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EARLY AND MIDDLE JURASSIC MARINE GASTROPODS FROM THE NEUQUÉN BASIN, ARGENTINA

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Abstract. Systematic knowledge of Early and Middle Jurassic marine gastropods from Argentina has been supplied during the last decade through several contributions. The present paper describes a new marine gastropod fauna for the Jurassic of the Neuquén Basin, represented by four major taxa such as Patellogastropoda, Vetigastropoda, Caenogastropoda and Heterobranchia, including 14 new species of the genera *Scurriopsis* (*Hennocquia*), *Eucyclus*, *Pleurotomaria*, *Laevitomaria*, *Obornella*, *Crossostoma*, *Palaeorissoina*, *Euconactaeon, Striactaeonina* and *Sulcoactaeon*; members of *Ambercyclus* and *Rhabdocolpus* are also described from the studied area. Most of these taxa are first reported in the Jurassic of Argentina, extending their palaeobiogeographical distribution in South America at that time. Particularly, the genera *Obornella*, *Palaeorissoina,* and *Euconactaeon* also extend their chronostratigraphic distribution in the Jurassic marine deposits of the Neuquén Basin, from the late Hettangian (*Palaeorissoina*) and late Pliensbachian (*Obornella*) to the Aalenian–Bajocian (*Euconactaeon*). The new fossils described here expand the known diversity of the marine gastropod faunas in the Jurassic of Argentina and contribute to the paleontological knowledge of the group in the Mesozoic of the Southern Hemisphere.

Key words. Gastropoda. Early–Middle Jurassic. Neuquén Basin. Argentina.

Resumen. GASTRÓPODOS MARINOS DEL JURÁSICO TEMPRANO Y MEDIO DE LA CUENCA NEUQUINA, ARGENTINA. El conocimiento sistemático de los gastrópodos marinos del Jurásico temprano y medio de Argentina ha sido dado a conocer durante la última década a través de numerosas contribuciones. El presente artículo tiene como objetivo dar a conocer una nueva fauna de gastrópodos marinos para el Jurásico de la Cuenca Neuquina, la cual está representada por cuatro grandes clados: Patellogastropoda, Vetigastropoda, Caenogastropoda y Heterobranchia, e incluye 14 nuevas especies de los géneros *Scurriopsis* (*Hennocquia*), *Eucyclus*, *Pleurotomaria*, *Laevitomaria*, *Obornella*, *Crossostoma*, *Palaeorissoina*, *Euconactaeon, Striactaeonina* y *Sulcoactaeon*; representantes de los géneros *Ambercyclus* y *Rhabdocolpus* también se reconocen en la región. La mayoría de los taxones descriptos se registran por primera vez en el Jurásico de Argentina, permitiendo ampliar su distribución paleobiogeográfica en América del Sur durante ese período. Particularmente, los géneros *Obornella*, *Palaeorissoina* y *Euconactaeon* extienden su distribución cronoestratigráfica en el Jurásico marino de Cuenca Neuquina, desde el Hettangiano tardío (*Palaeorissoina*) y Pliensbachiano tardío (*Obornella*) hasta el Aaleniano–Bajociano (*Euconactaeon*). Los nuevos fósiles aquí descriptos expanden nuestro conocimiento sobre la diversidad de las faunas de gastrópodos marinos en el Jurásico de Argentina y contribuyen al conocimiento paleontológico del grupo en el Mesozoico del hemisferio sur.

Palabras clave. Gastropoda. Jurásico temprano y medio. Cuenca Neuquina. Argentina.

Early and Middle Jurassic marine gastropods from the Andean region of Argentina have been studied by Ferrari (2009, 2011, 2012, 2013, 2014, 2015, 2017, 2022), Damborenea and Ferrari (2008), Ferrari and Damborenea (2015) and Ferrari *et al.* (2014, 2015). These contributions provided a comprehensive systematic database of the gastropod taxonomic composition in the region, indicating that gastropods are well represented in the Jurassic of Argentina by three major clades: Vetigastropoda, Caenogastropoda, and Heterobranchia (Supplementary online information). Even though Patellogastropoda Lindberg, 1986 is also present, it is less commonly found in the marine deposits of Argentina during the Jurassic. The present paper describes an abundant and diversified gastropod fauna from the Early and Middle Jurassic marine deposits of the Neuquén Basin. Representatives of Patellogastropoda, Vetigastropoda, Caenogastropoda, and Heterobranchia are reported, reassessing the Jurassic gastropod collections currently existing in Argentina and supplying new evidence on Jurassic marine gastropods in South America (Supplementary online information). Seventeen gastropod species are described here from the Neuquén Basin, among which 14 are new to science; these

are *Scurriopsis* (*Hennocquia*) *sanjuanensis* sp. nov., *Scurriopsis* (*Hennocquia*) *cagnadensis* sp. nov., *Eucyclus novus* sp. nov., *Pleurotomaria*? *trochotomorpha* sp. nov., *Pleurotomaria*? *plana* sp. nov., *Laevitomaria australis* sp. nov., *Laevitomaria*? *gigas* sp. nov., *Obornella victoriae* sp. nov., *Crossostoma extensa* sp. nov., *Crossostoma*? *acuta* sp. nov., *Palaeorissoina hettangiensis* sp. nov., *Euconactaeon volkheimeri* sp. nov., *Striactaeonina minor* sp. nov., and *Sulcoactaeon sabattinae* sp. nov. The occurrence of *Pleurotomaria*? sp., *Rhabdocolpus patagoniensis* (Ferrari, 2017), and *Ambercyclus* sp. confirm that these taxa are typical components of the Early Jurassic marine gastropod associations in the Andean region of Argentina. The genera *Leavitomaria*, *Obornella*, *Crossostoma*, *Palaeorissoina*, *Euconactaeon*, and *Sulcoactaeon* are recorded for the first time in the Jurassic marine deposits of Argentina and extend their palaeobiogeographical distribution to South America at that time. Furthermore, the genera *Obornella*, *Palaeorissoina,* and *Euconactaeon* also extend their chronostratigraphic distribution in the Jurassic marine deposits of the Neuquén Basin, from the late Hettangian (*Palaeorissoina*; late Hettangian to Valanginian) and late Pliensbachian (*Obornella*; late Pliensbachian to Oxfordian) to the Aalenian–Bajocian (*Euconactaeon*; Norian–Rhaetian to Aalenian–Bajocian).

These new findings show that the knowledge of South American Jurassic gastropods is currently being extended by systematic research and can provide exhaustive information to interpret the palaeobiogeographical distribution of some particular gastropod genera in the Southern Hemisphere during the Jurassic (Supplementary online information).

GEOLOGICAL SETTING

A geological framework of the Argentinean Neuquén Basin was summarized by Ferrari (2015, p. 920; 2017, p. 245; see references therein) and Ferrari and Damborenea (2015, p. 627). The gastropod material described below comes from several localities in the Neuquén Basin, in the San Juan, Mendoza, and Neuquén provinces (Fig. 1).

In southern San Juan Province, Pliensbachian–Toarcian sediments, originally described by Volkheimer *et al.* (1978) as the Los Patos Formation (Damborenea, 1987), yield gastropods species at the Río de Los Patos Sur locality (Fig. 1.2, RPS–N). In Mendoza Province, Hettangian to Toarcian sediments of the Atuel-western Malargüe depocentre contain gastropods at Arroyo El Alumbre/Arroyo Malo (Fig. 1.2, AAM–N) (Damborenea *et al.*, 2017), Arroyo Las Chilcas (Fig. 1.2, ACHL–N) (Damborenea & Manceñido, 2005; geological map in Damborenea *et al.*, 2017), Puesto Araya (Fig. 1.2, locality PAY–N) (Damborenea & Manceñido, 2005; geological map in Damborenea *et al.*, 2017), Cerro Puchenque (Fig. 1.2, CPH–N) (Damborenea, 1987), and Cañada Colorada (Fig. 1.2, CÑC–N) localities. Gastropods were also found in Pliensbachian–Toarcian deposits in the Cuyo Group beds within the Neuquén embayment in northern and southern Neuquén Province, at Arroyo Ñiraicó (Fig. 1.2, AÑR–N), Estación Rajapalo (Fig. 1.2, ER–N), Espinazo del Zorro (Fig. 1.2, EZ–N), Estancia Santa Isabel (Fig. 1.2, ESI–N) and Picún Leufú (Fig. 1.2, PLF–N) (Damborenea, 1987; Riccardi *et al.*, 2011) localities. Aalenian sediments yield gastropods in Mendoza Province at Bardas Blancas locality (Fig. 1.2, locality BBL–N) (Damborenea, 1987), and in Aalenian–Bajocian marine deposits of the Neuquén Province, a gastropod species described here was found in Cerro Lotena locality (Fig. 1.2, CLT–N) (named as Loma Alfa locality in Riccardi *et al.*, 2011) (Fig. 1.2).

MATERIALS AND METHODS

The gastropod material here described was collected by S. Damborenea, A. Riccardi, M. Manceñido, S. Ballent (all from the Museo de Ciencias Naturales de La Plata, Argentina), C. Gulisano (GeoPark, Argentina), and W. Volkheimer (IANIGLA, Argentina), during several field trips to the Neuquén Basin.

Stratigraphical sections for most of the localities yielding gastropods in the Neuquén Basin were described by Damborenea *et al.* (1975), Damborenea (1987), Damborenea and Manceñido (2005) and Damborenea *et al.* (2017). Specimens described here were found in the Early and Middle Jurassic at different stratigraphic levels, spanning the Hettangian to Bajocian, according to the current ammonite biozonation (Riccardi, 2008; Riccardi *et al.*, 2011).

The Argentinean gastropod material is currently housed in the Museo de Ciencias Naturales de La Plata repository. The specimens were prepared by technical staff (Santiago Bessone) at the Instituto Patagónico de Geología y Paleontología (IPGP, CCT CONICET-CENPAT) laboratory. The

material was coated with ammonium chloride to enhance sculpture details for photography. Photographs were taken by M. Ferrari and technical staff, S. Lucas, using a digital camera at IPGP.

The systematic classification of the gastropod taxa follows Bouchet *et al.* (2017).

Institutional abbreviation. MLP, Museo de Ciencias Naturales de La Plata, Buenos Aires, Argentina.

