



## A revision of the genus *Olivancillaria* (Mollusca: Olividae) from the southwestern Atlantic

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### Abstract

The genus *Olivancillaria* is revised and restricted to eight living species: *O. deshayesiana*, *O. carcellesi*, *O. urceus*, *O. contortuplicata*, *O. orbignyi*, *O. teaguei*, *O. auricularia* and *O. vesica*. The last two species were previously considered as subspecies. The name *O. uretai* is a junior synonym of *O. orbignyi*. The genus *Olivancillaria* is endemic to the southwestern Atlantic, ranging from Bahia state, Brazil (~12°S) to Chubut province (42°37'S), Argentina, intertidal to 70 m depth. It is a clear representative of the Argentine Malacological province. Redescriptions and re-illustration of types were done for each species. Shell ultrastructure, radulae, penes, siphon papillae and egg capsules are described and illustrated by SEM images. A geometric morphometric analysis was carried out to confirm shell variation on size and shape among species. The geographic distribution of each species is provided based on field observations as well as on museum records.

**Key words:** Argentina, Gastropoda, geometric morphometric analysis, Neogastropoda, *Olivancillaria*, Olividae

## Introduction

The family Olividae Latreille, 1825 includes carnivorous or detritivorous semi-infaunal marine gastropods of moderate size (Smith 1998). They inhabit nearshore waters in temperate and tropical regions. Thirty species of Olividae are reported from South America, from the genera *Olivancillaria* d'Orbigny, 1840, *Oliva* Bruguière, 1789, *Olivella* Swainson, 1831, *Ancilla* Lamarck, 1799, *Jaspidella* Olsson, 1956, *Agaronia* Gray, 1839 and *Amalda* Adams & Adams, 1853 (see *e.g.* Absalão 2000, Absalão & Pimenta 2003, Pastorino 2003, Rios 2009).

Among the regional taxonomic treatments specifically of the genus *Olivancillaria*, Marcus & Marcus (1959) described the anatomy of *O. urceus* (as *O. brasiliensis*) and *O. auricularia* (under the genus *Lintrricula*). Later Klappenbach (1964, 1965, 1966) published a series of papers where he described three species and discussed the status of two others belonging to this genus. The last account of *Olivancillaria* species was done by Thomé (1966), who described *O. buckuporum* from southern Brazil, considered later as a local variation of *O. carcellesi* (Rios 1970, Thomé *et al.* 2004).

In a very interesting approach, Tursch (1988) studied several protoconch parameters of some species of Olividae and confirmed supraspecific differences among several genera including *Olivancillaria*. Carranza & Norbis (2005) have documented the variation among the shells of *O. urceus* from several Southwestern Atlantic localities. Recently, Teso *et al.* (2010) studied the phenotypic variation of shell size and shape of *O. carcellesi* from four Southwestern localities using geometric morphometric methods.

The aim of this paper is to revise and redescribe the living species of *Olivancillaria* including examination of type material, corroborated ranges, together with SEM illustrations of shell ultrastructure, radulae, penes, siphonal papillae and, when available, egg capsules. In addition, a geometric morphometric analysis was carried out to confirm shell variation in size and shape among species.

## Material and methods

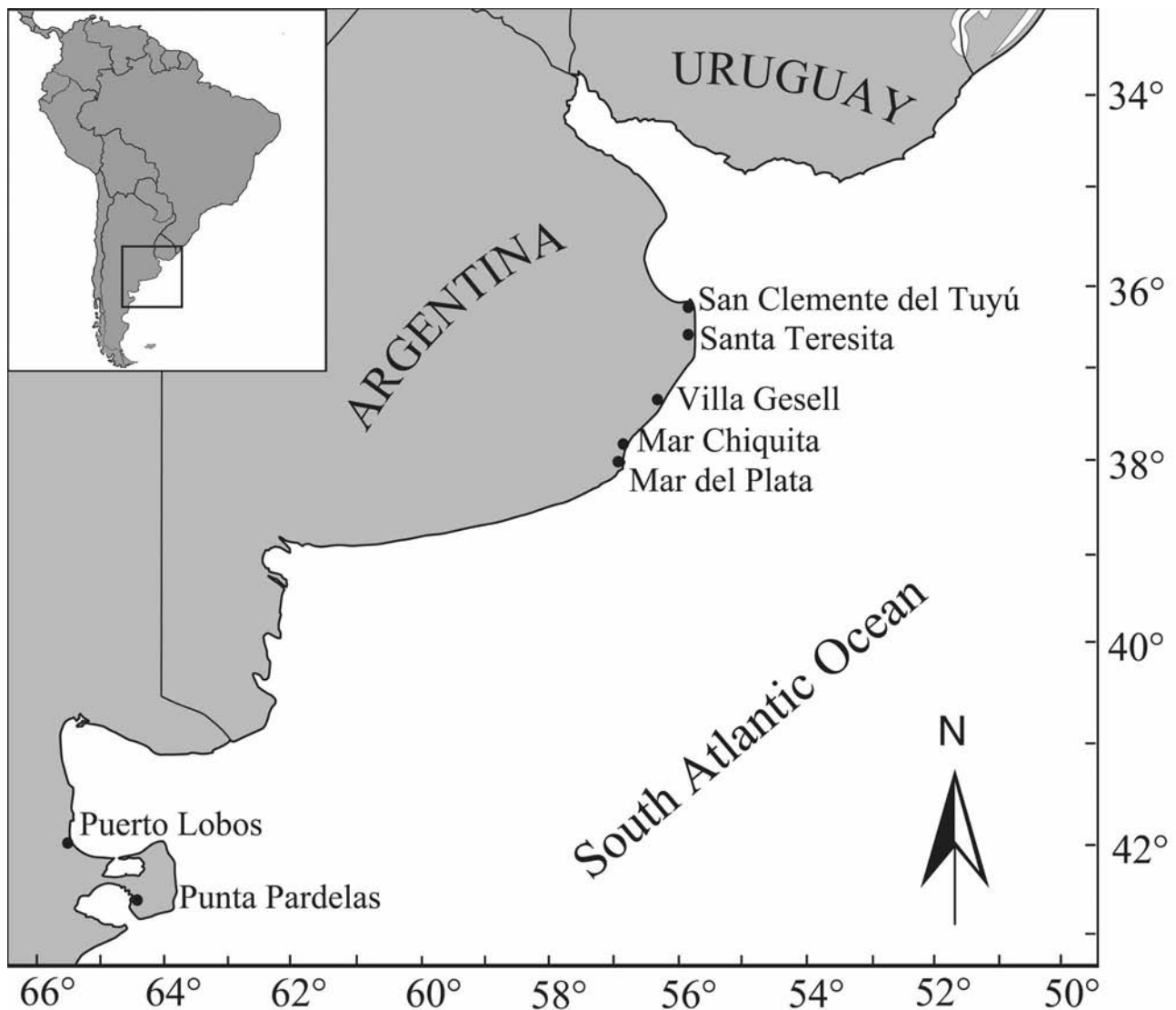
Live specimens were collected from several localities along the Argentine coast: intertidally from San Clemente del Tuyú (36°22'S, 56°42'W) and Santa Teresita (36°32'S, 56°40'W); by bottom trawling in 4–12 m depth from Villa Gesell (37°15'S, 56°58'W), Mar Chiquita (37°44'S, 57°24'W) and Mar del Plata (38°02'S, 57°31'W); by SCUBA diving in 6–20 m depth from Puerto Lobos (42°00'S, 65°04'W) and Punta Pardelas (42°37'S, 64°15'O) (Figure 1). Other specimens analyzed are housed at the following institutions: Museu Nacional de Rio de Janeiro (MNRJ), Museu de Zoologia da Universidade de São Paulo (MZUSP) and Museu Oceanográfico “Profesor Eliézer de Carvalho Rios”, Rio Grande (MORG), Brazil; Museo Nacional de Historia Natural (MNHNM) and Barattini's collection at the Museo Zoológico Municipal “Dámaso Larrañaga”, both in Montevideo, Uruguay; Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Buenos Aires (MACN-In) and Museo de La Plata (MLP), Argentina; The Natural History Museum, London (NHMUK) and National Museums Liverpool (NML); Muséum d'Histoire naturelle, Genève (MHNG); Natuurhistorisch Museum, Rotterdam (NMR), The Netherlands; Muséum national d'Histoire naturelle, Paris (MNHN), the Zoological Institution, St-Petersburg, Russia, Museum of Natural History Vienna (NHMW), Austria and Universidade de Santiago de Compostela (USC), Spain. All shells were photographed using a Nikon D100 camera with a Micro Nikkor lens and digitally processed with the appropriate software.

All known citations of living records for the genus *Olivancillaria* in the literature are included on the synonymic lists (See Table 2 for index).

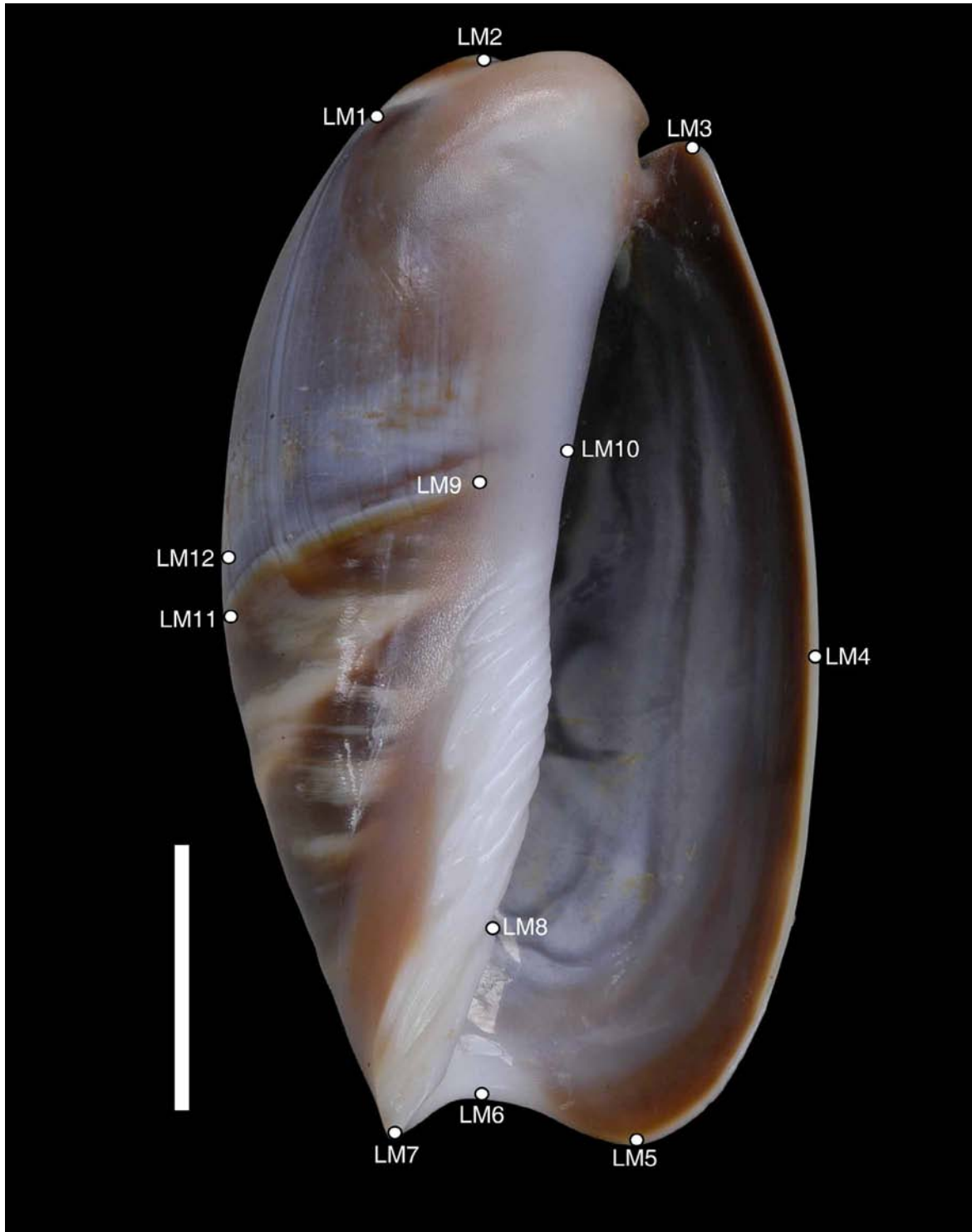
Dissections were performed on ethanol-preserved specimens for study of the gross anatomy of the anterior alimentary system, and the pallial portions of the male and female reproductive systems. Radulae were cleaned with NaClO and sonicated in an ultrasonic cleaner from about five males and five females of each species. Shell ultrastructure was studied using freshly fractured collabral sections taken from the central portion of the lip on the last whorl. The shell thickness was divided into four groups: thickest (~2.3 mm), thick (~1 mm), medium (~0.6 mm) and thinnest (~0.4 mm). SEM photographs were taken using a Philips XL30 at MACN.

Geometric morphometric analysis was performed on twenty specimens of each species (Table 1). Twelve landmarks representative of the shell (*sensu* Rohlf 1996, Roopnarine & Vermeij 2000) were chosen on apertural view

(Figure 2); for descriptions of each landmark see Teso *et al.* (2010). The landmark data were used to calculate the specimen size and to describe the shape variation among species. Size was calculated as the square root of the summed squared distances of a specimen's landmarks to their geometric centroid:  $CS = [\sum (di)^2]^{1/2}$ , where CS is centroid size and  $di$  is the distance of landmarks to their centroid. The description of shape was carried out by relative warp analysis (RWA) (Bookstein 1991) performed with the tpsRelw (Rohlf 2005). This method is comparable to principal component analysis, which summarizes a specimen shape as a deformation from a common reference. The relative warps were computed with the scaling option  $\alpha = 0$  which weights all landmarks equally, for studying differences in shell shape among samples (Rohlf *et al.* 1996). In addition, the interspecific variation among groups was tested with a multivariate analysis of variance (MANOVA) of partial warp scores (Zelditch *et al.* 2004). The posterior categorization was revealed by canonical variates analysis (CVA). We also used a discriminant function analysis (DFA) with the RWs (Relative Warps) and CS (centroid size) to test differences between groups. Allometric variation was tested with a multiple regression model with the relationships between RWs and CS and with a covariance analysis (ANCOVA). Differences in centroid size distributions among groups were tested with one-way ANOVA and post hoc Tukey HSD test (Sokal & Rohlf 1995). Normality was tested with Lilliefors test. Statistical analysis was carried out with Statistic v. 6.0. When homogeneity of variances could not be achieved by transformation, data were analyzed nonetheless, since analysis of variance is robust for departure from this assumption when sizes of samples are equal (Underwood 1997). Results were, however, interpreted with caution by judging significance more conservatively ( $\alpha = 0.01$ ).



**FIGURE 1.** Map showing the sampled localities.



**FIGURE 2.** Apertural view of *Olivancillaria carcellesi* (MACN-In 37505) showing the homologous landmarks used in the geometric morphometric analysis. Scale bar = 1 cm.

## Results

### Morphometric analysis

The geometric morphometric method by means of MANOVA and posterior CVA showed significant differences among groups (Wilks'  $\lambda = 0.00001$ ,  $\chi^2 = 1464.4501$ ,  $P < 2.22045 \times 10^{-16}$ ). The study revealed eight morphotypes

(Figure 3). We found that 100% of the original cases were cross-validated correctly into their species groups based on the Mahalanobis distance in the space defined by the significant CVA axes.

**TABLE 1.** Localities and museum specimens of *Olivancillaria* used for the geometric morphometric analysis. CS: centroid sizes (average  $\pm$  SD). Mar del Plata, Buenos Aires (MdP), La Paloma, Rocha (LP), La Coronilla, Rocha (LC), São Pablo (SP), Espírito Santo (ES).

Species	Localities	Museum lots	CS
<i>O. auricularia</i>	MdP	MACN-In 10297, 11996, 16686, 35976	52.7 $\pm$ 9.9
<i>O. carcellesi</i>	MdP	MACN-In 25366, 37505	44.7 $\pm$ 6.7
<i>O. contortuplicata</i>	LP	MNHNM 638, 1298, 737 (paratypes); 3866, 4520, 9114, 4402, 9115, 15525	34.6 $\pm$ 3.9
<i>O. deshayesiana</i>	MdP	MACN-In 37503	38.9 $\pm$ 1.9
<i>O. teaguei</i>	LC	MNHNM 1230 (paratypes), 1237 (paratypes), 1241 (paratypes), 4301	24.0 $\pm$ 3.7
<i>O. orbignyi</i>	MdP	MACN-In 16545, 37504; MNHNM 0875, 0543 (paratypes)	33.6 $\pm$ 6.5
<i>O. urceus</i>	MdP	MACN-In 37502	48.8 $\pm$ 12.5
<i>O. vesica</i>	SP	MNHNM 9556, 10657, 13590, 14256, 34196, 43233, 46888	67.4 $\pm$ 11.8
<i>O. cf. carcellesi</i>	ES	MNHNM 3026, 9612; MORG 100, 8244, 9138, 10660, 12307, 17769, 27561.	51 $\pm$ 11.0

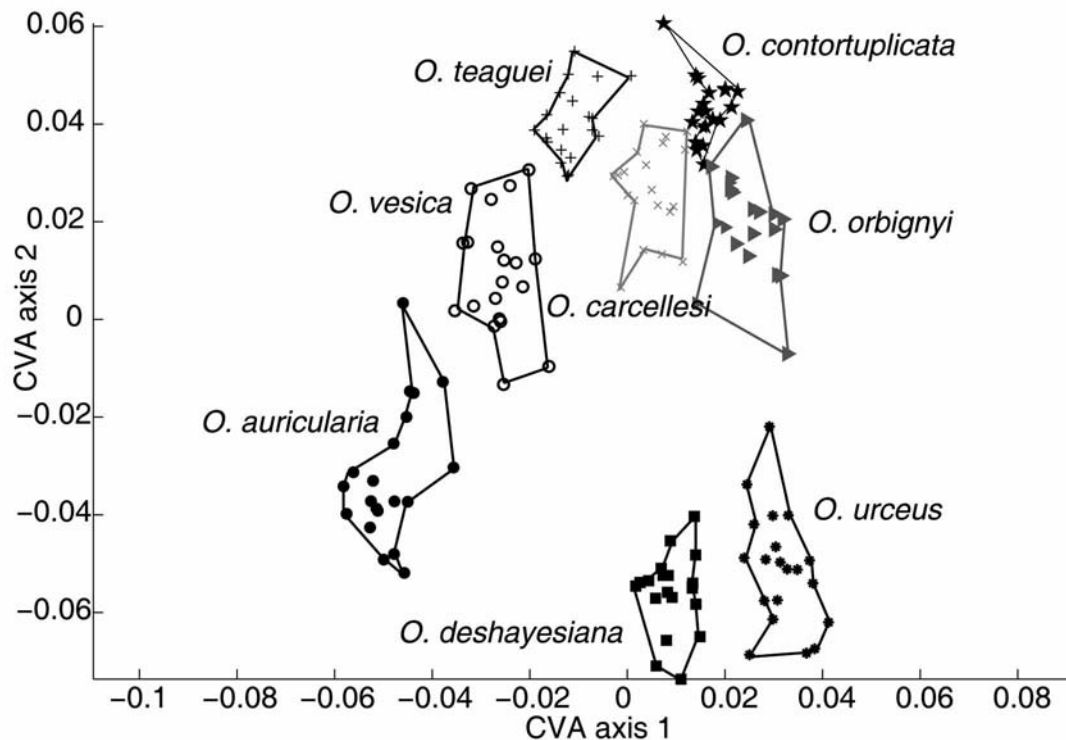
**TABLE 2.** Species attributed to the genus *Olivancillaria*, valid names (**in bold**) and page number where the species is treated.

