

Early Jurassic Caenogastropoda and Architectibranchia from the Neuquén Basin, Argentina

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Abstract.—Early Jurassic marine gastropods are well represented in Argentina by three major taxa: Vetigastropoda, Caenogastropoda and Architectibranchia (= Opisthobranchia). The present paper aims at the description of six new caenogastropod species and one new architectibranch species from the Early Jurassic marine deposits of the Neuquén Basin, namely *Procerithium subimbricatum* n. sp., *Microschiza weaveri* n. sp., *Naricopsina aequabilis* n. sp., *Naricopsina ballentae* n. sp., *Pictavia rothi* n. sp., *Oonia acuta* n. sp., and *Cylindrobullina brevispira* n. sp. Seven other caenogastropods are reported for the first time in the area, including *Cryptaulax redelii* Ferrari, *Procerithium nulloi* (Ferrari), *Rhabdocolpus patagoniensis* (Ferrari), *Rhabdocolpus?* sp., *Pseudomelania feruglioi* Ferrari, *Pseudomelania* aff. *baugieriana* (d’Orbigny), and *Anulifera chubutensis* Ferrari, extending their palaeobiogeographical distribution to the Andean region of Argentina during the Early Jurassic. Caenogastropods such as *Globularia catanlilensis* (Weaver) and *Microschiza? americana* (Mörnicke), and the architectibranch species *Striactaeonina transatlantica* (Behrendsen) and *Cylindrobullina ovata* (Behrendsen) are redescribed and discussed based on new specimens from the type and other localities. The new fossils described here expand the known diversity of the gastropod faunas in the Early Jurassic of Argentina and contribute to the paleontological knowledge of the group in the Mesozoic of South America.

Introduction

Updated knowledge of Early Jurassic marine gastropods from the Andean region of Argentina has been provided recently by Ferrari (2009, 2011, 2012, 2013, 2014, 2015) for the Chubut Basin, and by Damborenea and Ferrari (2008) and Ferrari et al. (2014, 2015) for the Neuquén Basin. Those contributions supplied an updated systematic database of the gastropod taxonomic composition in the region. These studies indicate that gastropods are well represented in the Early Jurassic of Argentina by three major taxa: Vetigastropoda, Caenogastropoda and Architectibranchia (= Opisthobranchia), although Patellogastropoda Lindberg, 1986 and other representatives of Heterobranchia Haszprunar, 1988 are also present but less commonly found and less diversified in the marine deposits. The systematic and palaeobiogeographical knowledge about Argentinean vetigastropods was discussed recently by Ferrari (2015). The present paper is focused on the Caenogastropoda and Architectibranchia species and attempts to improve and update the systematic knowledge of these particular taxa in the Neuquén Basin, and to reassess the Jurassic gastropod collections currently existing in Argentina, supplying new evidence on Early Jurassic marine gastropods in South America. Nineteen caenogastropod and architectibranch species are reported here from the Neuquén Basin, among which seven are new to science; these are *Procerithium subimbricatum* n. sp., *Microschiza weaveri* n. sp., *Naricopsina aequabilis* n. sp., *Naricopsina ballentae* n. sp., *Pictavia rothi* n. sp., *Oonia acuta*

n. sp., and *Cylindrobullina brevispira* n. sp. Seven other caenogastropods are testified for the first time in the area including *Cryptaulax redelii* Ferrari, *Procerithium nulloi* (Ferrari), *Rhabdocolpus patagoniensis* (Ferrari), *Rhabdocolpus?* sp., *Pseudomelania feruglioi* Ferrari, *Pseudomelania* aff. *baugieriana* (d’Orbigny), and *Anulifera chubutensis* Ferrari, extending their known palaeobiogeographical distribution in the Andean region of Argentina. The occurrences of *Globularia catanlilensis* (Weaver), *Microschiza? americana* (Mörnicke), *Procerithium bodenbenderi* (Behrendsen), and the architectibranchs *Striactaeonina transatlantica* (Behrendsen) and *Cylindrobullina ovata* (Behrendsen) is confirmed based on new material from the type and other localities in the Early Jurassic marine beds at the Neuquén Basin.

Geologic setting

A geological framework of the Argentinean Neuquén and Chubut basins was summarized by Ferrari (2015, p. 920, see references therein). The gastropod material described below comes from several localities in the Neuquén Basin, at the Neuquén and Mendoza provinces (Fig. 1.2).

In Mendoza Province, Hettangian to Toarcian sediments of the Atuel–western Malargüe depocentre contain gastropods at Arroyo Malo (Fig. 1.2, locality AML-N), Arroyo El Pedrero (Fig. 1.2, locality APR-N), Arroyo Las Chilcas (Fig. 1.2, locality ACHL-N), Puesto Araya (Fig. 1.2, locality PAY-N), Paso del Portezuelo Ancho (Fig. 1.2, locality PA-N), Arroyo del

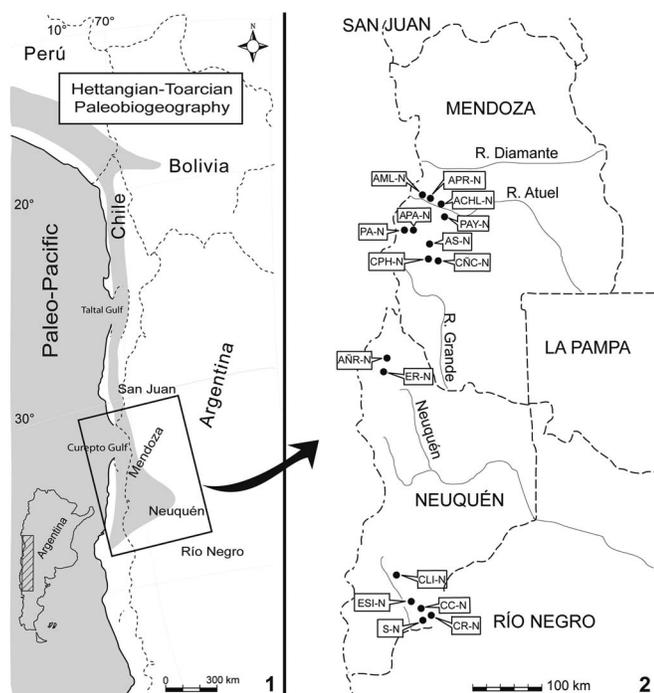


Figure 1. (1) Map of the western part of South America showing the study area at the Neuquén Basin during the Hettangian-Toarcian. (2) Location map of the main localities with gastropod species described in the text. AML-N = Ayo. Malo; APR-N = Ayo. El Pedrero; ACHL-N = Ayo. Las Chilcas; PAY-N = Puesto Araya; PA-N = Paso del Portezuelo Ancho; APA-N = Arroyo del Portezuelo Ancho; AS-N = Ayo. Serrucho; CPH-N = Co. Puchenque; CÑC-N = Cañada Colorada; ANR-N = Ayo. Niraico; ER-N = Estación Rajapalo; CLI-N = Catán Lil; ESI-N = Ea. Santa Isabel; CC-N = Carrán Curá; CR-N = Co. Roth; S-N = Sañicó (modified from Ferrari, 2015).

Portezuelo Ancho (Fig. 1.2, locality APA-N), Arroyo Serrucho (Fig. 1.2, locality AS-N), Cerro Puchenque (Fig. 1.2, locality CPH-N), and Cañada Colorada (Fig. 1.2, locality CÑC-N). Gastropods were also found in Pliensbachian–Toarcian deposits in the Cuyo Group beds within the Neuquén embayments in northern and southern Neuquén Province, at Arroyo Niraico (Fig. 1.2, locality ANR-N), Estación Rajapalo (Fig. 1.2, locality ER-N), Catán Lil (Fig. 1.2, locality CLI-N), Estancia Santa Isabel (Fig. 1.2, locality ESI-N), Carrán Curá (Fig. 1.2, locality CC-N), Cerro Roth (Fig. 1.2, locality CR-N), and Sañicó (Fig. 1.2, locality S-N).

Materials and methods

The gastropod material here described was collected by S. Damborenea, A. Riccardi, M. Manceñido, J. Echevarría (Museo de Ciencias Naturales de La Plata), S. Lanés (Universidad de Buenos Aires), C. Gulisano (YPF), and the

present author during several fieldtrips 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), and Damborenea and Manceñido (2005). Specimens described here were found in the Early Jurassic at different stratigraphic levels, spanning the Hettangian to early Toarcian, according to the current ammonite biozonation (Riccardi 2008a, b; Riccardi et al., 2011).

Most of the Argentinean gastropod material described here is housed in the Museo de Ciencias Naturales de La Plata (MLP) collection and in the Museo Paleontológico Carmen Funes, Plaza Huincul (MCF-PIPH). Material described by Weaver (1931), which is currently housed in the Burke Museum of Natural History and Culture (Seattle, USA) (BM), was revised and casts are kept in the La Plata Museum collections. Additional gastropod material described by Gründel (2001a) from the Early Jurassic of Chile and Argentina which is currently stored at the Museum für Naturkunde, Berlin (MB.Ga.) was also revised, subsequently compared with the specimens here analyzed and included in this paper. The Argentinean specimens were prepared by technical staff (Leandro Canessa and Roberto Pfeiffer) at the MEF laboratory, and by Santiago Bessone at the CENPAT laboratory. Latex casts were obtained from specimens preserved as external moulds and the material was coated with ammonium chloride to enhance sculpture details for photography. Photographs were taken using a digital camera, and using scanning electronic microscopy (SEM) at ALUAR (Pto. Madryn).

Repositories and institutional abbreviations.—MLP = Museo de Ciencias Naturales de La Plata, Buenos Aires, Argentina; MCF-PIPH = Museo Paleontológico Carmen Funes, Plaza Huincul, Neuquén, Argentina; MB.Ga. = Museum für Naturkunde Humboldt-Universität zu, Berlin, Germany; MPEF-PI = Museo Paleontológico Egidio Feruglio; BM = Burke Museum of Natural History and Culture, Seattle, USA; CENPAT = Centro Nacional Patagónico, Puerto Madryn, Chubut, Argentina; ALUAR = Aluminio Argentino, Puerto Madryn, Chubut, Argentina; YPF = Yacimientos Petrolíferos Fiscales.