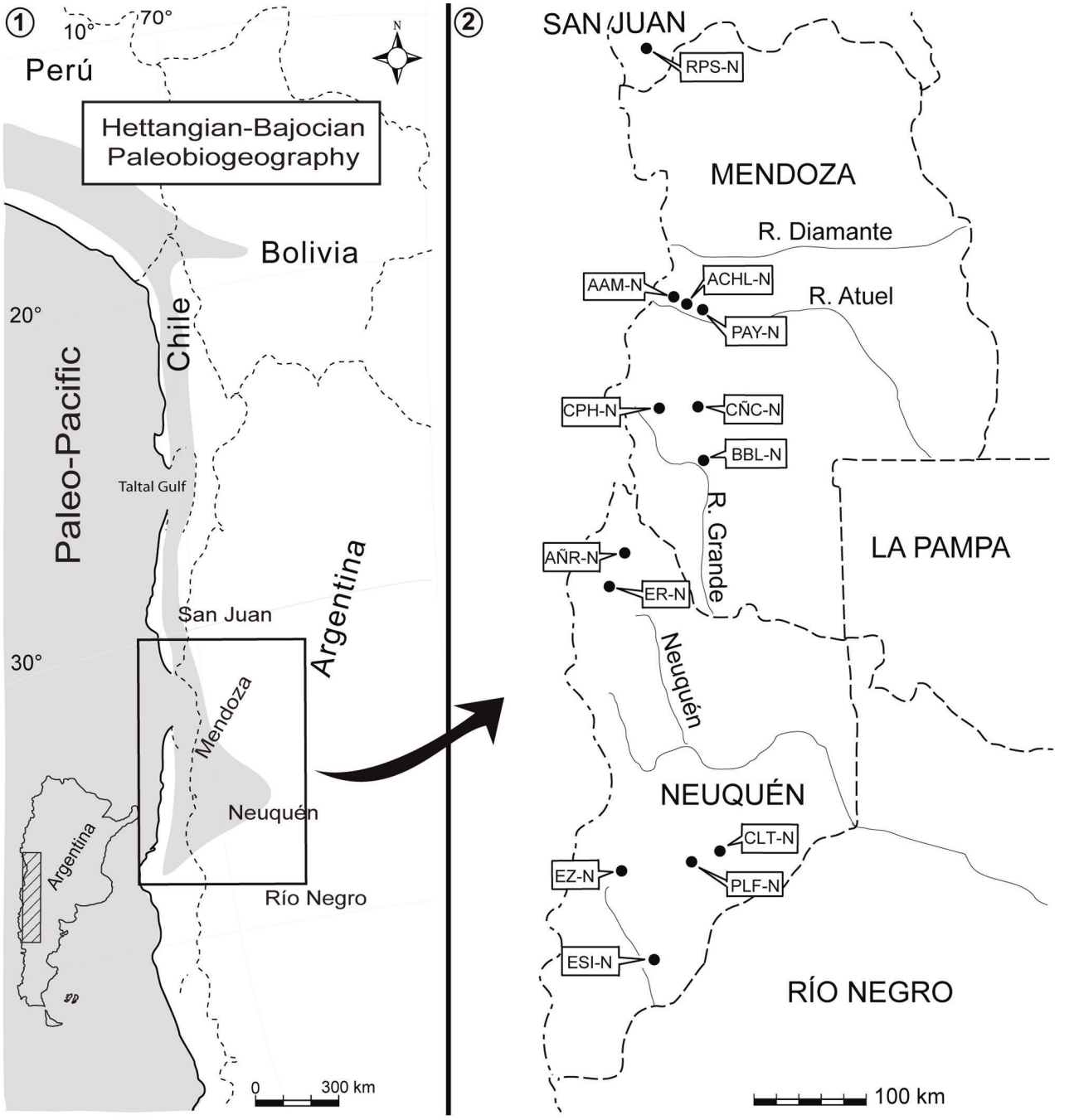

Figure 1.1, Map of the western part of South America showing the study area at the Neuquén Basin during the Hettangian–Bajocian. **2,** Map of the main localities with gastropod species described in the text. **RPS-N,** Río de los Patos Sur; **AAM-N,** Arroyo el Alumbre/Arroyo Malo; **ACHL-N,** Arroyo Las Chilcas; **PAY-N,** Puesto Araya; **CPH-N,** Co. Puchenque; **CÑC-N,** Cañada Colorada; **BBL-N,** Bardas Blancas; **AÑR-N,** Arroyo Ñiraico; **ER-N,** Estación Rajapalo; **EZ-N,** Espinazo del Zorro; **ESI-N,** Estancia Santa Isabel; **CLT-N,** Catán Lil; **PLF-N,** Picún Leufú (modified from Ferrari, 2015, 2017).

SYSTEMATIC PALAEONTOLOGY

Subclass PATELLOGASTROPODA Lindberg, 1986
?Superfamily LOTTIOIDEA Gray, 1840
?Family ACMAEIDAE Forbes, 1850

Genus ***Scurriopsis*** Gemmellaro, 1879

Type species. *Scurriopsis neumayri* Gemmellaro, 1879. Sinemurian, north-western Sicily, Italy.

Geographic and stratigraphic distribution. Early Jurassic (Hettangian–Toarcian); Europe, South America, Antarctica, northern Africa.

Subgenus ***Hennocquia*** Wenz, 1938

Type species. *Patella hennocquii* Terquem, 1855. Hettangian, Hettange-Grande (Lorraine, France).

Scurriopsis (Hennocquia) sanjuanensis sp. nov.

Figure 2.1–2.9

LSID urn:lsid:zoobank.org:act:36CF25E2-16A7-47F0-8D15-A48CBC96D86F

Derivation of name. Referred to the San Juan Province (Argentina), where the material was found.

Diagnosis. Patelliform, limpet-shaped, with elliptical peristome; apex anteriorly eccentric; posterior outline flattened to slightly convex; fine concentric collabral lines; collabral threads present in juvenile shells.

Type material. Holotype, MLP 36488, one recrystallized teleoconch; Paratype, MLP 36489, one recrystallized teleoconch.

Referred Materials. MLP 36490, MLP 36491, MLP 36492; three recrystallized teleoconchs.

Description. Patelliform, limpet-shaped, moderately high shell. Peristome elliptical. Apex eccentric placed anteriorly at 46%–70% of the shell length. Posterior outline of the shell in lateral view flattened to slightly convex. Anterior outline flattened. Juvenile specimen with the apex located in a median position of the shell. Sculpture made of fine concentric collabral lines; collabral threads visible in the juvenile specimen. Radial elements lacking.

Dimensions (mm). MLP 36488, Holotype: height, 7.56 mm; width, 13.57 mm; length of the peristome (L), 17.33 mm; distance of the apex from the posterior margin of the peristome (Lp), 10.56 mm. MLP 36489, Paratype: height, 6.68 mm; width, 8.98* mm; L, 11.41 mm; 8.92* mm. MLP 36490 (juvenile): height, 4 mm; width, 7 mm; L, 8.71 mm; Lp, 5 mm. 431 (B): height, 7.5 mm; width, 10.5 mm; length of the peristome (L), 12.62 mm; distance of the apex from the posterior margin of the peristome (Lp), 8.5 mm. MLP 36491: height, 8.45 mm; width, 12.74 mm; L, 14.52* mm; Lp, 11.44* mm. *= incomplete specimen.

Remarks. The genus was previously reported in Argentina from the Early Jurassic (late Pliensbachian–early Toarcian) of the Chubut Province (as *Scurriopsis*? sp.; in Ferrari, 2014: p. 566, fig. 3 a–h). Here it is provided the first occurrence of *Scurriopsis (Hennocquia)* in the late Pliensbachian marine deposits of the San Juan Province. The new species here described differs from the Chubutean form in being smaller and in lacking radial ribs. *Scurriopsis* (*Hennocquia*) *sanjuanensis* sp. nov. also resembles *Scurriopsis* (*Hennocquia*) *hettangiensis* (Terquem, 1855: p. 281, pl. 18, fig. 2) (in Monari *et al.*, 2011: p. 355, fig. 5D–I), from the Early Jurassic (Hettangian) of Europe. The European form, however, has more developed concentric growth lines, and radial lines and riblets are commonly present, whereas the Argentinean species lacks radial elements. Another species comparable to *Scurriopsis* (*Hennocquia*) *sanjuanensis* sp. nov. is *Scurriopsis* (*Dietrichiella*) *subquadrata* (Dunker, 1846: p. 188, as *Patella subquadrata*) (in Terquem, 1855: p. 280, pl. 18, fig. 3, as *Patella dunkeri*; in Gründel, 2010: p. 4, pl. 1, figs. 3–4), from the Early Jurassic (Hettangian) of Germany; *Scurriopsis* (*Dietrichiella*) *subquadrata*, however, is smaller, has the apex slightly more eccentric in the anterior margin of the shell, and the anterior outline more vertical and flattened.

Geographic and stratigraphic distribution. Early Jurassic (early Toarcian, *Tenuicostatum* Zone), San Juan Province, Argentina.

Type locality. Río de los Patos Sur, San Juan Province, Argentina.

Scurriopsis* (*Hennocquia*) *cagnadensis sp. nov.

Figure 2.10–2.18

LSID urn:lsid:zoobank.org:act:9479DBC8-B9C7-47AC-A344-1903CAE9112C

Derivation of name. Referred to the Cañada Colorada locality in Mendoza Province (Argentina), where the material was found.

Diagnosis. Patelliform, limpet-shaped; peristome elliptical;

apex placed anteriorly; concentric collabral lines on the shell surface; fine and sharp radial ribs intercept the collabral lines.

Type Material. Holotype, MLP 36493, one recrystallized teleoconch; Paratype, MLP 36494, one recrystallized teleoconch.

Description. Patelliform, limpet-shaped to cup-shaped, small-sized, and moderately high shell. Peristome elliptical. Apex eccentric placed anteriorly at 60%–75% of the shell length. Posterior slope of the shell in lateral view convex to flattened. Anterior slope convex. Surface of the shell covered with strong, concentric, and irregularly spaced collabral lines. Fine, dense, and sharp radial ribs cover the whole shell surface and intercept the collabral lines giving a reticulate ornament pattern.

Dimensions (mm). MLP 36493, Holotype: length of the peristome (L), 6.88 mm; distance of the apex from the posterior margin of the peristome (Lp), 4.06 mm; width, 5.06 mm; height, 3.07 mm. MLP 36494, Paratype: length of the peristome (L), 7.5 mm; distance of the apex from the posterior margin of the peristome (Lp), 5.67 mm; width, 6.43 mm; height, 4.13 mm.

Remarks. The new species here described is very similar in shell shape and ornamentation to *Scurriopsis* (*Scurriopsis*) *schmidti* (Dunker, 1844) (in Terquem, 1855: p. 281, pl. 18, fig. 4, as *Patella schmidti*; in Meier & Meiers, 1988: p. 25, pl. 2, fig. 4; and in Monari *et al.*, 2011: p. 352, fig. 5A–C), reported by Monari *et al.* (2011) from the Early Jurassic (Hettangian) of Luxembourg; however, it differs from *Scurriopsis* (*Hennocquia*) *cagnadensis* sp. nov. in having stronger primary and secondary radial ribs which are intercepted by denser growth striae, and in being much larger. *Scurriopsis* (*Hennocquia*) *hettangiensis* (Terquem, 1855: p. 281, pl. 18, fig. 2, as *Patella hettangiensis*) (in Monari *et al.*, 2011: p. 355, fig. 5D–I), is also comparable to the new species here described, although the species from Luxembourg is larger, has finer and densely packed collabral lines and weaker radial ribs. *Scurriopsis* (*Hennocquia*) *cagnadensis* sp. nov. is similar to *Scurriopsis bathonica* (Cox & Arkell, 1950: p. 54, as *Acmaea bathonica*) (in Morris & Lycett, 1851: p. 90, pl. 12, fig. 3, as *Patella sulcata*; and in Fischer, 1969: p. 126, pl. 14, figs. 23–24), from the Middle Jurassic (Bathonian) of France, in ornament pattern and shell size; however, the species from France has slightly sharper and more acute radial ribs. *Scurriopsis aubentonensis* (d'Archiac, 1843: p. 249, pl. 28, fig. 8a, as *Patella aubentonensis*) (in Fischer, 1969: p. 126, pl. 14, fig. 25), from the Middle Jurassic (Bathonian) of France, also resembles *Scurriopsis* (*Hennocquia*) *cagnadensis* sp. nov.; *S. aubentonensis*, however, has a more conical shell shape with a more sloped and flattened anterior and posterior margins. *Scurriopsis*? sp. (in Ferrari, 2014: p. 566, fig. 3a–h), from the Early Jurassic (late Pliensbachian–early Toarcian) of the Chubut Province (southern Argentina), differs from the new species in being larger, in having a more elevated shell with a pointed apex, and sharper radial ribs more developed toward the largest slope of the shell. Finally, *Scurriopsis* (*Hennocquia*) *cagnadensis* sp. nov. differs from *Scurriopsis* (*Hennocquia*) *sanjuanensis* sp. nov. in having a more reticulated ornament pattern with fine and sharp radial ribs intercepting collabral lines.

Geographic and stratigraphic distribution. Early Jurassic (late Toarcian), Mendoza Province, Argentina.

Type locality. Cañada Colorada locality, Mendoza Province, Argentina.

Subclass VETIGASTROPODA Salvini-Pläwen, 1980

Family EUCYCLIDAE Koken, 1897

Genus ***Eucyclus*** Eudes-Deslongchamps, 1860

Type species. *Eucyclus obeliscus* Eudes-Deslongchamps, 1860 from the Pliensbachian of Normandy, France.

Remarks. Ferrari *et al.* (2014) proposed a new diagnosis for the genus *Eucyclus* based on the topotypic material housed in the Natural History Museum (*Eucyclus obeliscus* Eudes-Deslongchamps, 1860, topotype NMHUK PI G. 16010, from the Pliensbachian of France) (see emended diagnosis in Ferrari *et al.*, 2014: p. 1176). The authors emphasized the presence of non-umbilicated shells with a single strong keel near the abapical suture and base ornamented by numerous spiral ribs to distinguish *Eucyclus* from *Amberleya* Morris & Lycett, 1851 and *Ambercyclus* Ferrari *et al.*, 2014.

Eucyclus novus sp. nov.

Figure 2.19–2.25

LSID urn:lsid:zoobank.org:act:4C3BAD02-570B-4D20-9032-719ACB89B665

Derivation of name. Derivated from the latin *novus*=new, referring to the first occurrence of a true representative of *Eucyclus* in the Andean region of Argentina.

Diagnosis. Trochiform to cyrtoconoid shell; early teleoconch distinct pagodiform and cyrtoconoidal; sharp peripheral angulation on early teleoconch; mature whorls slightly coeloconoidal with an angulation at mid-whorl; fine spiral cords on early whorls; acute and sharp spiral cords on mature whorls; peripheral spiral cord with pointed nodes on mature whorls; fine prosocline collabral lines on the shell surface; base anomphalous and convex with regularly spaced spiral cords; orthocline collabral lines on base; subangular aperture; thick columellar lip.