<b><i>Olivancillaria urceus</i> (Röding, 1798)</b>		7
<i>Voluta pinguis</i> Solander, 1786	synonym of <i>Olivancillaria urceus</i>	7
<i>Oliva brasiliensis</i> Chemnitz, 1788	synonym of <i>Olivancillaria urceus</i>	7
<b><i>Olivancillaria vesica</i> (Gmelin, 1791)</b>		10
<i>Oliva aquatilis</i> Reeve, 1850	synonym of <i>Olivancillaria vesica</i>	10
<b><i>Olivancillaria auricularia</i> (Lamarck, 1811)</b>		13
<i>Oliva patula</i> Sowerby, 1825	synonym of <i>Olivancillaria auricularia</i>	13
<i>Claneophila gibbosa</i> Gray 1858 (non Born, 1778)	synonym of <i>Olivancillaria auricularia</i>	13
<b><i>Olivancillaria contortuplicata</i> (Reeve, 1850)</b>		15
<b><i>Olivancillaria deshayesiana</i> (Ducros de Saint Germain, 1857)</b>		16
<i>Oliva ovata</i> Marrat, 1871	synonym of <i>Olivancillaria deshayesiana</i>	16
<b><i>Olivancillaria orbignyi</i> (Marrat, 1868)</b>		20
<i>Agaronia testacea</i> Barattini & Ureta 1961 (non Lamarck, 1811)	synonym of <i>Olivancillaria orbignyi</i>	20
<i>Olivancillaria uretai</i> Klappenbach, 1965	synonym of <i>Olivancillaria orbignyi</i>	20
<b><i>Olivancillaria teaguei</i> Klappenbach, 1964</b>		24
<b><i>Olivancillaria carcellesi</i> Klappenbach, 1965</b>		24
<i>Agaronia steeriae</i> Lange de Morretes, 1949 (non Reeve, 1850)	synonym of <i>Olivancillaria carcellesi</i>	24
<i>Olivancillaria buckuporum</i> Thomé, 1966	synonym of <i>Olivancillaria carcellesi</i>	24
<i>Oliva nana</i> Lamarck, 1811	belongs in the genus <i>Olivella</i> Swainson, 1831	28
<i>Oliva acuminata</i> Lamarck, 1811	belongs in the genus <i>Agaronia</i> Gray, 1839	28
<i>Oliva cauta</i> Marrat, 1871	Belongs to different olivid genus, not <i>Olivancillaria</i>	28

The RWA of all groups demonstrates that 89.6% ( $\alpha = 0$ ) of total variations are expressed by the first four axes (RW1 = 40.4%, RW2 = 35.5%, RW3 = 7.5% and RW4 = 6.2%). The scores obtained from this analysis revealed significant regression between shape and centroid size ( $P < 0.01$ ). Although two groups discriminated by the CVA, *O. auricularia* and *O. teaguei*, exhibited significant allometry between RW1 and centroid size (linear regressions:

$r^2 = 0.56$  and  $r^2 = 0.35$ ,  $P < 0.001$ ), the two allometric relationships differed significantly (ANCOVA,  $F = 481.7$ ,  $P < 0.0001$ ). Allometry does not account for shape differences between the other six species.

The main differences among species, according to this method, lay in siphonal channel curvature, the height of the spire, the thickness of columellar callus and on the most external part of the posterior fasciolar band. Almost all forms showed significant differences in centroid size distribution (ANOVA,  $F = 46.34$ ,  $P < 0.01$ ). The smaller group was *O. teaguei* and the larger group was *O. vesica* (Table 1).



**FIGURE 3.** Results of canonical variates analysis of all *Olivancillaria* species on the first two axes.

## Systematics

### Class Gastropoda Cuvier, 1798

### Subclass Orthogastropoda Ponder & Lindberg, 1997

### Superorder Caenogastropoda Cox, 1959

### Order Sorbeoconcha Ponder & Lindberg, 1997

### Infraorder Neogastropoda Thiele, 1929

### Superfamily Muricoidea Rafinesque, 1815

### Family Olividae Latreille, 1825

### Subfamily Olivinae Latreille, 1825

## Genus *Olivancillaria* d'Orbigny, 1840

**Type species.** *Oliva brasiliensis* Chemnitz, 1788 *nomen nudum* rejected by Direction 1, (ICZN, 1964) (= *Olivancillaria urceus* [Röding, 1798]) SD by Marcus & Marcus 1959 = *Scaphula* Swainson, 1840 (*non* Benson, 1834) (type species: *Oliva patula* Sowerby, 1825) = *Scaphura* Gray, 1865 (error pro Swainson, 1840) = *Lintricula* Adams & Adams, 1853 (type species: *Bulla vesica* Gmelin, 1791 = *Claneophila* Gray, 1858 (type species not designated)).

**Remarks.** There is no original designation of *O. urceus* (Röding, 1798) as the type species of the genus *Olivancillaria*. However Marcus & Marcus (1959) named *O. urceus* (as *O. brasiliensis*) as type species and according to the ICZN art. 69 this satisfies the criteria for a subsequent designation.

Gray (1858) disregarded *Olivancillaria* and described several new generic names including *Claneophila* with three species. This genus is a clear synonym of d'Orbigny's *Olivancillaria*.

**Diagnosis.** Shell oval-oblong of medium size (up to 63.5 mm), aperture narrow, elongate. Protoconch of about 2 whorls, usually covered by columellar callus. Spire short of about three to five flat whorls; suture channeled, deep, and partially filled with material from the columellar callus; one to twelve columellar folds, one basal fold followed by a deep groove always present; fasciolar band well defined, rounded by a groove; inner columellar walls partially dissolved on the first whorls. Posterior mantle tentacle always present. Foot voluminous not completely retracted into shell. Penis elongated and laterally flattened, sperm channel straight and completely open. Operculum, eyes and tentacles always absent.

### *Olivancillaria urceus* (Röding, 1798)

Figures 4–5

*Voluta pinguis* Solander, 1786: 174, No. 3740 *n. n.*; Dillwyn 1817: 516; Wood 1818: 92; Swainson 1821: pl. 42; Burch & Burch 1964: 111.

*Oliva brasiliensis* Chemnitz, 1788: 130, pl. 147, figs. 1367–1368 *n. n.* rejected by Direction 1 (ICZN 1964); Schumacher 1817: 244; Chenu 1845: 30, pl. 31, figs. 1–3, 10, pl. 35, figs. 5–6; Reeve 1850: pl. 8, fig. 13 a, b.

*Porphyria urceus* Röding, 1798: 37.

*Oliva Brasiliiana*. Lamarck, 1811: 322; Marrat 1871: 23, pl. 18 figs. 278–279.

*Oliva Braziliiana*. Swainson 1821: pl. 42 (error pro *Oliva brasiliensis* Chemnitz, 1788).

*Olivancillaria brasiliensis*. d'Orbigny 1840: 420; H. & A. Adams 1853: 141; Lange de Morretes 1949: 100; Castellanos 1970: 117, pl. 9, fig. 2; Boffi 1979: 26.

*Claneophila brasiliiana*. Gray 1858: 48.

*Oliva (Olivancillaria) brasiliiana*. Tryon 1883: 90, pl. 36, fig. 88, pl. 1, fig. 2; Carcelles 1944: 259, pl. 5 fig. 47; Camacho 1975: 357.

*Olivancillaria brasiliiana*. Fischer 1887: 598; Barattini & Ureta 1961: 126, pl. 37; Penchaszadeh 1971: 50; Webb 1986: 104–105, pl. 48, fig. 18; Aguirre 1991: 164.

*Olivancillaria urceus*. Johnson 1915: 103; Marcus & Marcus 1959: 180; Burch & Burch 1964: 111, pl. 7, fig. 9; Thomé 1966: 163; Figueiras 1967: 65; Sicardi 1967: 56–57; Jurberg 1970, fig. 1; Rios 1970: 101, pl. 31; Figueiras & Sicardi 1973: 259–260, pl. 14 fig. 186; Rios 1975: 110, pl. 32, fig. 468; Milstein *et al.* 1976: 152; Scarabino 1977: 190; Rios 1985: 110, pl. 38, fig. 487; Calvo 1987: 162, fig. 145; Tursch 1988: 246; Rios 1994: 142, pl. 46, fig. 610; Penchaszadeh 2004: 263, fig. 20; Scarabino 2004: 322; Thomé *et al.* 2004: 57, No. 49; Absalão & Pimenta 2005: 22, fig. 39; Carranza & Norbis 2005: fig. 2–3; Clavijo *et al.* 2005: 388; Demicheli & Scarabino 2006: 526; Scarabino *et al.* 2006: 146; Urteaga & Pastorino 2007: 1431–1439, figs. 1–4; Rios 2009: 269, No. 667.

**Diagnosis.** Shell large (up to 63.5 mm, largest of the genus), subquadrangular, solid; protoconch always visible, never covered by callus; anterior columellar callus very thick; shell dirty pinkish, with axial irregular clear or dark lines, spire and fasciolar band brown-ocher; live animals with foot and siphon dark-pink.

**Description.** Shell large, subquadrangular, thick, smooth, polished (thickness ~1 mm); protoconch of 1 3/4 translucent whorls, transition to teleoconch indistinct; suture channeled with 5 1/4 whorls; columellar callus very thick, uniform, covering the suture and part of the spire in large specimens; aperture elongated, wide, slightly less than 5/6 of total shell length; outer lip smooth, thin, straight; posterior part of columella slightly convex and smooth with 6–11 anterior oblique folds, externally to those folds, 2 or 3 pronounced folds parallel to columellar edge; fasciolar band well defined, brown-ocher with axial bands; posterior groove deep; siphonal channel deep (Figure 4). Shell ultrastructure composed of three layers: more than half of the thickness is in the middle layer (of crossed-



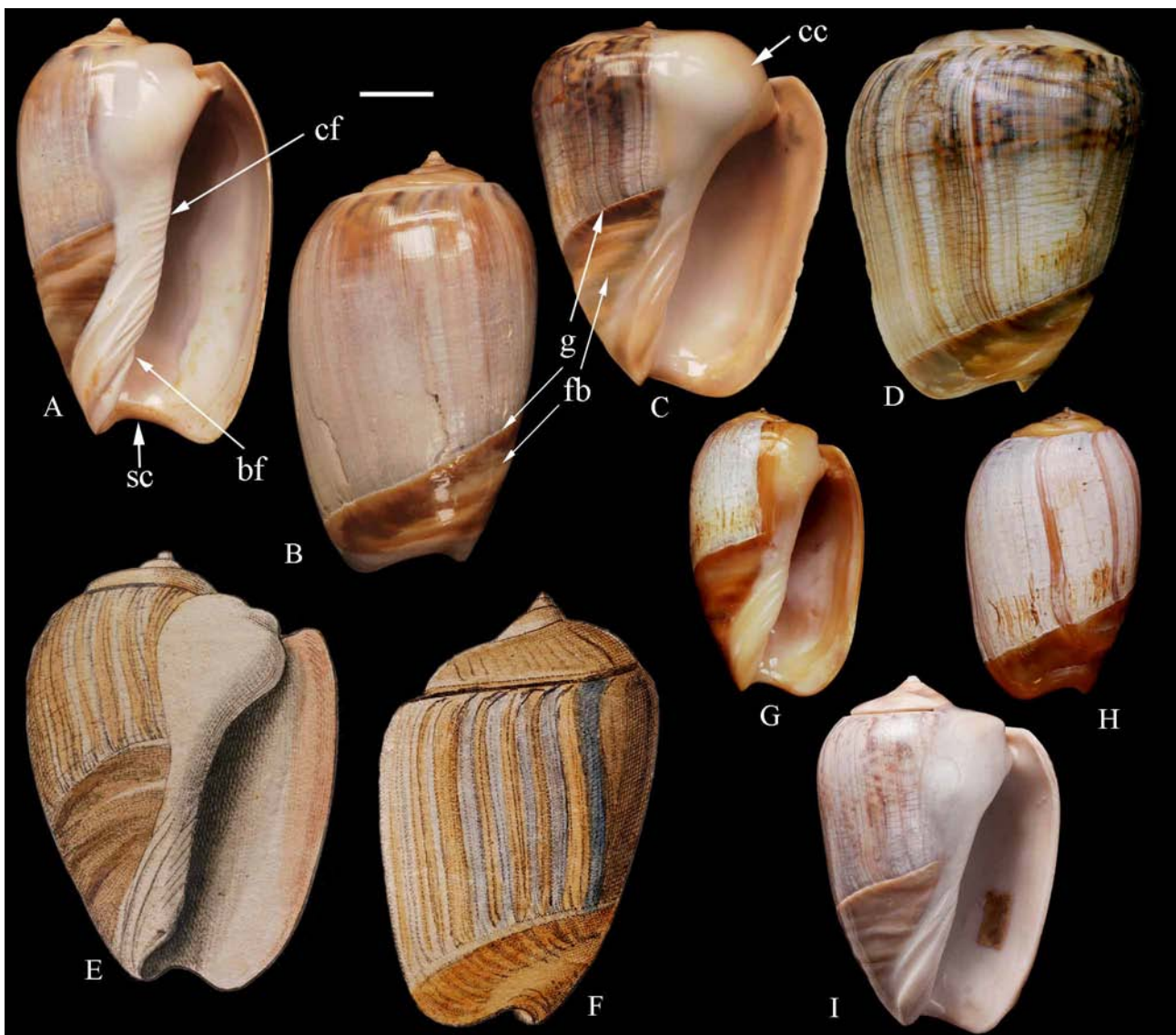
lamellar crystals of aragonite), and outer layer (of amorphous calcite) and innermost layer (of prismatic crystals of aragonite) are thinner (Figure 5E).

Radula rachiglossate (Figure 5A), rachidian teeth tricuspid with the central cusp smaller, a small denticle usually present on each side of the lateral rachidian cusps (Figure 5B). Lateral teeth C shape, with quadrangular base.

Living specimens with pink color around and on the sole of the foot and siphon. Penis muscular, elongated (Figure 5C), tapering with a tip slightly sharpened, laterally flattened with a straight spermatic groove open all along. Siphon large, the distal tip with numerous branched papillae of two orders (Figure 5D).

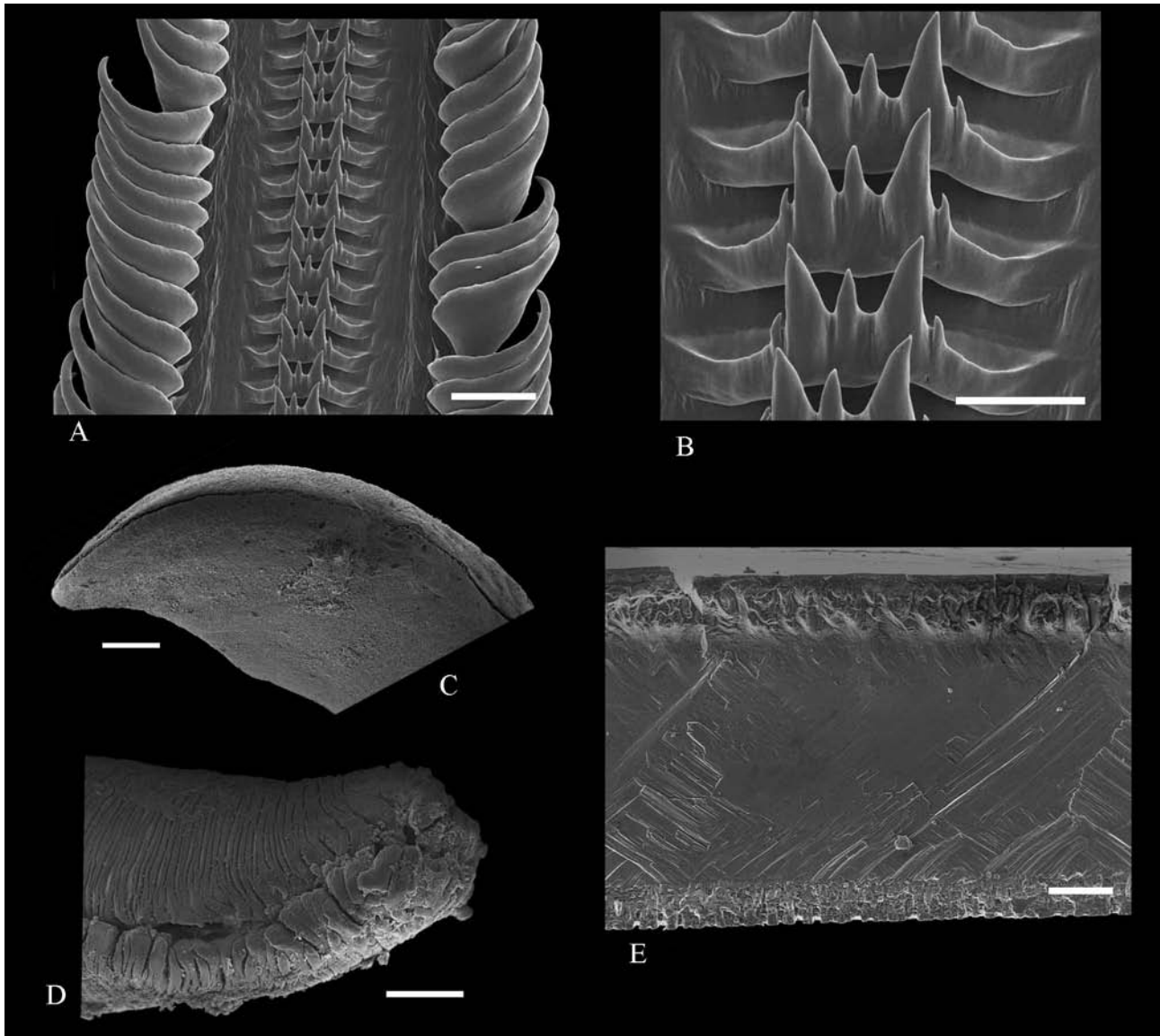
**Geographic distribution.** From Sumbauma (12°15'S; 37°47'W), Bahia state, Brazil to Puerto Lobos (42°00'S; 65°04'W), San Matías Gulf, Chubut province, Argentina in 0–53 m depth.

