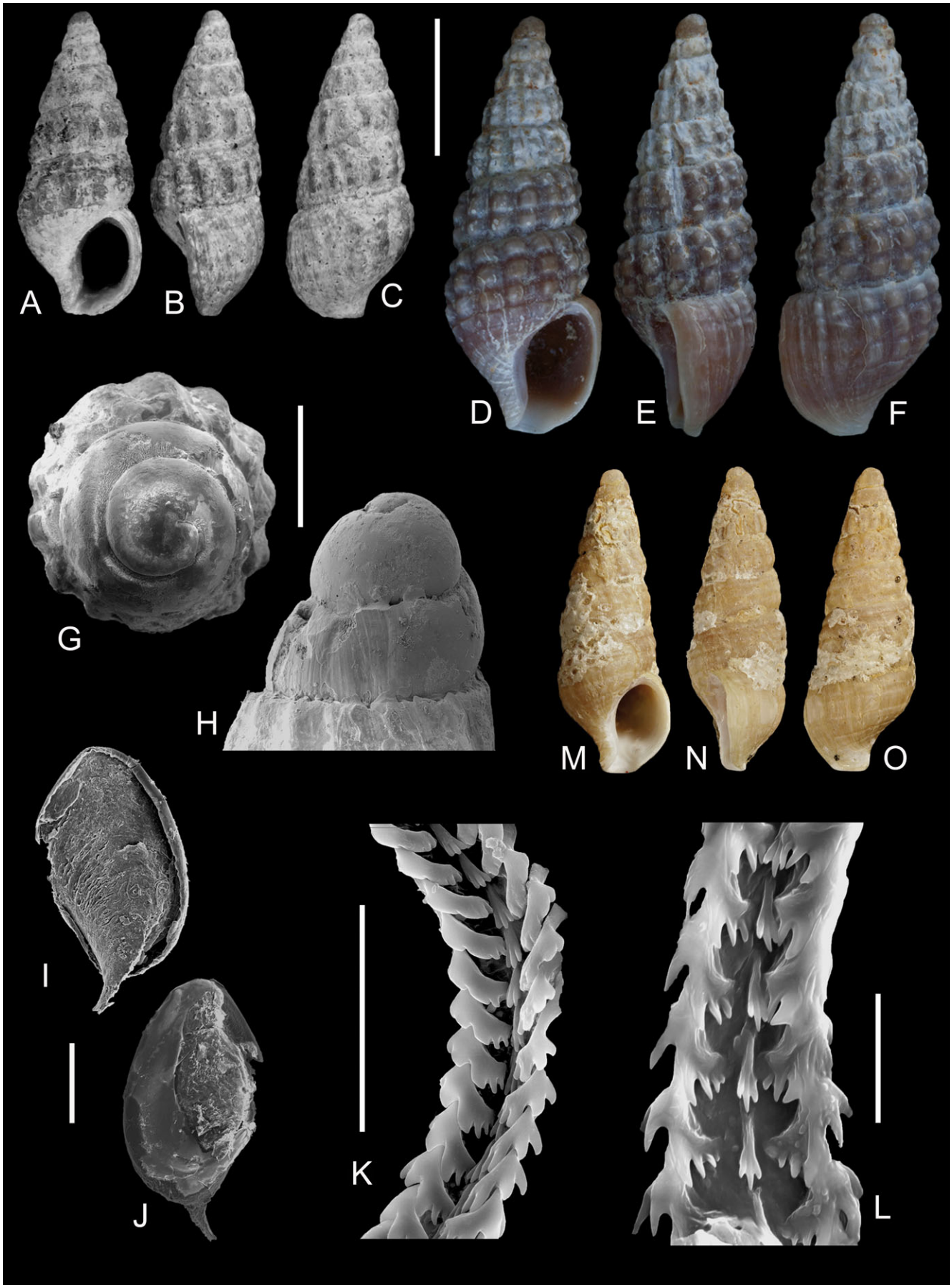
Species excluded from Savatieria

'*Savatieria*' *meridionalis* (Smith, 1881)

(Fig. 5A–G)