Type Material. Holotype, MLP 15552, one recrystallized teleoconch.

Description. Dextral, trochiform to cyrtoconoid, conical, and medium-sized shell with a height of 17.81 mm and a width of 18.13 mm. The protoconch is not preserved. The teleoconch consists of four convex whorls. The early teleoconch is distinctly pagodiform and cyrtoconoidal. The sutures are deeply impressed, and a sharp peripheral angulation is present above the suture on the early teleoconch. The angulation of whorls runs about one-third of the distance between the adapical and abapical suture on the early whorls. The ramp above the angulation is convex; the angulation of whorls is delimited by a spiral cord; the lower portion of the whorl becomes flat abapically toward the peripheral angulation. Mature shell becomes slightly coeloconoidal, with the angulation located at about mid-whorl. The early whorls are ornamented by regularly spaced and fine spiral cords on the ramp and on the lower portion of the whorl below the angulation. On mature whorls the spiral cords are sharp, more acute, also regularly spaced but slightly more distant from each other. Small, very weak, and pointed nodes are visible on the peripheral spiral cords on mature whorls. Fine prosocline collabral lines intercept the spiral elements. The base is anomphalous and strongly convex, covered by regularly spaced spiral cords. Fine orthocline collabral lines intercept the spiral elements on the base. The aperture is holostomatous and subangular, with a thick columellar lip.

Remarks. The specimen here described fits with the new emended diagnosis of the genus *Eucyclus* proposed by Ferrari *et al.* (2014) (see above). The new species, *Eucyclus novus* sp. nov., is comparable to the type species *Eucyclus obeliscus* Eudes-Deslongchamps, 1860 (junior synonym of *Turbo julia* d'Orbigny, 1853), from the Pliensbachian of France. The type species, however, is larger and more elongated, has a higher spire, the whole shell is cyrtoconcoidal with markedly convex whorls, and the spiral cord at the angulation is more prominent (see Fischer & Weber, 1997: pl. 21, fig. 11; Ferrari *et al.*, 2014: p. 1177, fig. 3). *Eucyclus* (*Eucyclus*) *alpinus* Stoliczka (1861: p. 176, pl. 2, fig. 12) (in Szabó, 2009: p. 75, fig. 72), from the Early Jurassic (Sinemurian–Pliensbachian) of Europe and Morocco, differs from *Eucyclus novus* sp. nov. in having a more littoriniform shell with strongly convex whorls and deeply impressed sutures, the whole shell surface ornamented by tubercled spiral cords, and a subquadrangular aperture. *Eucyclus* (*Eucyclus*) *sandrae* Szabó (2009: p. 77, fig. 74E–F), from the Early Jurassic (Sinemurian) of Austria, also differs from the new species in having a more elongated shell shape, and the ornament consisting on four spiral cords between the periphery and the lower suture but without spiral ornament developed between mid-whorl and the upper suture; moreover, nodes are more abundant on the spiral cords in *E. sandrae*.

Eucyclus novus sp. nov. is the first mention of a true representative of *Eucyclus* in the Early Jurassic (early Toarcian) of Argentina.

Geographic and stratigraphic distribution. Early Jurassic (early Toarcian), Neuquén Province, Argentina.

Type locality. Arroyo Ñiraico, Neuquén Province, Argentina.

Genus ***Ambercyclus*** Ferrari *et al.*, 2014

Type species. *Amberleya orbignyana* Hudleston, 1892 (=*Purpurina ornata* d'Orbigny, 1850; preoccupied), from the Middle Jurassic (Bajocian) of England.

Remarks. See the diagnosis of *Ambercyclus* in Ferrari *et al.* (2014: p. 1178).

Geographic and stratigraphic distribution. Early Jurassic (Pliensbachian–Toarcian)–Early Cretaceous; Europe, South America, and North America.

Ambercyclus sp.

Figure 2.26–2.33

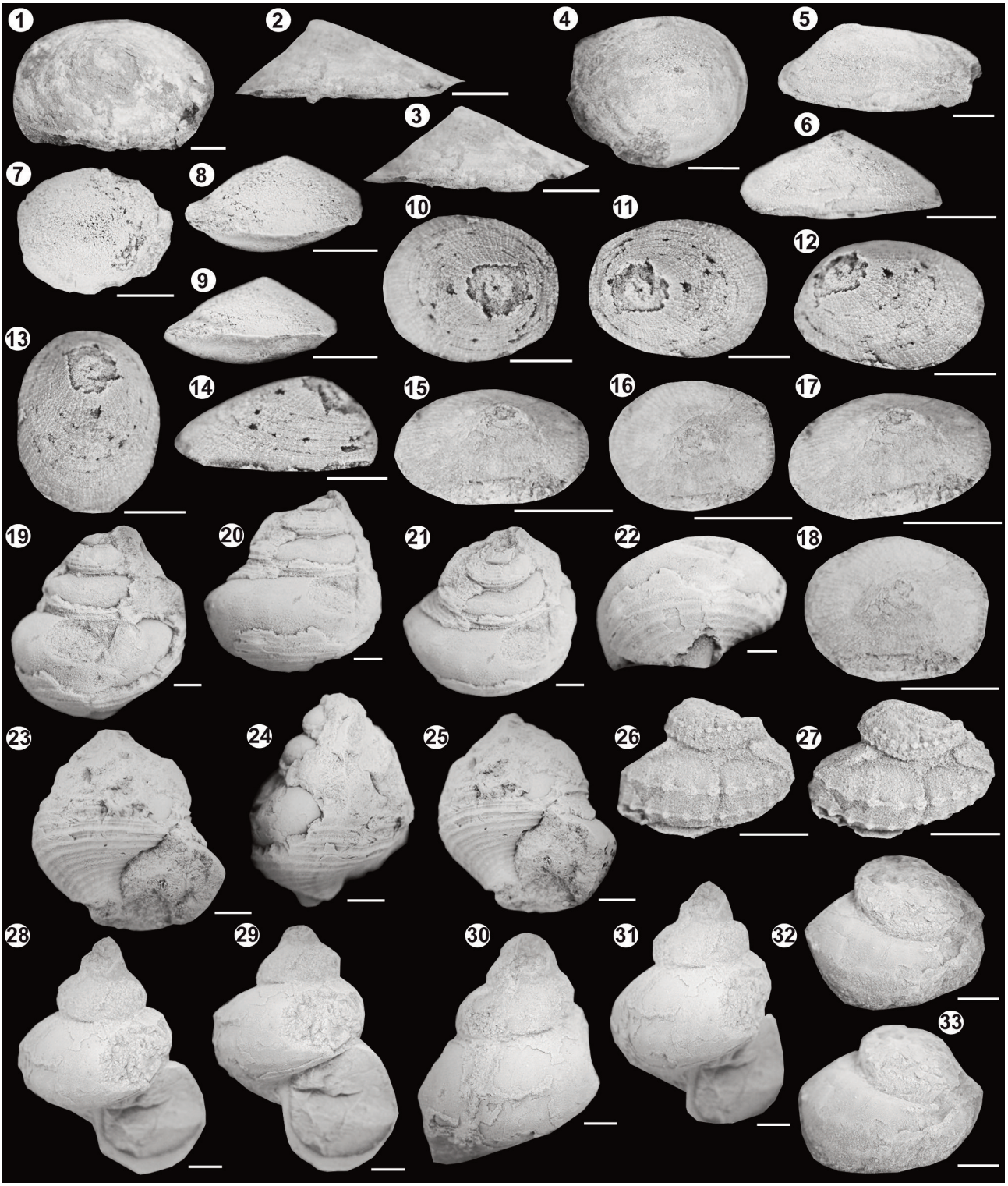

Figure 2. 1–9, ***Scurriopsis (Hennocquia) sanjuanensis*** sp. nov. **1–3, MLP 36488**, holotype; **1,** apical view; **2–3,** lateral views; **4–6, MLP 36489**, paratype; **4,** apical view; **5–6,** lateral views; **7–9, MLP 36490**, juvenile specimen; **7,** apical view; **8–9,** lateral views. **10–18,** ***Scurriopsis (Hennocquia) cagnadensis*** sp. nov.; **10–14, MLP 36493**, holotype; **10–13,** apical views; **14,** lateral view; **15–18, MLP 36494,** paratype, apical and lateral views. **19–25,** ***Eucyclus novus*** sp. nov., **MLP 15552**, holotype; **19–20, 24,** lateral views; **21,** apical view; **23, 25,** basal and apertural views. **26–33,** ***Ambercyclus*** sp. **26–27, MLP 36496**, lateral views; **28–31, MLP 36495**; **28–29, 31,** lateral and apertural views; **30,** lateral view;**32–33, MLP 36497**, lateral views. 1–27: scale bar = 3 mm; 28–33: scale bar = 5 mm.

Referred Materials. MLP 36495, MLP 36496, MLP 36497, MLP 15434; four recrystallized teleoconchs.

Description. Dextral, trochiform conical to cyrtoconoidal, moderately high-spired and medium-sized shell. The teleoconch consists of five convex whorls, with a height of 32.65 mm and a width of 22.93 mm. Spire whorls are slightly gradate in outline. Sutures are impressed, and the sutural ramp is slightly convex to flattened and wide, inclined 45° abapically. The last whorl is markedly more convex than the spire and delimited by two acute peripheral spiral cords, which bear distinct, pointed, and regularly spaced nodes; the interspace between the spiral cords is concave. Collabral ornament is poorly developed on the shell surface. Regularly spaced axial ribs connect the nodes between the peripheral spiral cords. The base is convex and ornamented by fine, regularly spaced spiral cords intercepting fine prosocline growth lines, which are more visible in the umbilical area; nodes on the basal spiral cords are very weakly developed. The aperture is holostomatous and subcircular; the outer lip is convex and continuous with the basal lip. The columellar lip is thickened and straight, forming an angle of 90° with the basal lip.

Remarks. Following the characterization of Ferrari *et al.* (2014), the specimens here analyzed are typical members of *Ambercyclus*. Four *Ambercyclus* species have been described so far from the Early Jurassic (late Sinemurian–early Toarcian) of Argentina, and these are *Ambercyclus espinosus* (Ferrari, 2009: p. 450, fig. 2A, as *Amberleya*? *espinosa*) (in Ferrari *et al.*, 2014: p. 1178, fig. 3.1), *Ambercyclus*? *isabelensis* Ferrari *et al.* (2014: p. 1180, fig. 3.2–3.9), *Ambercyclus andinus* Ferrari (2015: p. 931, fig. 4I–J) and *Ambercyclus chilcaensis* Ferrari (2015: p. 932, fig. 4K–L). *Ambercyclus* sp. differs from these forms in having a more convex shell outline, weaker and less pointed nodes, less developed and weaker axial ribs on the flanks of whorls, and a strongly subcircular aperture.

Ambercyclus ornatus (Sowerby, 1819) (in Sowerby, 1821: p. 39, pl. 221, fig. 1, as *Trochus ornatus*; and in Monari *et al.*, 2017: p. 26, fig. 11E–U), from the Middle Jurassic (early Bajocian) of Europe, is also comparable to *Ambercyclus* sp., although it has stronger peripheral spiral cords with a third weaker adapical cord on each whorl, a more conical shell outline, a higher spire, stronger nodes, more developed collabral elements and a strongly developed spiral cords on base. *Ambercyclus cratisculptus* Szabó *et al.* (2019: p. 76, fig. 18), from the Middle Jurassic (Aalenian–Bajocian) of Italy, differs from *Ambercyclus* sp. in having strongly developed collabral ornament and more acute spiral cords marking the angulations of whorls. *Calliotropis* (*Riselloidea*) *keideli* Ferrari *et al.* (2014: p. 1181, figs. 4.1–13, 5.1–8). from the Early Jurassic (late Pliensbachian–early Toarcian) of Argentina, also resembles *Ambercyclus* sp.; however, the former species has a more cyrtoconoidal shell shape, weaker and less pointed nodes on the angulation of whorls, lacks a pseudoumbilicus, and has a strongly circular aperture.

Geographic and stratigraphic distribution. Early Jurassic (Hettangian, Z.a. *Kamerkarites bayoensis*), Arroyo El Alumbre/Arroyo Malo, Río Atuel, Mendoza Province, Argentina; (Pliensbachian and late Toarcian, Z.a. *Dumortieria*), Picún Leufú and Estación Rajapalo, Neuquén Province, Argentina.

Family PLEUROTOMARIIDAE Swainson, 1840

Genus ***Pleurotomaria*** Defrance, 1826

Type species. *Trochus anglicus* Sowerby, 1818a, subsequent designation by Woodward (1851). Somerset (south-western England), late Pliensbachian (Cox, 1954, 1955).