Systematic paleontology

Superorder Caenogastropoda Cox, 1960

Order Sorbeoconcha Ponder and Lindberg, 1997

Suborder Cerithiomorpha Golikov and Starobogatov, 1975

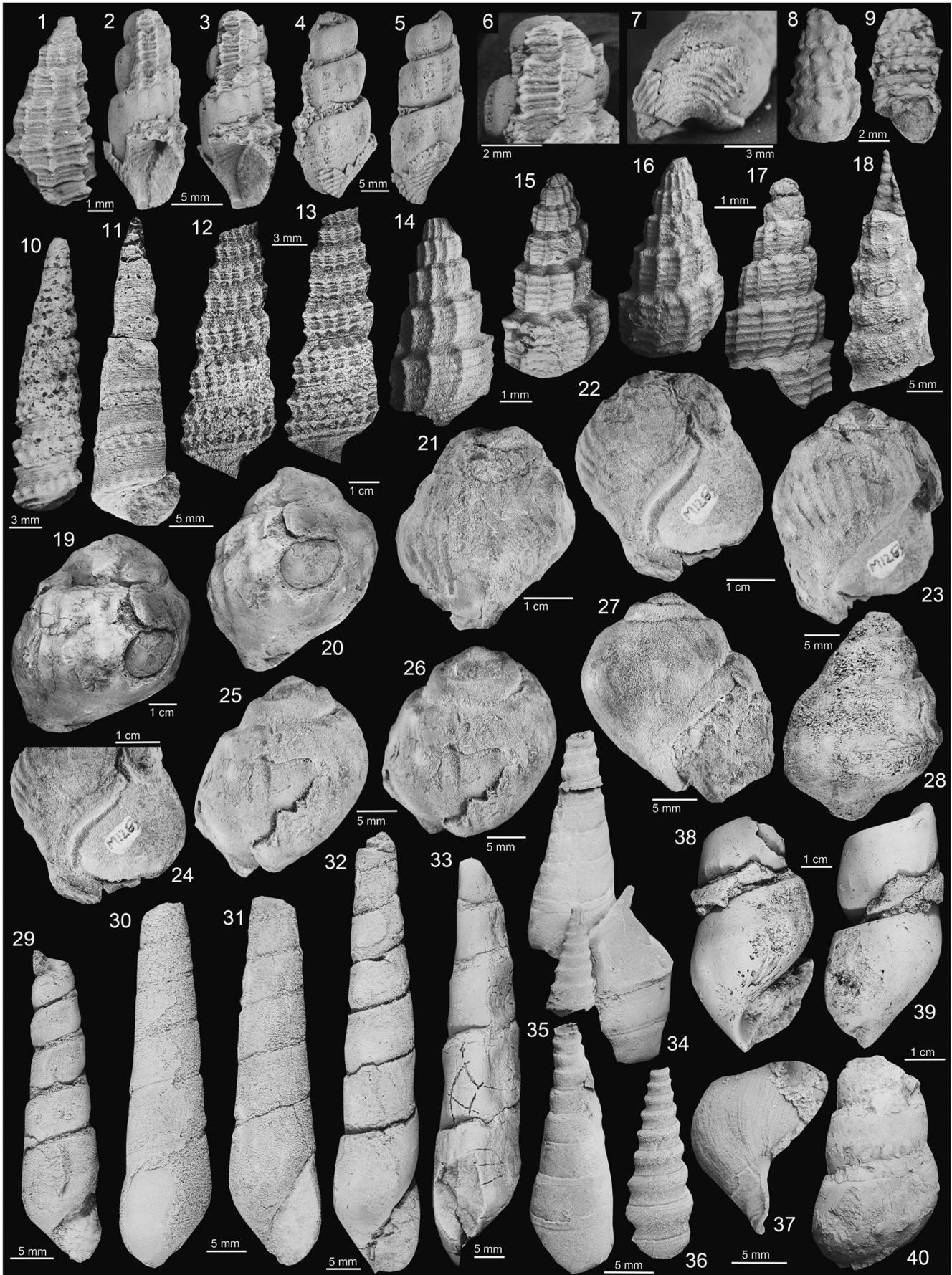
Superfamily Cerithioidea Fleming, 1822

Family Procerithiidae Cossmann, 1906

Subfamily Procerithiinae Cossmann, 1906

Genus *Cryptaulax* Tate, 1869

Figure 2. (1–7) *Cryptaulax redelii* Ferrari, 2012. (1) MLP 35459, lateral view. (2–7) MLP 12193/a. (2, 3) Lateral and apertural views, (4, 5) lateral views, (6, 7) ornament detail. (8–10) *Procerithium nulloi* (Ferrari, 2009). (8) MLP 35464, lateral view. (9) MLP 12163, lateral and apertural view. (10) MCF-PIPH 567, lateral view. (11) *Procerithium bodenbenderi* (Behrendsen, 1891), MLP 35462, lateral view. (12, 13) *Procerithium subimbricatum* n. sp., MLP 35460, holotype, lateral views. (14–17) *Procerithium (Rhabdocolpus) patagoniensis* Ferrari, 2012, MLP 35465. (14–17) Lateral views; (18) *Rhabdocolpus?* sp., MLP 35517, lateral view. (19–27) *Microschiza weaveri* n. sp. (19, 20) MLP 25020 (cast of BMNH 44091/SA1029), paratype, lateral views. (21–24) MLP 35468, holotype. (21) lateral view; (22, 23) lateral and apertural views; (24) apertural detail. (25–27) MLP 35467, paratype. (25) Lateral view; (26) apical view; (27) lateral and apertural. (28) *Microschiza? americana*, MLP 25021 (cast of BMNH 269/SA1029) lateral view. (29–35) *Pseudomelania feruglioi* Ferrari, 2013. (29) MLP 35472, lateral and apertural views. (30, 31) MLP 35473, lateral and apertural views. (32) MLP 35469, lateral and apertural view. (33) MLP 19638, lateral view. (34–37) MLP 35459. (34) Three specimens in lateral views; (35) juvenile and mature teleoconch in lateral view; (36) juvenile teleoconch detail; (37) basal detail. (38, 39) *Pseudomelania* aff. *baugieriana* (d'Orbigny, 1850) MLP 12174, fragmentary specimen in lateral views. (40) *Anulifera chubutensis* Ferrari, 2013, MLP 35516, lateral view.



Type species.—*Procerithium (Xystrella) protortile* Cox, 1965, pro *Cerithium tortile* Hébert and Eudes-Deslongchamps, 1860, from the Middle Jurassic (Callovian) of France.

Occurrence.—Cosmopolitan; Upper Triassic–Lower Cretaceous.

Cryptaulax redelii Ferrari, 2012
Figure 2.1–2.7

2012 *Cryptaulax redelii* Ferrari; Ferrari, p. 327, fig. 2I–K.

Holotype.—MPEF-PI 3508, from Lomas Occidentales, Chubut Province, Argentina in the Mulanguíñeu Formation (Ferrari, 2012, fig. 2I–K).

Occurrence.—Cerro Roth and Estación Rajapalo, Pliensbachian, Neuquén Province. Previously known from Lomas Occidentales, Pliensbachian-Toarcian, Chubut Province, Argentina (Ferrari, 2012).

Description.—See original description of the species in Ferrari (2012, p. 327).

Materials.—MLP 12193a/b, 35459; three specimens preserved as external moulds.

Dimensions (mm).—MLP 12193/a: height = 17.0; width = 8.7; apical angle = 47°*. MLP 12193/b: height = 16.2; width = 9.4; apical angle = 42°*. MLP 35459: height = 8.7; width = 3.9; apical angle = 51°. * = fragmentary data.

Remarks.—According to the diagnosis proposed by Ferrari (2012, p. 327), the specimens here analyzed certainly represent members of *Cryptaulax redelii*. Ferrari (2012, p. 327) reported this species from the Early Jurassic (Pliensbachian-Toarcian) of the Chubut Province. *Cryptaulax weaveri* Ferrari and Damborenea (2015, p. 634, fig. 2. 16–19), from the early Bajocian of the Neuquén Basin, differs from *C. redelii* in having a high number of primary and secondary spiral cords on mature teleoconch whorls, and more conspicuous nodes at the crossing points of spiral and axial elements.

For comparison with other similar *Cryptaulax* species from Argentina and western Tethys, see Ferrari (2012).

Genus *Procerithium* Cossmann, 1902

Type species.—*Procerithium quinquegranosum* Cossmann, 1902, from the Early Jurassic (Hettangian) of France.

Occurrence.—Europe, Africa, New Zealand, Asia, Antarctica (?), and South America; Lower Jurassic (Hettangian)–Lower Cretaceous (Barremian).

Remarks.—Representatives of *Procerithium* were characterized by Gründel (1999). According to the author, this genus groups “slender shells, with numerous whorls, outline of the whorls straight to convex, with distinct sutures, on later whorls the number of spiral and axial elements is variable with

nodes at the crossing points, base weakly convex, angulated to the upper part of the whorls, with one strong spiral at the periphery and 1–2 weaker spirals toward the centre.” In the present paper, the diagnosis of Gründel (1999) is followed.

Procerithium nulloi (Ferrari, 2009)
Figure 2.8–2.10

2009 *Cryptaulax nulloi* Ferrari, p. 457, fig. 3F–H.

2012 *Procerithium nulloi* (Ferrari); Ferrari, p. 328, figs. 2L–T, 4A–F.

Holotype.—MPEF-PI 1870, from Puesto Currumil, Chubut Province, Argentina in the Osta Arena Formation (Ferrari, 2012, figs. 2P–Q).

Occurrence.—Cerro Roth and Subida a Sañicó, Pliensbachian, Neuquén Province, Argentina. Previously known from Puesto Currumil and Lomas Occidentales, Pliensbachian–Toarcian, Chubut Province, Argentina (Ferrari, 2009, 2012).

Description.—See original description of the species in Ferrari (2009, p. 457; 2012, p. 328).

Materials.—MLP 12163, 35464, MCF-PIPH 567; five fragmentary and recrystallized specimens; one external mould.

Dimensions (mm).—MCF-PIPH 567: height = 22.7; width = 6.4; apical angle = 26°. MLP 35464-1: height = 11.0; width = 3.3; apical angle = 28°. MLP 35464-2: height = 11.5; width = 4.0. MLP 35464-3: apical angle = 36°.

Remarks.—The specimens reported here fits with the characterization of the species proposed by Ferrari (2009, p. 457, fig. 3F–H, as *Cryptaulax nulloi*; Ferrari, 2012, p. 328, figs. 2L–T, 4A–F), from the Early Jurassic of the Chubut Province, Argentina.

For comparisons of *Procerithium nulloi* with other similar species of South America and western Tethys, see Ferrari (2009, 2012).

Procerithium bodenbenderi (Behrendsen, 1891) new
combination
Figure 2.11

1891 *Cerithium bodenbenderi* Behrendsen, p. 382, pl. 22, fig. 4.

1922 *Cerithium bodenbenderi* Behrendsen; Behrendsen, p. 168, pl. 1, fig. 4.

Holotype.—A well-preserved specimen, originally described by Behrendsen (1891) from the Early Jurassic of Paso del Portezuelo Ancho, Mendoza Province, Argentina (Behrendsen, 1891, p. 382, pl. 22, fig. 4). Behrendsen’s original material, which should be housed at Göttingen, Germany, could not be examined.

Occurrence.—Cerro Puchenque and Paso del Portezuelo Ancho, Pliensbachian, Mendoza Province, Argentina.

Description.—Dextral, turriculate, high-spired, and medium-sized shell. The teleoconch comprises up to 10 (or more) flattened whorls, with a height of 34.0 mm and a width of 9.0 mm. The apex forms an angle of 30°, although earliest teleoconch whorls are missing in the available specimens. Suture is deeply impressed in a spiral furrow. The ornament is spiral predominantly, consisting of one to two primary and strongly nodular cords located in adapical and abapical position on the outer face; a second order of weaker spiral cords appear between the primary ones, and in the middle of mature whorls are present in numbers of 12–14. The presence of two strong nodular spiral keels bordering the sutures gives the outer face of the shell a slightly concave appearance. The base is flat, ornamented by weak spiral cords; the aperture is holostomatous and subcircular.