**Type material.** [*Porphyria urceus*] was not found (see remarks); [*Voluta pinguis*] two probable syntypes, NHMUK 506 from the collection of the Reverend Mordaunt Cracherode (Figure 4I), who is known to have exchanged shells with Joseph Banks, Captain Cook and the Duchess of Portland, among others (K. Way pers comm.); [*Oliva brasiliensis*] material is apparently lost. One specimen from the Zoological Institution (Saint Petersburg, Russia) matches the illustrated in fig. 1368, pl. 147 of Chemnitz (1788) (Figures 4E–F) however there is no clear indication on this specimen to assure the status (Sirenko, pers. comm.).



**FIGURE 4.** *Olivancillaria urceus* (Röding, 1798). A–B, MACN-In 38158 from Mar del Plata, Buenos Aires province, Argentina; C–D, MACN-In 38159 from Prainha Branca, São Paulo, Brazil; E–F, illustration of *Oliva brasiliensis* from plate 147, figures 1367–1368 of Chemnitz (1788); G–H, MACN-In 38157 from Mar del Plata, Buenos Aires province, Argentina; I, *Voluta pinguis* Solander, 1786, probable syntype NHMUK 506 from “Brazil”. Scale bar = 1 cm. bf: basal fold; cc: columellar callus; cf: columellar folds; fb: fasciolar band; g: fasciolar groove; sc: siphonal channel.





**FIGURE 5.** *Olivancillaria urceus*. A, radula, frontal view, scale bar = 100 µm, B, detail of rachidian teeth scale bar = 50 µm; C, penis, scale bar = 200 µm; D, siphon, scale bar = 500 µm; E, ultrastructure of the shell, scale bar = 200 µm.

**Type locality.** *Voluta pinguis*, *Oliva brasiliensis*, and *Porphyria urceus* all described from “Brazil”.

**Other material examined. Brazil.** Brazil: NHMUK 1854.12.4.413, 1854.12.4.414; Bahia (BA): MZUSP 51170; Sumbauma, BA: MZUSP 51003; Iguape, BA: MNRJ 6914, 6916; Piuma, Espírito Santo (ES): MZUSP 33392; ES: MZUSP 33392, 62975; Cape de São Thomé, Rio de Janeiro (RJ): MZUSP 73577; Niterói, RJ: MNRJ 6913, 9225, 13113; Rio das Ostras, RJ: MNRJ 8614; Cabo Frio, RJ: MNHNM 7849, MORG 41394, MNRJ 2817, 14578; Arraial do Cabo, RJ: MNRJ 2806, 11796; Jurujuba, RJ: MNRJ 277, 6912, 13068; Rj: MORG 13556 (40–50 m), NMR 60530, MNRJ 800, 6911, 6921; Praia de Grumari, RJ: MNRJ 1166, 1892, 6257, 6439, 13070; Copacabana, RJ: MACN-In 5041, MNRJ 14349; Guaratiba, RJ: MORG 25941 (20 m); Barra da Tijuca, RJ: MNRJ 2395; Ubatuba, São Paulo (SP): MORG 11006 (10 m), MZUSP 30083, 51197, 64200; Ilha Grande, SP: MZUSP 61390, 61396; Caraguatatuba, SP: MACN-In2976, MNRJ 6904; Ilha Victoria, SP: MNHNM 7590 (32–37 m); Ilha de Alcatrazes, SP: MNHNM 5278, MORG 12545 (40 m); Bertioga, SP: MZUSP 45678, 45679, 45702, 60325; Guarujá, SP: MNHNM 9059 (20 m), MNRJ 7739; Santos, SP: MZUSP 32112; Praia Grande, SP: MZUSP 59986, 83741; Peruíbe, SP: MORG 10666 (intertidal); Iguape, SP: MACN-In 1861, MNRJ 11417, 11602; Ilha Comprida, SP: MNRJ 11662; Cananeia, SP: MNHNM 7846 (20 m), 9002, 9188, MORG 1347, MZUSP 51196, 51587; Paranaguá, SP: MORG 5225, 45131, MNRJ 11632, 11636; Prainha Branca, SP: MACN-In 38159; Peruíbe, SP: MZUSP 26686, 61216, 61218; SP: MACN-In 2770, MNHNM 5276, 7843, MNRJ 1528, 3348, 3349, 14276;

Guaratuba, PR (Paraná): MNHNM 7842, 7850, MZUSP 51182; SC (Santa Catarina): MACN-In 35887; Bombinhas, SC: MORG 40175 (8–12 m); Torres, Rio Grande do Sul (RS ): MORG 2723, 41492, 41631; Mostardas, RS: MORG 6643 (36 m), 41525 (15 m), 41537; São José do Norte, RS: MNRJ 772; Cassino, RS: MACN-In 08220, 09447, 35391, MNHNM 3644, 7857, 7847, MORG 9119, 5165, MNRJ 683, 2882, 3457, 3860, 6460, 7111; Chuí, RS: MORG 16833 (intertidal), MNRJ 693; RS: MORG 5682 (15 m), 10467 (10 m), 11551 (22 m), 22259, (53 m). **Uruguay.** Chuy, Rocha: MNHNM 6214, 6831, 6125; Cabo Polonio, Rocha: MNHNM 7848; Santa Teresa, Rocha: MLP 5240, MNHNM 2788, 6207 (15 m); La Paloma, Rocha: MACN-In 15296, 15154, 30483, MNHNM 1244, 3920, 4237, 7851, 7852, 7853, 7855, 7856, 9000, 9003, 11589, MORG 19051, MNRJ 1249, 6529; Punta del Este, Maldonado: MNHNM 7841, 7844, 7854, 7858, MZUSP 67731 (20–30 m); Carrasco, Canelones (Quaternary): MNHNM 759, 853; Punta Carretas, Montevideo (Quaternary): MNHNM 613. **Argentina.** Punta Rasa, Buenos Aires: MACN-In 16301; San Clemente del Tuyú, Buenos Aires: MLP 3915-3; Mar del Plata, Buenos Aires: MACN-In 9217-005, 9363-015, 11553, 12064, 12219, 12222-004, 16545, 33753, 35979, 37502, 38157, 38158, MNHNM 2177, 4348, 7859, 8999, 9009, 9060, 9062, 10412, MORG 9025, 12955 (37 m), MNRJ 6917. Miramar, Buenos Aires: MACN-In 09252-005, MLP 1468, 2182; Quequén, Buenos Aires: MLP 2148, 2194; Necochea, Buenos Aires: MLP 3093; Monte Hermoso, Buenos Aires: MACN-In 6619-040, 11246, 14811, MLP 1404, 1416, 3021, 3072, 3073, 3087, 3088; Bahía Blanca, Buenos Aires: MACN-In 11247, 11329; MLP 3025; Carmen de Patagones, Buenos Aires: MLP 3030; San Antonio, Río Negro: MLP 603, 2548, 3034, 3091, 3671-2, 9588; Golfo San Matías, Río Negro: MACN-In 21296, 30285; Puerto Lobos, Chubut: MLP 601, MNHNM 3116. Patagonia: NHMUK 1854.12.4.416.

**Remarks.** The type material of *Porphyria urceus* Röding, 1789 was not found despite the cited existence of five specimens. Nevertheless it was described referring to Chemnitz's *Oliva brasiliensis* (1788 pl. 147, figs. 1367–8, rejected work according to Direction 1 ICZN, 1961). According to the ICZN art. 72.4.1 Chemnitz' illustration is part of the syntypes of *P. urceus* leaving no doubts about the synonymy. Röding (1798) also cited Gmelin's *Voluta oliva* (1791), which is in fact, the type species of the genus *Oliva*, according to Olsson & Dance (1966). Finally, he mentioned figures 1 and 2 of the plate 4 of Kammerer (1786). Plate 4 of this work represents only one figure, a bivalve, moreover none of the other plates of this book illustrates *Olivancillaria* species.

The syntypes of *Voluta pinguis* Solander, 1786 housed at NHMUK are clearly conspecific as reported by Dillwyn (1817). However, Rehder (1967) ruled out this name from the valid species of the Portland Catalogue. This was already commented by Burch & Burch (1964).

### ***Olivancillaria vesica* (Gmelin, 1791)**

Figures 6A–E; 7A, B, G

*Bulla vesica* Gmelin, 1791: 3433; Dodge 1955: 10.

*Oliva auricularia*. Chenu 1845: 30, pl. 31, figs. 5–6 (non Lamarck, 1811).

*Oliva aquatilis* Reeve, 1850: pl. 18, fig. 38.

*Olivancillaria (Lintricula) vesica*. H. Adams & A. Adams 1853: 141, pl. 15, fig. 2a; Fischer 1887: 598.

*Clanophila auricularia*. Gray 1858: 48.

*Oliva vesica* (sic). Marrat 1871: 23, pl. 18, figs. 283–285 (not fig. 280).

*Oliva (Olivancillaria) auricularia*. Tryon 1883: 90–91, pl. 36, fig. 93 (non Lamarck, 1811).

*Lintricula auricularia*. Marcus & Marcus 1959: 99–188, pl. 1, figs. 3–9 (non Lamarck, 1811).

*Olivancillaria auricularia*. Burch & Burch 1964: pl. 7, fig. 8 (non Lamarck, 1811); Thomé 1966: 167.

*Olivancillaria vesica vesica*. Klappenbach 1966: 76; Rios 1970: 101, pl. 31; 1985: 110, pl. 38, fig. 488; Tursch 1988: 246; Rios 1975: 111, pl. 33, fig. 469; Rios 1994: 142, pl. 46, fig. 611; Borzone & Vargas 1999: 55–60; Caetano & Absalão 2002: 215–218; Caetano *et al.* 2003: 1–8; Absalão & Pimenta 2005: 20, fig. 38; Rios 2009: 270, No. 668.

*Olivancillaria vesica*. Carranza & Norbis 2005: 83–89.

**Diagnosis.** Shell large (up to 60 mm), oval-oblong, apex usually not covered by callus; spire medium size; columellar callus thin but distinct; shell grayish with zig-zag light brown axial lines; fasciolar band light brown.

**Description.** Shell large oval-oblong, solid, thick (thickness ~1 mm); surface polished, bright; protoconch usually not covered by columellar callus; teleoconch of four flat whorls; spire of 1 2/3 convex whorl; suture channeled, half covered by columellar callus; aperture elongated, approximately 4/5 of total shell length; outer lip curved; posterior part of columella convex and smooth, with 4–10 anterior oblique folds; externally to those folds there are 2

or 3 pronounced folds parallel to columellar edge; fasciolar band well defined, light brown; posterior groove deep; siphonal channel deep (Figure 6A–E).

Shell ultrastructure as in *O. urceus* (Figure 7 D).

Radula rachiglossate (Figure 7A) as in *O. urceus*, some specimens with a unique denticle on one side of the lateral rachidian cusp.

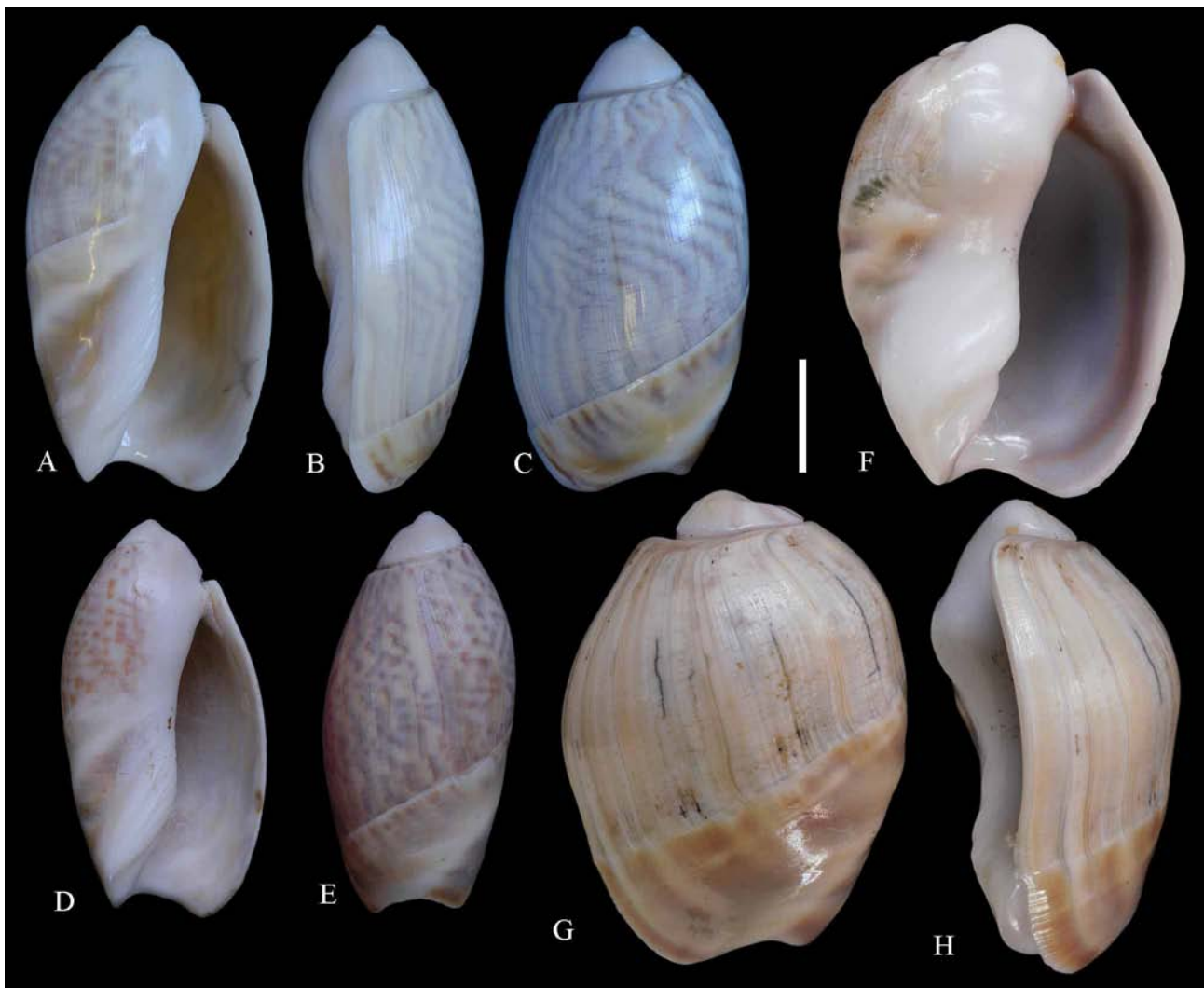
Siphon short with few papillae of the same size on the distal tip (Figure 7G).

Egg capsules hemispherical, elevated, flattened and flexible. A suture bisects the capsule in two equal parts. A large operculum (escape-aperture) defined by a groove covers the entire capsule. A single embryo hatches from each capsule. According to Borzone & Vargas (1991) living specimens of *Tivela mactroides* and *T. ventricosa* are the most common oviposition substrates at least in the southern Brazil area.

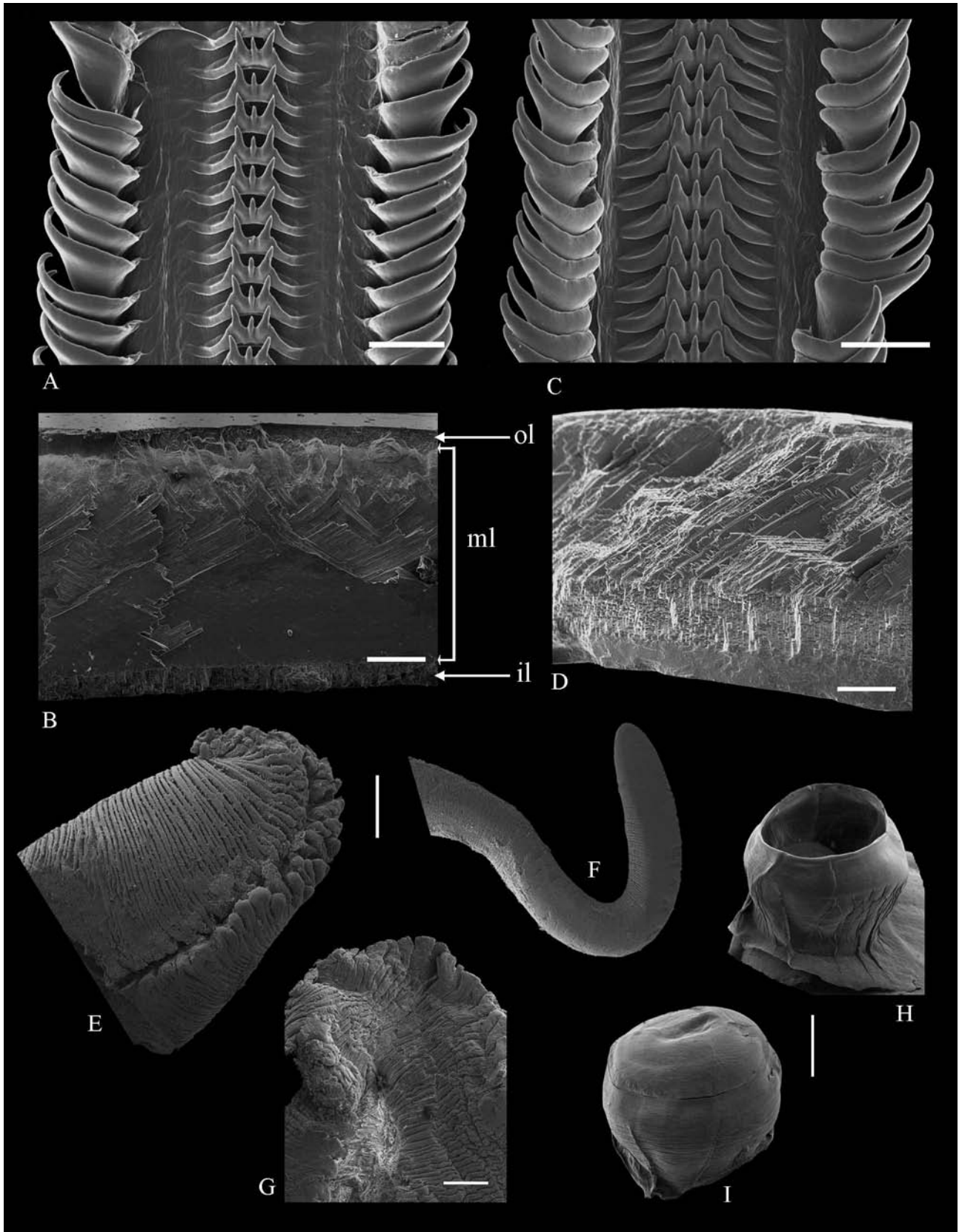
**Geographic distribution.** Iguape (13°34'S; 38°48'W), Bahia state to Florianópolis 27°35'S; 48°33'W), Santa Catarina state, both in Brazil in 0–20 m depth. There is no record of this species outside Brazilian waters.