Remarks. Monari & Gatto (2013, p. 753) proposed a diagnosis of *Pleurotomaria* to include 'medium to large-sized, discoidal to high trochiform shells, with the earliest spire turbiniform-gradate with rounded to roundedly angulated outer edge of the ramp and with a network of spiral threads and collabral riblets. Early adult and fully adult shell gradate, with the outer edge of the ramp roundedly to sharply angulated and provided with a row of nodes. Peribasal band roundedly angulated and most frequently bearing nodes, partially to completely exposed on the spire. Selenizone broad, running about in the middle of the outer face, flat to concave in the early whorls, flat to convex on the adult shell. Spiral ornament commonly dominant on the adult shell'. The material described below fits the characterization of Monari & Gatto (2013).

Geographic and stratigraphic distribution. Middle Triassic–Recent; cosmopolitan.

Pleurotomaria*? *trochotomorpha sp. nov.

Figure 3.1–3.4

LSID urn:lsid:zoobank.org:act:FDB45B7F-AB81-4966-99F9-AC5D7DDF6580

Derivation of name. Referred to the resemblance in shell shape and ornamentation to the genus *Trochotoma* Eudes-Deslongchamps, 1843.

Diagnosis. Strongly gradate; sutural ramp narrow and horizontal; weak spiral cords on the shell surface; selenizone below mid-whorl delimited by two spiral ribs; a row of small nodes on last whorl below the selenizone.

Type material. Holotype, MLP 36498, one recrystallized teleoconch.

Description. Dextral, strongly conical, trochospiral-gradate, medium-sized, and moderately high-spired shell, with a height of 17.9 mm and a width of 22.55 mm. The protoconch is not preserved. The teleoconch consists of four whorls; whorls are gradate in outline with the outer face slightly convex to flattened. Sutural ramp narrowly developed and horizontal, slightly inclined abapically. Sutures are deeply impressed. The ornament is partially visible in the shell surface; it consists of weak, irregularly spaced spiral cords. The selenizone is located below mid-whorl; it is flat delimited by two acute spiral ribs. A row of small and rounded nodes is visible on the last whorl, below the selenizone, and delimiting the angulation between the last whorl and the base. Basal and apertural characters are missing.

Remarks. Following Monari & Gatto (2013) characterization, the new species fits the trochospiral *Pleurotomaria* morphotype (see Monari & Gatto, 2013: p. 754, fig. 2A). The species here described shows some characters of the genus, such as a selenizone located below mid-whorl. However, the ornament pattern is feebly visible in the present material and it does not show the row of nodes above the selenizone typical of *Pleurotomaria*; thus, it is doubtfully attributed to this genus.

Representatives of *Pleurotomaria* have been described from the Early and Middle Jurassic of Argentina. *Pleurotomaria* sp. (in Ferrari, 2014: p. 570, fig. 4f–j), from the Early Jurassic (Pliensbachian–Toarcian) of the Chubut Province, resembles *Pleurotomaria*? *trochotomorpha* sp. nov. in general shell morphology, although the species from Chubut is smaller and has a reticulate ornament pattern. Another species comparable to *Pleurotomaria*? *trochotomorpha* sp. nov. is *Pleurotomaria bajociana* Ferrari & Damborenea (2015: p. 630, fig. 2.1–10), from the Middle Jurassic (early Bajocian) of the Neuquén Basin; *P. bajociana*, however, is larger, has a more angular shell shape, the surface is covered by regularly spaced spiral cords in a zigzag pattern crossed by prosocline growth lines, and the selenizone is wider and ornamented by prosocline lunulae. *Pleurotomaria anglica* (Sowerby, 1818: p. 95, pl. 142, as *Trochus anglicus*) (in Monari & Gatto, 2013: p. 756, fig. 3), from the Early Jurassic (Pliensbachian) of England, is much larger than *P*?*. trochotomorpha* sp. nov., has conspicuous nodes on the angulation of whorls, and has more developed spiral cords on the shell surface. *Pleurotomaria armata* Münster in Goldfuss (1844: p. 74, pl. 186, fig. 7a–b) (in Monari & Gatto, 2013: p. 756, figs. 4–5), from the Middle Jurassic (Bajocian) of Europe and Morocco, differs from the new species in having a nodose angulation at the periphery of whorls forming a spiral peribasal swelling, a sharp shoulder with strong spaced nodes, and very fine collabral threads. Another species comparable to *P*?. *trochotomorpha* sp. nov. is *Pleurotomaria actinomphala* Eudes-Deslongchamps (1848: p. 32, pl. 18, fig. 1) (in d'Orbigny, 1850: p. 458, pl. 374; and in Monari & Gatto, 2013: p. 762, fig. 8), from the Middle Jurassic (Aalenian-, Bajocian) of Europe; but *P. actinomphala* has a shallow and wide spiral swelling at the periphery, and a wider and slightly convex to cord like selenizone located at mid-line of outer face. *Pleurotomaria pogibshiensis* Ferrari *et al.* (2020: p. 566, fig. 5A–N), from the Early Jurassic (middle Hettangian) of Alaska, has a peripheral angulation with a spiral swelling of pointed nodes, and the selenizone with a median spiral cord; these characters are absent in *P*?*. trochotomorpha* sp. nov.

Geographic and stratigraphic distribution. Early Jurassic (late Pliensbachian), Neuquén Province, Argentina.

Type locality. Estancia Santa Isabel, Neuquén Province, Argentina.

***Pleurotomaria*?** sp.

Figure 3.5–3.9

Referred Material. MLP 36499, one recrystallized teleoconch.

Description. Dextral, trochospiral, strongly gradate, medium-sized, and moderately high-spired shell, with a height of

27.51 mm and a width of 31.09 mm. The protoconch is not preserved. The teleoconch consists of four strongly gradate whorls. The sutural ramp is widely horizontal, and sutures are impressed. Neither the selenizone nor the ornament pattern is visible on the shell surface. The base is convex and phaneromphalous, with a widely opened umbilicus. The aperture is circular.

Remarks. Although the selenizone and the typical ornament pattern of *Pleurotomaria* are not visible in the specimen analyzed, it does show the general shell morphology of the genus; however, it is very poorly preserved and, thus, doubtfully assigned to *Pleurotomaria*. *Pleurotomaria*? sp., however, fits within the trochospiral *Pleurotomaria* morphotype proposed by Monari & Gatto (2013: p. 754, fig. 2A). *Pleurotomaria*? sp. is comparable to *Pleurotomaria*? *trochotomorpha* sp. nov., but *Pleurotomaria*? sp. is larger, has a strongly more gradate shell outline, last whorl is slightly more expanded and has a wider sutural ramp. *Pleurotomaria pogibshiensis* Ferrari *et al.* (2020: p. 566, fig. 5A–N), from the Early Jurassic (middle Hettangian) of Alaska, differs from *Pleurotomaria*? sp. in having a peripheral angulation with a spiral swelling of 20–22 nodes, spiral cords on the shell surface intercepted by prosocline growth lines, and a broad selenizone at midwhorl with a median spiral cord.

Geographic and stratigraphic distribution. Early Jurassic (Hettangian, Z.a. *Discamphiceras reissi*); Arroyo el Alumbre, Río Atuel, Mendoza Province, Argentina.

Pleurotomaria*? *plana sp. nov.

Figure 3.10–3.15

LSID urn:lsid:zoobank.org:act:CAE9F16E-7D7D-477F-A5F0-74F446BB7268

Derivation of name. Derived from the Spanish adjective *plana*=plain/flat, referring to the strongly flattened or depressed spire for a representative of *Pleurotomaria*.

Diagnosis. Sublenticular, depressed shell; spire whorls with rounded angulation; periphery of last whorl bordered by two acute spiral keels; a third abapical keel borders the periphery; prosocline axial ribs present on the ramp of last whorl; base flattened and angulated; aperture subangular.

Type Material. Holotype, MLP 27860, one recrystallized teleoconch; Paratype, MLP 36500, one fragmentary and recrystallized teleoconch.

Description. Dextral, sublenticular-gradate, depressed and large sized-shell, consisting of three whorls. The height is 35.3 mm and the width is 54.36 mm. The spire whorls have a rounded angulation. The last whorl is markedly expanded and strongly angulated; the ramp of the last whorl is flat to slightly concave and delimited by two strong spiral carinas; the outer face is wide, flattened, and delimited by a strong spiral keel at the periphery. The selenizone is not clearly visible on the outer face. Sutures are deeply incised in a concave spiral furrow. Prosocline and irregularly spaced axial ribs are visible on the ramp of the last whorl. The spiral ornament is visible on the last whorl; it consists of two strong keels delimiting the ramp and a third abapical keel bordering the periphery. The base is flattened and strongly angulated. The umbilical area is covered by a callus, and the aperture is subangular.

Remarks. According to Monari & Gatto's (2013) diagnosis, the specimens here described fit in with the discoidal *Pleurotomaria* morphotype (see Monari & Gatto, 2013: p. 754, fig. 2B); however, considering that the selenizone is not visible, the new species is left in open nomenclature. *Pleurotomaria*? *plana* sp. nov. is comparable to *Pleurotomaria ornatadepressa* Hudleston (1895: p. 431, pl. 39, fig. 3a–c) (in Monari & Gatto, 2013: p. 766, fig. 10), from the Middle Jurassic of Europe. The European form, however, has elongated nodes on the ramp of whorls and on the periphery of the shell, and collabral lines on the early teleoconch. *Pleurotomaria baugieri* d'Orbigny, 1847 (in d'Orbigny, 1850: p. 463, pl. 378, fig. 2–4; in Hudleston, 1895: p. 435, pl. 39, figs. 4–5; and in Monari & Gatto, 2013: p. 767, fig. 11), also from the Middle Jurassic of Europe, differs from *Pleurotomaria*? *plana* sp. nov. in having a strongly developed reticulate ornament pattern on the ramp of whorls, a cord of conspicuous nodes on the periphery of the last whorl, and a widely opened umbilicus. *Pleurotomaria faberi* Monari & Gatto (2013: p. 769, fig. 12), from the Middle Jurassic (Bajocian) of Luxembourg, is larger than *Pleurotomaria*? *plana* sp. nov., has a more trochiform shell shape with a discoidal spire, and strongly nodose angulations.

Geographic and stratigraphic distribution. Early Jurassic (early Pliensbachian, Z.a. *Meridiceras externum*–Pliensbachian), Mendoza Province, Argentina.

Type locality. Puesto Araya and Cerro Puchenque localities, Río Atuel, Mendoza Province, Argentina.

Figure 3. 1–4, *Pleurotomaria*? *trochotomorpha* sp. nov., **MLP 36498,** holotype; **1–2, 4,** lateral views; **3,** apical view. **5–9, *Pleurotomaria*?** sp., **MLP 36499**; **5,** apical view; **6–7, 9,** lateral views; **8,** basal view. **10–15, *Pleurotomaria*? *plana*** sp. nov., **MLP 27860,** holotype; **10,** apical view; **11–13,** lateral views; **14,** basal view; **15,** lateral and apertural views. **16–21, *Laevitomaria*? *gigas*** sp. nov., **MLP 36502**, holotype; **16, 18–19,** lateral views; **17, 20,** apical views; **21,** basal view. **22–25, *Laevitomaria australis*** sp. nov., **MLP 36501**, holotype; **22–23**, lateral views; **24–25,** basal and apertural views. **26–32, *Obornella victoriae*** sp. nov. **26–29, MLP 36503**, holotype; **26–27,** apical views (black arrow indicates the selenizone); **28—29,** basal and lateral views; **30–32, MLP 36504**, paratype; **30–31,** apical views; **32,** ornament detail (black arrow indicates the selenizone). 1–4, 26–32: scale bar = 3 mm; 5–25: scale bar = 1 cm

Genus ***Laevitomaria*** Conti & Szabó, 1987

Type species. *Pyrgotrochus*? *problematicus* Szabó, 1980 (p. 63, pl. 4, figs. 1–3). Bajocian (*Stephanoceras humphriesianum* Zone to *Parkinsonia parkinsoni* Zone), Bakony Mountains (Hungary).

Remarks. Gatto *et al.* (2015) emended the diagnosis of the genus *Laevitomaria* to include pleurotomariid's shell conoidal higher than wide, with cyrtoconoid apical spire. Early teleoconch whorls evenly and moderately convex. Adult whorls weakly to somewhat convex. Last whorls occasionally angulated at the selenizone. Periphery rounded-angular. Base low with a slightly convex surface, anomphalous to rather broadly phaneromphalous. Selenizone below mid-whorl, rarely just at mid-whorl, concave to flat on early shell, flat to markedly convex on fully adult shell. Selenizone of the adult shell moderately to quite wide. Early shell ornamented by a network of spiral threads and collabral riblets. Adult sculpture consists only of spiral threads or striae which tend to vanish during the ontogeny. Base almost smooth or crossed by thin and sharp spiral lines (see also Conti & Szabó, 1987). Conti & Szabó (1897) pointed out that the assignment of *Laevitomaria* to Pleurotomariidae should be temporary, although Gatto *et al.* (2015) included the genus with certainty into this family. Here, the classification of Gatto *et al.* (2015) is followed.