Lachesis meridionalis Smith, 1881: 28, pl. 4, fig. 3 (Borja Bay, Magellan Strait, 20 fathoms [36 m], bottom of stones and shells; holotype NHMUK 1880.9.19.24). Tryon, 1884: 226, pl. 32, fig. 26.
Savatieria meridionalis—Dell, 1972: 37, fig. 16 (holotype). Ramírez, 1990: 72, fig. 83. Linse, 1999: 402.
Savatieria (*Savatieria*) *meridionalis*—Castellanos & Fernández, 1975: 58.
Savatieria meridionale—Castellanos, 1992: 30, pl. 2, fig. 20. Valdovinos, 1999: 137. Forcelli, 2000: 94, fig.
Savatieria molinae Strebel, 1905: 644, pl. 22, figs 33–33c (several localities in Tierra del Fuego; 3 syntypes ZMH 3126–3128). Strebel, 1908: 21. Carcelles, 1950: 62. Carcelles & Williamson, 1951: 298. Powell, 1960: 149. Valdovinos, 1999: 137.
Savatieria concinna Melvill & Standen, 1912: 356, fig. 17 (54° 25′S, 57° 32′W, Burdwood Bank, 56 fathoms [100.8 m]; holotype NMSZ 1921.143.678). Powell, 1960: 149.
Savatieria concinna Melvill & Standen, 1913 (*sic*)—Carcelles & Williamson, 1951: 298. Valdovinos, 1999: 137.

Examined material: Holotype of *L. meridionalis*. 3 syntypes of *S. molinae*. Holotype of *S. concinna*. 4 km South of Punta Desengaño, San Julián, Santa Cruz, 24 sh. (MACN-In 36929). 54° 05.35′S, 60° 41.87′W, PDBB 2017, 122 m depth, 1 sh. (MACN-In 41369). 54°



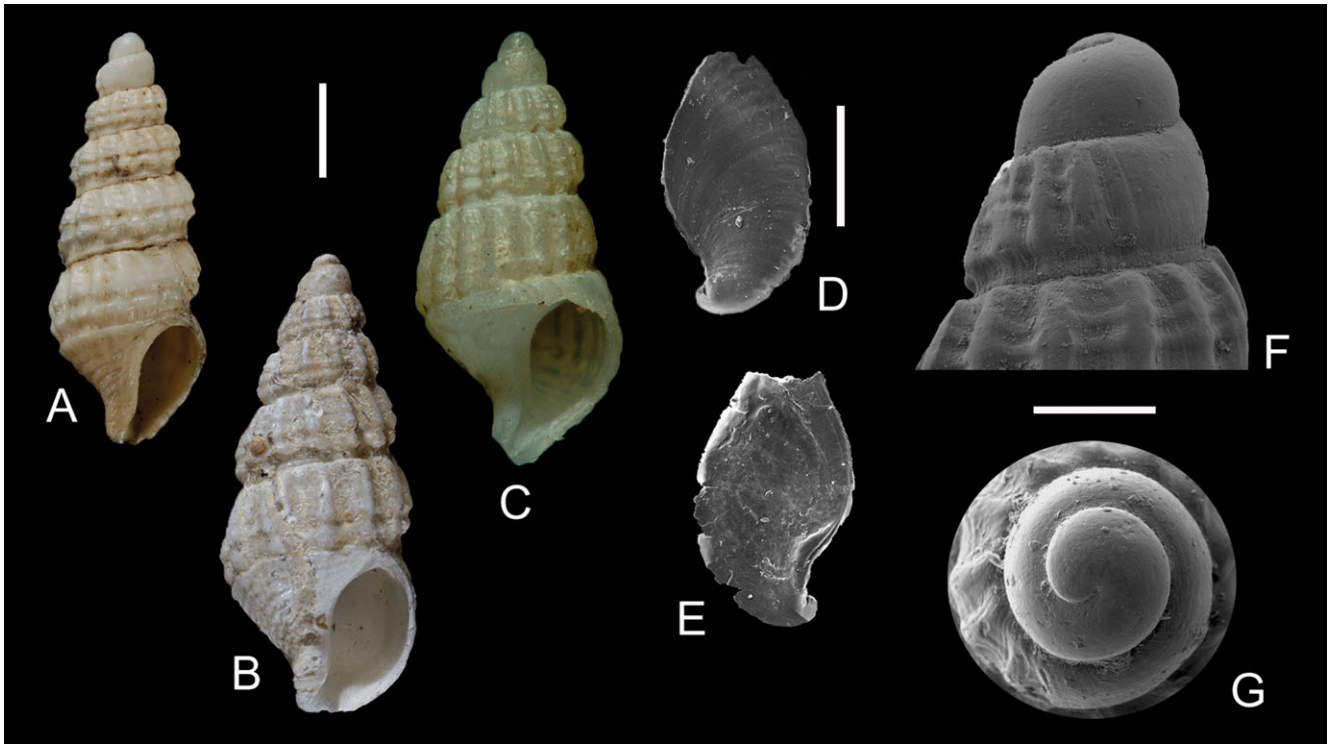


Figure 5. A–G. '*Savatieria*' *meridionalis* (Smith, 1881). **A.** *Lachesis meridionalis*, holotype (NHMUK 1880.9.19.24), apertural view. **B.** *S. molinae* Strebel, syntype (ZMH 3126), apertural view. **C.** *S. concinna* Melvill & Standen, 1912, holotype (NMSZ 1921143.678), apertural view. **D, E.** 54° 55.82′S, 67° 03.68′W, CAV 2014, 57 m depth (MACN-In 41371), external and internal views of operculum with SEM. **F, G.** 4 km S of Punta Desengaño, San Julián, Santa Cruz (MACN-In 36.929), lateral and apical views of protoconch with SEM. Scale bars: **A–C** = 1.0 mm. **D–G** = 500 μm.