**Type material.** [*O. vesica*] was not found at the Linnaean Society of London (LSL) where most of the material studied by Linnaeus is housed. [*O. aquatilis*] holotype NHMUK 1892.9.24.20. In order to clarify the taxonomic status of *Olivancillaria vesica* we designate the specimen MNRJ 18.979, illustrated here (Figures 6D–E) as neotype, in agreement with the article 75.3.1–7 of the ICZN, with type locality Maricá, Rio de Janeiro state, Brazil.

**Type locality.** [*O. vesica*] and [*O. aquatilis*] both from Brazil.



**FIGURE 6.** A–C, holotype of *Olivancillaria aquatilis* Reeve, 1850, NHMUK 1892.9.24.20, from Brazil; D–E, neotype of *Olivancillaria vesica* (Gmelin, 1791) MNRJ 18.979, from Maricá, Rio de Janeiro state, Brazil; F–H, neotype of *Olivancillaria auriculata* (Lamarck, 1811) MACN-In 38160 from Cassino, Rio Grande do Sul state, Brazil. Scale bar = 1 cm.



**FIGURE 7.** A–B, *Olivancillaria vesica*. A, radula frontal view, scale bar = 100  $\mu$ m; B, ultrastructure of the shell, scale bar = 200  $\mu$ m. C–F, *Olivancillaria auricularia*. C, radula frontal view, scale bar = 100  $\mu$ m; D, ultrastructure of the shell, scale bar = 500  $\mu$ m; E, siphon with numerous branched papillae in the distal tip; F, penis; scale bar for E and F = 1 mm. G, *O. vesica*, siphon with few papillae of the same size, scale bar = 1 mm. H–I, *O. auricularia*, egg capsules from Cassino, Rio Grande do Sul state, Brazil, scale bar = 500  $\mu$ m. ol: outer layer; ml: middle layer; il: innermost layer.

**Other material examined. Brazil.** Iguape, Bahia (BA): MNRJ 6905, MZUSP 81401; Caravelas, BA: MZUSP 61340; Cabo de São Tomé, Rio de Janeiro (RJ): MZUSP 34717; Rio das Ostras, RJ: MNRJ 9553; Buzios, RJ: MORG 20998 (intertidal), MNRJ 6910, 8541, MZUSP 80611; Barra da Tijuca, RJ: MZUSP 33532; Cabo Frio, RJ: MNHNM 9593, 9597, MORG 4185, 34197, MNRJ 2759, 2768, 2816, 4184, 4906, 5898, 8615, 14357; RJ: MORG 1056; Arraial do Cabo, RJ: MORG 42998 (intertidal), MZUSP 65715, 65716, 70938, MNRJ 2802; Saquarema, RJ: MNRJ 6246; Maricá, RJ: MNRJ 7812, 7928, NMR 61890; Niterói, RJ: MNRJ 7222, 9692, 14570; Copacabana, RJ: MORG 33897, MNRJ 5899, 8085, 8390, 13114, 13119; Praia de Grumari, RJ: MNRJ 1889, 1890, 6459, 9459, 9511; Ilha Grande, RJ: MNHNM 9592; Caraguatatuba, SP (São Paulo): MZUSP 704; Santos, SP: MORG 13590 (intertidal), 34196; Peruíbe, SP: MORG 10658, 43233 (intertidal); Ilha Comprida, SP: MNHNM 9141; Cananeia, SP: MZUSP 33242; 51196; SP: MNHNM 9154, 9175 (20 m), 9556, MORG 10657, 10824, 10872, MNRJ 14304, Matinhos, PR (Paraná): MZUSP 51160; Guaratuba, PR: MZUSP 51190, 51194; Piçarras, SC (Santa Catarina): MORG 46727, 47753, 50223; Itapema, SC: MORG 18133; Bombinhas, SC: MORG 50742 (intertidal); Campeche, SC: MORG 42889 (intertidal); Pântano do Sul, SC: MNRJ 14347; SC: MNHNM 9596.

**Remarks.** *Bulla vesica* Gmelin, 1791 was described, in brief and rather vaguely, without any particular feature that easily differentiates from other species of *Olivancillaria*. However, it refers to the figure of Bonanno, (1684, fig. 332) a pre-Linnean, unavailable, work. Although this figure is also somewhat imprecise it is possible to appreciate the similarity with *Olivancillaria vesica* (illustrated here in Figures 6D–E). Probably, this unclear description plus a poorly defined figure brought confusion throughout history. *O. vesica* was usually mixed or synonymized by different authors with *Oliva auricularia* Lamarck, 1811, which also has neither type material nor original illustration (e.g. Chenu (1845) and Tryon (1883) grouped *O. vesica* within *O. auricularia*). Reeve (1850: pl. 18, sp. 38) already mentioned this problem and contributed to the general confusion by synonymizing *O. auricularia* Duclos (non Lamarck) within *Oliva aquatilis*. Most of the observed differences in the spire shape between specimens of *O. vesica* depend on the degree of concealment of it, due to a great variation in the amount of subsequent deposition of CaCO<sub>3</sub> on the columellar callus.

Marcus & Marcus (1959: pl. 1, figs. 3–9) illustrated the characteristic siphon papillae of *O. vesica* (as *Lintrricula auricularia*). This distinctive character of the siphon, and the zig-zag dark axial lines and elongated shape of the shell serve to easily differentiate *O. vesica* from *O. auricularia*. Rocha Barreira (2001) also considered Marcus & Marcus's material as *O. vesica*.

### ***Olivancillaria auricularia* (Lamarck, 1811)**

Figures 6F–H; 7C–F, H–I

*Oliva auricularia* Lamarck, 1811: 323; Deshayes & M. Edwards 1844: 625; Chenu 1845: 30–31, pl. 31, figs. 7, 11–12 (non figs. 4–6), (non pl. 35, figs. 1–2); Reeve 1850, pl. 18, fig. 39; Marrat 1871: 23, pl. 18, fig. 280 (non figs. 283–285).

*Oliva patula* Sowerby, 1825: 87, No. 2331; Reeve 1850: pl. 18, fig. 39.

*Scaphula patula*. Swainson 1840: 322, fig. 87b.

*Lintrricula auricularia*. Lange de Morretes 1949: 100.

*Claneophila gibbosa* Gray 1858: 48 (non Born, 1778).

*Oliva (Olivancillaria) auricularia*. Tryon 1883: 90–91, pl. 36, fig. 91 (non figs. 92–94).

*Olivancillaria (Lentricula) (sic) auricularia*. Carcelles 1944: 259, pl. 5, fig. 46; Camacho 1975: 357.

*Olivancillaria auricularia*. Barattini & Ureta 1961: 127, pl. 37; Castellanos & Fernández 1964: 98; Thomé 1966: 167; Olivier & Penchaszadeh 1968: 6; Castellanos 1970: 118, pl. 9, fig. 1; Olivier *et al.* 1971: 31; Penchaszadeh & Olivier 1975: 137; Boffi 1979: 26; Calvo 1987: 162, fig. 141; Aguirre 1991: 164; Borzone 1995: 50–51; Penchaszadeh 2004: 259, fig. 12.

*Olivancillaria vesica auricularia*. Klappenbach 1966: 76–77; Figueiras 1967: 66; Sicardi 1967: 57; Rios 1970: 101, pl. 31; Figueiras & Sicardi 1973: 260–261, pl. 14, fig. 187; Rios 1975: 11, pl. 33, fig. 470; Scarabino 1977: 190; Rios 1985: 110, pl. 38, fig. 489; Abbott & Dance 1986: 194; Defeo *et al.* 1992: 833–834; Jaramillo 1994: 231; Rios 1994: 142, pl. 46, fig. 612; Brazeiro & Defeo 1996: 529; Defeo *et al.* 1996: 14; Riestra *et al.* 1996: 2; Borzone & Vargas 1999: 57; Gil & Thomé 2001: 153–154; Rocha-Barreira 2002: 83–89; 2003a: 107–116; 2003b: 29–35, fig. 2a, b; Thomé *et al.* 2004: 58, No. 50; Rios 2009: 270, No. 669.

*Olivancillaria vesica*. Scarabino 2004: 323; Clavijo *et al.* 2005: 389; Scarabino *et al.* 2006: 146 (non Gmelin, 1791).

**Diagnosis.** Shell large (up to 57 mm), thick, oval; apex always covered by callus; spire short, columellar callus, large, prominent, covering columellar folds; aperture very wide, elongated; shell grey with axial lines; fasciolar band light brown.

**Description.** Shell oval, glossy, solid, the thickest (~2.3 mm); protoconch of 1 1/2 whorls, completely covered by columellar callus; transition to teleoconch indistinct; spire short, apex not visible; suture channel covered, except last whorl; anterior part of the callus covering columella folds; aperture very wide, elongated, 5/6 of total shell length; outer lip sharp and curved; posterior part of columella slightly convex and smooth, 1–6 anterior oblique folds always present; externally to those folds, 1–3 larger folds, parallel to columellar edge; fasciolar band well defined, light brown with axial bands, posterior groove deep; siphonal channel deep (Figures 6F–H).

Shell ultrastructure: about half the thickness is in middle layer (of crossed-lamellar crystals of aragonite); the outer layer (of amorphous calcite) and innermost layer (of prismatic crystals of aragonite) are thinner (Figure 7D).

Radula (Figure 7 C) similar to *O. urceus* but rachidian lateral cusp with one or two denticles on each side.

Color of living specimens uniform white, sometimes gray. Penis (Figure 7F) as in *O. urceus* but with rounded tip, siphon large with numerous branched papillae in the distal tip as in *O. urceus* (Figure 7E).

Egg capsules circular, flattened with the attached surface asymmetric (Figures 7H–I). Large operculum defined by a groove covering the whole capsule. A single embryo per capsule. The walls of the capsule are as in *O. vesica*. Capsules were usually attached to shell fragments (Borzzone 1995, Rocha-Barreira 2002).

**Distribution.** Maricá (22°55'S; 42°49'W), Rio de Janeiro state, Brazil to Villarino (42°25'S; 64°31'W), Río Negro province, Argentina in 0–26 m depth.

**Type material.** [*O. auricularia*] lost (Heros, pers. comm. and Finet, pers. comm.), it is not at MNHN nor at MHNG where most of Lamarck's material is housed; [*Oliva patula*] lost as it is not at NHMUK with the rest of Sowerby's material (Way, pers. comm.). In order to clarify the taxonomic status of *Olivancillaria auricularia* we designate the specimen MACN-In 38160, illustrated here (Figures 6F–H) as neotype according to article 75.3.1–7 with type locality Cassino, Rio Grande do Sul state, Brazil.

**Type locality.** [*O. auricularia*] and [*Oliva patula*] Brazil.

**Other material examined. Brazil.** Maricá, Rio de Janeiro (RJ): MNRJ 1164, 1165, 8590; Cabo Frio, RJ: MORG 34052, MNRJ 904, 1969, 2005, 6447; Arraial do Cabo, RJ: MNRJ 2388, 2389, 6907, 11700; Saquarema, RJ: MNRJ 5891, 5906, 6247, 6248, 6249, 12136; Niterói, RJ: MNRJ 5704, 5705; Jurujuba, RJ: MNRJ 278, 279; Praia de Grumari, RJ: MNRJ 1888, 1891, 2391, 2748, 6459; Ilha da Marambaia, RJ: MNRJ 865; Ubatuba, São Paulo (SP): MZUSP 51200; Caraguatatuba, SP: MNRJ 11640; Santos, SP: MORG 13590 (intertidal), MNRJ 11652, 11683, 11699, Peruíbe, SP: MNRJ 2180; SP: MACN-In 02974, MORG 46884 (10–15 m); Paranaguá, PR (Paraná): MORG 5178, MZUSP 51021; Piçarras, Santa Catarina (SC): MORG 46727, 50221, 50222, 50223, 50224; Camboriú, SC: MZUSP 33316; Itapema, SC: MORG 18133; Florianópolis, SC: MNR 60529; Bombinhas, SC: MORG 47714; Campeche, SC: MORG 31292 (intertidal), 31534 (10 m); Pântano do Sul, SC: MORG 1547; Laguna, SC: MORG 30544, 47903, MNRJ 2390, MZUSP 32064; Garopaba, SC: MORG 31302; Imbituba, SC: MORG 25082 (intertidal); SC: MNHNM 9130; Torres, Rio Grande do Sul (RS): MORG 8407, 13765, 39230, MZUSP 33315; Arroio do Sal, RS: MORG 43048; Capão da Canoa, RS: MNHNM 7890, 9555, MORG 12999 (intertidal), 43049, MNRJ 4866; Osorio, RS: MORG 43047; Tramandaí, RS: MORG 6859 (intertidal), 24752, 25569, MZUSP 33530, MNRJ 6096, 7104; Mostardas, RS: MORG 26318 (26 m); São José do Norte, RS: MNRJ 773, 775; Rio Grande, RS: MORG 3125, 3464, 8010, 9399, 9856, 11171, 12921, 15668 (intertidal), 22422, 26357 (intertidal), 46684, 47779; Cassino, RS: MACN-In 38160, MNHNM 3648, 9152, MORG 6, 9531, 21827 (intertidal), 32740 (intertidal), 45049, MZUSP 54479, MNRJ 8973, 9050; Chuí, RS: MNHNM 9145, MORG 3796, 4530, 5345, 7743, 8534, 8887, 9291, 9370, 10577, 11177 (intertidal), 14020, MNRJ 8539. **Uruguay.** Chuy, Rocha: MNHNM 9119, 9147, 10924, MNRJ 6915; La Coronilla, Rocha: MNHNM 281, 1091, 4285, 9110, 9117, 9118, 9123, 9124, 9127, 9132, 9133, 9136, 9138, 9139, 9143, 9149, 9151, 9153, 9156, 14196, 14261, MORG 16236 (intertidal), 19069 (intertidal), MLP 4334-3, 5229, 9583, 27146, MNRJ 1218; Cabo Polonio, Rocha: MNHNM 9128, MLP 5248; La Paloma, Rocha: MACN-In 15153, 15296, 15311, MNHNM 673, 4415, 9045, 9125, 9126, 9129, 9134, MORG 136, 9502 (intertidal), 9847, 32604 (intertidal); Punta del Este, Maldonado: MACN-In 11074, MNHNM 2095, 3865, 9135, MORG 11197. **Argentina.** Punta Rasa, Buenos Aires: MACN-In 16302, 35962; San Clemente del Tuyú, Buenos Aires, MNRJ 9134; Mar de Ajó, Buenos Aires: MACN-In 7781, MNHNM 9142 (10 m), MLP 3640, 27150; Pinamar, Buenos Aires: MACN-In 30866; Villa Gesell, Buenos Aires: MNHNM 9150; Mar Chiquita: Buenos Aires: MNHNM 9589, 9591; Mar del Plata, Buenos Aires: MACN-In 10297, 11517, 11996, 12220, 12222-001, 16686, 20413, 35976, MNHNM 9146, MLP 427, 3090, MNRJ 6909; Miramar, Buenos Aires: MACN-In 09252-004; Quequén, Buenos Aires: MLP 2148; Necochea, Buenos Aires: MLP 3917, 3930; Monte Hermoso, Buenos Aires: MACN-In 6619-039, 11246-001, 11249, 14810, 35392, MLP 1412-2, 1416, 2066-1,



3020; Claromecó, Buenos Aires: MNHNM 9120; Pehuencó, Buenos Aires: MLP 3916-2; Bahía Blanca, Buenos Aires: MACN-In 11248; Villarino, Río Negro: MACN-In 13144, MLP 488-2.

**Remarks.** Klappenbach (1966) suggested that *O. auricularia* and *O. vesica* should be treated as subspecies based on their distribution. In fact this was followed by most subsequent authors (*i.e.* Figueiras 1967, Sicardi 1967, and Rios 1970). Scarabino (2004) questioned this suggestion and proposed the probable existence of latitudinal variation, using the name *O. vesica* for both species. The distribution of *O. auricularia* and *O. vesica* overlaps between Maricá, Rio de Janeiro state and Florianópolis, Santa Catarina state so the concept of subspecies is inapplicable here. They differ in the morphology of siphon, shape, color and thickness of shell. The egg capsules are also distinct (Borzzone & Vargas 1991, Borzzone 1995). In addition, *O. auricularia* and *O. vesica* are clearly separated in the CVA (Figure 3) and have differences in centroid size (Tukey tests  $P < 0.01$ , Table 1) confirming, also statistically, that they are two distinct species.

The type material of *Oliva patula* Sowerby, 1825, was not found at the NHMUK, however, Swainson's illustration (1840: 332, fig. 87b) is good enough to be recognized as a synonym.

Gray cited *C. gibbosa* erroneously from West Africa; he was actually referring to *O. auricularia*. Similarly, his *C. auricularia* appears to be *O. vesica*. In addition, his *Claneophila gibbosa* is not *Voluta gibbosa* Born, 1778 as also reported by Melvill (1904).

### ***Olivancillaria contortuplicata* (Reeve, 1850)**

Figures 8 F–H; 9 A–D

*Oliva contortuplicata* Reeve, 1850: pl. 20, fig. 51; Marrat 1871: 27, pl. 20, figs. 332–333.

*Agaronia contortuplicata*. Adams & Adams 1853: 142; Gray 1858: 52.

*Oliva (Olivancillaria) auricularia*. Tryon 1883: 90–91, pl. 36, fig. 94 (*non* Lamarck, 1811).

*Olivancillaria contortuplicata*. Barattini & Ureta 1961: 128, pl. 37; Burch & Burch 1964: pl. 7, fig. 7; Thomé 1966: 167; Sicardi 1967: 57; Rios 1970: 100, pl. 30; Figueiras & Sicardi 1973: 261, pl. 14 fig. 188; Rios 1975: 110, pl. 32, fig. 463; Rios 1985: 109, pl. 37, fig. 483; Abbott & Dance 1986: 193; Calvo 1987: 162, fig. 143; Tursch 1988: 246; Rios 1994: 142, pl. 45, fig. 606; Scarabino 2004: 322; Scarabino *et al.* 2006: 145, fig. 1; Carranza 2007: 22; Rios 2009: 268, N° 663.

**Diagnosis.** Shell small (up to 35.1 mm in length); spire high, apex never covered by callus; columella with a conspicuous groove, posterior to columellar folds; shell grayish, fasciolar band whitish, with light brown areas.