Materials.—MLP 35462, 35463; two fragmentary and recrystallized specimens.

Dimensions (mm).—MLP 35462: height = 34.0; width = 9.0; apical angle = 40°. MLP 35463: height = 43.0; width = 10.5.

Remarks.—*Procerithium bodenbenderi* was originally described by Behrendsen (1891) under the genus *Cerithium*. This species is here reassigned to the genus *Procerithium*, following the updated characterization of Gründel (1999) (see also Ferrari, 2012).

Behrendsen's species is very similar in ornament to *Procerithium nulloi* (Ferrari). The differences between both species were clearly stated out by Ferrari (2012): "*Procerithium nulloi* is very similar to *Cerithium bodenbenderi* Behrendsen (1891, p. 382, pl. 22, fig. 4) from the Early Jurassic of Mendoza Province (Argentina). They share the same general shell morphology, with a high-spired shell, slightly concave whorls and nodose rows bordering the sutures on each mature whorl. However, *C. bodenbenderi* is much larger, has more conspicuous nodes and a greater number (12–14) of spiral ribs on mature whorls."

P. bodenbenderi has a paleogeographical distribution limited to the Mendoza Province, whereas the northernmost occurrence of *P. nulloi* in the Andean region of Argentina reaches the southern Neuquén Province.

Procerithium subimbricatum new species
Figure 2.12–2.13

Holotype.—MLP 35460; one specimen preserved as external mould.

Diagnosis.—Sub-imbricate, turriculate; subhorizontal sutural ramp; spiral ornament predominant on the outer face; adult teleoconch with 2 primary spiral cords; 2 secondary spirals cords between the primary ones on mature whorls; nodes at the crossing points of spiral and axial elements.

Occurrence.—Paso del Portezuelo Ancho, late Pliensbachian, Mendoza Province, Argentina.

Description.—Dextral, turriculate, medium-sized and high-spired shell. The apex is broken and earliest teleoconch whorls are missing. The protoconch is not preserved. The fragmentary teleoconch has a height of 18.2 mm and a width of 7.7 mm, and consists of seven slightly imbricated whorls. The ramp is flat to inclined approximately 45° from sutures; toward the outer face the whorl become flat and vertical. Suture is clearly impressed in a spiral furrow. The shell is ornamented by spiral, axial and nodular elements. The ramp bears weak and regularly spaced axial ribs. The outer face of whorls is ornamented by four regularly spaced spiral cords; two primary cords are located in an adapical and abapical position on the outer face; two other secondary cords are median and located between the primary ones. The primary spiral cords become stronger toward mature growth stages. Strong and regularly spaced axial ribs intercept the spiral elements on the outer face forming nodes at the crossing points. Nodes are more conspicuous and acute at the intersection with the primary spiral cords. On last whorl, nodes are even stronger and a third spiral and nodular cord appears below the abapical one, delimiting the base. The base is flat to slightly convex, ornamented by 1 spiral cord. The apertural characters are missing.

Etymology.—Referred to the strongly sub-imbricated teleoconch whorls.

Remarks.—In the present paper, the concepts of Gründel (1999, 2003) and Schulbert and Nützel (2013) are followed to include the specimen here described into the genus *Procerithium*. The variable number of spiral and axial elements on mature whorls, together with the presence of nodes at the crossing points, are considered as the main diagnostic characters; however, none of the protoconch features are preserved in the available material.

Procerithium subimbricatum n. sp. differs from *Procerithium nulloi* (Ferrari, 2009; see above) in being larger, having an imbricate outline shell, a sub-horizontal sutural ramp, and axial ribs on the shell surface. *P. subimbricatum* resembles *Procerithium (Rhabdocolpus) patagoniensis* Ferrari; however, the new species has a sub-imbricate shell outline, a more reticulate ornament pattern, secondary spiral cords on the middle of whorls, and more developed nodes at the crossing points of axial and spiral elements.

Genus *Rhabdocolpus* Cossmann, 1906

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

Occurrence.—Europe, New Zealand, Antarctica and South America; Late Triassic?–Late Jurassic.

Remarks.—The characterization of *Rhabdocolpus* was stated out by Gründel (1999) and Bandel et al. (2000). Both authors included within *Rhabdocolpus* high-spired and flattened to slightly convex outline shell, with a horizontal to strong sloping sub-sutural ramp, opisthocyrt axial ribs on the teleoconch, forming nodes at the crossing point with spiral elements, and base with an adapical channel and lacking abapical notch. The genus is common in the Jurassic of Europe, and Haas (1953)

reported the first occurrence of *Rhabdocolpus* in the Upper Triassic of the Pucará group (South America). In the present paper, the diagnosis of Gründel (1999) and Bandel et al. (2000) are followed.

Rhabdocolpus patagoniensis (Ferrari, 2012) new combination
Figure 2.14–2.17

- 2009 *Cryptaulax* cf. *damboreneae* Ferrari, p. 454, fig. 3E.
2012 *Procerithium* (*Rhabdocolpus*) *patagoniensis* 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 and Bessone, p. 353, fig. 3L–M.

Holotype.—MPEF-PI 3517, from Lomas Occidentales, Chubut Province, Argentina in the Mulanguíneu Formation (Ferrari, 2012, figs. 4G–J).

Occurrence.—Arroyo Las Chilcas, Río Atuel region, late Sinemurian (*Orthechioceras-Paltechioceras* Zone), Mendoza Province, Argentina. Previously known from Lomas Occidentales and La Casilda, Pliensbachian–Toarcian, Chubut Province, Argentina (Ferrari, 2012).

Description.—Dextral, turriculate, small-sized and high-spired shell. The protoconch is not preserved. The teleoconch has a mean height of 4.7 mm and a mean width of 2.6 mm, and consists of six flattened to slightly convex whorls. The mean apical angle is of 59°, although earliest teleoconch whorls are missing. A narrow sub-sutural ramp gives the periphery of the shell a step-like outline. Suture is weakly impressed. The axial ornament is predominant on all teleoconch whorls and consists of opisthocyrt to straight ribs, which run from suture to suture. The axial ribs are strong and slightly orthocone on juvenile whorls, becoming more spaced and opisthocyrt toward mature growth stages. The axial elements intercept five to six regularly spaced spiral cords on teleoconch whorls, forming nodes at the crossing points. The nodes on the adapical spiral cords are spiny and stronger than the others. The base is convex and ornamented by four visible regularly spaced spiral cords. The aperture is fragmentary and subcircular.

Materials.—MLP 35465, 35466; three specimens preserved as negative moulds.

Dimensions (mm).—MLP 35465-1: height = 4.6; width = 2.5; apical angle = 57°. MLP 35465-2: height = 4.9; width = 3.0; apical angle = 60°. MLP 35466: height = 4.7; width = 2.5; apical angle = 60°.

Remarks.—Ferrari (2012, p. 329) and Ferrari and Bessone (2015, p. 353) described this species as *Procerithium* (*Rhabdocolpus*) *patagoniensis* from the Early Jurassic (Pliensbachian–Toarcian) of the Chubut Province. Here it is transferred to the genus *Rhabdocolpus* following the diagnosis of Gründel (1999) and Bandel et al. (2000). Representatives of

Rhabdocolpus have been reported recently from the early Bajocian of the Neuquén Basin with the species *Rhabdocolpus* (*Infacerithium*) *excavatus* Ferrari and Damborenea (2015, p. 635, fig. 2.20–22). The Bajocian form, however, has a less step-like outline shell with more convex teleoconch whorls, a less horizontal sub-sutural ramp, and more rounded and conspicuous nodes at the crossing point of spiral and axial ribs. *Cryptaulax* cf. *damboreneae* Ferrari (2009, p. 545, fig. 3E), from the early Toarcian of Cerro Puchenque locality, was originally described by the author as a conespecific species of *Cryptaulax damboreneae*; however, it has a larger shell, orthocone to slightly opisthocline axial ribs, and stronger spiral cords. *Cryptaulax* cf. *damboreneae* is here included as a synonymous of *Rhabdocolpus patagoniensis* (Ferrari, 2012) (see above).

For comparisons with other similar procerithiids species, see Ferrari (2012).

Rhabdocolpus? sp.
Figure 2.18

Occurrence.—Cerro Puchenque, Pliensbachian, Mendoza Province, Argentina.

Description.—Dextral, turriculate, high-spired, and medium-sized shell. The fragmentary teleoconch has a height of 23.2 mm and a width of 7.5 mm, and consists of ten step-like whorls. The sub-sutural ramp is narrow and horizontal, and sutures are weakly incised in a spiral furrow on the subsutural area. The upper portion of whorls is delimited by a convex, nodular swollen belt, which gives the periphery of the shell a step-like appearance. Nodes are conspicuous, rounded, and more or less spaced. The nodular swollen belt also bears fine, separated, and almost imperceptible spiral cords. Whorls become flat to slightly concave toward the outer face. Basal and apertural characters are missing.

Materials.—MLP 35517; one fragmentary specimen.

Remarks.—The single specimen described is assigned to *Rhabdocolpus* based on the presence of a high-spired shell and an horizontal sub-sutural ramp; however, the typical axial ribs on the whorls flank intercepted by spiral cords and forming nodes at the crossing points, and the adapical channel on base are not visible in the available material; thus, the specimen is left in open nomenclature. *Rhabdocolpus?* sp. differs from *Rhabdocolpus patagoniensis* in being larger and in lacking the strong opisthocyrt axial ribs intercepted by spiral cords on the shell surface.

Suborder Hypsogastropoda Ponder and Lindberg, 1997
Superfamily Littorinoidea Gray, 1840
Family Purpurinidae Zittel, 1895
Genus *Microschiza* Gemmellaro, 1878

Type species.—*Turbo philenor* d'Orbigny, 1847, from the Early Jurassic (Sinemurian) of France.

Occurrence.—Early Jurassic–Early Cretaceous; Europe, Japan, South America.

Remarks.—*Microschiza* was originally proposed by Gemmellaro (1878) as a subgenus of *Chemitzia*, to distinguish sub-imbricated and bucciniform shells, with a low spire, aperture oval, strongly expanded abapically and acute posteriorly, and ornamented by sinusoidal axial ribs. Later authors (Cossmann, 1909; Delpy, 1937; Wenz, 1938; Kase, 1984) included *Microschiza* within Pseudomelaniidae, even though Fischer and Weber (1997) assigned the genus to the family Purpurinidae, on the basis of its similarities with the genus *Purpurina* d'Orbigny, 1850. However, the systematic position of *Microschiza* still remains unclear. In the present paper, the proposal of Fischer and Weber (1997) is followed.

The genus *Microschiza* is not a very common genus within the Mesozoic gastropod faunas, and has a relatively narrow distribution range, being only mentioned in Early Jurassic and Early Cretaceous deposits of Europe and Japan, respectively. The new species described below represent the first occurrence of *Microschiza* in the Jurassic of Argentina.

Microschiza weaveri new species
Figure 2.19–2.27

1931 *Amberleya* cf. *americana* Möricke; Weaver: p. 370. (pars)
2001a *Microschiza* sp. Gründel, p. 60, pl. 4, figs. 15–16.

Holotype.—MLP 35468; one recrystallized specimen.