15′S, 60° 00′W, CAV 2013, 97–101 m depth, 6 sh. (MACN-In 40685). 54° 57.62′S, 66° 54.52′W, CAV 2014, 72 m depth, 1 sh. (MACN-In 41370). 54° 55.82′S, 67° 03.68′W, CAV 2014, 57 m depth, 4 sh. and 1 an. (MACN-In 41371). 55° 04.21′S, 66° 02.46′W, CAV 2014, 172.9 m depth, 1 sh. (MACN-In 41372).

Remarks: The shell of '*S.*' *meridionalis* (Fig. 5A–C) has a grooved instead of impressed suture and 2–5 cords (Fig. 5F, G) that continue over the rib on each whorl instead of the furrows described for *Savatieria* species. In addition, the operculum (Fig. 5D, E) lacks the projecting nucleus and thick rim that characterize *Savatieria*. The shell and opercular characters indicate that this species belongs to a genus different from *Savatieria*. Study of radular characters is required to determine an accurate generic position. *Savatieria molinae* and *S. concinna* are part of the range of variation found in larger series of shells of '*S.*' *meridionalis*. Both species are here considered synonyms, as were also suggested by some previous authors (e.g. Melvill & Standen, 1912; Dell, 1972; Castellanos & Fernández, 1975).

'Savatieria' chordata Castellanos *et al.* 1987

(Fig. 6A–F)

Savatieria chordata Castellanos *et al.*, 1987: 97, pl. 1, fig. 3 (50° 30′S, 62° 31′W, 159 m; holotype and 5 paratypes MLP-In 4688). Castellanos, 1992: 31, pl. 2, fig. 21. Linse, 1999: 402. Forcelli, 2000: 93, fig. Signorelli *et al.*, 2015: 64, fig. 6C, D (holotype).

Examined material: Holotype and 5 paratypes. 54° 15′S, 60° 00′W, CAV 2013, 97–101 m depth, 5 an. and 3 sh. (MACN-In 40687). 54° 05.35′S, 60° 41.87′W, PDBB 2017, 122 m depth, 1 an. (MACN-In 41373). 55° 04.21′S, 66° 02.46′W, CAV 2014, 172.9 m depth, 1 an. and 5 sh. (MACN-In 41374). 55° 05.78′S, 65° 43.22′W, PDBB 2017, 246–275 m depth, 3 sh. (MACN-In 41375).

Remarks: The shell (Fig. 6A), operculum and radula illustrated here clearly reveal *S. chordata* as belonging in a different, probably undescribed, genus. The protoconch (Fig. 6E, F) has a very different morphology with the first whorl deeply sunken and is shorter (1¾ whorls *vs* 2–2¼ in *Savatieria* species). The base of the last whorl has 9–10 spiral cords and not furrows as in *Savatieria*. The operculum (Fig. 6C, D) is thin, oval and the nucleus is subterminal and not projecting. Finally, the radula (Fig. 6B) is also rachiglossan, but with a different arrangement, similar to some species of *Argeneuthria* Pastorino, 2016.

According to the measurements cited in the original description of *'S.' chordata*, the specimen illustrated as holotype in Castellanos *et al.* (1987: pl. 1, fig. 3) and figured here (Fig. 6A) corresponds to a paratype. Signorelli *et al.* (2015: fig. 6C, D) illustrated the holotype.

DISCUSSION

Shell, radular and opercular characters studied here for *Savatieria frigida*, *S. coppingeri* and *S. areolata* are distinctive of the genus *Savatieria*. The axial ribs intersected by furrows together with a long spire

Figure 4. A–L. *Savatieria areolata* Strebel, 1905. **A–C.** Syntype (ZMH unnumbered), three views of shell. **D–L.** Ushuaia, Tierra del Fuego, intertidal (MACN-In 41368). **D–F.** Three views of shell. **G, H.** Apical and lateral views of protoconch with SEM. **I, J.** External and internal views of operculum with SEM. **K, L.** Two upper views of radula. **M–O.** *Savatieria bertrandi* Melvill & Standen, 1914, syntype (NMW 1955.158.325), three views of shell. Scale bars: **A–F, M–O** = 3.0 mm; **G–J** = 500 μm; **K** = 50 μm; **L** = 20 μm.