**Description.** Shell small oval-oblong; the thinnest of the species discussed (~0.4 mm), smooth; protoconch of 1 1/2 translucent whorls, transition to teleoconch indistinct; spire high, of 4 convex whorls, suture channeled; columellar callus faint, extended just towards suture; aperture elongated, about 3/4 of total shell length; outer lip smooth slightly curved; posterior part of columella slightly convex, smooth with a marked groove posterior to the anterior columellar folds; 4–5 anterior oblique folds, 2–3 conspicuous folds parallel to columellar edge; fasciolar band distinctive; shell whitish with light brown areas; posterior groove deep; siphonal channel deep (Figures 8F–H).

Shell ultrastructure of three layers: as in *O. urceus*; (Figure 9B).

Radula (Figure 9A) as in *O. auricularia*.

The penis is similar to the other species of the genus, with the tip slightly pointed (Figure 9C) as in *O. urceus*. Siphon large with numerous branched papillae in the distal tip (Figure 9D) as in *O. urceus*.

**Distribution.** Imbituba (28°07'S; 48°41'W), Santa Catarina state, Brazil to La Paloma (34°39'S; 54°09'W), Rocha department, Uruguay, usually intertidal.

**Type material.** Holotype NHMUK 20100471 (Figures 8F–H).

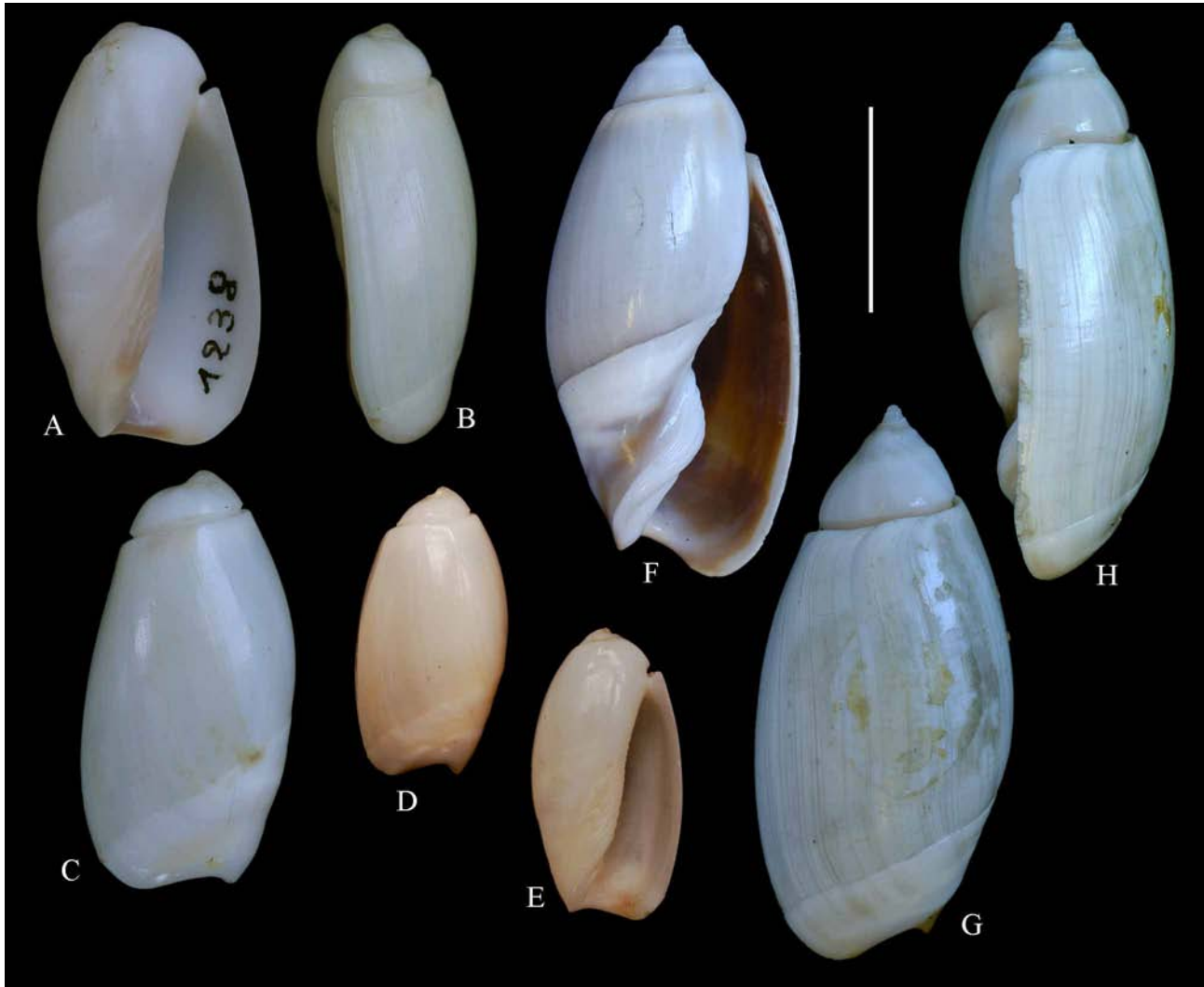
**Type locality.** It was originally cited from the coast of Senegal, Africa. There were no other reports from this locality after the original description. It is probably mistaken. Barattini & Ureta (1961) and subsequent authors cited this species from the coast of Uruguay and Brazil.

**Other material examined. Brazil.** Imbituba, Santa Catarina (SC): MORG 25083 (intertidal); Laguna, SC: MORG 47896; Tramandaí, Rio Grande do Sul (RS): MZUSP 51084, MNRJ 843, 2881; São José do Norte, RS: MNRJ 774; Rio Grande, RS: MZUSP 51268, MNRJ 3595; Cassino, RS: MORG 30, 11892 (intertidal), 39156; Chuí, RS: MNHNM 9094, MNRJ 8538, MORG 88535, 886, 9292, 10576, MZUSP 33088; RS: MORG 3188, 3318 (intertidal), 4543 (intertidal), 7343, 8006, 9137, 9401, 9857, 15667, 17739, 31379 (intertidal), MZUSP 10648,



16200. **Uruguay.** Chuy, Rocha: MNHNM 3160; La Coronilla, Rocha: MLP 4334-2, 9584, MNHNM 279, 3159, 9088, 9090, 9091, 9092, 9096, 9097, 9098, 9552, MNRJ 1217, 6451, 6531, MORG 16243, 19070, 32615, 47368 (intertidal), 49178 (intertidal), 50305, NMR 62170; La Paloma, Rocha: MNHNM 9095, MNRJ 841, MORG 9503, MZUSP 52030, Punta del Este, Maldonado: MNHNM 2081, MORG11198.

**Remarks.** *O. contortuplicata* was well understood since its description, perhaps because the shell is unique and has little variation. As far as we know, there are no synonymous names and the species is restricted to southern Brazil and Uruguay.



**FIGURE 8.** A–C, *Olivancillaria teaguei* Klappenbach, 1964, holotype MNHNM 1238, from La Coronilla, Rocha department, Uruguay; D–E, *Olivancillaria teaguei* from Uruguay; F–H, *Olivancillaria contortuplicata* (Reeve, 1850) holotype NHMUK 20100471 Senegal in error. Scale bar = 1 cm.

***Olivancillaria deshayesiana* (Ducros de Saint Germain, 1857)**

Figures 10, 11

*Oliva deshayesiana* Ducros de Saint Germain, 1857: 86, pl. 3, figs. 67 a, b.

*Oliva ovata* Marrat, 1871: 23, pl. 18, figs. 281–282.

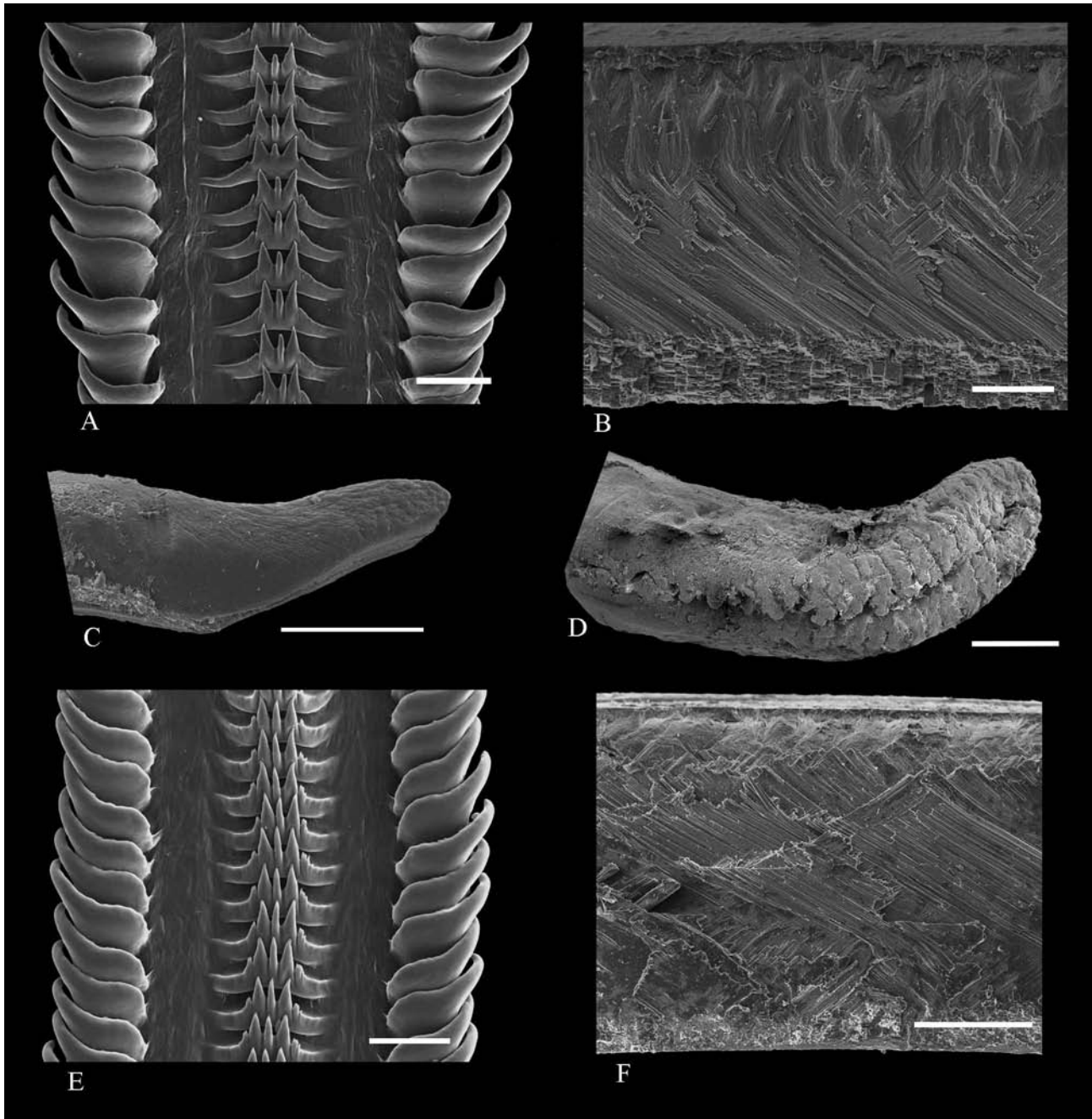
*Oliva (Olivancillaria) deshayesiana*. Tryon 1883: 90, pl. 86, fig. 89.

*Olivancillaria deshayesiana*. Lange de Morretes 1949: 101; Barattini & Ureta 1961: 127–128, pl. 37; Figueiras 1961: 18; Thomé 1966: 167; Sicardi 1967: 57; Rios 1970: 101, pl. 31; Penchaszadeh 1971: 50; Figueiras & Sicardi 1973: 261–262, pl. 14, fig. 189; Rios 1975: 110, pl. 32, fig. 464; Rios 1985: 110, pl. 38, fig. 486; Calvo 1987: 162, fig. 144; Borzone 1994: 27; Rios 1994: 142, pl. 46, fig. 607; Borzone 1995: 48, figs. 3–11; Borzone & Vargas 1999: 57; Scelzo *et al.* 2002: 50;

Rocha-Barreira 2003: 113; Thomé *et al.* 2004: 56, N° 47; Penchaszadeh 2004: 264, figs. 21–23; Scarabino 2004: 322; Clavijo *et al.* 2005: 388; Demicheli & Scarabino 2006: 526; Scarabino *et al.* 2006: 145; Giménez *et al.* 2009: 166, figs. 14–22; Rios 2009: 269, N° 664; Teso & Penchaszadeh 2009: 557.

*Olivancillaria auricularia*. Webb 1986: *partim* 104–105, pl. 48, fig. 17, (*non* Lamarck, 1811).

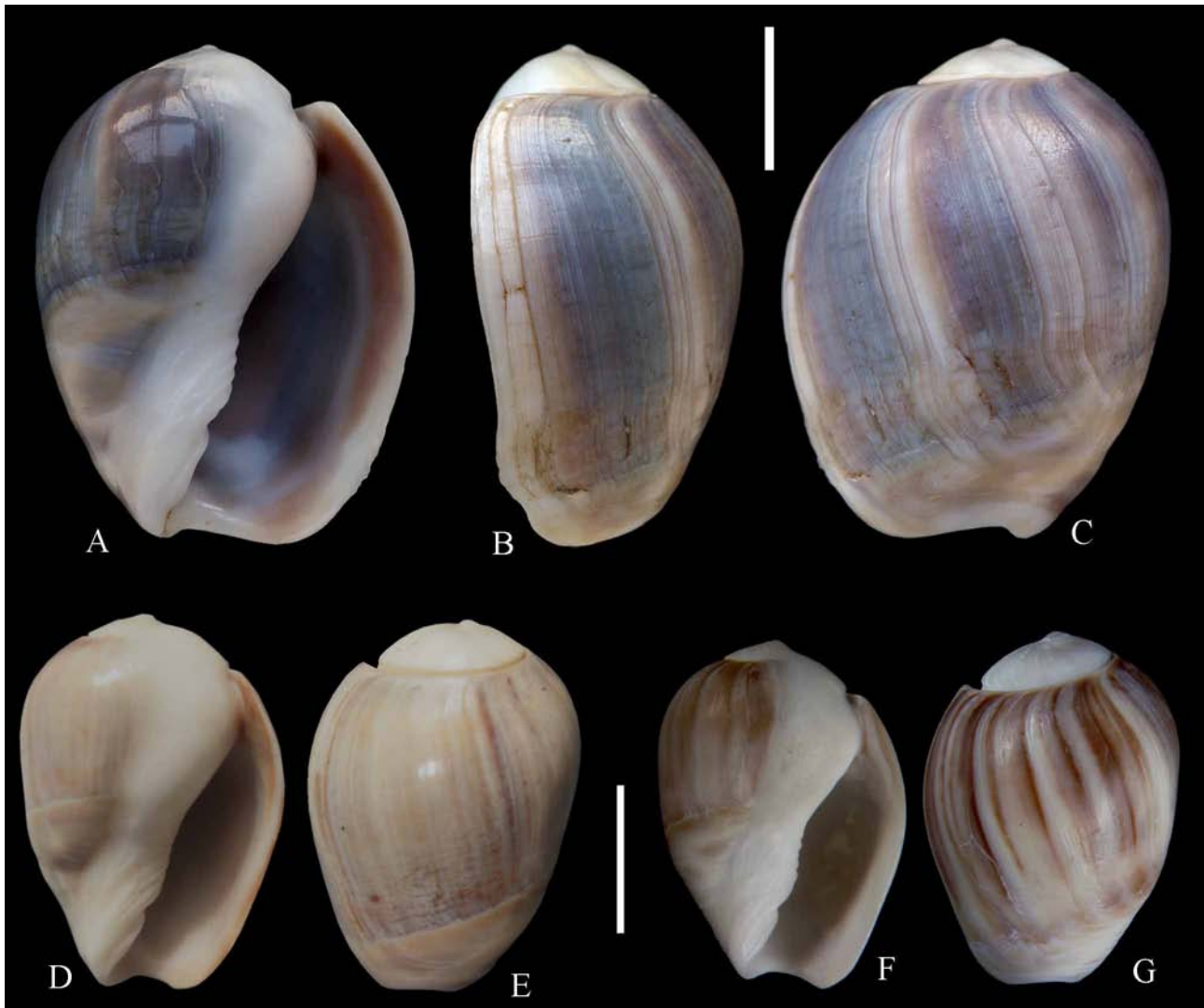
**Diagnosis.** Shell of medium size (up to 35 mm), suboval, spire very short, apex slightly defined; posterior columellar callus thick; shell bluish grey with clear axial lines, fasciolar band light brown to grey; siphon with branched papillae.



**FIGURE 9.** A, radula of *O. contortuplicata*, frontal view, scale bar = 100  $\mu$ m; B, ultrastructure of the shell, scale bar = 80  $\mu$ m; C, penis, scale bar = 500  $\mu$ m; D, siphon, scale bar = 2 mm; E, radula of *O. teaguei*, frontal view, scale bar = 50  $\mu$ m; F, ultrastructure of the shell, scale bar = 200  $\mu$ m.

**Description.** Shell suboval, solid, thick (~1 mm on the lip); surface polished, bright; spire very short with 3 1/2 slightly convex whorls; protoconch smooth of 1 1/4 translucent whorl; transition to teleoconch indistinct; suture channeled, 2/3 of last whorl, the rest covered by well-defined and uniform columellar callus; aperture elongated,

wide, approximately 5/6 of total shell length; outer lip smooth, thin and slightly curved, some specimens with an anterior basal denticle posterior to fasciolar groove; posterior part of columella slightly convex and smooth, 4–6 anterior oblique folds; 1 or 2 pronounced folds parallel to columellar edge; fasciolar band well defined, brown to grey with axial bands, posterior groove deep; siphonal channel deep (Figures 10A–G).



**FIGURE 10.** *Olivancillaria deshaysiana* (Ducros de Saint Germain, 1857). A–C, from Mar del Plata, Buenos Aires province, Argentina; D–E, holotype of *Oliva ovata* NML 17.6.1875; F–G, lectotype of *Oliva deshaysiana* MNHN unnumbered, scale bars = 1 cm.

Shell ultrastructure composed of three layers, as in *O. auricularia* (Figure 11G).

Radula (Figures 11A–B) as in *O. urceus* but one or sometimes two small denticles on each side of the lateral rachidian cusps. Lateral teeth C shaped, with quadrangular base.