Paratypes.—MLP 35467; one recrystallized specimen. BMNH 44091/SA1029 of Weaver's collection and originally assigned by Weaver (1931) to *Amberleya* cf. *Americana* (cast MLP 25020).

Diagnosis.—Globular and slightly bucciniform shell; convex whorls; sutural ramp narrow and horizontal; prosocyr to sinusoidal axial ribs; aperture holostomatous and oval; outer lip strongly convex; columellar lip thickened.

Occurrence.—Catán Lil, Plienbachian, Neuquén Province, Argentina (Weaver collection); Arroyo Las Chilcas, Río Atuel region, late Sinemurian (*Orthechioceras*–*Paltechioceras* Faunule), Mendoza Province; Cerro de Cuevitas, Early Jurassic (Sinemurian), Chile (Gründel, 2001a).

Description.—Dextral, globular to slightly bucciniform, gradate, medium- to large-sized, and low-spined shell. The protoconch is not preserved. The teleoconch has a mean height of 41.6 mm and a mean width of 33.6 mm, and consists of three to four strongly convex whorls, but slightly concave in the middle, and last whorl greatly expanded. The apex forms an angle of 122°. The sub-sutural ramp is narrowly horizontal. Suture is incised in a concave furrow. The axial ornament is predominant and visible on last whorl, and consists of prosocyr to sinusoidal and strong axial ribs. The base is strongly convex to angular and smooth. The aperture is holostomatous and forms an adapical notch. The outer lip is convex and the columellar lip thickened as a callus. The basal lip is expanded abapically.

Etymology.—Dedicated to C. Weaver, who contributed to the paleontological knowledge of Jurassic marine gastropods from the Andean region of Argentina and who collected one of the paratypes.

Materials.—MB.Ga.785; one recrystallized teleoconch. Specimen originally assigned by Gründel (2001a) to *Microschiza* sp., from the Early Jurassic (Sinemurian) of Chile.

Dimensions (mm).—MLP 35468, holotype: height = 41.4; width = 32.2; apical angle = 122°. MLP 35467, paratype: height = 24.0; width = 20.2; apical angle = 115°. MLP 25021, paratype: height = 64.5; width = 55.0; apical angle = 131°. MB.Ga.785: height = 36.6; width = 27.0; apical angle = 122°.

Remarks.—The material here described shows the diagnostic characters of *Microschiza*, such as bucciniform and sub-imbricate shell, with the ornament consisting on sinusoidal axial ribs or furrows, oval aperture.

The type species *Microschiza philenor* (d'Orbigny) (Fisher and Weber, 1997, p. 128, pl. 23, figs. 22–23), from the Early Jurassic (Sinemurian) of France, is smaller than the Argentinean form, has a rather higher-spined shell with a more acute apex; a more gradate shell shape; a more developed ornament pattern with axial and spiral elements forming nodes at intersections points.

The Cretaceous species, *Microschiza japonica* (Nagao) (in Kase, 1984; p. 110, pl. 4, figs. 5–7), from the Early Cretaceous of Japan, is similar to *M. weaveri* n. sp.; however, *M. japonica* is smaller, has the shell surface sculptured by axial furrows which are variable in strength and number, and its axial furrow usually has nodes on the depression of body whorls. The last character is missing in the Argentinean species. *Microschiza* aff. *heybroeki* Delpy, 1940 (Kase, 1984; p. 112, pl. 14, fig. 9a–b), from the Early Cretaceous of Japan, differs from *M. weaveri* in having nodes at the shouldered edge of whorls and in lacking axial ribs.

Microschiza? americana (Möricke, 1894) new combination
Figure 2.28

1894 *Amberleya americana* Möricke: p. 29, pl. 4, fig. 8a–b.

1931 *Amberleya* cf. *americana* Möricke; Weaver: p. 370. (pars)

Type material.—Specimens described by Möricke (1894, p. 29, pl. 4, fig. 8a–b) from the Lower Jurassic beds at Mina Amolanas, Chile. The material was originally housed at Strassburg University but could not be examined.

Occurrence.—Catán Lil, Pliensbachian, Neuquén Province, Argentina.

Description.—Dextral, gradate, medium-sized, and moderately high-spined shell. The teleoconch has a height of 51.3 mm and a width of 39.4 mm. The apex forms an angle of 64°. The horizontal sub-sutural ramp is narrowly developed. The outer face is flat to slightly concave in the middle. On the periphery of whorls, a row of rounded nodes is visible. Suture is weakly incised. The base is flat to angular

and slightly concave. The aperture is missing. The columellar lip is thickened.

Materials.—Cast MLP 25021 (original material BMNH 269/SA1029 of Weaver's collection); one fragmentary specimen.

Remarks.—The material here analyzed was assigned by Weaver (1931) to *Amberleya* cf. *americana*, although it seems to be a member of *Microschiza*, because it has a bucciniform and sub-imbricated shell shape. However, the prosocyrts and sinusoidal axial ribs, together with the strongly oval aperture, characteristic of *Microschiza*, are not visible in the present material, and thus it is left in open nomenclature. Ferrari (2009) stated out that *Amberleya* itself is of rather disputable identity, and that descriptions and illustrations available in Möricke (1894, p. 29, pl. 4, fig. 8a–b) show that *Amberleya americana* differs significantly from the type species *Amberleya bathonica* Cox and Arkell, 1950 (see Ferrari et al., 2014, fig. 2). Ferrari et al. (2014) discussed the systematic status of the genus *Amberleya* and restricted the usage of the name *Amberleya* to shells with small umbilicus, a single abapical keel and adapical spiral cord, ornamented by blunt nodes and smooth base; this restricts it largely to the type species *A. bathonica*.

Microschiza? americana (Möricke, 1894) differs from *Microschiza weaveri* in having a slightly more gradate and higher-spired shell, narrower apical angle, less convex whorls, more developed nodular elements, and lacking sinusoidal and prosocyrts axial ribs.

Order Ptenoglossa Gray, 1853
Superfamily Pseudomelanoidea R. Hornes, 1884
Family Pseudomelaniidae R. Hornes, 1884
Genus *Pseudomelania* Pictet and Campiche, 1862

Type species.—*Pseudomelania gresslyi* Pictet and Campiche, 1862, by subsequent designation by Wenz (1938); from the Lower Cretaceous (Neocomian) of Switzerland.

Occurrence.—Triassic–Cretaceous (Kaim, 2004). Europe, Asia, Africa, Madagascar, New Zealand and America.

Pseudomelania feruglioi Ferrari, 2013
Figure 2.29–37

2013 *Pseudomelania feruglioi* Ferrari, p. 582, figs. 2F–I, 3A–D.

?2015 *Pseudomelania feruglioi* Ferrari; Ferrari and Bessone, p. 354, fig. 3O.

Holotype.—MPEF-PI 4155, from Lomas Occidentales, Chubut Province, Argentina in the Mulanguíneu Formation (Ferrari, 2013, fig. 2F).

Emended diagnosis.—Dextral, anomphalous and turriculate shell; teleoconch up to ten whorls; juvenile teleoconch slightly convex or step-like with a convex swollen belt in the adapical sutural area; mature teleoconch with a strong adapical spiral keel on each whorl; opisthocline growth lines on the middle of

mature whorls, and prosocyrts on the lower portion of whorls and on base; aperture oval forming a narrow siphonal canal.

Occurrence.—Cerro Roth and Estación Rajapalo, Pliensbachian, Neuquén Province; Cerro Puchenque, Arroyo Serrucho and Arroyo del Portezuelo Ancho, Pliensbachian, Mendoza Province, Argentina. Previously known from Lomas Occidentales and Betancourt, Pliensbachian–Toarcian, Chubut Province, Argentina (Ferrari, 2013).

Description.—Dextral, phaneromphalous, turriculate, high-spired and medium- to large-sized shell. The teleoconch has a mean height of 39.9 mm and mean width of 12.4 mm. The mean apical angle is of 37°, although earliest teleoconch whorls are missing in the better preserved specimens. In the most complete specimens, the teleoconch is composed of eight whorls. The earliest whorls are slightly step-like with a convex swollen belt in the adapical sutural area; the whorls become flat to slightly concave toward mature growth stages. Suture is incised and clearly visible on juvenile whorls. Ornament is poorly developed on juvenile whorls, and stabilizes toward mature teleoconch with an adapical spiral keel on each whorl. Opisthocline collabral lines are visible on the middle of mature whorls and become prosocyrts on the lower portion of whorls and on base. The base is strongly convex and the aperture holostomatous, oval and acute adapically, with the columellar lip strongly expanded abapically forming a narrow siphonal canal.

Materials.—MLP 19638, 25097, 35459, 35469, 35470, 35471, 35472, 35473, 35474, 35475, 35476, 35477, 35478; MCF-PIPH 693, 681, 688, 557, 541; 18 recrystallized specimens.

Dimensions (mm).—Table 1.

Remarks.—*Pseudomelania feruglioi* Ferrari (2013) was previously reported by Ferrari (2013) from the Early Jurassic of the Chubut Province. The specimens from the Chubut Province, however, do not show the step-like earliest whorls with the convex swollen belt in the adapical sutural area, and have instead slightly convex juvenile whorls. Moreover, the Chubut specimens lack the clearly visible opisthocline growth lines in the middle of mature whorls and the prosocyrts lines on base, and lack the columellar lip forming a narrow siphonal canal. These differences are considered here as intraspecific variability within *Pseudomelania feruglioi*, and have been included in the emended the diagnosis of the species (see above).

Table 1. Dimensions (mm) of *Pseudomelania feruglioi* Ferrari, 2013. – = missing data; j = juvenile.

Specimen	Height	Width	Apical angle
MLP 19638	57.6	14.2	30°
MLP 25097	42.0	7.0	–
MCF-PIPH 693	30.8	14.2	–
MCF-PIPH 688/1	34.4	13.8	–
MCF-PIPH 557	38.8	15.0	–
MCF-PIPH 541	36.0	21.0	–
MLP 35469	69.3	14.2	33°
MLP 35472	35.6	8.8	45°
MLP 35473	51.5	12.3	–
MLP 35459-1	30.0	10.8	–
MLP 35459-2,j	13.7	5.8	–

The species resembles *Pseudomelania procera* Eudes-Deslongchamps, 1842 (in d'Orbigny, 1850, p. 41, pl. 239, figs. 2–3), from the Middle Jurassic (Bajocian) of England and France, although the European species is larger and has a narrower apical angle.

For comparisons with similar and coeval *Pseudomelania* species, see Ferrari (2013, p. 584).

Pseudomelania aff. *baugieriana* (d'Orbigny, 1850)
Figure 2.38–2.39

Occurrence.—Carrán Curá, Early Jurassic (Pliensbachian), Neuquén Province, Argentina.

Description.—Dextral and turriculate shell. The fragmentary teleoconch is an internal mould and consists of two whorls; the ramp of whorls is narrow. The outer face becomes flat to slightly convex. The periphery of whorls is bordered by a row of small and rounded nodes. The base is strongly convex and the aperture oval with the outer lip convex and the columellar lip concave.

Materials.—MLP 12174; one recrystallized specimen.