Geographic and stratigraphic distribution. Early Jurassic (late Sinemurian)–Late Jurassic (Oxfordian); Europe, Asia, India, and South America.

Laevitomaria australis sp. nov.

Figure 3.22–3.25

LSID urn:lsid:zoobank.org:act:04E45D7D-E317-4F14-A5F4-F93AEDDC3528

Derivation of name. Referred to the first occurrence of the genus in the Southern Hemisphere during the Jurassic.

Diagnosis. Conoidal to cyrtoconoidal shell; convex teleoconch whorls with narrow sutural ramp; selenizone weekly impressed and located below mid-whorl; selenizone indented by weak nodular spiral ribs; irregularly spaced spiral ribs on mature whorls; base flattened and narrowly phaneromphalous; angular aperture.

Type Material. Holotype, MLP 36501, one recrystallized teleoconch.

Description. Conoidal to slightly cyrtoconical, roundedly gradate, high-spired and medium-sized shell, with a height of 20.71 mm and a width of 19.72 mm. The protoconch is not preserved. The teleoconch consists of six whorls and the apex is fragmentary. The teleoconch whorls are convex with a very narrow and horizontal sutural ramp. Sutures are impressed in a spiral furrow. The selenizone is weakly impressed and flattened to slightly concave, located below mid-whorl; it is indented by one or two weak nodular spiral ribs and visible on mature whorls. The ornament is weakly visible in the juvenile stages, where fine spiral ribs are present only; in the mature whorls it consists of irregularly spaced and clearly visible spiral ribs. The base is flattened and phaneromphalous, with a narrowly opened umbilicus and ornamented by regularly spaced spiral ribs. The aperture is angular.

Remarks. Following the emended diagnosis of Gatto *et al.* (2015: p. 218; see above), the single specimen here analyzed fits the characterization of *Laevitomaria*.

The type species *Laevitomaria problematica* (Szabó, 1980: p. 63, pl. 4, figs. 1–3, as *Pyrgotrochus*? *problematicus*) (in Gatto *et al.*, 2015: p. 219, figs. 2–3), from the Middle Jurassic (Bajocian) of Hungary and Italy, is comparable to the new species *Laevitomaria australis* sp. nov.; however, in the type form the three last whorls are obtusely angular at the selenizone, the selenizone is concave in the juvenile stages becoming convex towards mature whorls, the base bears a wide umbilicus, and the shell surface is ornamented by spiral and collabral elements forming a reticulate pattern. *Laevitomaria danii* Szabó (2009: p. 49, fig. 43), from the Early Jurassic (late Pliensbachian) of Hungary, differs from *Laevitomaria australis* sp. nov. in having a conspicuous and wider selenizone located at mid-whorl, base broadly phaneromphalous and a network ornament pattern. *Laevitomaria coarctata* (Stoliczka, 1861: p. 188, pl. 4, fig. 3, as *Pleurotomaria coarctata*) (in Szabó, 2009: p. 47, fig. 40), from the Early Jurassic (late Pliensbachian) of Austria, resembles the species here described, although the European form has a more conical shell with subangulated whorls and the selenizone is situated at the top of the convexity of whorls in the outer face. *Laevitomaria periferalis* (Szabó, 1980: p. 62, pl. 3, fig. 6, as *Pyrgotrochus periferalis*) (in Szabó, 2009: p. 48, fig. 41), from the Early Jurassic (late Sinemurian–early

Pliensbachian) of Hungary, has a broad and convex selenizone somewhat below mid-whorl, the base is slightly convex, and the collabral ornament is more developed. Szabó *et al.* (2019) described the species *Laevitomaria babalusciae* Szabó *et al.* (2019: p. 22, fig. 9A–F) from the Late Jurassic (Oxfordian–Kimmeridgian) of southern Italy. The italian species differs from *Laevitomaria australis* sp. nov. in having a feebly coeloconoidal shell, a wider selenizone which is slightly concave to flat and ornamented by distinct lunulae, an early teleoconch ornamented by a reticulate pattern of spiral and collabral elements, and collabral lines more developed toward the mature whorls.

Geographic and stratigraphic distribution. Early Jurassic (late Pliensbachian), Neuquén Province, Argentina.

Type locality. Estancia Santa Isabel, Neuquén Province, Argentina.

Laevitomaria*? *gigas sp. nov.

Figure 3.16–3.21

LSID urn:lsid:zoobank.org:act:04FBC7F6-50CA-4923-BEA2-91D38A70E2F3

Derivation of name. Derived from the Greek word γίγας=*gigas*, referring to the big-sized shell.

Diagnosis. Conoidal to cyrtoconoidal shell; large size; wide selenizone running about mid-whorl; prosocline growth lines above the selenizone; base flattened and angulated at the periphery of last whorl; wide umbilical area.

Type Material. Holotype, MLP 36502; one recrystallized teleoconch.

Description. Dextral, trochiform, conoidal to slightly cyrtoconical, large-sized shell with a height of 65.13 mm and a width of 73.97 mm. The teleoconch consists of four flat to slightly convex whorls. Sutures are deeply impressed in a spiral furrow. Last whorl is moderately convex with an angulated periphery. The selenizone is visible on the last whorl, running slightly below mid-whorl. It is flat to slightly concave and wide, delimited by sharply incised lines. Prosocline growth lines are visible on the last whorl above the selenizone. The base is flat and angulated at the periphery of the last whorl. The umbilical area is wide and the aperture fragmentary.

Remarks. The specimen here analyzed is tentatively assigned to *Laevitomaria* (see diagnosis of Gatto *et al.*, 2015). It differs from *Laevitomaria australis* sp. nov. in having a much larger teleoconch, more conical shell and a wider selenizone. Moreover, the spiral ribs typical of *Laevitomaria australis* sp. nov. are not present in *Laevitomaria*? *gigas* sp. nov. *Laevitomaria fasciata* (Sowerby, 1818: p. 37, pl. 220, fig. 1, as *Trochus fasciatus*) (in Gatto *et al.*, 2015: p. 224, fig. 5), from the Middle Jurassic (Ealy Bajocian) of Europe, is very similar to *L*?. *gigas* sp. nov. in shell size, although the European form has a wider selenizone with lunulae which becomes feebly convex during growth, and a remarkable reticulate ornament pattern on juvenile whorls. Another species comparable to *Laevitomaria*? *gigas* sp. nov. is *Laevitomaria amyntas* (d'Orbigny, 1847) (in d'Orbigny, 1850: p. 495, pl. 392, figs. 6–10, as *Pleurotomaria amyntas*; in Hudleston, 1895: p. 415, pl. 35, fig. 12, and in Gatto *et al.*, 2015: p. 222, fig. 4), from the Middle Jurassic (Aalenian–Bajocian) of Europe, but *L. amyntas* has a more roundedly gradate shell, the selenizone is cord-like and moderately wide on adult whorls, it has a deep and wide umbilicus, and a markedly more developed reticulate ornament pattern.

Representatives of *Laevitomaria* have been reported in the Early and Late Jurassic Europe (see Szabó, 2009; Gatto *et al.*, 2015; Szabó *et al.*, 2019). Both new species here described are the first occurrence of the genus in the Early Jurassic (Pliensbachian) of Argentina and South America, extending its palaeobiogeographical distribution into the southern hemisphere during the Jurassic.

Geographic and stratigraphic distribution. Early Jurassic (Pliensbachian), Mendoza Province, Argentina.

Type locality. Puesto Araya locality, Río Atuel, Mendoza Province, Argentina.

Obornella Cox, 1959

Type species. *Pleurotomaria plicopunctata* Eudes-Deslongchamps, 1849, from the Middle Jurassic (Bajocian) of France.

Remarks. *Obornella* Cox, 1959 has been characterized by having a turbiniform, sublenticular shell with a narrowly opened umbilicus, a cord-shaped narrow selenizone running close to the abapical suture near the periphery, a very narrow outer face almost completely covered by the subsequent whorl, and a strong ornament pattern consisting of closely spaced collabral ribs and spiral threads.

The periphery is commonly crenate (Harasewych & Kiel, 2007; Szabó *et al.*, 2019). Similar to this genus is *Trapanimaria* proposed by Szabó *et al.* (2019). *Trapanimaria*, however, has a more developed, gently convex and wider ramp, the outer face of whorls is concave, and the selenizone on angulation is rather narrow to moderately wide, initially flat then concave, and bordered by two spiral threads or cords (see Ferrari & Benyoucef, 2021: p. 2).

Geographic and stratigraphic distribution. Early Jurassic (Pliensbachian)–Late Jurassic (Oxfordian); Europe, Iran, India, northern Africa, Madagascar, and South America.

Obornella victoriae sp. nov.

Figure 3.26–3.32

LSID urn:lsid:zoobank.org:act:46021771-0E47-4F9A-806A-4B04CD563EBB

Derivation of name. Dedicated to my daughter Victoria M. Pintos.

Diagnosis. Sublenticular, strongly depressed shell; cord-shaped and strongly nodose selenizone running above the peripheral cord; prosocline axial ribs intercept two or three nodose rows at the periphery of the shell; nodes rounded and conspicuous; seven–eight prosocline and acute axial ribs on base; close or very narrowly opened umbilicus; quadrangular aperture.

Type Material. Holotype, MLP 36503, one recrystallized teleoconch; Paratype, MLP 36504, one recrystallized teleoconch.

Referred Material. MLP 36505, one fragmentary and recrystallized teleoconch.

Description. Sublenticular, strongly depressed, low-spired and small-sized shell with a height of 7.13 mm and a width of 14.2 mm. The protoconch is fragmentary and consists of 1½ whorls; the teleoconch comprises four flattened whorls. The suture is impressed and the sutural ramp is flattened and horizontal. The strongly nodose and cord-shaped selenizone is visible above the periphery of the last whorl (Fig. 3.26, 27, 32). The shell surface is covered by regularly spaced and prosocline axial ribs which are intercepted by two strongly nodose spiral cords in the abapical portion of last whorl above the selenizone; a peripheral and nodular spiral cord is visible below the selenizone. This pattern extends toward the base. The nodes on the spiral cords are rounded and conspicuous. The base is slightly convex, has two nodose rows abapically to the selenizone and is ornamented by seven–eight strongly prosocline and acute axial ribs running from the periphery of the shell toward the umbilical area. Between the axial ribs, fine prosocline growth lines are visible. The umbilicus is closed or very narrowly opened, and the aperture is quadrangular.

Remarks. The described specimens represent true members of *Obornella* (see characterization of the genus above). *Obornella victoriae* sp. nov. differs from *Obornella zetes* (d'Orbigny, 1855) (in d'Orbigny, 1850: p. 443, pl. 363, figs. 8–11, as *Pleurotomaria zetes*, and in Fischer & Weber, 1997: p. 168, pl. 36, figs. 8a,c, 9a–b), from the Early–Middle Jurassic of France, in having a more depressed shell , rounded and conspicuous nodes on the spiral cords, and strongly acute axial ribs on base. *Obornella discus* (Eudes-Deslongchamps, 1849: p. 95, pl. 16, fig. 3, as *Pleurotomaria discus*) (in d'Orbigny, 1850: p. 551, pl. 417, figs. 1–5, as *Pleurotomaria buvignieri*; and in Fischer & Weber, 1997: p. 203, pl. 37, figs. 7, 8a–b), from the Middle and Upper Jurassic (Callovian–Oxfordian) of France, differs from *Obornella victoriae* sp. nov. in having a more trochiform and gradate shell, less nodose spiral cords, and a widely opened umbilicus. The shell ascribed by Conti & Monari (2001: p. 187, figs. 5.4–5) to *Obornella yeovilensis* (Tawney, 1873: p. 52, pl. 3, fig. 4) (in Hudleston, 1895: p. 439, pl. 39, figs. 8–9), from the Middle Jurassic (Bajocian) of England and Morocco, is larger than *O. victoriae* sp. nov., has a more trochiform and higher-spired shell, a strongly nodose periphery, a more prominent selenizone with strong and regularly repeating lunulae, and a broadly phaneroumphalus base. *Obornella wuerttembergensis* (Sieberer, 1907: p. 46, pl. 3, fig. 8), from the Middle Jurassic (Bathonian) of Germany, and also described by Das *et al.* (2005: p. 343, fig. 10A–H) and Jaitly *et al.* (2000: p. 39, pl. 2., figs. 1, 2) from coeval deposits of India, is comparable to the new species; although the Indian form has a more cyrtoconical shell outline, regularly spaced spiral cords on the whole shell surface, lacks rounded and conspicuous nodes, has a flat or fairly convex selenizone and a widely opened umbilicus. *Obornella granulata* (Sowerby, 1818: p. 37, pl. 220, fig. 2, as *Trochus granulatus*) (in d'Orbigny, 1850: p. 466, pl. 380, figs. 1–6, as *Pleurotomaria granulata*; in Fischer & Weber, 1997: p. 177, pl. 37, figs. 2–5), from the Middle Jurassic (Bajocian) of Europe, is larger than *O. victoriae* sp. nov., has a more

gradate and cyrtoconoid shell, slightly convex whorls, the cord-like selenizone is covered by lunulae instead on rounded nodes, the base lacks the acute prosocline axial ribs typical of the new species, and it is broadly phaneroumphalous. Finally, *Obornella* cf. *granulata* (Sowerby, 1818) (in Ferrari & Bonyoucef, 2021: p. 3, fig. 3A–L), from the Middle Jurassic (Bajocian) of Algeria, has a more gradate shell outline than the Argentinean form, sharper spiral cords, thicker axial threads which form weak nodes at the crossing points with the spiral elements, and a swollen belt on the umbilical area.