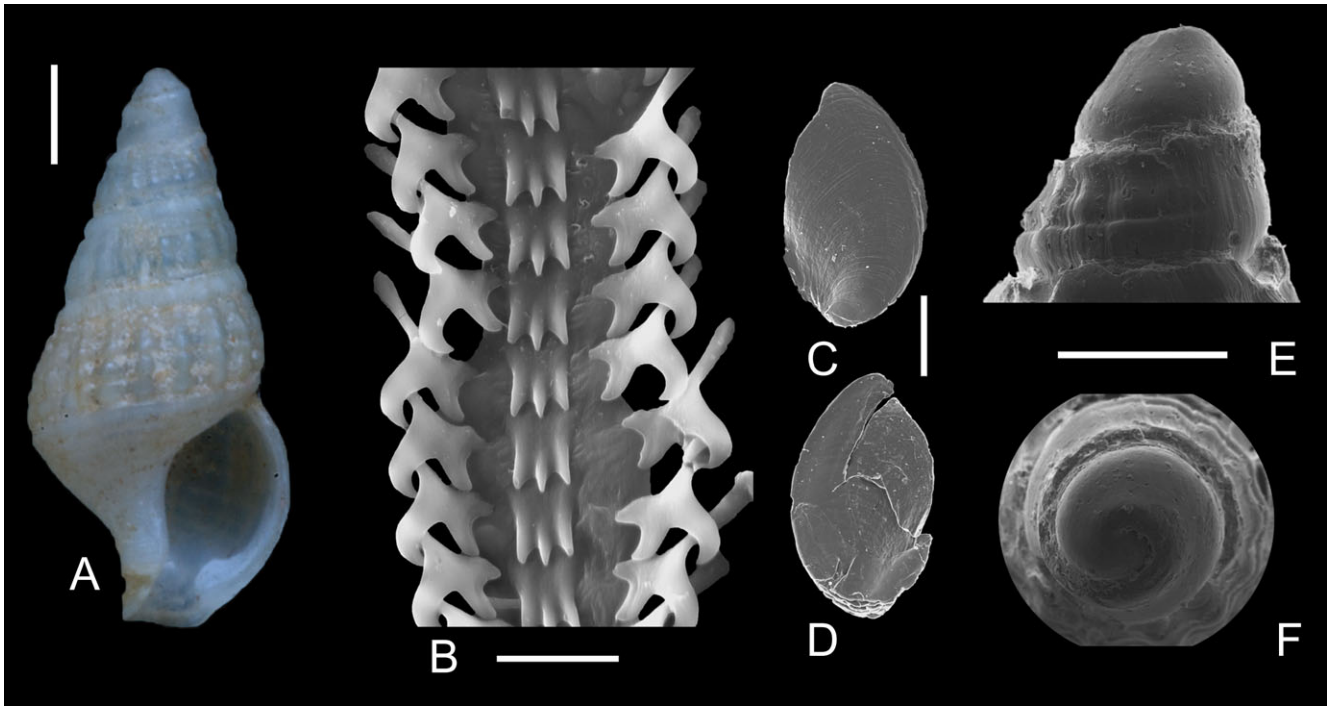


Figure 6. A–F. '*Savatieria*' *chordata* Castellanos *et al.* 1987. **A.** Paratype (MLP-In 4.688), apertural view. **B–F.** 55° 04.21′S, 66° 02.46′W, CAV 2014, 172.9 m depth (MACN-In 41374). **B.** Upper view of radula. **C, D.** External and internal views of operculum with SEM. **E, F.** Lateral and apical views of protoconch with SEM. Scale bars: **A** = 1.0 mm. **B** = 20 μm. **C–F** = 500 μm.

(40% or more of shell length) are the main shell characters that unite these species. The distinctive morphology of the operculum with terminal and strongly projecting nucleus is a singular feature unusual in the southwestern Atlantic neogastropod fauna. Radular characters are also quite distinctive. Among the Prosiphiinae, in which it is included, no other genus has similar organization.

Castellanos & Fernández (1975) described the subgenus *Lisosavatieria* based on the smooth shell surface of *S. deseadense*. This character is highly variable and in fact *S. deseadense* is here considered a synonym of *S. coppingeri*, a species with strong axial ribs. The subgeneric assignation therefore appears unnecessary and *Lisosavatieria* is a consider a synonym of *Savatieria*.

'*Savatieria*' *meridionalis* and '*S.*' *chordata*, according to shell, opercular and/or radular characters, are here excluded from *Savatieria*. More information is required to establish a proper generic position for each of these species.

Savatieria species are restricted to the southern tip of South America with a northern limit in the Atlantic Ocean at Puerto Deseado, Santa Cruz province (~47°45′S) and in the Pacific Ocean at 50°S (Valdovinos, 1999). They are considered a distinctive representative of the Magellanic malacological province.

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