Remarks.—*Pseudomelania* aff. *baugieriana* is similar to *Pseudomelania baugieriana* (d'Orbigny, 1850) (p. 40, pl. 243, fig. 5; Fischer and Weber, 1997, p. 17, pl. 2, fig. 16), from the Early Jurassic (Toarcian) of France; however, the Argentinean material shows a row of weak nodes on the periphery of the shell; the former character is missing in *P. baugieriana* (d'Orbigny). *Pseudomelania lorieri* (d'Orbigny, 1850) (p. 38, pl. 238, fig. 1; Fischer and Weber, 1997, p. 16, pl. 1, fig. 28), from the Early Jurassic (Toarcian) of France, resembles also the species here described; but, the European form has more convex teleoconch whorls, with the last one less expanded, and lacks the peripheral row of nodes. *Pseudomelania repeliniana* (d'Orbigny, 1850) (p. 39, pl. 238, fig. 9; Fischer and Weber, 1997, p. 16, pl. 2, figs. 14–15), from the Toarcian of France, has less convex whorls and a more developed axial ornament than the Argentinean species. *Pseudomelania (P.) disparilis* (d'Orbigny, 1850) (p. 47, pl. 243, fig. 6; Fischer and Weber, 1997, p. 21, pl. 2, fig. 9), from the Middle Jurassic (Bajocian) of France, is very similar to *P.* aff. *baugieriana*, but the European species has less convex whorls and a more developed horizontal ramp.

Family Protorculidae Bandel, 1991
Genus *Anulifera* Zapfe, 1962

Type species.—*Zygopleura (Anulifera) variabilis* Zapfe, 1962, from the Rhaetian (Late Triassic) of Austria.

Occurrence.—Late Triassic–Middle Jurassic. Europe, Asia, South America.

Anulifera chubutensis Ferrari, 2013
Figure 2.40

2013 *Anulifera chubutensis* Ferrari, p. 585, fig. 3F–G.

Holotype.—SEGEMAR 25000 (cast MPEF-PI 4107), from Lomas Occidentales, Chubut Province, Argentina in the Mulanguñeu Formation (Ferrari, 2013, fig. 3F).

Occurrence.—Estancia Santa Isabel, Pliensbachian, Neuquén Province. Previously known from Lomas Occidentales, Pliensbachian–Toarcian, Chubut Province, Argentina (Ferrari, 2013).

Description.—See original description in Ferrari (2013, p. 585).

Materials.—MLP 35516; one fragmentary and recrystallized specimen.

Remarks.—The material here analyzed certainly belongs to the species *Anulifera chubutensis* (see Ferrari 2013, p. 585). *Anulifera sigmoidea* Ferrari and Damborenea (2015, p. 636, fig. 2.23–31) recently reported from the early Bajocian of the Neuquén province differs from *A. chubutensis* in being smaller, having a more slender outline shell, a slightly concave mature whorls, and sigmoidal growth lines on the outer face.

For comparisons with other similar species of the genus, see Ferrari (2013).

Superfamily Campaniloidea Douvillé, 1904

Family Ampullinidae Cossmann in Cossmann & Peyrot, 1919
Genus *Globularia* Swainson, 1840

Type species.—*Ampullaria sigaretina* Lamarck, 1804, from the Eocene of France.

Occurrence.—Triassic?/Jurassic–Holocene. Cosmopolitan.

Globularia catanlilensis (Weaver, 1931)
Figure 3.1–3.10

1931 *Natica catanlilensis* Weaver, p. 378, pl. 42, figs. 277–278.

1934 *Natica* aff. *catanlilensis*, Feruglio, 1934, p. 49, pl. 5, figs. 2a, b, 3a, b.

1942 *Natica catanlilensis* Wahnish, 1942, p. 61, pl. 2, figs. 1a, b.

2013 *Globularia* cf. *catanlilensis* (Weaver, 1931); Ferrari, p. 587, figs. 3H, 4A–C.

Holotype.—BM 280/1029, from the Early Jurassic of Catán Lil at Southern Neuquén (Weaver, 1931, p. 378, pl. 42, figs. 277–278). Cast of the holotype: MLP 25017.

Occurrence.—Cerro Roth, Carrán Curá, Estancia Santa Isabel and Catán Lil, Sinemurian–Pliensbachian, Neuquén Province, Argentina; Puesto Araya, Pliensbachian, Mendoza Province, Argentina.

Description.—Dextral, globular, anomphalous, naticiform, low-spined and medium- to large-sized shell. The teleoconch has a mean height of 33.9 mm and a mean width of 27.7 mm. The apex forms an angle of 109°. The spire is composed of five strongly convex whorls; last whorl is more expanded than the



spire representing the 80% of the shell height. The sub-sutural ramp is narrowly horizontal to slightly convex. The outer face of last whorl is strongly convex in specimen MCF-PIPH 563 and weakly concave in the adapical part of last whorl in specimen MLP 12171. These differences are considered here as intraspecific variability. Sutures are deeply impressed in a concave spiral furrow. The ornament is predominantly spiral and clearly visible on last whorl. The spiral elements consist of very thin and regularly spaced cords; between cords, weak spiral furrows appear. Collabral growth lines are not clearly visible. The base is strongly convex. The umbilicus is closed or partially covered by a columellar callus. The aperture is holostomatous and oval, with the outer lip convex.

Materials.—MLP 12171, 35479, 35480, 35481, 35482, 35515; MCF-PIPH 563; seven recrystallized specimens.

Dimensions (mm).—Table 2.

Remarks.—Ferrari (2013) suggested that the species originally referred to *Natica* from the Jurassic of South America should no longer be considered as real representatives of Naticidae and thus were transferred by the author to the genus *Globularia*. In the present paper, the classification of Ferrari (2013) is followed.

The material here described agree with the diagnostic characters of *Globularia*, including a globular, naticiform, low-spired, and convex shell, with weak spiral ribs, and the closed umbilical area.

Globularia catanlilensis (Weaver) was originally described as *Natica catanlilensis* Weaver (1931, p. 378, pl. 42, figs. 277–278) from the Early Jurassic of Catan-Lil locality, Neuquén Province, Argentina. *Natica klingamanni* Weaver (1931; p. 374, pl. 42, figs. 279–280) differs from *G. catanlilensis* in having a more elongated shell, a narrower spiral angle, a narrower basal angle, a developed collabral ornament with fine growth lines which become sinuous on the outer face of the whorls, and sutures not very distinct. *Globularia andina* Ferrari and Damborenea (2015, p. 637, fig. 3.1–3.13), from the early Bajocian of the Neuquén Basin, differs from *G. catanlilensis* in having a more gradate

shell outline, a more developed horizontal sub-sutural ramp, very fine prosocline growth lines on the outer face of last whorl but lacking spiral cords, and a columellar lip thickened as a callus. *Globularia* cf. *catanlilensis* (Weaver) was originally considered by Ferrari (2013) as conspecific to *Globularia catanlilensis* (Weaver). However, after analyzing in detail the shell characters of both species they share identical morphology and ornament pattern, and *Globularia* cf. *catanlilensis* is thus retained here as synonymous of *G. catanlilensis*.

For comparisons with other similar species, see also Ferrari (2013, p. 587).

Genus *Naricopsina* Chelot, 1886

Type species.—*Lobostoma guarangeri* Davoust, 1855, from the Middle Jurassic (Bathonian) of Europe.

Occurrence.—Early Jurassic (Sinemurian)—Upper Cretaceous (Maastrichtian). Europe, Africa, Asia, America.

Remarks.—In the present paper, the genus *Naricopsina* is considered as a member of Ampullinidae (see Kaim et al., 2004; Ferrari, 2013). According to Gründel (2001b, 2003) the representatives of this genus share a naticiform shell, whose spire is depressed to distinct, with the edge of the aperture not thickened and orthocline, with teleoconch whorls convex, without any sculpture or with weak spiral sculpture. The growth lines are partially thickened, more or less prosocline, straight or sinuous, a narrow but distinct umbilicus is developed, the aperture is broadly oval and the inner lip has a callus that sometimes covers the umbilicus. The species described below fits with the characterization of Gründel (2001b).

Naricopsina aequabilis new species

Figure 3.11–3.21

Holotype.—MLP 25096; one recrystallized specimen.

Paratype.—MLP 25098; one recrystallized specimen.

Diagnosis.—Globose, step-like shell; narrow, horizontal sub-sutural ramp; outer face convex; last whorl more expanded than the spire; ornament lacking; umbilicus widely opened or covered by a callus; aperture oval.

Occurrence.—Subida a Sañicó, Estancia Santa Isabel and Arroyo Ñiraico, Pliensbachian–early Toarcian, Neuquén Province; Arroyo Serrucho, Cerro Tricolor, Cañada Colorada, Arroyo El Pedrero, Cerro Puchenque and Puesto Araya, late Sinemurian (F. de *Orthechioceras*/*Paltechioceras*) to late Toarcian, Mendoza Province, Argentina.

Table 2. Dimensions (mm) of *Globularia catanlilensis* (Weaver, 1931). – = missing data.

Specimen	Height	Width	Apical angle
MLP 12171/1	36.8	28.3	104°
MLP 12171/2	51.0	39.5	–
MLP 35479	59.0	50.1	–
MLP 35480	23.0	18.0	–
MLP 35515	14.0	13.0	–
MLP 35481	26.0	22.7	–
MLP 35482	36.8	30.2	–
MCF-PIPH 563	25.0	20.0	115°

Figure 3. (1–10) *Globularia catanlilensis* (Weaver, 1931). (1–5) MLP 12171. (1–2, 5) Lateral views; (3) apical view; (4) lateral and apertural views. (6–10) MCF-PIPH 563. (6–9) Lateral views; (10) apical view. (11–21) *Naricopsina aequabilis* n. sp. (11) MLP 25098, paratype, lateral view. (12–15) MLP 25096, holotype. (12, 13) Lateral view; (14) apertural view; (15) apical view. (16, 17) MLP 35484, lateral views. (18, 19) MLP 35486, lateral views. (20, 21) MLP 27884, lateral views. (22–26) *Naricopsina ballentae* n. sp., MLP 35494, holotype. (22, 23) lateral views; (24, 25) apical views; (26) lateral and apertural views. (27–31) *Pictavia rothi* n. sp. (27, 28) MLP 12170. (27) Lateral view; (28) basal and apertural views. (29–31) MLP 12169, paratype. (29, 31) Lateral views; (30) basal and apertural views.

Description.—Dextral, globose, naticiform, medium-sized and low-spined shell. The protoconch is not preserved. The teleoconch is composed of four strongly convex and step-like whorls. The mean height of the teleoconch is 24.4 mm and a mean width is 20.5 mm. The apex forms an angle of 103°, although earliest teleoconch whorls are missing in the available specimens. Teleoconch whorls have a narrow and horizontal sub-sutural ramp; the whorls become strongly convex toward the outer face. Suture is deeply incised in a concave spiral furrow. The shell is externally smooth. The base is convex. The umbilicus is widely open or partially covered by a callus. The aperture is holostomatous and broadly oval with the adapical edge acute and the basal edge convex.

Etymology.—Latin, adjective *aequabilis* = uniform; referring to the uniform ornament pattern and the absence of sinuous collabral ribs on the shell surface, which is a diagnostic character of the genus.

Materials.—MLP 12164, 15552a/b, 27884, 35483, 35484, 35485, 35486, 35487, 35488, 35489, 35490, 35491, 35492, 35493; sixteen recrystallized specimens.