Obornella victoriae sp. nov. is the first record of the genus in the Early Jurassic of Argentina. This report extends the stratigraphic distribution of *Obornella* into the late Pliensbachian of South America, being the oldest and southernmost occurrence of the genus so far.

Geographic and stratigraphic distribution. Early Jurassic (late Pliensbachian), Neuquén Province, Argentina.

Type locality. Estancia Santa Isabel, Neuquén Province, Argentina.

Family COLLONIIDAE Cossmann, 1917
Subfamily CROSSOSTOMATINAE Cox, 1960

Genus ***Crossostoma*** Morris & Lycet, 1850

Type species. *Delphinula* (*Crossostoma*) *pratti* Morris & Lycett, 1851, from the Middle Jurassic (Bajocian) of England.

Remarks. *Crossostoma* includes thick, turbinate depressed shells, with umbilicus closed by thickened glaze on inner lip. Few whorls that in the adults are smooth. Fully grown shell having thickened apertural margin. The aperture is rounded (after Bandel *et al.*, 2000; Kaim, 2004). Gründel (2008) pointed out that the essential characters of the Ataphrus-group are indeed absent in the type species *D.* (*Crossostoma*) *pratti*. However, the author highlighted that *Crossostoma reflexilabrum* (d'Orbigny, 1847) does have these characters including the presence of a crescent-shaped columellar callus; thus, *Crossostoma reflexilabrum* certainly belongs to the ataphrid group. A similar morphology of the columellar callus was reported by Szabó *et al.* (1993) for *Crossostoma* species from Sicily. According to these authors, a close phylogenetic relationship between *Crossostoma* and the Jurassic *Ataphrus* species is clear.

Geographic and stratigraphic distribution. Early Jurassic–Middle Jurassic; Europe, South America.

Crossostoma acuta sp. nov.
Figure 4.8–4.12

LSID urn:lsid:zoobank.org:act:72DFE668-C5FB-4758-9A7B-10C18063A017

Derivation of name. Referred to the presence of a strongly acute and pointed apex.

Diagnosis. Planispiral shell with a pointed apex; protoconch with 1½ globose whorls; teleoconch with 5½ convex whorls; last whorls markedly expanded and convex; shell smooth; base strongly convex; aperture circular; apertural margin thickened and with a trumpet-like shape.

Type Material. Holotype, MLP 36507; one recrystallized teleoconch.

Description. Dextral, planispiral, small-sized and low-spired shell with an acute and pointed apex. The height is 6.7 mm, and the width is 11.78 mm. The protoconch consists of 1½ convex and globose whorls. The teleoconch comprises 5½ convex whorls; last whorl markedly convex and more expanded than the spire. Sutures are deeply impressed in a concave furrow. The shell is smooth. The base is strongly convex and smooth. The aperture is circular with a thickened fragmentary apertural margin with a trumpet-like shape (Fig. 4.8–4.9).

Remarks. *Crossostoma acuta* sp. nov. is very similar to *Crossostoma macrostoma* (Stoliczka, 1861: p. 178, pl. 3, fig. 5, as *Rotella macrostoma*) (in Szabó, 2009: p. 60, fig. 55), from the Early Jurassic (Sinemurian) of Austria, in shell size and morphology; the European species, however, has slightly less acute apex, and growth lines visible on the shell surface. *Crossostoma pratti* Morris & Lycett (1851: p. 72, pl. 11, fig. 21) (in Gründel, 2008: p. 184, fig. 2.1), from the Middle Jurassic (Bajocian) of England, is comparable to *C. acuta* sp. nov.; however, the new species has a markedly more pointed apex. *Crossostoma expansum* Conti & Fischer (1984: p. 142, pl. 3, fig. 4a–c), from the Middle Jurassic (Bajocian) of Italy, differs from *Crossostoma acuta* sp. nov. in having a more elongated shell shape with a less expanded last teleoconch whorl. *Crossostoma parvilabiosum* Conti & Fischer (1984: p. 142, pl. 3, fig. 5a–c), also from the Middle Jurassic (Bajocian) of Italy, is comparable to the new species but *C. parvilabiosum* has fewer teleoconch whorls and a less pointed apex. *Crossostoma globulifera* Bandel *et al.* (2000: p.

81, pl. 3, figs. 10–13), from the Early Jurassic (Pliensbachian) of New Zealand, is much smaller than *C. acuta* sp. nov., has a less pointed apex, and less expanded last teleoconch whorl.

Geographic and stratigraphic distribution. Early Jurassic (Pliensbachian), Mendoza Province, Argentina.

Type locality. Cerro Puchenque locality, Mendoza Province, Argentina.

Crossostoma*? *extensa sp. nov.

Figure 4.1–4.7

LSID urn:lsid:zoobank.org:act:D16DBF0B-87C4-4422-B431-02AD9FFCF89D

Derivation of name. Referred to the markedly expanded whorls for a representative of the genus.

Diagnosis. Turbinate, depressed shell with rapidly expanding whorls; periphery of last whorl delimited by an acute carina; four irregularly spaced spiral cords on last whorl; base convex; wide umbilicus; crescent-shaped columellar lip covers the umbilical area.

Type Material. Holotype, MLP 36506, one recrystallized teleoconch.

Description. Dextral, turbinate, strongly depressed and very low-spired shell with rapidly expanding whorls. The height is 7 mm and the width is 17 mm. The teleoconch consists of four convex whorls; last whorl markedly more expanded than the spire. Sutures are impressed in a concave furrow. The ramp of last whorl is strongly convex; the periphery of the last whorl is delimited by a sharp, acute, and strongly angulated spiral carina. The collabral ornament is not visible, and four irregular spiral cords border the periphery of the last whorl. The base is strongly convex, with the umbilical area partially covered by a thick and crescent-shaped columellar lip. The aperture is holostomatous but not completely visible.

Remarks. Representatives of *Crossostoma* have an anomphalous shell, while their closed counterparts of the genus *Paleocollonia* have an open umbilicus. *Palaeocollonia* also have an expanded and thickened peristome and a turbiniform shell (Cox, 1960a). The new species herein described seems to have an umbilicus (although partially covered by the columellar lip), but lacks the expanded peristome and the turbiniform outline shell. Following *Crossostoma*'s characterization (see above), features such as a turbiniform depressed shell and an umbilicus closed by a thickened glaze on the inner lip allows to tentatively assign the specimen analyzed to *Crossostoma*. The new species *Crossostoma*? *extensa* sp. nov. resembles *Crossostoma reflexilabrum* (d'Orbigny, 1847) (in d'Orbigny, 1850: p. 317, pl. 323, figs. 14–16, as *Delphinula reflexilabrum*; and in Gründel, 2008: p. 184, fig. 2.2–5), from the Early Jurassic (Pliensbachian) of France, but the European form has a more globose shell shape and lacks the fine spiral cord on the periphery of last whorl. The type species *Crossostoma pratti* Morris & Lycett (1851: p. 72, pl. 11, fig. 21) (in Gründel, 2008: p. 184, fig. 2.1), from the Middle Jurassic (Bajocian) of England, differs from *Crossostoma*? *extensa* sp. nov. in having a more globose shell shape, rugose growth lines near the aperture and in lacking the crescent shaped-columellar callus. *Crossostoma macrostoma* (Stoliczka, 1861: p. 178, pl. 3, fig. 5, as *Rotella macrostoma*) (in Szabó, 2009: p. 60, fig. 55), from the Early Jurassic (Sinemurian) of Austria, differs from *Crossostoma*? *extensa* sp. nov. in having prosocline growth lines on the shell surface and markedly parasigmoidal on base, and a trumpet-like outer lip peristome on adult shells. *Crossostoma globulifera* Bandel *et al.* (2000: p. 81, pl. 3, fig. 10–13), from the Early Jurassic (Pliensbachian) of New Zealand, is also comparable to the new species; however, *C. globulifera* is much smaller and has a more globose and turbinate shell shape. *Crossostoma spirata* Bandel *et al.* (2000: p. 82, pl. 3, figs. 14–16), also from the Early Jurassic (Pliensbachian) of New Zealand, differs from *Crossostoma*? *extensa* sp. nov. in having the apical side of the shell almost planispiral while the basal side is strongly convex, the ornament consisting of spiral grooves that cover the whole shell surface, and in having prosocline and straight growth lines. Finally, *Crossostoma acuta* sp. nov. differs from *Crossostoma*? *extensa* sp. nov. in having more numerous teleoconch whorls, a more pointed apex, less expanded last whorl, and in lacking spiral cords on the peripheral region of the last whorl.

Crossostoma? *extensa* sp. nov. and *Crossostoma acuta* sp. nov. are the first reports of the genus in the Early Jurassic of Argentina and South America.

Geographic and stratigraphic distribution. Early Jurassic (late Pliensbachian), Neuquén Province, Argentina.

Type locality. Cerrito la Ventana, Espinazo del Zorro, Neuquén Province, Argentina.