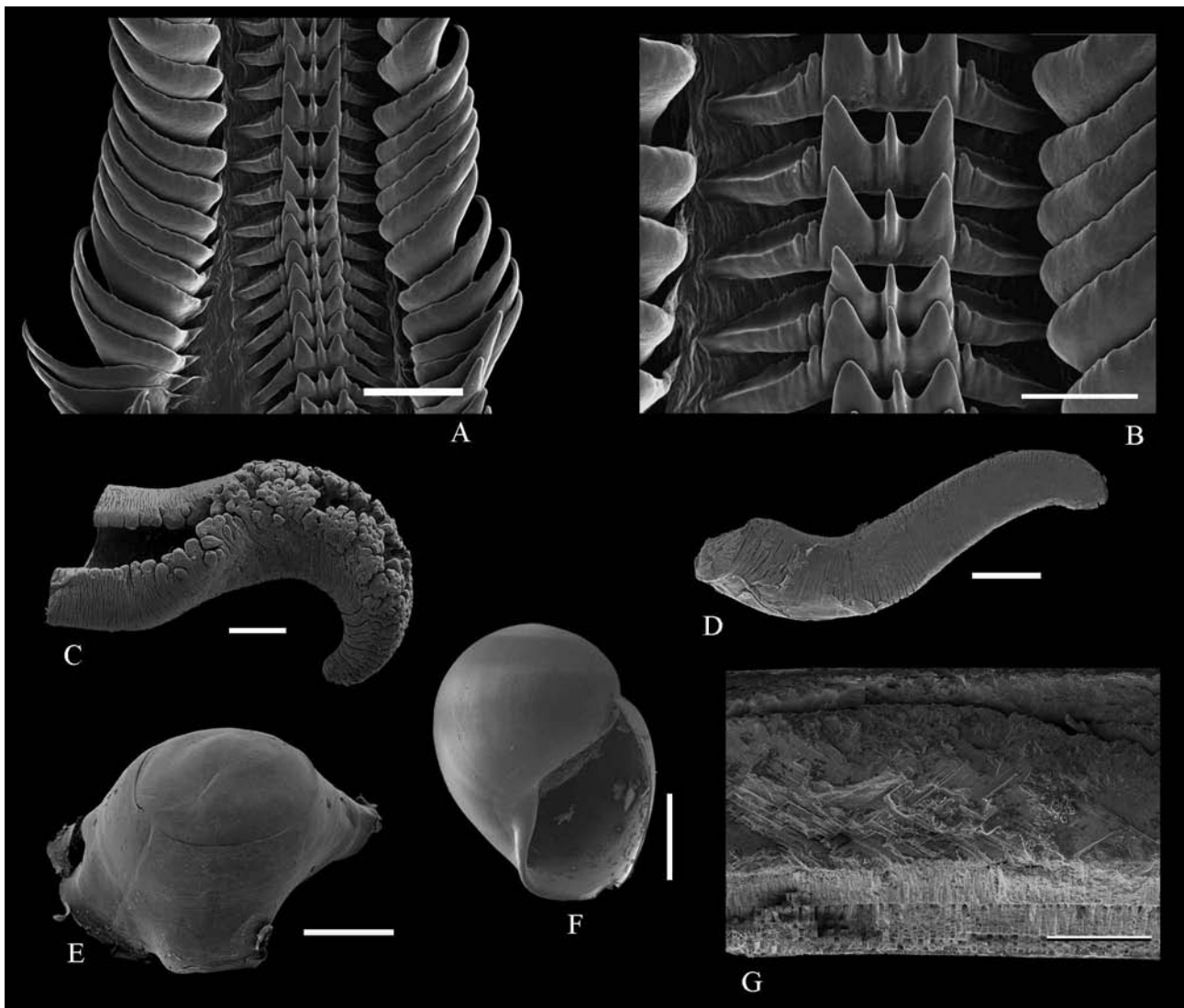
Live animals white in general, foot pinkish and siphon purple. Penis as in *O. auricularia* (Figure 11D); siphon large, distal tip with numerous branched papillae of second and third order (Figure 11C).

Egg capsules semispherical, elevated, flattened and rigid, yellowish in color. A suture bisects the capsule in two equal parts. A large operculum (escape aperture) defined by a groove covering the entire capsule (Figure 11E). A single embryo hatches from each capsule (Figure 11F). Oviposition usually occurs on living substrates such as the shells of the gastropods *Buccinanops monilifer* (Kiener, 1834), *B. cochlidium* (Dillwyn, 1817) and *B. uruguayensis* (Pilsbry, 1897).

**Geographic distribution.** Ilha Grande (23°09'S; 44°13'W), Rio de Janeiro state, Brazil to Necochea (38°33'S; 58°44'W), Buenos Aires province, Argentina in 0–60 m depth.

**Type material.** [*Oliva deshaysiana*] lectotype (Figures 10D–E) and one paralectotype, both housed at MNHN unnumbered, herein designated (see remarks below); [*Oliva ovata*] holotype NML 17.6.1875. Ford (1953) in a

revision of the notes of Tomlin's about Marrat's type material mentioned the existence of one specimen that he regarded as holotype. According to ICZN article 73.1.2, "If the taxon was established before 2000 evidence derived from outside the work itself may be taken into account to help identify the specimen". On this basis the specimen of *Oliva ovata* should be considered the holotype.



**FIGURE 11.** *Olivancillaria deshaysiana*. A–B, radula, A, frontal view, scale bar = 100  $\mu$ m, B, detail of rachidian teeth, scale bar = 50  $\mu$ m; C, siphon tip, critical-point dried, scale bar = 1 mm; D, penis, critical-point dried; scale bar = 1 mm; E, egg capsule, scale bar = 500  $\mu$ m; F, embryo shell, from Mar del Plata, Buenos Aires province, Argentina, scale bar = 250  $\mu$ m; G, ultrastructure of the shell, scale bar = 200  $\mu$ m.

**Type locality.** [*Oliva deshaysiana*] erroneously described from the coast of California. Tryon (1883) restricted its distribution to South America. [*Oliva ovata*] unknown.

**Other material examined.** **Brazil.** Ilha Grande, Rio de Janeiro (RJ): MORG 14218 (40–60 m); Praia Grande, São Paulo (SP): MZUSP 82769 (10 m); SP: MNRJ 14147, 14171; Porto Belo, Santa Catarina (SC): MZUSP 32900; Torres, Rio Grande do Sul (RS): MORG 6071, 47658 (intertidal); Passo da Lagoa, RS: MORG 8833 (40 m); Tramandaí, RS: MORG 13709 (60 m); São José do Norte, RS: MORG 15215; Mostardas, RS: MORG 8231 (15–25 m), 8428 (18 m); Cassino, RS: MNHNM 3649, 9039, MORG 4061, 5370, 14471, 15396, 31390, 39224, 40180, MNRJ 776, 3593, 6918, 7112, 8537; MZUSP 16199, 62722; Rio Grande, RS: MORG 23142 (23 m), 41496, 42703 (10–20 m), 43021 (10–20 m), 45802, MZUSP 32729, 32732, 32891, 32900, 43086, 43091, 51037, 62796 (22 m); Sarita, RS: MORG 33150; Chuí, RS: MORG 4525, 14024. **Uruguay.** La Coronilla, Rocha: MNHNM 280, 379, 9026, MORG 16239, 47369, 49198, MNRJ 1773; Cabo Polonio, Rocha: MNHNM 9058, La Paloma, Rocha: MLP 4334-1, MNHNM 3811, 3867, 4235, 4419, 9028, 9032, 9033, 9034, 9035, 9036, NMR

62166, MORG 137, 9501, 19052, 32606, MZUSP 33449, 51039, 69708 (10–15 m), MNRJ 1242, 6452, 6534; Punta del Este, Maldonado: MNHNM 2106, 9029; Carrasco, Canelones (Quaternary): MNHNM 781, 9031. **Argentina.** San Clemente del Tuyú, Buenos Aires: MLP 9585; Mar del Tuyú, Buenos Aires: MORG 26072; San Bernardo, Buenos Aires: MORG 43083 (5 m); Mar de Ajó: Buenos Aires MNHNM 9063; Villa Gesell, Buenos Aires: MNHNM 9027; Mar Chiquita: Buenos Aires: MNHNM 9037, 9061, 9069, MORG 8710; Mar del Plata, Buenos Aires: MACN-In 9361-076, 9363-014, 12065, 35958, 37503, 38160, MLP 3099, MNHNM 2179, 9064, 9065, 9066, 9590, MORG 9026, 10805 (40 m), 11285 (40 m), 11169 (40 m), MZUSP 51031 (40 m), 74081, MNRJ 8600; Necochea, Buenos Aires: MLP 3093. Patagonia: NHMUK 1854.12.4.416.

**Remarks.** This is perhaps the most conservative species of the genus *Olivancillaria* with very little shell variation. According to the literature records *O. deshayesiana* was recently included in the Argentine fauna despite its usual presence in shallow waters. After the original description several authors cited Duclos as the author of *O. deshayesiana* however Ducros de Saint Germain is the original author. In agreement with the ICZN article 74 and in order to preserve stability of nomenclature, we designate as lectotype the (unnumbered) specimen (of 26.7 mm of total shell length) and the other one as paralectotype, both housed at MNHN. The holotype of *Oliva ovata* Marrat, 1871 housed at NML 17.6.1875 shows it as a synonym as it was previously reported by Tryon (1883).

### ***Olivancillaria orbigny* (Marrat, 1868)**

Figures 12–13

*Olivancillaria auricularia* d'Orbigny, 1840 (*non* Lamarck, 1811); 421, pl. 59, figs. 20–22.

*Olivancillaria vesica*. H. Adams & A. Adams 1853 (*non* Gmelin, 1791): 141, pl. 15, fig. 2 (only).

*Oliva orbigny* Marrat, 1868: 167–168; Marrat 1871: 24, pl. 25, fig. 458; Burch & Burch 1960: 30.

*Oliva* (*Callianax*) *orbigny*. Tryon 1883: 88, pl. 34, fig. 59.

*Olivia* (*sic*) *orbigny* Rydén 1936: 259, fig. 133d; Martínez Soler 1964: 280, fig. 7.

*Agaronia testacea* Barattini & Ureta 1961: 128 (*non* Lamarck, 1811).

*Olivancillaria uretai* Klappenbach, 1965: 6–8, pl. 2; Thomé 1966: 167; Figueiras 1967: 66; Sicardi 1967: 57; Olivier & Penchaszadeh 1968: 6; Rios 1970: 100, pl. 31; Castellanos 1970: 119; Castellanos 1971: 51; Olivier *et al.* 1971: 31; Penchaszadeh 1971: 50; Figueiras & Sicardi 1973: 263–264, pl. 14 fig. 192; Penchaszadeh & Olivier 1975: 137; Rios 1975: 110, pl. 32, fig. 467; Scarabino 1977: 190; Rios 1985: 110, pl. 38, fig. 486.; Abbott & Dance 1986: 193; Calvo 1987: 162, fig. 146; Tursch 1988: 246; Borzone 1994: 27; Rios 1994: 142, pl. 46, fig. 609; Borzone 1995: 51; Borzone & Vargas 1999: 57; Scarabino 2004: 322; Thomé *et al.* 2004: 57, N° 48; Clavijo *et al.* 2005: 389; Demicheli & Scarabino 2006: 526; Scarabino *et al.* 2006: 146; Rios 2009: 269, No. 666.

*Olivancillaria teaguei*. Castellanos, 1970: *partim* 119, (*non* Klappenbach 1964).

*Agaronia orbigny*. Wagner & Abbott 1978: 809.

**Diagnosis.** Shell of medium size (up to 35 mm) oval-oblong; spire very high; columella straight; columellar callus faint; shell grayish, fasciolar band light brown.

**Description.** Shell oval-oblong, solid, smooth, medium thickness (~0.6 mm); protoconch 1 1/2–1 3/4 whorls, translucent; spire very high, of 4 1/2 convex whorls; transition to teleoconch indistinct; suture channeled not covered; columellar callus faint, extended just towards suture; aperture elongated, 3/4 of total shell length; outer lip smooth slightly curved; 3–5 anterior oblique folds, 2–4 pronounced folds parallel to columellar edge; fasciolar band well defined, light brown in color; posterior groove deep; siphonal channel deep (Figure 12).

Shell ultrastructure of three layers: as in *O. urceus* (Figure 13B).

Radula (Figure 13A) as in *O. urceus*.

In freshly collected specimens foot uniform white and siphon brown reddish in color. Penis (Figure 13C) as in *O. deshayesiana*, siphon (Figure 13D) as in *O. urceus*.

Egg capsules rounded with thin margin and laterally compressed. Large operculum defined by a groove (Figures 13E–F) covering the whole capsule. A single embryo per capsule. Capsule wall softer than in *O. deshayesiana*. Oviposition occurs on shell fragments (Borzone 1995).

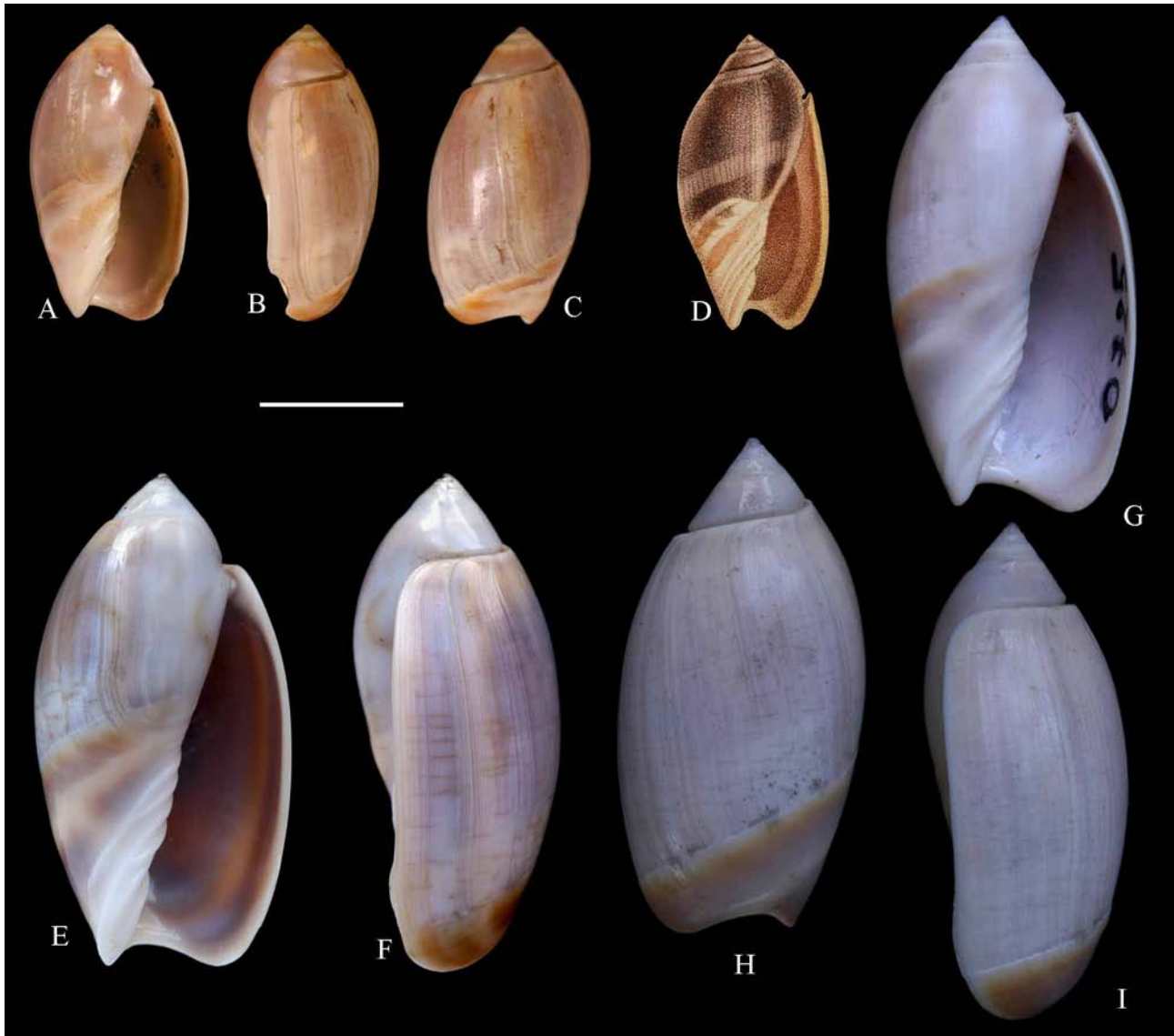
**Distribution.** From Niterói (22°58'S; 43°02'W), Rio de Janeiro state, Brazil to Caleta de los Loros (41°33'S; 65°02'W), Río Negro province, Argentina in 0–35 m depth.

**Type material.** [*O. orbigny*] lectotype NHMUK 1854.12.4.416 and 3 paralectotypes NHMUK 1854.12.4.416/6–8 from San Blas, Patagonia, herein designated (see remarks).



[*O. uretai*] holotype MNHNM 725; 47 paratypes: MNHNM 435, 3 specimens, from La Coronilla, Rocha department; MACN 27536, 2; MNHNM 512, 6; 621, 2; 726 2; 832, 2; 887, 2; 940, 3; 903, 1; 927,3; 1243, 1; 1300, 5; MORG 17763, 1, all from La Paloma, Rocha department; MNHNM 12, 2, Punta del Este, Maldonado department; MNHNM 543, 5; 873, 2; 874, 6; 875, 3, all from Mar del Plata, Buenos Aires province Argentina.