Dimensions (mm).—Table 3.

Remarks.—The material here described is assigned to *Naricopsina* on the basis of a naticiform shell shape, lacking a distinct sculpture, the teleoconch whorls strongly convex, the aperture broadly oval, and a callus in the inner lip which sometimes covers the umbilicus (see Gründel, 2001b, 2003; Kaim et al., 2004).

In comparison with other similar Argentinean species, *Naricopsina aequabilis* n. sp. is very similar to *Natica* cf. *bulimoides* (Deshayes), from the Early Cretaceous of the Agrio Formation, Neuquén Province, Argentina (Weaver, 1931, p. 374, pl. 43, figs. 289–290). Both share similar general shell morphology, with a globose shape, spire whorls with a very narrow sub-sutural ramp, aperture oval and the inner lip callused and deflected; however, the species assigned to *Natica* has a narrower spire angle, is larger than *N. aequabilis*, and the inner lip is separated from the last whorl by a V-shaped depression. *Natica* cf. *philippi* Möricke (Jaworski, 1926b, p. 196; Weaver, 1931, p. 377), from the Early Jurassic of Argentina, show resemblance with *N. aequabilis*; however, according to the available descriptions, *N. cf. philippi* has a spire rather higher than *N. aequabilis*, an open umbilicus, and a narrower apical

Table 3. Dimensions (mm) of *Naricopsina aequabilis* n. sp. – = missing data.

Specimen	Types	Height	Width	Apical angle
MLP 25096	Holotype	30.0	30.7	106°
MLP 25098	Paratype	44.4	39.0	109°
MLP 35483	–	24.3	18.8	–
MLP 35484	–	16.8	13.5	99°
MLP 35485	–	20.3	18.4	–
MLP 35486	–	21.2	17.6	98°
MLP 35487	–	35.5	30.0	–
MLP 35488	–	32.0	24.5	–
MLP 35489	–	10.0	9.4	–
MLP 35492	–	17.0	14.2	–
MLP 35493	–	29.9	19.4	–
MLP 27884	–	11.4	11.0	101°

angle. *Naricopsina laevis* (Stoliczka, 1861) (Szabó, 2009, p. 98, fig. 91), from the Early Jurassic (Sinemurian) of Europe, resembles *N. aequabilis*, but, the European species is smaller, and has unequally thin and strongly prosocline growth lines. *Naricopsina guerangeri* (Davoust, 1885) (Gründel, 2001b, p. 62, pl. 5, figs. 3–7), from the Middle Jurassic of Europe, is comparable to the Argentinean species; however, *N. guerangeri* has a lower spire and is smaller than *N. aequabilis*, has orthocline to slightly sinuous and distinctly prosocline growth lines, with their apical part prosoclyrt, and fine spiral elements (about 20) on base. *Naricopsina montreuilensis* (Hébert and Eudes-Deslongchamps, 1860) (Gründel, 2001b, p. 64, pl. 5, figs. 8–12; Gründel, 2003, p. 186, pl. 14, figs. 8–9, pl. 15, figs. 1–4), from the Middle Jurassic (Callovian) of Europe, differs from *N. aequabilis* in being smaller and in having spiral elements on the shell surface. *Naricopsina? sinuosa* (Gründel, 2001b, p. 65, pl. 6, figs. 1–6; Gründel, 2003, p. 186, pl. 15, figs. 6–9), from the Middle Jurassic (Callovian) of Europe, resembles the species here described, even though the European form is much smaller than the Argentinean species, and has fine and slightly opisthoclyrt growth lines near the adapical suture and on the base. The material described by Szabó and Jaitly (2004, p. 19, pl. 2, figs. 37–39) as *Naricopsina cornelia* (Laube, 1867), from the Callovian (Middle Jurassic) of India, is also comparable to *N. aequabilis*; the Indian form, however, has a wider apical angle, and irregularly spaced and strongly prosocline growth lines, with weak spiral lines crossing the collabral elements.

Naricopsina ballentae new species
Figure 3.22–3.26

Holotype.—MLP 35494; one recrystallized specimens.

Paratypes.—MLP 35495, 35496; two recrystallized specimens.

Diagnosis.—Globose, naticiform, very low-spined shell; sub-sutural ramp lacking; sutures slightly impressed; outer face convex; ornament lacking; last whorl more expanded than the spire and angular toward base; umbilical area widely opened; aperture circular to oval.

Occurrence.—Carrán Curá, late Pliensbachian, Neuquén Province, Argentina.

Description.—Dextral, globose, naticiform, medium-sized and low-spined shell. The apex forms an angle of 115°. The protoconch is not preserved. The teleoconch has a mean height of 14.4 mm and a mean width of 18.0 mm, and consists of four strongly convex whorls; last whorl markedly more expanded than the spire. Sub-sutural ramp is missing. Suture is incised in a spiral furrow. The shell is smooth. Last whorl is convex on the outer face and become slightly angular to the periphery. The base is convex with a widely opened umbilical area. The aperture is circular to slightly oval, with the outer lip strongly convex and the columellar lip thickened.

Etymology.—Dedicated to Dr. Sara Ballent (1950–2011), renowned micropalaeontologist from Museo de Ciencias Naturales de La Plata (MLP).

Dimensions (mm).—MLP 35494, holotype: height = 21.7; width = 25.0; apical angle = 115°. MLP 35495, paratype: height = 6.6; width = 11.5. MLP 35496, paratype: height = 15.0; width = 17.6.

Remarks.—*Naricopsina ballentae* n. sp. differs from *Naricopsina aequabilis* in having a less step-like shall shape, less impressed sutures, and a lower spire.

Naricopsina montreuilensis (Hébert and Eudes-Deslongchamps, 1860) (Gründel, 2001b, p. 64, pl. 5, figs. 8–12; Gründel, 2003, p. 186, pl. 14, figs. 8–9, pl. 15, figs. 1–4), from the Middle Jurassic (Callovian) of Europe, is very similar to *N. ballentae* in shell morphology; however, the European form has a more closed, funnel shaped and narrower umbilical area, a more convex and less angular last teleoconch whorl, fine spiral cords on base and stronger sinuous growth lines. *Naricopsina guerangeri* (Davoust, 1855) (Gründel, 2001b, p. 62, pl. 5, figs. 3–7), from the Middle Jurassic of Europe, is also comparable to the Argentinean species; however, *N. guerangeri* has a much lower spire, more convex last teleoconch whorl, and a more oval aperture.

Genus *Pictavia* Cossmann, 1925

Type species.—*Natica pictaviensis* d'Orbigny, 1852 (= *Natica bajocensis* d'Orbigny, 1852) from the Middle Jurassic (Bajocian) of France.

Occurrence.—Early Jurassic–Middle Jurassic; Europe, South America.

Remarks.—*Pictavia* shows close resemblance with the representatives of the genus *Oonia* Gemmellaro, 1878. Gründel (2001b), however, pointed out that members of *Oonia* differs from those of *Pictavia* in lacking a well-developed sub-sutural ramp on teleoconch whorls, and the growth lines (when present) are sinuous and prosocline. In contrast, members of *Pictavia* show a narrow ramp which may be smooth or ornamented by spiral rows of fine pits, and the growth lines are straight or only weakly sinuous and distinctly prosocline. Based on these characters, in the present paper the classification of Gründel is followed to include the Argentinean material into *Pictavia*.

Pictavia rothi new species Figures 3.27–3.31, 4.1–4.5

Holotype.—MLP 35497; one recrystallized specimen.

Paratypes.—MLP 12169, 15540; two recrystallized specimens.

Diagnosis.—Globose to egg-shaped shell; sub-sutural ramp narrowly horizontal; last whorl more expanded than the spire; ornament lacking; base convex; aperture oval with an S-shaped columellar edge; narrow umbilical area.

Occurrence.—Cerro Roth and Estación Rajapalo, Pliensbachian, and Arroyo Ñiraico, early Toarcian, Neuquén Province, Argentina.

Description.—Dextral, slightly globose to egg-shaped, small-sized, and moderately high-spined shell. Protoconch is not preserved. Teleoconch is composed of four to five convex whorls with a mean height of 24.4 mm and a mean width of 13.0 mm. The apex forms an angle of 85°. Last whorl more expanded than spire whorls. Suture is incised in concave spiral furrow and the sub-sutural ramp is narrowly horizontal. The shell is externally smooth and lacks the typical sinuous and prosocline growth lines.

On the last whorl of specimen MLP 12170, near the outer lip, irregularly spaced axial folds are visible. The base is convex and the aperture oval with an S-shaped columellar edge; adapical edge slightly acute and the abapical edge more expanded. A very narrow umbilical area is developed, which sometimes may be covered by a callus.

Etymology.—Dedicated to Dr. Santiago Roth (1850–1924), a renowned Swiss Argentine paleontologist.

Materials.—MLP 12170, 15436; two recrystallized specimens.

Dimensions (mm).—MLP 35497, holotype: height = 24.9; width = 17.6; apical angle = 82°. MLP 12169, paratype: height = 29.2; width = 2.6; apical angle = 98°. MLP 15540, paratype: height = 23.0; width = 13.6; apical angle = 76°. MLP 12170: height = 20.7; width = 18.3.

Remarks.—According to Gründel's (2001b) diagnosis, the material here described represents members of *Pictavia*, considering the narrowly developed sutural ramp as the main diagnostic feature (see above).

The type species *Natica pictaviensis* d'Orbigny (1852, p. 191, pl. 289, figs. 8–10; Fischer and Weber, 1997, p. 71, pl. 17, figs. 7–8, as *Ampullospira [Pictavia] bajociensis*), from the Middle Jurassic (Bajocian) of France, is very similar to the Argentinean species; however, the European form has a more slender shell shape, is smaller, has a slightly more developed sub-sutural ramp, and collabral elements.

The analyzed material is also similar to *Pictavia calypso* (d'Orbigny) (Gründel, 2001b, p. 57, pl. 3, fig. 14, pl. 4, figs. 1–9; 2003, p. 184, pl. 13, figs. 9–10, pl. 14, fig. 1), from the Middle Jurassic (Callovian) of Europe; however, the former species is smaller, and has well developed growth lines on the shell surface, which are intercepted by fine spiral cords. *Pictavia punctura* (Bean) (Gründel, 2001b, p. 58, pl. 4, figs. 10–15; 2003, p. 185, pl. 14, figs. 2–4), from the Middle Jurassic (Bathonian–Callovian) of Europe, differs from *Pictavia rothi* n. sp. in having a more developed collabral ornament with fine prosocline to slightly opisthocyrt growth lines, which are more developed on last teleoconch whorl.

Genus *Oonia* Gemmellaro, 1878

Type species.—*Melania abbreviata* Terquem 1855 = *Pseudomelania hettangiensis* Cossmann 1909, from the Early Jurassic of France.

Occurrence.—Early Jurassic–Middle Jurassic; Europe, South America.

Remarks.—As it is pointed out above, *Oonia* shows extreme resemblance with representatives of *Pictavia*. The difference between both genera relies in that *Oonia* lacks a sub-sutural ramp on the outer face of whorls and the growth lines are distinctly sinuous (weakly sinuous in *Pictavia*) and procline. The classification of Gründel (2001b) is also followed here.