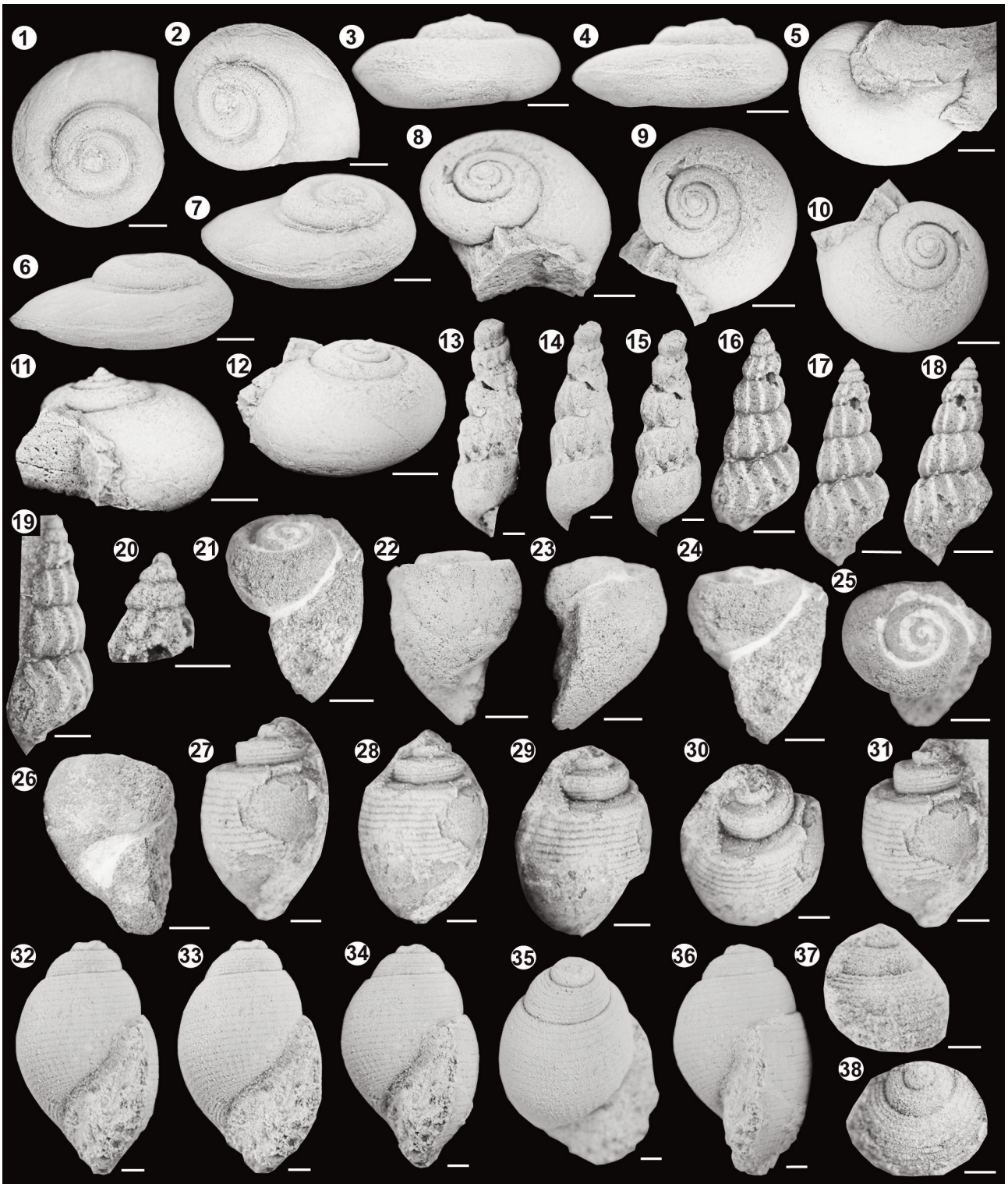

Figure 4. 1–7, ***Crossostoma? extensa*** sp. nov., **MLP 36506**, holotype; **1–2,** apical views; **3–4, 6–7,** lateral and apical views; **5,** basal view. **8–12,** ***Crossostoma acuta*** sp. nov., **MLP 36507**, holotype; **8–10,** apical views; **11–12,** lateral views. **13–15,** ***Rhabdocolpus patagoniensis*** (Ferrari, 2017), **MLP 36508**, lateral views. **16–20,** ***Palaeorissoina hettangiensis*** sp. nov., **MLP 36509**, holotype; **16–19,** lateral views; **20,** juvenile teleoconch detail. **21–26,** ***Euconactaeon volkheimeri*** sp. nov., **MLP 36510**, holotype; **21, 24,** apical and apertural views; **22–23,** lateral views; **25,** apical view; **26,** basal view. **27–31,** ***Striactaeonina minor*** sp. nov., **MLP 36511**, holotype; **27–29, 31,** lateral views; **30,** apical view. **32–38,** ***Sulcoactaeon sabattinae*** sp. nov. **32–36, MLP 36512**, holotype; **32–34, 36,** lateral and apertural views; **35,** apical view; **37–38, MLP 36513**, paratype, lateral and apertural views. 1–12, 21–26: scale bar = 3 mm; 13–20, 27–38: scale bar = 1 mm.

Subclass CAENOGASTROPODA Cox, 1960
Superfamily CERITHIOIDEA Fleming, 1822
Family PROCERITHIIDAE Cossmann, 1906

Genus ***Rhabdocolpus*** Cossmann, 1906

Type species. *Melania scalariformis* Deshayes, 1830 from the Middle Jurassic of France.

Remarks. The characterization of *Rhabdocolpus* was stated out by Gründel (1999a) and Bandel *et al.* (2000). Both authors included in *Rhabdocolpus* high-spired shells with flat to slightly convex whorls with a horizontal to strongly sloping sub-sutural ramp, opisthocyrt axial ribs on the teleoconch forming nodes at the crossing point with spiral elements, and peristome with an adapical channel and lacking abapical notch. The genus is common in the Jurassic of Europe and South America, and Haas (1953) reported the first occurrence of *Rhabdocolpus* in the Upper Triassic of the Pucará Group (Peru) (see Ferrari, 2017: p. 250).

Geographic and stratigraphic distribution. Late Triassic?–Late Jurassic; Europe, New Zealand, Antarctica, and South America.

Rhabdocolpus patagoniensis (Ferrari, 2017)
Figure 4.13–4.15

2009 ***Cryptaulax*** cf. ***damboreneae*** Ferrari. Ferrari, p. 454, fig. 3E.
2012 ***Procerithium*** **(*Rhabdocolpus*)** ***patagoniensis*** Ferrari. Ferrari, p. 329, figs. 4G–P, 5A–K.
2015 ***Procerithium*** **(*Rhabdocolpus*)** ***patagoniensis*** Ferrari. Ferrari, p. 84, fig. 5O–R.
2015 ***Procerithium*** **(*Rhabdocolpus*)** ***patagoniensis*** Ferrari. Ferrari & Bessone, p. 353, fig. 3L–M.
2017 ***Rhabdocolpus patagoniensis*** Ferrari, p. 250, fig. 2.14–2.17.

Referred Material. MLP 36508; one recrystallized teleoconch.

Description. Dextral, turriculate, slender, medium-sized and high-spired shell. The height is 13.68 mm and the width is 5.35 mm. The protoconch is not preserved. The teleoconch consists of five flattened to convex whorls. Sutures are incised. A narrow and horizontal sub-sutural shelf gives to the shell a slightly step-like shape. The axial ornament is predominant and consists of opisthocline and opisthocyrt acute axial ribs which run from suture to suture. Spiral elements are not visible. The base is convex, and the aperture is not completely visible.

Remarks. *Rhabdocolpus patagoniensis* (Ferrari, 2017) was originally described under the genus *Cryptaulax* by Ferrari (2009) and later reassigned to *Procerithium* (Ferrari, 2012, 2015). Ferrari (2017) transferred the species to the genus *Rhabdocolpus* following the characterization of Gründel (1999) and Bandel *et al.* (2000). For comparison to other representatives of the genus see Ferrari (2017: p. 250).

Geographic and stratigraphic distribution. Early Jurassic (late Sinemurian, *Orthechioceras-Paltechioceras* Zone); Arroyo Las Chilcas locality, Río Atuel, Mendoza Province, Argentina. Previously known from Lomas Occidentales and La Casilda localities, Pliensbachian–Toarcian, Chubut Province, Argentina (Ferrari, 2012).

Superfamily RISSOIDEA Gray, 1847
Family PALAEORISSOINIDAE Gray, 1847

Genus ***Palaeorissoina*** Gründel, 1999b

Type species. *Palaeorissoina compacta* Gründel, 1999b; from the Middle Jurassic (late Bajocian and Callovian) of north-east Germany and Poland.

Remarks. The genus was proposed by Gründel (1999b) to include shells with a 'broad conical protoconch with blunt apex and the first whorl planispiral, without sculpture. Thin spiral striae and parasigmoidal axial ribs are developed only on the last half whorl. Teleoconch broad to rather slender. Whorls convex with deep sutures. The sculpture consists of strong axial ribs. Their number is nearly constant during their lifespan. All whorls of the teleoconch are sculptured with spiral striae (which continue without interruption on the teleoconch) or the striae are restricted on the first teleoconch whorls. Base moderately convex, smooth, with collabral ribs and/or with the spiral striae. The course of the growth lines is opisthocyrt at the whorls and prosocyrt at the base. The aperture is D-shaped with a nearly straight inner lip. An abapical channel is mostly developed. Outer lip by adults thickened or not. In the present research the characterization of Gründel (1999b) is followed.

Geographic and stratigraphic distribution. Early Jurassic (late Hettangian)–Early Cretaceous (Valanginian); Europe and South America.

Palaeorissoina hettangiensis sp. nov.

Figure 4.16–4.20

LSID urn:lsid:zoobank.org:act:A4604848-EF3D-4A33-ACCC-44B9F194CB20

Derivation of name. Referred to the first occurrence of the genus in the Hettangian of Argentina and South America.

Diagnosis. Turriculate, slender shell; protoconch trochospiral with two convex whorls; clear demarcation between protoconch and teleoconch; teleoconch with slightly convex whorls; strongly opisthocyrt axial ribs along growth stages; fine spiral cords intercepting the axial ribs on the flank of whorls; base convex; aperture oval.

Type Material. Holotype, MLP 36509, one recrystallized teleoconch.

Description. Dextral, turriculated, slender, small-sized and high-spired shell. The protoconch is conical, trochospiral, with a pointed apex and consists of two smooth convex whorls, with a height of 0.45 mm (Fig. 4.20). Clear demarcation between protoconch and teleoconch. The teleoconch comprises four slightly convex whorls and has a height of 3.93 mm and a width of 1.67 mm. Sutures are impressed. Ornament consists of strongly opisthocyrt and acute axial ribs running from suture to suture, more or less constants in number along the growth stages. Very weak and fine spiral threads are visible on the flank of the penultimate whorl, intercepting the axial ribs. The base is strongly convex and smooth and the aperture is oval.

Remarks. The new species here described shows the diagnostic features defined by Gründel (1999b) for the genus *Palaeorissoina*. Representatives of *Palaeorissoina* have been recently reported in the late Toarcian of England (see Ferrari *et al.*, 2021). A species comparable to *Palaeorissoina hettangiensis* sp. nov. is *Palaeorissoina* aff. *acuminata* (Gründel, 1999b) (in Ferrari *et al.*, 2021: p. 893, fig. 3.5–10), from the Early Jurassic (late Toarcian) of England; the English form, however, does not show the weak spiral cords that are present in the new species. *Palaeorissoina acuminata* Gründel (1999b: p. 97, pl. 4, figs. 12–16; Kaim, 2004, as *Bralitzia acuminata*: p. 80, fig. 61), from the Middle Jurassic (Callovian) of Germany and Poland, is also very similar to *P. hettangiensis* sp. nov., but it has a slenderer teleoconch with many whorls and spiral cords densely packed. *Palaeorissoina compacta* Gründel (1999b: p. 93, pl. 1, figs. 1–4), from the Middle Jurassic (Bajocian-Bathonian) of Germany and Poland, differs from *Palaeorissoina hettangiensis* sp. nov. in having teleoconch whorls with 8–10 strongly asymmetrical axial ribs, spiral cords distinct only on the first teleoconch whorl and disappearing on the second whorl, and has a slightly horizontal sutural shelf.

Here it is supplied the first occurrence of the genus in the late Hettangian of Argentina, extending the palaeobiogeographical and chronostratigraphical distribution of *Palaeorissoina* into the earliest Jurassic of South America.

Geographic and stratigraphic distribution. Early Jurassic (late Hettangian, *Badouxia canadensis* Zone), Mendoza Province, Argentina.

Type locality. Arroyo El Alumbre/Arroyo Malo, Río Atuel, Mendoza Province, Argentina.

Subclass HETEROBRANCHIA Burmeister, 1837

Infraclass EUTHYNEURA Spengel, 1881

Cohort ACTEONIMORPHA Bouchet *et al.*, 2017

Superfamily ACTEONOIDEA d'Orbigny, 1843

Family CYLINDROBULLINIDAE Wenz, 1938

Genus ***Euconactaeon*** Meek, 1863

Type species. *Conus caumonti* Eudes-Deslongchamps, 1843; Pliensbachian; France.

Remarks. Gründel & Nützel (2012: p. 39) included in *Euconactaeon* shells with 'a heterostrophic protoconch, spire is not elevated, but plane or concave, with the transition from the flanks to the spire sharply or rounded angular. The shell tapers abapically so it is reversed conical. The aperture is narrow and elongated, somewhat widened and rounded abapically. The shell is smooth or has spiral striae. It lacks columellar folds'. The genus is mainly restricted to the western Tethyan region during the Early Jurassic (see Gründel & Nützel, 2012), and it has been also reported in the Late Triassic of Peru (Haas, 1953). Here, it is supplied the first occurrence of the genus in the Middle Jurassic of Argentina and South America.

Geographic and stratigraphic distribution. Late Triassic to Middle Jurassic (Aalenian/Bajocian); Europe and South America.

Euconactaeon volkheimeri sp. nov.

Figure 4.21–4.26

LSID urn:lsid:zoobank.org:act:438AD228-7AF6-4BDE-91E5-6A2508224DD5

Derivation of name. Dedicated to Dr. Wolfgang Volkheimer (1928–2018), a renowned German geologist and paleontologist who significantly contributed to the scientific knowledge of both disciplines in Argentina.

Diagnosis. Reversed conical shell; spire flattened to concave; suture runs in a deep and concave spiral furrow; last teleoconch whorl expanded; transition from the flank to the spire sharply angular; shell smooth; aperture narrow and elongated abapically.

Type Material. Holotype, MLP 36510, one recrystallized teleoconch.

Description. Conical, strongly cylindrical, small-sized, and very low-spired shell. The height of the shell is 13.25 mm and the width is 10.73 mm. The spire is flattened, consisting of 3½ whorls; the spire whorls are delimited by a deep and concave spiral furrow with the last spire whorl more deeply incised. Last whorl markedly more expanded than the spire. The transition from the flank to the spire is sharply angular. The shell tapers abapically and thus, it is reversed conical. The shell is smooth. The aperture is narrow and elongated abapically.