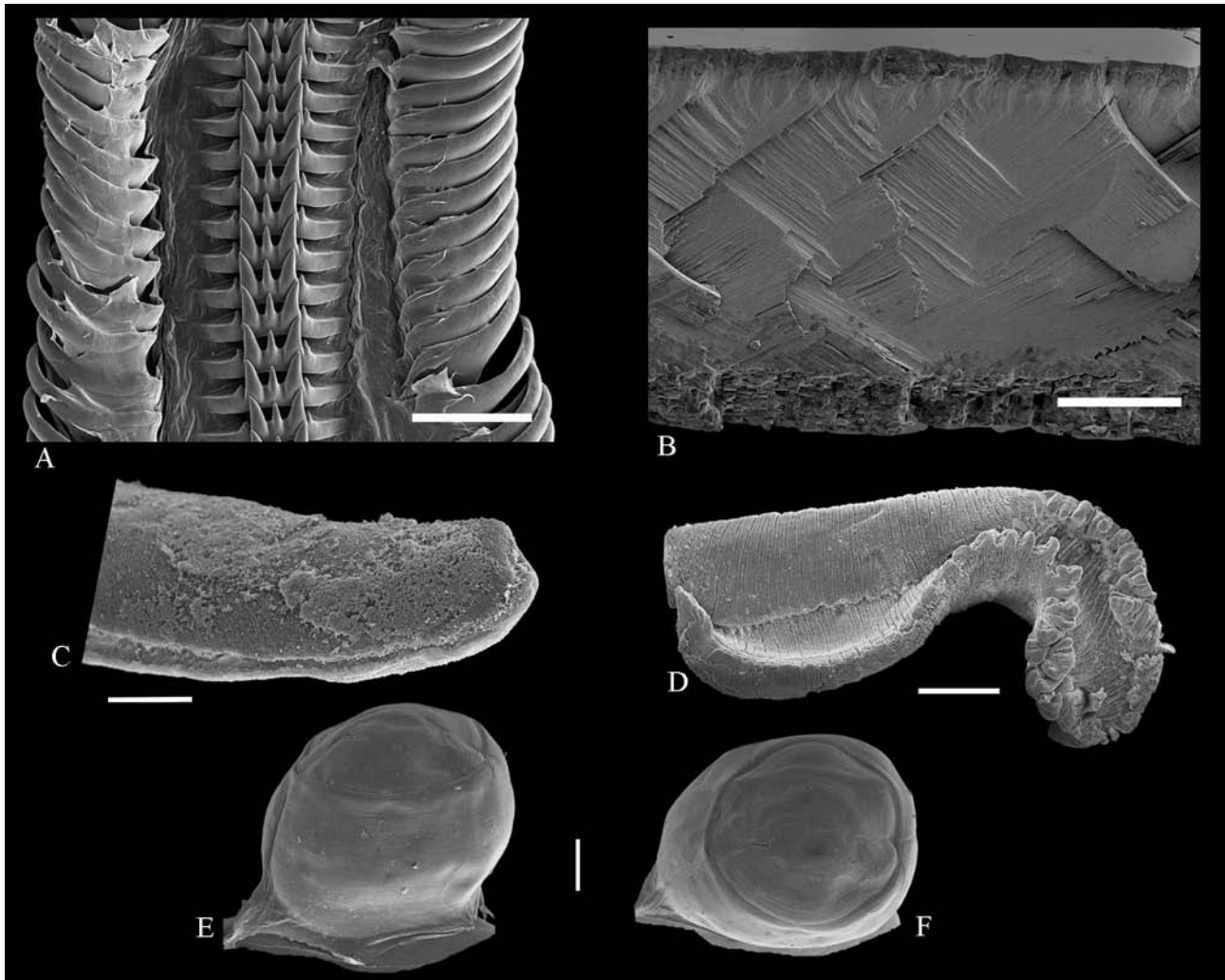
**Type locality.** [*O. orbigny*] San Blas, Patagonia (in Marrat 1871). [*O. uretai*] La Paloma, Rocha department, Uruguay.



**FIGURE 12.** A–C, lectotype of *Olivancillaria orbigny* NHMUK 1854.12.4.416/5; D, plate 59, figure 21 from d’Orbigny (1840); E–F, MACN-In 37504 from Mar del Plata, Buenos Aires province, Argentina; G–I, holotype of *Olivancillaria uretai* Klappenbach, 1965 MNHNM 725, from La Paloma, Rocha department, Uruguay. Scale bar = 1 cm.

**Other material examined. Brazil.** Niterói, Rio de Janeiro (RJ): MNRJ 8540; Barra da Tijuca, RJ: MNRJ 13887; RJ: MORG 27549; Guarujá, São Paulo (SP): MORG 12972 (20 m); Piçarras, Santa Catarina (SC): MORG 50225 (intertidal); SC: MORG 30397; Torres, Rio Grande do Sul (RS): MZUSP 65714, 67432; Mostardas, RS: MORG 4737 (8–20 m), MZUSP 32903; Cassino, RS: MORG 3020, 14472, 15395, 18692, 23185, 27599, 31341, 43023, 47673, MZUSP 51032, MNRJ 7113, 13244; Chuí, RS: MORG 4529 (intertidal), 11179, 46530; RS: MORG 7819 (16 m), 23046 (22 m), 23144 (23 m), 39212, 41498, 43034, MZUSP 32746. **Uruguay.** Chuy, Rocha: MORG 32767 (intertidal); La Coronilla, Rocha: MLP 9590, MORG 16237, 32616, 47366, 49171, 50342, MNHNM 377, 3917, 4418; Cabo Polonio, Rocha: MLP 5224; Santa Teresa, Rocha: MNHNM 9043; La Paloma, Rocha: MACN-In 30482, 1025, MNHNM 4425, 4589, 7107, 9042, 9044, 9046, MORG 9504, 9848, 11748, 19055 (intertidal),

32591, 32810, 40917, MZUSP 18560, 18860, 33430, NMR 62171, MNRJ 6165; Aguas Dulces, Rocha: MNHNM 10427; Rocha: MNHNM 5887; Punta del Este, Maldonado: MORG 11199; Piriápolis, Maldonado: MNHNM 9041; Carrasco, Canelones: MNHNM 9040. **Argentina.** Pinamar, Buenos Aires: MACN-In 30862; Mar del Plata, Buenos Aires: MACN-In 09361-077, 12222-003, 37504, MLP 3026, 3909, 3931, MNHNM 623, 11787, MORG 9027, 10326, 10702, 10807 (35 m), 11671 (20 m), MNRJ 842; Monte Hermoso, Buenos Aires: MLP 1403, 1412-3, 3022, 3907, 3908, 9589, MORG 39175; Bahía Blanca, Buenos Aires: MACN-In 06620-022, MLP 3040; Caleta de los Loros, Río Negro: MNHNM 7484.



**FIGURE 13.** *Olivancillaria orbigny* (Marrat, 1868). A, radula, frontal view, scale bar = 100  $\mu$ m; B, ultrastructure of the shell, scale bar = 200  $\mu$ m; C, penis, scale bar = 200  $\mu$ m; D, siphon, scale bar = 1 mm; E–F, egg capsule, MORG 27802, from Cassino, Rio Grande do Sul state, Brazil, scale bar = 200  $\mu$ m.

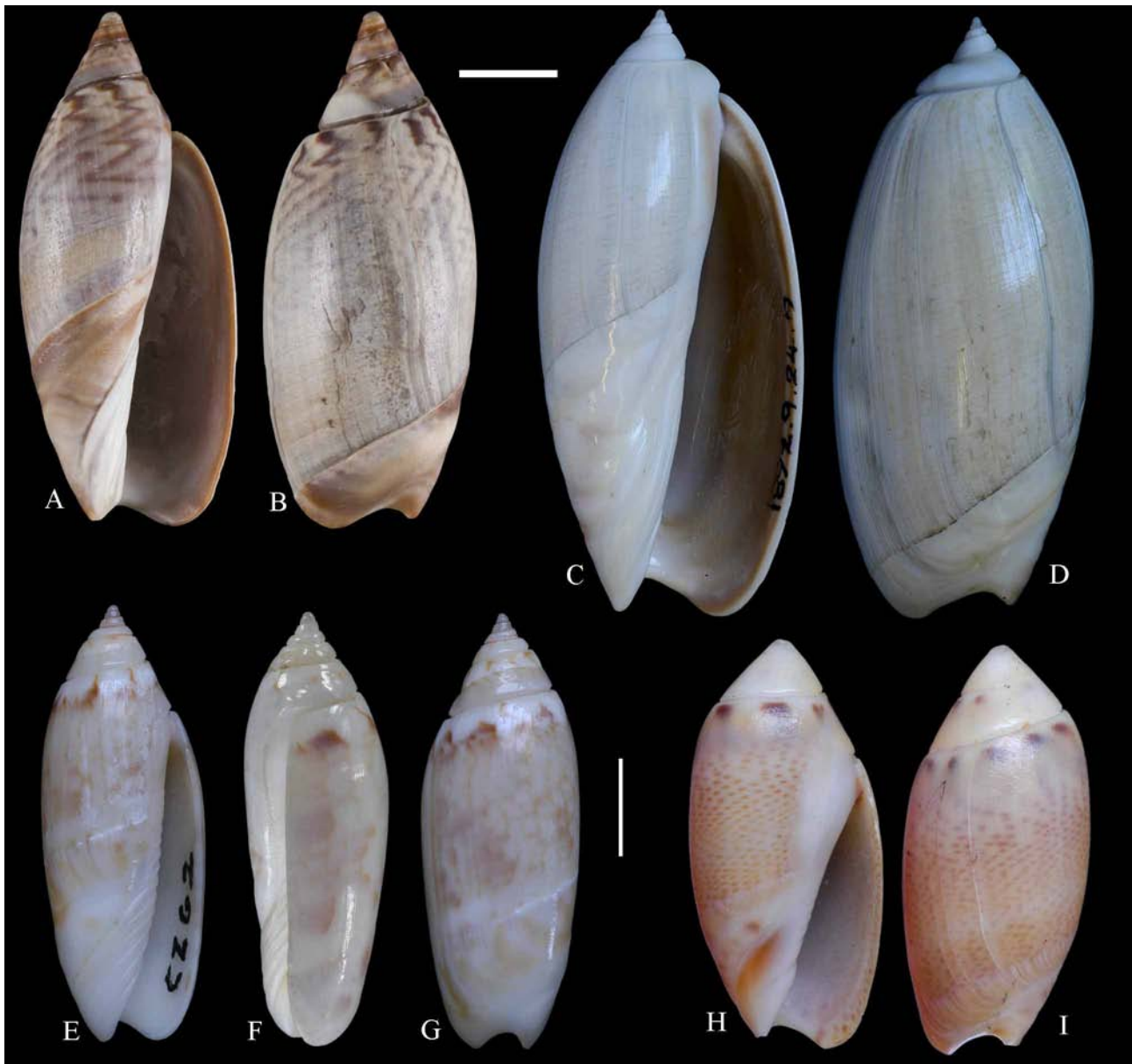
**Remarks.** Marrat (1868) described *Oliva orbigny* in a short note after figs. 20–22, plate 59 of d’Orbigny’s “*Voyage dans l’Amerique Meridionale*” (1840) (here illustrated in Figure 12D). The lot 1854.12.4.416 NHMUK has eight specimens that were identified by d’Orbigny (1840) as *Oliva auricularia* Lamarck, 1811. Four of them belong to *O. orbigny*. In order to fix the species and preserve stability of nomenclature we designate NHMUK 1854.12.4.416/5 as lectotype and the other three as paralectotypes (NHMUK 1854.12.4.416/6–8). The lectotype illustrated here (Figures 12A–C) matches clearly the figure mentioned by Marrat to describe his new species (in agreement with Recommendation 74B of the ICZN). The last four specimens, of lot NHMUK 1854.12.4.416 belongs to *O. carcellesi* and are not considered as part of the type material of *O. orbigny*.

Klappenbach (1965), ignoring Marrat’s note, as many authors did, described *O. uretai*, which is a junior subjective synonym of *O. orbigny*. Several authors mentioned *O. orbigny* after the original description (*i.e.* Marrat 1871, Tryon 1883, Rydén 1936, Burch & Burch 1960, Martínez Soler 1964, Wagner & Abbott 1978). Therefore,



prevailing usage of Klappenbach name does not applied because both articles, 23.9.1.1 (“the senior synonym or homonym has not been used as a valid name after 1899”) and 2 (“the junior synonym or homonym has been used for a particular taxon, as its presumed valid name, in at least 25 works, published by at least 10 authors in the immediately preceding 50 years and encompassing a span of not less than 10 years”), of ICZN (1999) must be met to keep using this junior name. According to the priority rule Marrat’s name must be maintained.

Barattini & Ureta (1961) reported the presence of *Agaronia testacea* Lamarck, 1811 from the Uruguayan coast. The type material of the latter species housed at MHNG (unnumbered with the coast of Mexico as type locality) is a different valid species (Figures 14A–B). The material identified as *Agaronia testacea* by Barattini & Ureta (1961) is probably *Olivancillaria orbigny* as was already noted by Klappenbach (1965) (as *Olivancillaria uretai*).



**FIGURE 14.** A–B, holotype of *Agaronia testacea* (Lamarck, 1811) MHNG unnumbered; C–D, holotype of *Oliva steeriae* Reeve, 1850 NHMUK 1892.9.24.19 from Gambia; scale bar = 1 cm for A–D; E–G, paratype of *Olivancillaria acuminata boavistensis* Burnay and Conceição, 1983 from Cape Verde Islands, Africa, USC 11; H–I, *Oliva nana* Lamarck, 1811 MORG 10.996 from Angola; scale bar for E–I = 2 mm.

## *Olivancillaria teaguei* Klappenbach, 1964

Figures 8A–E

Klappenbach, 1964, 132–134: pl. 8 figs. 1–2, 4–5, 8; Thomé 1966: 167; Sicardi 1967: 57; Rios 1970: 100, pl. 31; Figueiras & Sicardi 1973: 262, pl. 14 fig. 190; Rios 1975: 110, pl. 32, fig. 466; Scarabino 1977: 190; Rios 1985: 110, pl. 38, fig. 485; 1994: 142, pl. 46, fig. 608; Brazeiro & Defeo 1996: 529; Scarabino 2004: 322; Scarabino *et al.* 2006: 145, fig. 1; Carranza 2007: 22; Rios 2009: 269, N° 665.

**Diagnosis.** Shell very small (up to 25.8 mm) oval-oblong; spire short; apex rounded; columellar callus faint, poorly defined; siphonal channel, shallow; shell whitish, columellar folds and siphonal canal brownish.

**Description.** Shell, small, oval-oblong, medium thickness (~0.6 mm), smooth; protoconch partially covered by columellar callus; spire short; transition to teleoconch indistinct; suture channeled; columellar callus faint, uniform reaching suture; aperture elongated 3/4 of shell length; outer lip smooth, curved; 7–12 anterior oblique folds usually brownish; externally to those folds and parallel to columellar edge, 4 or 5 pronounced folds; fasciolar band well defined with posterior groove deep all along, brownish; siphonal channel shallow (Figures 8A–E).

Shell ultrastructure of three layers: as in *O. urceus* (Figure 9F).

Radula as in other species (Figure 9E).

**Distribution.** From Chuí (33°44'S; 53°21'W), Rio Grande do Sul state, Brazil to La Coronilla (33°53'S; 53°30'W), Rocha Department, Uruguay, usually intertidal or in the surf zone.

**Type material.** Holotype MNHNM 1238; 25 paratypes: MORG 8845, 3 specimens, from Chuí, Rio Grande do Sul (RS); MACN-In 27537, 2; MLP 11619, 1; MNHNM 1218, 2; 1230, 7; 1237, 3; 1241, 4; MORG 17765, 1; MZUSP 188859, 2, all from La Coronilla, Rocha, Uruguay.

**Type locality.** La Coronilla, Rocha Department, Uruguay.

**Other material examined.** **Brazil.** Chuí, RS: MORG 39228, 46529 (intertidal). **Uruguay.** Chuy, Rocha: MNHNM 2174; La Coronilla, Rocha: MNHNM 4301, MORG 15199 (intertidal), 16240 (intertidal), 32618, 47367, 49177 (intertidal), MZUSP 33087, NMR 57109, MNRJ 3390.

**Remarks.** The small size and creamy white color of *Olivancillaria teaguei* are the main differences from the other species of the genus. Castellanos (1964) reported its presence in Argentine waters based on the lots 1403, 3040, 3954, 4176–1, 7227 housed at MLP Buenos Aires province. No specimen of *O. teaguei* from the Argentina coast was ever found at the MLP or MACN. Those lots mentioned by Castellanos are *O. carcellesi* and *O. orbigny*, both common species from the Argentina coast.

## *Olivancillaria carcellesi* Klappenbach, 1965

Figures 15–17

*Oliva auricularia*. Chenu, 1845: pl. 35, figs. 1–2, (*non* Lamarck, 1811).

*Agaronia steeriae* Lange de Morretes, 1949, 101 (*non* Reeve, 1850); Rios 1970, 102, pl. 32.

*Olivancillaria carcellesi* Klappenbach, 1965: 2–6, pl. 1; Klappenbach 1966: 76–77; Figueiras 1967: 61; Sicardi 1967: 57; Castellanos 1970: 120, pl. 9, figs. 3–4; Rios 1970: 99, pl. 30; Penchaszadeh 1971: 50; Figueiras & Sicardi 1973: 263, pl. 14, fig. 191; Rios 1975: 110, pl. 32, fig. 462; Milstein *et al.* 1976: 152; Scarabino 1977: 191; Rios 1985: 109, pl. 37, fig. 482; Calvo 1987: 162, fig. 142; Aguirre 1991: 164; Borzone 1994: 27; Rios 1994: 142, pl. 45, fig. 605; Borzone 1995: 52; Pastorino 1995: 11, pl. 2, fig. 13; Forcelli 2000: 104, N° 301; Thomé *et al.* 2004: 56, N° 46; Clavijo *et al.* 2005: 388; Scarabino 2004: 322; Scarabino *et al.* 2006: 145; Rios 2009: 268, N° 662; Teso *et al.* 2010.

*Olivancillaria teaguei*. Castellanos, 1964: *partim* 98, (*non* Klappenbach 1964).

*Olivancillaria buckuporum* Thomé, 1966: 163–168, figs. 1–8.

*Olivancillaria steeriae*. Rios 1975: 110, pl. 32, fig. 465; Wagner & Abbott 1978: 812, fig. 19262 (*non* Reeve 1850).

**Diagnosis.** Shell large (up to 54 mm), oval-oblong; spire medium height; columella straight, aperture narrow; posterior columellar callus distinct; fasciolar band dark brown with irregular axial lines; shell bluish.