Oonia acuta new species
Figure 4.6–4.14

?1926 *Oonia euspiroides* (Gemmellaro, 1878); Jaworski, 1926, p. 200.

?1931 *Oonia* cf. *euspiroides* (Gemmellaro, 1878); Weaver 1931, p. 371.

2001a cf. *Oonia* Gründel, p. 59, pl. 5, fig 1–4.

Holotype.—MLP 12159/a; one recrystallized specimen.

Paratypes.—MLP 12159/b, 35498, 35499; five recrystallized specimens and one negative mould.

Diagnosis.—Globose, acute, high-spined shell; juvenile whorls slightly convex; mature whorls strongly convex; last whorls markedly expanded and elongated; spiral ornament predominant on juvenile whorls, opisthocyrt collabral ribs on mature whorls; base convex, aperture elongated and oval; umbilical area covered by a thin columellar callus.

Occurrence.—Cerro Roth, Pliensbachian, Neuquén Province; Paso del Portezuelo Ancho, Arroyo Malo and Arroyo Serrucho, late Hettangian to Pliensbachian, Mendoza Province, Argentina. Portezuelo de Pederales and Quebrada Cachina, Early Jurassic (Hettangian–Pliensbachian), Chile (Gründel, 2001a).

Description.—Dextral, globose, medium-sized and moderately high-spined shell, with a strongly oval and acute shape. The protoconch is not preserved. The teleoconch has a mean height of 26.3 mm and a mean width of 15.2 mm, and is composed of seven convex whorls. The teleoconch is higher than wide with an apical angle of 65°. The three earliest teleoconch whorls are flat to slightly convex, becoming strongly convex toward the mature growth stages. Last teleoconch whorl is more expanded than spire and elongated toward the abapical edge. Suture is deeply incised in a spiral furrow. The three to four juvenile whorls have a predominant spiral ornament, consisting on weak and fine irregularly spaced cords. On mature whorls, spiral cords become obsolete and opisthocyrtic collabral ribs are visible. The base is convex and the aperture strongly elongated and oval. The columellar lip forms a thin callus and the umbilical canal is

Table 4. Dimensions (mm) of *Oonia acuta* n. sp. – = missing data.

Specimen	Types	Height	Width	Apical angle
MLP 12159/a	Holotype	20.0	10.5	81°
MLP 12159/b	Paratype	23.6	11.8	83°
MLP 35498	Paratype	19.3	15.6	61°
MLP 35499	Paratype	19.1	13.2	65°
MB.Ga.787	–	27.4	15.4	61°
MB.Ga.786	–	35.1	20.5	57°
MB.Ga.789	–	39.9	19.7	46°

deeply impressed. A small siphonal notch is visible on the basal lip in specimen MLP (33).

Etymology.—Latin, adjective *acuta* = acute; referred to the strongly acute shell.

Materials.—MB.Ga.786, 787, 789; three recrystallized specimens. Specimens originally assigned by Gründel (2001a) to cf. *Oonia* sp., from the Early Jurassic (Hettangian–Pliensbachian) of Chile.

Dimensions (mm).—Table 4.

Remarks.—*Oonia acutovata* Gründel (2001b, p. 60, pl. 4, figs. 16–17, pl. 5, figs. 1–2), from the Middle Jurassic (Bathonian–Callovian) of Europe, differs from *O. acuta* n. sp. in having a more oval shell and the inner lip forming a narrow callus, and in being smaller.

The genus *Oonia* was previously reported from Argentina by Jaworski (1926) and Weaver (1931). *Oonia euspiroides* (Gemmellaro, 1878) (Jaworski, 1926, p. 200; Weaver, 1931, p. 371 as *O. cf. euspiroides*), from the Early Jurassic of Portezuelo Ancho (Mendoza, Argentina), shows close resemblance to *O. acuta*; however, neither Jaworski nor Weaver figured their material. According Gemmellaro's (1878) diagnosis, *O. euspiroides* has well developed growth lines on the shell surface and a narrower spire angle. Considering that *O. acuta* comes from the same locality (Paso del Portezuelo Ancho) that *Oonia euspiroides*, here the species described by Jaworski (1926) and Weaver (1931) are doubtfully included as synonymous of the new species.

Subclass Heterobranchia Gray, 1840

Order Architectibranchia Haszprunar, 1985 (= Order Opisthobranchia Milne Edwards, 1848)

Remarks.—Gründel and Nützel (2012) pointed out that shells bearing heterobranchs such as modern *Acteon* or *Bullina* have been traditionally considered to represent basal opisthobranchs. The authors revised and discussed some Triassic and Jurassic opisthobranch genera, which are related to the modern forms, and based on recent molecular studies they supported the idea that

Figure 4. (1–5) *Pictavia rothi* n. sp. (1, 2) MLP 15540, paratype, lateral views. (3–5) MLP 35497, holotype, lateral views. (6–14) *Oonia acuta* n. sp. (6–9) MLP 12159/a, holotype. (6, 7) Lateral views; (8, 9) lateral and apertural views. (10) MLP 12159/b, paratype, lateral view. (11, 12) MLP 35499, lateral views. (13, 14) MLP 35498, lateral views. (15–20) *Striactaeonina transatlantica* (Behrendsen). (15, 16) MLP 25094a/b, lateral views. (17) MLP 35508, lateral view. (18) MLP 35510, lateral view. (19, 20) MLP 35509, lateral and apertural views. (21–27) *Cylindrobullina ovata* (Behrendsen, 1891). (21) MLP 35514, lateral view. (22–24) MCF-PIPH 546. (22) Lateral view; (23) lateral and apertural views; (24) apical view. (25, 26) MLP 35511, lateral views; (27) MLP 35512, lateral view. (28, 29) *Cylindrobullina brevispira* n. sp., MLP 35513, holotype. (28) Lateral view; (29) apical view.



Opisthobranchia is not a monophyletic group (Dinapoli and Klussmann-Kolb, 2010; Schrödl et al., 2011). Thus, they used the name Architectibranchia to include Mesozoic representatives of Opisthobranchia. In the present paper, the classification of Gründel and Nützel (2012) is followed.

Superfamily Acteonoidea d'Orbigny, 1843
Family Tubiferidae Cossmann, 1895
Genus *Striactaeonina* Cossmann, 1895

Type species.—*Orthostoma avena* Terquem, 1855; Early Jurassic (Hettangian) of Luxembourg.

Occurrence.—Early Jurassic–Middle Jurassic; Europe, South America.

Remarks.—Based on the characterization of Gründel and Nützel (2012) members of *Striactaeonina* share 'cylindrical to oval shells, with distinctly elevated spire. The last whorl is moderately convex and not inflated. The whorls have a sub-sutural ramp, which is oblique in most cases. The ramp is demarcated from whorl face by a spiral furrow. Spiral striae are present in whorls flanks and on base. The growth lines are prosocylindrical and curving backward in their apical portion. The aperture is drop-shaped, with the outer lip convex and the inner lip showing a convex parietal and concave columellar portion. Considering these diagnostic characters, the specimens described below are retained into *Striactaeonina*.

Striactaeonina transatlantica (Behrendsen, 1891)
Figure 4.15–4.20

- 1891 *Actaeonina transatlantica* Behrendsen, p. 383, pl. 22, fig. 9.
1894 *Actaeonina transatlantica* Behrendsen, Möricke, p. 31.
1922 *Actaeonina transatlantica* Behrendsen; Behrendsen, p. 169, pl. 1, fig. 7.
1926a *Striactaeonina transatlantica* (Behrendsen); Jaworski, p. 400.
1926b *Striactaeonina transatlantica* (Behrendsen); Jaworski, p. 201.
1931 *Striactaeonina transatlantica* (Behrendsen); Weaver, p. 390.
1982 *Striactaeonina transatlantica* (Behrendsen); Pérez, p. 123, pl. 16, fig. 16.
2001 *Striactaeonina transatlantica* (Behrendsen); Gründel, p. 65, pl. 6, figs. 10–11.

Type material.—Several specimens, originally described by Behrendsen (1891) from the Early Jurassic of Paso del Portezuelo Ancho, Mendoza Province, Argentina (Behrendsen, 1891, p. 383, pl. 22, fig. 9). Behrendsen's original material, which should be housed at Göttingen, Germany, could not be examined, and thus no lectotype designation is proposed here.

Occurrence.—Cerro Roth, Pliensbachian, Neuquén Province; Arroyo Serrucho, Cerro Puchenque, Paso del Portezuelo Ancho

Table 5. Dimensions (mm) of *Striactaeonina transatlantica* (Behrendsen, 1891). — = missing data.

Specimen	Height	Width	Apical angle
MLP 25094/a	23.9	16.7	90°
MLP 25094/b	27.2	17.0	96°
MCF-PIPH 547	13.5	10.3	—
MLP 35500	33.0	20.7	—
MLP 35501	36.8	20.5	—
MLP 35502	23.9	16.5	—
MLP 35503	23.5	18.9	—
MLP 35504	35.4	26.7	—
MLP 35505	31.5	19.7	—
MLP 35506	48.4	26.2	—
MLP 35508	32.7	14.5	68°
MLP 35509	24.3	14.2	83°
MLP 35510	51.6	27.7	69°

and Arroyo del Portezuelo Ancho, Pliensbachian, Mendoza Province, Argentina.

Description.—Dextral, anomphalous, medium-sized and low-spired shell, with an oval to cylindrical shape. The protoconch is not preserved. The teleoconch has a mean height of 31.2 mm and a mean width of 19.2 mm, is strongly stepped in outline and consists of approximately three to four flat to slightly convex whorls. The apex forms an angle of 81°, although earliest whorls are missing in the available specimens. Last teleoconch whorl is more expanded than the spire. Suture is incised and bordered by a weak spiral furrow. The sub-sutural ramp is smooth, horizontal and narrow, and bordered by a peripheral and acute spiral cord. The outer face is flat and becomes slightly convex toward the last whorl and is ornamented by regularly spaced spiral cords; the interspaces between cords develop weak spiral furrows. Collabral ornament is lacking. The base is convex to slightly angular, and the aperture oval.

Materials.—MLP 25094a/b, 25095, 35500, 35501, 35502, 35503, 35504, 35505, 35506, 35507, 35508, 35509, 35510; MCF-PIPH 547; 15 recrystallized specimens.

Dimensions (mm).—Table 5.

Remarks.—*Striactaeonina transatlantica* was previously reported in the Early Jurassic of Argentina by several authors (Behrendsen, 1891, 1922; Möricke, 1894; Jaworski, 1926a, b; Weaver, 1931). Particularly, this species occurs in Pliensbachian deposits of Portezuelo Ancho (Mendoza Province) and Catán Lil (Neuquén Province); but also is present in coeval marine sediments at Qda. Asientos and Jorquera/La Guardia (Chile) (see Pérez, 1982; Gründel, 2001a). *Striactaeonina atuelensis* Gründel, 2001a (p. 66, pl. 6, figs. 7–8), from the Early Jurassic (early Pliensbachian) of Río Atuel (Mendoza) has recently been revised at the Museum für Naturkunde repository (specimen MB.Ga.803). The species from Chile is very similar to *S. transatlantica* in general shell morphology and ornament pattern; however, it is slightly smaller than *S. transatlantica*, has a spire with slightly more convex whorls and a less gradate outline shell, has a narrower sub-sutural ramp, and a wider apical angle of 111°. *Actaeonina (Striactaeonina) supraliasica* Cox (1965, p. 173, pl. 29, fig. 4a, b, c), from the Early Jurassic (Toarcian) of

Kenya, is slightly smaller than the Argentinean form, has a more acute spire and narrower sub-sutural ramp.