Remarks. Based on Gründel & Nützel's (2012) characterization, the single specimen here analyzed certainly represents a member of *Euconactaeon*. The type species *Euconactaeon caumonti* (Eudes-Deslongchamps, 1843), from the Early Jurassic (Pliensbachian) of France, is very similar to *Euconactaeon volkheimeri* sp. nov. However, the type species is larger with a height of 30.5 mm, and has a more concave spire. *Conactaeon* (*Euconactaeon*) *concavus* (Eudes-Deslongchamps, 1840) (in d'Orbigny, 1850: p. 163, pl. 285, figs. 8–11, as *Actaeonina concava*; and in Fischer & Weber, 1997: p. 63, pl. 15, fig. 11), from the Early Jurassic (Pliensbachian) of France, is very similar to the new species; however, the European form has a deeper and slightly more concave spire. *Conactaeon* (*Euconactaeon*) sp. (in Fischer *et al.*, 2002: p. 453, fig. 6), from the Early Jurassic (Sinemurian) of Central Italy, is much larger than *E. volkheimeri* sp. nov. Haas (1953) described two *Euconactaeon* species comparable to the Argentinean form. *Cylindrobullina* (*Euconactaeon*) *tambosolensis* Haas (1953: p. 277, pl. 18, figs. 40–43, 46, 47, 49–52, 59–61), from the Late Triassic of Peru, is very similar to *E. volkheimeri* sp. nov.; however, the Peruvian form is much smaller, has a distinctly concave base, and very fine spiral cords in the paratype AMNH 27644:7. *Cylindrobullina* (*Euconactaeon*) *ninacacana* Haas (1953: p. 278, pl. 18, figs. 53–58) has more concave and flattened spire whorls, without spiral furrows delimiting each other.

The new occurrence of *Euconacateon* in the Aalenian–Bajocian marine deposits of the Neuquén Basin extends the palaeobiogeographical and chronostratigraphical distribution of the genus into Middle Jurassic of Argentina and South America.

Geographic and stratigraphic distribution. Middle Jurassic (Aalenian–Bajocian), Neuquén Province, Argentina.

Type locality. Cerro Lotena locality, Neuquén Province, Argentina.

Family TUBIFERIDAE Cossmann, 1895

Genus ***Striactaeonina*** Cossmann, 1895

Type species. *Orthostoma avena* Terquem, 1855; Hettangian; Luxemburg.

Remarks. Representatives of *Striactaeonina* were characterized by Gründel & Nützel (2012) (see also Ferrari, 2017). The diagnosis of these authors is herein followed.

Striactaeonina was previously reported in the Early Jurassic (Pliensbachian) of the Neuquén Basin (see Ferrari, 2017). The present paper supplies the first record of the genus in the Middle Jurassic (Aalenian) of the Neuquén Basin.

Geographic and stratigraphic distribution. Lower Jurassic–Upper Jurassic; Europe and South America.

Striactaeonina minor sp. nov.

Figure 4.27–4.31

LSID urn:lsid:zoobank.org:act:6554AD1F-2C05-4C8D-A959-F8D4DABB8003

Derivation of name. Referred to the smallest (=*minor*, Latin) size for a Jurassic South American *Striactaeonina*.

Diagnosis. Oval to cylindrical shell; very small size for the genus; spire strongly gradate; ramp smooth and narrow; ramp's edge delimited by a peripheral spiral cord; regularly

spaced spiral furrows on the shell surface; base convex and angular.

Type Material. Holotype, MLP 36511, one recrystallized teleoconch.

Description. Oval to cylindrical, step-like, gradate, very small-sized, and low-spired shell. The height is 6.1 mm and the width is 4.4 mm. The protoconch is not preserved. The teleoconch consists of 3 ½ whorls. Spire whorls strongly gradate. The ramp or whorls is smooth, narrow, flattened, and horizontal. The edge of the ramp is marked by a distinct peripheral spiral cord. Outer face of spire whorls is straight; the outer face of last whorl is slightly convex. Last whorls markedly more expanded than the spire. The shell is ornamented by regularly spaced spiral grooves. The base is convex to angular.

Remarks. Based on the characterization of Gründel & Nützel (2012) the single specimen here analyzed represents a true member of *Striactaeonina*. The genus was previously reported in the Early Jurassic of the Neuquén Basin. *Striactaeonina transatlantica* (Behrendsen, 1891: p. 383, pl. 22, fig. 9, as *Actaeonina transatlantica*) (in Ferrari, 2017: p. 2060, figs. 1.15–4.20), from the Pliensbachian of Neuquén and Mendoza provinces, differs from the new species in being much larger with a mean height of 31.2 mm and in having slightly more convex and less step-like spire whorls. *Striactaeonina atuelensis* Gründel (2001a: p. 66, pl. 6, figs. 7–8), from the Early Jurassic (early Pliensbachian) of Río Atuel (Mendoza), is also much larger than *Striactaeonina minor* sp. nov. and has markedly more convex spire whorls. *Striactaeonina richterorum* Schulbert *et al.* (2013: p. 768, fig. 32E–G) (in Ferrari *et al.*, 2021, p. 900, fig. 4W–Y, as *Striactaeonina* cf. *richterorum*), from the Early Jurassic (upper Toarcian) of southern Germany and northern England, is similar to *Striactaeonina minor* sp. nov. in shell size; however, the European form has a more cyclindrical shell shape, a broad, slightly convex and oblique ramp with a more conspicuous spiral furrow bordering the outer whorl face, and lacks the typical spiral furrows on the shell surface. *Striactaeonina elegans* Ferrari *et al.* (2021: p. 902, fig. 5A–E), also from the Early Jurassic (upper Toarcian) of England, is similar to *S. minor* sp. nov. in shell size and ornamentation; however, *S. elegans* has a less step-like spire and an oblique ramp delimited by a peripheral spiral bulge with a spiral furrow.

There are no certain reports of Middle Jurassic *Striactaeonina* species in South America; thus, the new occurrence of *Striactaeonina* in the Aalenian (*W. groeberi* Zone) marine deposits of the Neuquén Basin would extend the chronostratigraphical distribution of the genus in this region at that time.

Geographic and stratigraphic distribution. Middle Jurassic (Aalenian, *W. groeberi* Zone), Mendoza Province, Argentina.

Type locality. Bardas Blancas locality, Mendoza Province, Argentina.

Family BULLINIDAE Gray, 1850
(= SULCOACTAEONIDAE Gründel, 1997)

Genus ***Sulcoactaeon*** Cossmann, 1895

Type species. *Actaeonina striatosulcata* Zittel & Goubert, 1861; Upper Jurassic (Oxfordian), France.

Remarks. Gründel (1997) established the new family Sulcoactaeonidae based on the genus *Sulcoactaeon* and placed the family within the superfamily Cylindrobullinoidea Wenz, 1947. Later, Gründel & Nützel (2012) considered Sulcoactaeonidae as a synonym of Bullinidae. The diagnosis of the genus *Sulcoactaeon* was recently updated by Kaim (2004), Kaim & Beisel (2005), and Gründel & Nützel (2012). Representatives of this genus share a slender to broadly oval shell. The protoconch is smooth and mostly coaxial, with one to two visible whorls. The teleoconch whorls have a narrow and sometimes indistinct ramp with rounded abaxial edge as transition to the whorl flanks. The whorls are ornamented with spiral grooves, which may be frequent on the base. A spiral furrow sometimes demarcates the ramp. The growth lines are prosocyrt from the suture to the center of the base. The aperture is narrowly oval with an acute adapical portion and a broad abapical notch. The outer lip is evenly convex, and the inner lip forms a ledge, which covers an umbilical chink (see also Ferrari *et al.*, 2021).

The genus has been reported in the Jurassic and Cretaceous of Europe. Here it is supplied the first occurrence of *Sulcoactaeon* in the Middle Jurassic of Argentina and South America.

Geographic and stratigraphic distribution. Middle Jurassic (Aalenian) – Lower Cretaceous (Valanginian); Europe, South America.

Sulcoactaeon sabattinae sp. nov.

Figure 4.32–4.38

LSID urn:lsid:zoobank.org:act:66763FF0-6DFF-4DF9-B4D5-2924C8FE6735

Derivation of name. Dedicated to Dr. Nora M. Sabattini (1941–2021), a renowned Argentinean paleontologist who focused her research on Paleozoic marine gastropods.

Type material. Holotype, MLP 36512, one recrystallized teleoconch; Paratype, MLP 36513, one recrystallized teleoconch.

Diagnosis. Globose, broadly oval shell; teleoconch with convex whorls; sutural ramp narrow and indistinct with rounded abaxial edge as transition of the whorl flanks; sutures impressed; regularly spaced spiral grooves on the shell surface; prosocline to prosocyrt growth lines intercepting the spiral grooves forming very small and weak nodes at the intersection points; aperture narrowly oval; acute adapical channel and bread abapical notch.

Description. Globose, broadly oval, medium-sized, and low spired shell. The height is 10.97 mm and the width is 7.11 mm. The protoconch is not preserved. The teleoconch consists of four strongly convex whorls; last whorl higher than the spire. Spire whorls are strongly convex. The ramp of whorls is very narrow and almost indistinct, with a rounded abaxial edge as transition to the whorl flanks. Sutures are deeply impressed in a spiral furrow. The ornament is composed of regularly spaced spiral grooves. Weak prosocline to prosocyrt growth lines are visible on the flank of the last whorl, becoming stronger and clearly visible on the base. The prosocyrt growth lines intercept the spiral grooves on the base, giving a slightly reticulate appearance and forming very weak and almost imperceptible nodes at the crossing points. The aperture is narrowly oval with an acute adapical channel and a broad abapical notch. The outer lip is convex and the inner lip covers the umbilical chink.

Remarks. The new species fits with the updated characterization proposed by Gründel & Nützel (2012: p. 47) and is comparable to its coeval Tethyan counterparts. *Sulcoactaeon laevis* Gründel, Nützel & Schulbert in Gründel (2007: p. 250, fig. 4 D–E), from the Middle Jurassic (early Aalenian) of Germany, differs from *Sulcoactaeon sabattinae* sp. nov. in having a more gradate and step-like spire with a distinct ramp, and in lacking the spiral grooves and prosocyrt growth lines on the shell surface. *Sulcoactaeon sedgvici* (Phillips, 1829: p. 191, pl. 11, fig. 33, as *Auricula sedgvici*) (in Ferrari *et al.*, 2021: p. 904, fig. 5M–R), from the Early and Middle Jurassic of England, has a spire more or less gradate and the sutural ramp horizontal. *Sulcoactaeon erratica* Gründel, 1997 (in Gründel & Nützel, 2012: p. 47, fig. 11b–c), from the Middle Jurassic (Callovian) of Germany, is very similar to the new Argentinean species, although the Tethyan form is much smaller with a height of 3.4 mm. *Sulcoactaeon rantera* Gründel (2006: p. 15, pl. 5, figs. 9–13), from the Middle Jurassic (late Bathonian) of France, differs from *S. sabattinae* sp. nov. in being much smaller with a height of 1.2 mm, in having also a more gradate spire and more developed sutural ramp, in having a less expanded last teleoconch whorl, a widely oval aperture, and a small open umbilicus. *Sulcoactaeon polonicus* Kaim (2004: p. 153, fig. 131), from the Middle Jurassic (Bathonian) of Poland, is comparable to the new species; however, *S. polonicus* is much smaller with a height of 2.44 mm, has a broadly spindle-like shell, and the teleoconch whorls with narrow and well pronounced adapical ramp. *Sulcoactaeon pulloides* (Hudleston, 1896: p. 470, pl. 42, fig. 16, as *Actaeonina pulloides*) (in Gründel, 1997: p. 186, pl. 3, fig. 15, pl. 4, figs. 1–7; and in Gründel, 2003: p. 221, pl. 24, fig. 10, pl. 25, figs. 1–2), from the Middle Jurassic of England and Germany, differs from *S. sabattinae* sp. nov. in having a more elongated spire, spiral grooves clearly visible on base only, and a subquadrangular aperture. *Sulcoactaeon raresculpta* Gründel (1997: 189, pl. 5, figs. 5–10) (in Gründel, 2003: p. 222, pl. 25, figs. 7–8), from the Middle Jurassic (Bathonian) of Germany, shows a more elongated and more gradate and step-like spire than the new species, the last teleoconch whorl is shorter and widely expanded, and the spiral grooves are visible on base only.

Sulcoactaeon sabattinae sp. nov. is the first occurrence of the genus in the Middle Jurassic (Aalenian) of Argentina and South America.

Geographic and stratigraphic distribution. Middle Jurassic (Aalenian, *W. groeberi* Zone), Mendoza Province, Argentina.

Type locality. Bardas Blancas locality, Mendoza Province, Argentina.

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