Family *Cylindrobullinidae* Wenz, 1938

Remarks.—Gründel and Nützel (2012) argued that *Cylindrobullina* represents the oldest confirmed genus of the family *Cylindrobullinidae* with its first certain occurrence from the Late Triassic of South America (Haas, 1953). Gründel (2010) re-described the type species of the genus, *Cylindrobullina fragilis* (Dunker, 1846), and suggested that the use of the genus had to be changed. Representatives of *Cylindrobullina* have cylindrical shells with a somewhat elevated spire.

Genus *Cylindrobullina* von Ammon, 1878

Type species.—*Cylindrobullina fragilis* (Dunker, 1846), from the Early Jurassic (Hettangian) of North Germany.

Occurrence.—Late Triassic–Late Jurassic; Europe, South America.

Remarks.—The genus *Cylindrobullina* shows extreme resemblance with *Actaeonia* and thus, the assignment of some species to one or the other is usually questionable. Gründel and Nützel (1998) considered *Cylindrobullina* and *Actaeonina* as synonymous, giving the priority to *Actaeonina*. Later, Gründel and Nützel (2012) stated out that the systematic placement of *Actaeonina* is unclear due to the unknown protoconch of the type species, *A. carbonaria* (de Koninck, 1843). The authors suggested that the teleoconch morphology of *A. carbonaria* resembles that of the Mesozoic species of ‘*Cylindrites*’, including a low spire, very narrow aperture, and a distinct ramp which is demarcated by an angulation from the whorls flank. These similarities suggest that *Actaeonina* could be indeed the earliest member of *Cylindrobullina/Cylindrites* group. Representatives of *Cylindrobullina* share a cylindrical shell shape, the whorls embrace just below the subsutural ramp, the aperture is high and narrow, the spire is low and distinct, whorls are smooth or weakly ornamented with strengthened growth lines, spiral striae or spiral threads on base, growth lines on the flanks weakly prosocyrt and on the ramp directed backward and opisthocyrt, aperture very high, and the protoconch (although unknown from the type species) is heterostrophic (see diagnosis of Gründel, 2010; Gründel and Nützel, 2012). These characters are considered here to assign the specimens described below to *Cylindrobullina*.

Cylindrobullina ovata (Behrendsen, 1891) new combination Figure 4.21–4.27

1891 *Actaeonina ovata* Behrendsen, p. 383, pl. 22, fig. 7.

2015 *Actaeonina ovata* Behrendsen, 1891; Ferrari, p. 88, fig. 7 R–T.

Type material.—One specimen originally described by Behrendsen (1891) from the Early Jurassic of Paso del Portezuelo Ancho, Mendoza Province, Argentina (Behrendsen, 1891,

p. 383, pl. 22, fig. 7). Behrendsen’s original specimen, which should be housed at Göttingen, Germany, could not be examined.

Emended diagnosis.—Oval, egg-shaped shell; teleoconch whorls convex; last whorl greatly expanded; sub-sutural ramp horizontal; prosocyrt collabral ribs; regularly spaced spiral furrows on base.

Occurrence.—Cerro Roth, Pliensbachian, Neuquén Province; Cerro Puchenque, Paso del Portezuelo Ancho and Arroyo Serrucho, Pliensbachian, Mendoza Province, Argentina.

Description.—Dextral, oval, egg-shaped, medium-sized and low-spired shell. The protoconch is not preserved. The teleoconch is composed of five convex whorls with a mean height of 23.9 mm and a mean width of 13.8 mm. The axis forms an apical angle of 72°. Last teleoconch whorl is greatly more expanded than the spire. The spire is low. The sub-sutural ramp is narrowly horizontal and convex. The outer face of whorls is strongly convex. Suture is impressed in a weak spiral furrow. The shell is smooth, or has prosocyrt collabral ribs on last teleoconch whorl in some specimens. The base is convex with fine and regularly spaced spiral furrows. The aperture elongated and strongly oval, with the posterior end acute and the anterior end expanded. The columellar lip is thin.

Materials.—MCF-PIPH 546, MLP 35511, 35512, 35514; four recrystallized specimens.

Dimensions (mm).—MLP 35514: height = 17.2; width = 8.7; apical angle = 54°. MCF-PIPH 546: height = 22; width = 13; apical angle = 87°. MLP 35511: height = 29.2; width = 15.8; apical angle = 75°. MLP 35512: height = 27.2; width = 17.8; apical angle = 72°.

Remarks.—The species was originally described by Behrendsen (1891, p. 383, pl. 22, fig. 7) under the genus *Actaeonina*, from the Early Jurassic of Portezuelo Ancho (Mendoza Province, Argentina). Here, Behrendsen’s species is reassigned to *Cylindrobullina*, following the updated characterizations of Gründel (2010) and Gründel and Nützel (2012). Moreover, the new material here described show the typical prosocyrt growth lines on the shell surface and the spiral striae on base. The spiral ornament was not described in the original characterization of Behrendsen, and in the present paper this character is included in the emended diagnosis of the species.

Cylindrobullina ovata resembles *Actaeonina novozealandica* Bandel et al. (2000, p. 101, pl. 10, figs. 8–10, 12), from the Early Jurassic of New Zealand; however, the species described by Bandel et al. (2000) is much smaller than *C. ovata*, has a higher spire shell, a teleoconch whorls with rounded angular corner, a developed spiral groove, and fine growth lines on the shell surface. *Actaeonina submoorei* Kuhn (1936) (in Gründel and Nützel, 1998, p. 76, pl. 4, figs. 5–10), from the Early Jurassic (Pliensbachian) of Germany differs from *C. ovata* in having a more developed sub-sutural ramp, spiral grooves on the angular corner of whorls, and a more acute spire. *Actaeonina domeria* Gründel and Nützel (1998, p. 77, pl. 5, figs. 2–4), *Actaeonina*

obliquata Gründel and Nützel (1998, p.78, pl. 4, fig. 11–12, pl. 5, fig. 1) and *Actaeonina rara* Gründel and Nützel (1998, p.78, pl. 4, figs. 11–12, pl. 5, fig. 1), all from the Early Jurassic (early Pliensbachian) of Germany, have wider sub-sutural ramps in comparison to *A. ovata*. *Cylindrobullina arduennensis* (Piette, 1856) (in Gründel and Nützel, 2012, p. 36, fig. 2), from the Early Jurassic (Hettangian) of France, is very similar to *C. ovata* in shell shape, although the European form is much smaller.

Haas (1953) described many *Cylindrobullina* species from the Late Triassic of the Pucará Group (Central Peru), which are very similar to *C. ovata*. *Cylindrobullina (Cylindrobullina?) pyrulaeformis* Haas (1953, p. 266, pl. 17, figs. 67–69, 72–72, 84, 85) and *Cylindrobullina (C?) obesa* Haas (1953, p. 264, pl. 17, figs. 54–57, 60–63, 65, 66, 70, 71, 75, 76, 79–82, 86) differs from *C. ovata* in having strongly convex whorls, and more pronounced sutural ramps. Particularly, *Cylindrobullina (C?) pyrulaeformis* has a strongly corkscrew-shaped columella and *Cylindrobullina (C?) obesa* has a slightly concave base; these characters are not visible in *A. ovata*.

Cylindrobullina brevispira new species

Figure 4.28–4.29

Holotype.—MLP 35513; one recrystallized specimen.

Diagnosis.—Egg-shaped; extremely low spire for the genus; sub-sutural ramp widely horizontal; last whorls greatly expanded; ornament lacking; aperture elongated and oval.

Occurrence.—Arroyo Serrucho, Pliensbachian, Mendoza Province, Argentina.

Description.—Dextral, oval, egg-shaped, medium-sized and very low-spined shell. The protoconch is not preserved. The teleoconch is composed of five convex whorls and has a height of 25.0 mm and a width of 17.4 mm. The axis forms an apical angle of 120°. Last teleoconch whorl is greatly more expanded than spire. The sub-sutural ramp is widely horizontal and forms a rounded edge as transition with last whorls; the outer face of whorls is strongly convex. Suture is impressed in a weak spiral furrow. The shell is smooth and the base convex. The aperture is elongated and strongly oval, with the posterior end acute.

Etymology.—Referred to the extremely low-spined shell in comparison with other representatives of the genus.

Dimensions (mm).—MLP 35513, holotype: height = 25; width = 17.4; apical angle = 120°.

Remarks.—*Cylindrobullina brevispira* n. sp. shows a more obtuse apical angle and a more convex whorls outline than *Cylindrobullina ovata*. *Cylindrobullina brevispira* is also comparable to the type species *Cylindrobullina fragilis* (Dunker, 1846), from the Early Jurassic (Hettangian) of North Germany; however, the European form has a more elevated spire and clearly visible opisthocyrt collabral ribs on the outer face of last whorl. *Cylindrobullina arduennensis* (Piette, 1856) (in Gründel and Nützel, 2012, p. 36, fig. 2), from the Early Jurassic (Hettangian) of France, is similar to *C. brevispira*, although the

European form is much smaller, has a less convex last whorl with opisthocyrt collabral ribs, and a slightly more elevated spire.

Acknowledgments

I am deeply grateful to S. Damborenea (MLP) for providing most of the specimens described here, which were collected by her from 1975 onwards during field trips to the Neuquén Basin accompanied by M. Manceñido and A. Riccardi (both at MLP) to whom I also extend my gratitude. I thank A. Riccardi for allowing access to the MLP collection and for supplying an updated biostratigraphical framework for the Neuquén Basin. I also thank the Dirección General de Patrimonio Cultural, Secretaría de Estado de Cultura de la Provincia de Neuquén, and L. Zingoni, who allowed the access to outcrops in his land in southern Neuquén Province. I am also grateful to R. Coria (Museo Carmen Funes, Plaza Huincul, Neuquén, Argentina) for arranging the loan of the gastropod material collected by the author. I extend my gratitude to S. Bessone (CENPAT), L. Canessa (MEF), and N. Pfeiffer (MEF) for preparation of specimens; and to M. Manceñido and J. Echevarría (MLP) for their help during fieldwork in the Neuquén Basin in 2012. I thank S. Lanés for providing specimens from Arroyo El Pedrero and J. Groizard (ALUAR) for allowing access to the scanning electron microscope. Study of the MLP and MCF-PIPH gastropod material was made possible by a Sylvester-Bradley Award from the Palaeontological Association. The revision of the MB.Ga. gastropod material was made possible in part by a project financed by AGENCIA being PICT 2013-0356. I thank M. Aberhan (Museum für Naturkunde, Berlin) for allowing the access to the MB.Ga. invertebrate collection. This study is also part of a long-term project financed by CONICET grants, the last one being PIP 112-200801-01567. Finally, I extend my gratitude to R. Gatto (Dipartimento di Geoscienze, Università di Padova, Italy) and A. Beu (GNS, New Zealand) for their valuable comments, which helped to greatly improve the manuscript.

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Accepted 23 August 2016