**Description.** Shell oval-oblong, solid, somewhat thick (~1 mm), smooth, glossy; protoconch of 1 2/3 whorls, translucent; spire of medium height, of 3 3/4 to 4 convex whorls, transition to teleoconch indistinct; suture channeled, columellar callus uniform, reaching to the suture; aperture elongated, 7/8 of total shell length; outer lip smooth, curved; columella slightly convex, 10–12 anterior oblique folds, 3 or 4 pronounced folds parallel to colu-

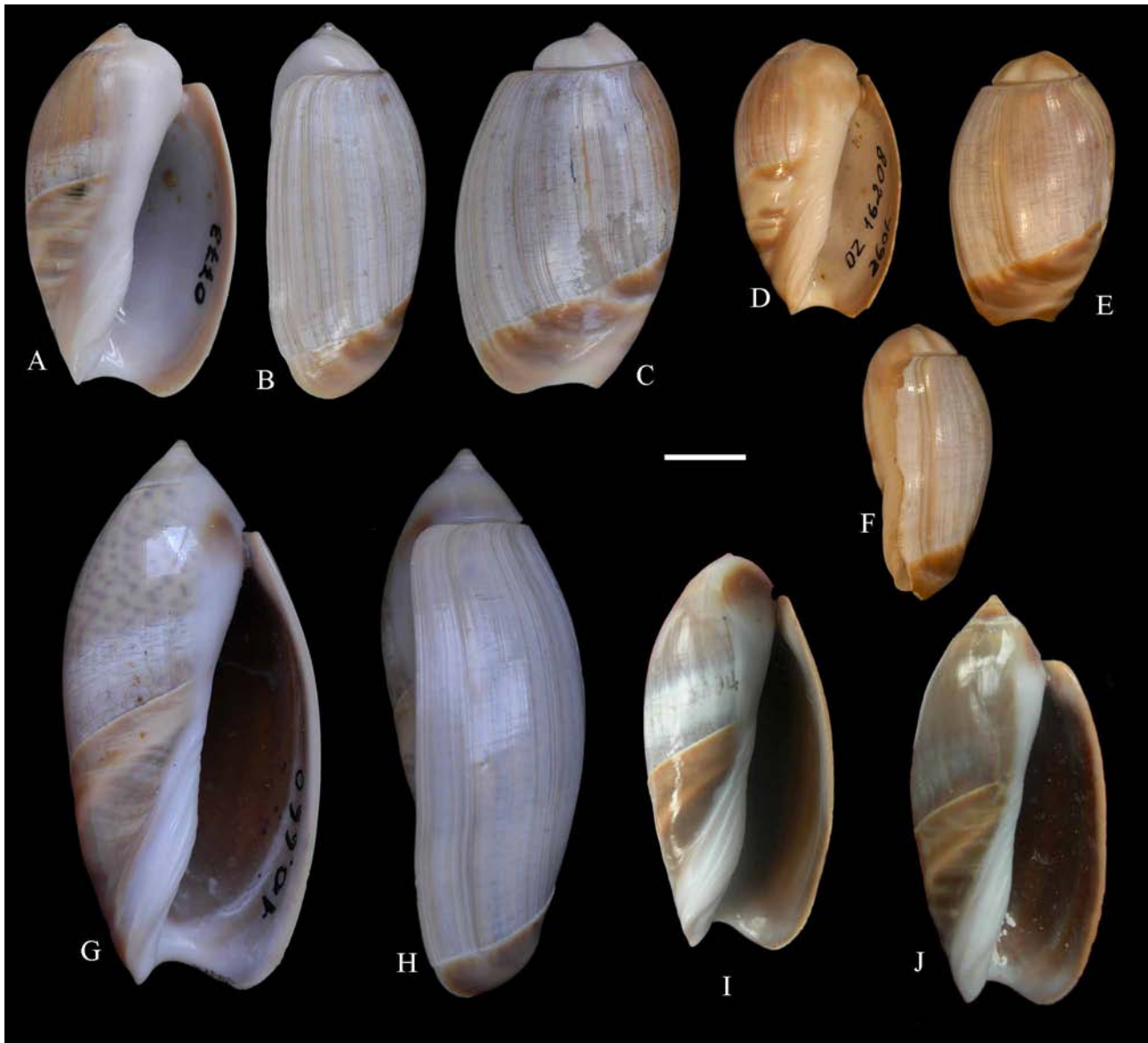
mellar edge; fasciolar band dark brown with irregular axial lines; posterior groove deep; siphonal channel deep (Figures 15A–J).

Shell ultrastructure of three layers: as in *O. auricularia* (Figure 16B).

Radula (Figure 16A) as in *O. urceus*.

Color of living specimens white with dark purple on the foot, siphon alternating between purple and brown. Penis elongated with tip rounded (Figure 16C) as in *O. deshayesiana*, siphon (Figure 16D) as in *O. urceus*.

Egg capsules semispherical with the attached surface elliptical, the walls rigid as in *O. deshayesiana*. A large operculum (Figures 16E–F) covers the whole capsule, which contains a single embryo. Egg capsules are laid on living specimens of *Buccinanops globulosus*, *Olivella tehuelcha* and *O. puelcha*.



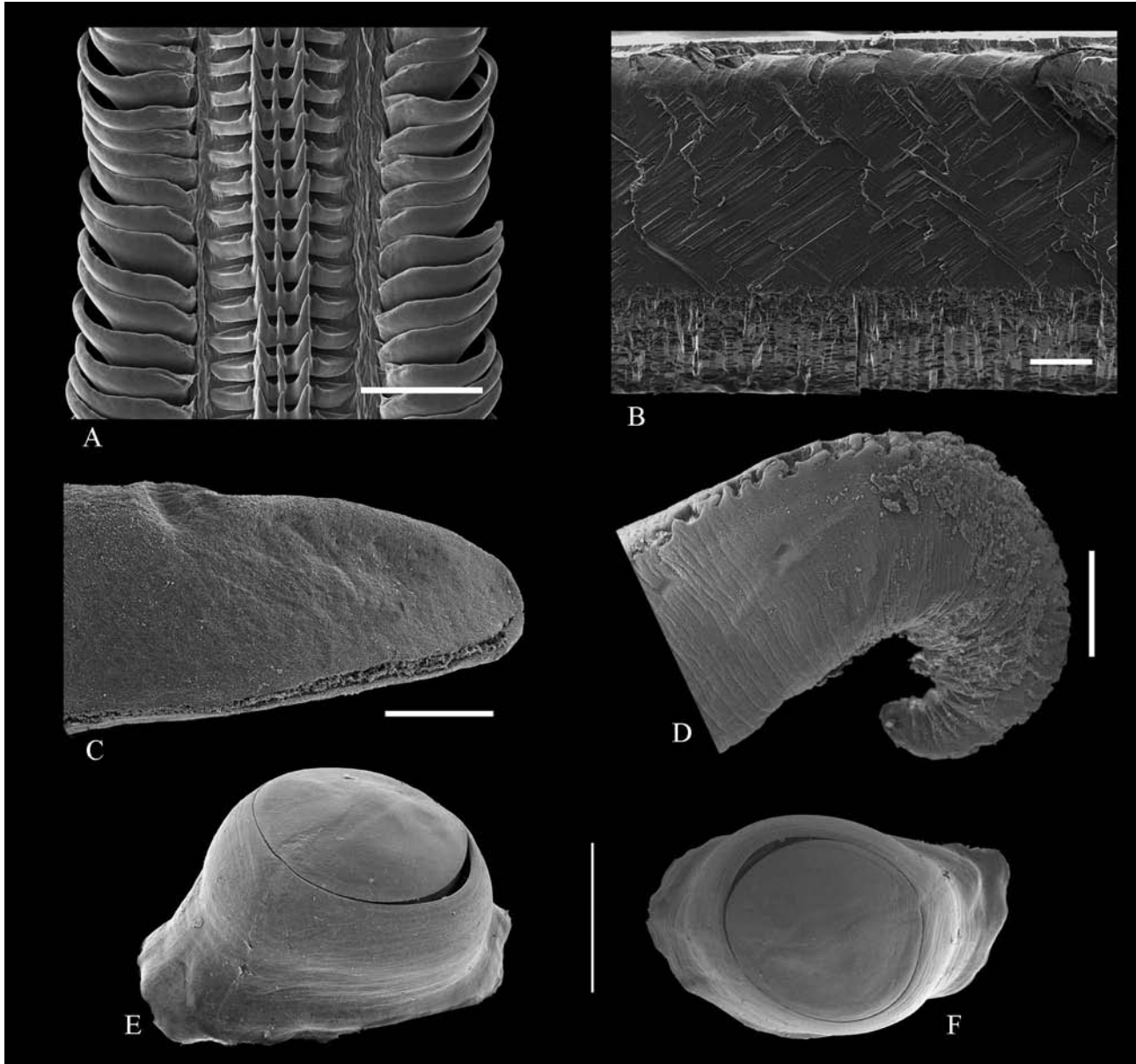
**FIGURE 15.** A–C, *Olivancillaria carcellesi* Klappenbach, 1965 holotype MNHNM 0773, from Punta del Este, Maldonado department, Uruguay; D–F, paratype of *Olivancillaria buckuporum* Thomé, 1966, MZUSP 16208 from Cassino, Rio Grande do Sul state, Brazil; G–H, *Olivancillaria* cf. *carcellesi* MORG 10.660 from Espírito Santo state, Brazil; I, *Olivancillaria* cf. *carcellesi* MZUSP 61339 from Praia Grande, São Paulo state, Brazil; J, *Olivancillaria* cf. *carcellesi* MZUSP 73374, São Tomé, Rio de Janeiro state, Brazil; scale bar = 1 cm.

**Distribution.** From Praia do Forte (12°33'S; 37°59'W), Bahia state, Brazil to Punta Pardelas (42°37'S, 64°15'W), Chubut province, Argentina in 0–70 m depth. This species has the largest range within the genus.

**Type material.** [*O. carcellesi*] holotype: MNHNM 773; 28 paratypes: MORG 3715, 2 specimens, (Cassino, RS); MNHNM 638, 1, 737, 4, 1298, 1, (La Paloma, Rocha department); MNHNM 22, 3, 774, 2, 795, 2, 886, 1,

MORG 17764, 1, (Punta del Este, Maldonado department); MNHNM 590, 3, (Punta Ballena, Maldonado department); MNHNM 699, 2, (Puerto Militar, Buenos Aires province); MZUSP 10647, 6, (Monte Hermoso, Buenos Aires province); [*Olivancillaria buckuporum*] holotype: MRCN 1117, paratypes: MORG 2606, 4, 3715, 3, 7949, 3, 9525, 4, MZUSP 16208, 1, (Cassino, RS state).

**Type locality.** [*O. carcellesi*] Punta del Este, Maldonado department, Uruguay. [*O. buckuporum*] Cassino, Rio Grande do Sul state (RS), Brazil.



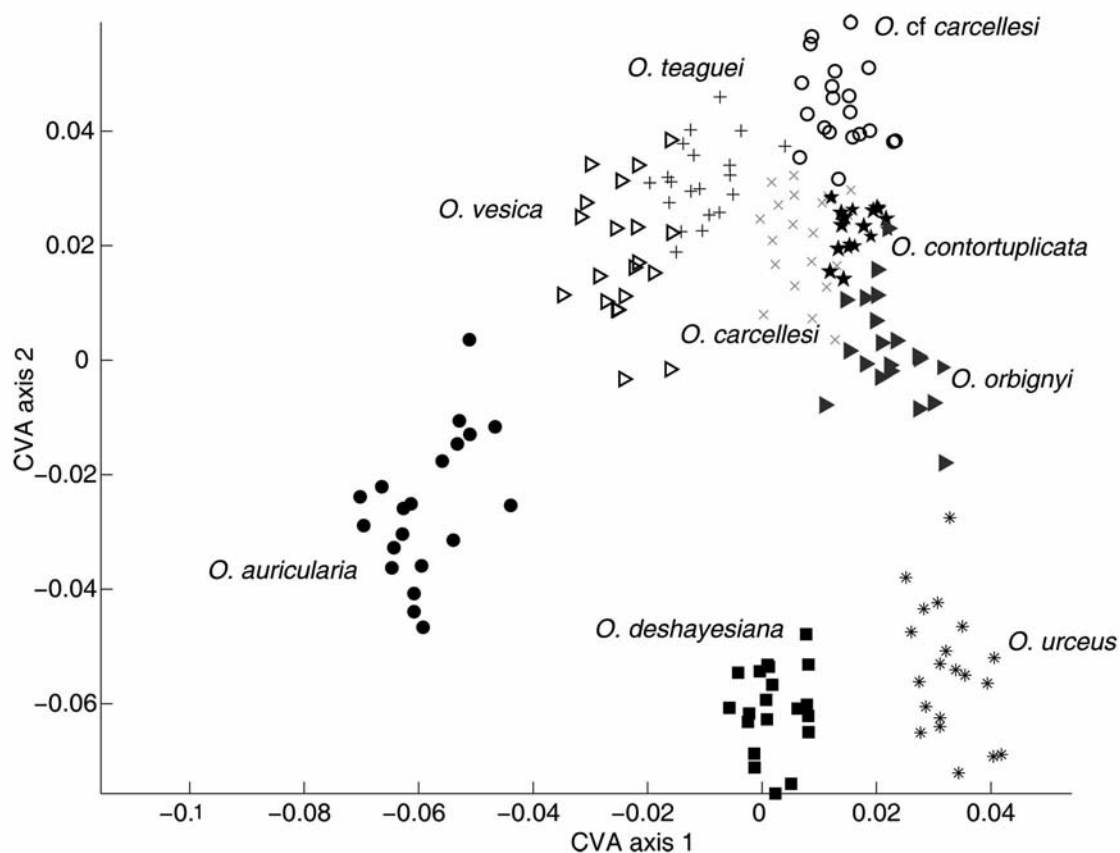
**FIGURE 16.** *Olivancillaria carcellesi*. A, radula, frontal view, scale bar = 100 µm; B, ultrastructure of the shell, scale bar = 200 µm; C, penis, scale bar = 200 µm; D, siphon, scale bar = 1 mm; E–F, egg capsule from Punta Pardelas, Chubut province, Argentina, scale bar = 1 mm.

**Other material examined. Brazil.** Praia do Forte, Bahia (BA): MORG 25073 (intertidal); Victoria, Espírito Santo (ES): MNHNM 9612, MZUSP 73478, 73677 (50–60 m), 74647 (50–60 m); Guarapari, ES: MNHNM 3026, NMR 61856, MORG 100, 8244, 9138, 10660, 10715 (intertidal), 12307, 13338, 13345, 17375, 17769, 19258, 27561 (intertidal), 31677 (intertidal), 33895, 34654, 49176, 50011, MNRJ 4258, MZUSP 73477 (50–60 m); Cabo Frio, Rio de Janeiro (RJ): MORG 4187, 43970 (30–40 m), MZUSP 73678 (60–70 m); São Tomé, RJ: MORG 43975 (60 m), MZUSP 65711 (30–40 m), 68958 (30–40 m), 69707 (60 m), 72673, 73374 (30–40 m), 73780 (30–40m); Guanabara, RJ: MORG 12971 (25 m); RJ: MZUSP 73676 (60 m); Santos, São Paulo (SP): MORG 30463

(50–60 m); Praia Grande, SP: MZUSP 61339; Porto Belo, Santa Catarina (SC): MORG 41536; Araçatuba, SC: MORG 25081; Pinheira, SC: MORG 38834 (intertidal); Torres, RS: MORG 43046 (15–25 m), MZUSP 32722 (15–25 m); Lagoa do Passo, RS: MORG 8832 (40 m); Tramandaí, RS: MORG 43052 (15–25 m); Mostardas, RS: MORG 41536 (35 m), 46625 (20 m), 49906 (12–20 m), MZUSP 32886; São José do Norte, RS: MORG 15216, 46626 (intertidal); Cassino, RS: MNHNM 15048, MORG 27603, 31346, 40187, 42701, MZUSP 3606, 35487, 44169, MNRJ 6933; RS: MORG 18903 (16 m), 21096, 22258 (53 m), 23125 (24 m), 24755, 32855, 32906, 43037, 45741, MZUSP 32719, 332921, 6307; Chuí, RS: MORG 14023. **Uruguay.** La Coronilla, Rocha: MORG 16238, 49187 (intertidal); La Paloma, Rocha: MNHNM 3866, 4401, 4520, 6122, 9114, 9115, MORG 19053, 32607, 32809 (intertidal); Punta del Este, Maldonado: MNHNM 4423, MZUSP 74376 (30 m); Punta Ballena, Maldonado: MNHNM 9113. **Argentina.** Mar Chiquita, Buenos Aires: MNHNM 9116 (10 m); Mar del Plata, Buenos Aires: MACN-In 12222-002, 37505, MNHNM 11779, MORG 10703 (37 m), 10806, 11164 (37 m), 11670 (20 m); Quequén, Buenos Aires: MLP 2176, MZUSP 91228; Necochea, Buenos Aires: MACN-In 14254, MLP 3093; Monte Hermoso, Buenos Aires: MLP 3031, 3032, 3036; Bahía Blanca, Buenos Aires: MACN-In 24161, 24296; San Blas, Buenos Aires: MACN-In 20264, 20577; Carmen de Patagones, Buenos Aires: MZUSP 10644, 51156; Boca del Río Negro, Río Negro: MLP 3029, 3041; Bahía Creek, Río Negro: MLP 4176-1; San Antonio, Río Negro: MLP 1331, 1337-2, 3034, 3671-2; Puerto Lobos, Chubut: MLP 601; Puerto Pirámide, Chubut: MLP 3028, 5177; Punta Pardelas, Chubut: MACN-In 37506; Patagonia: NHMUK 1854.12.4.415, 1854.12.4.416.

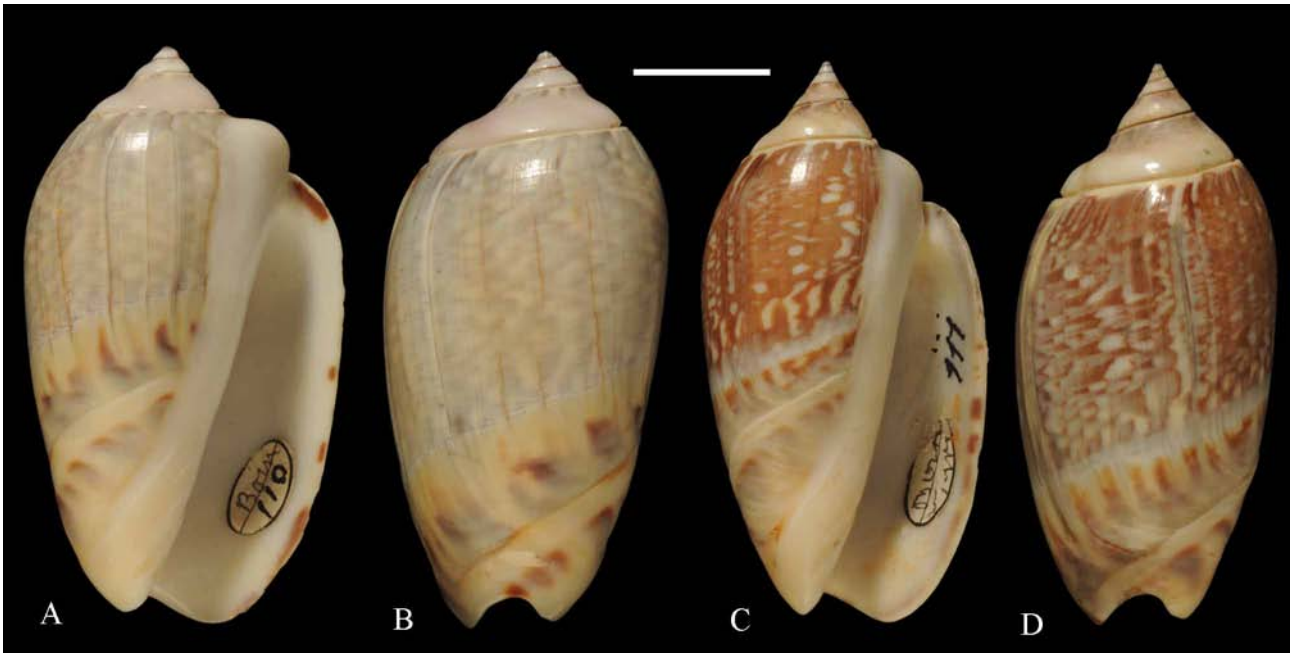
**Remarks.** Revision of the type material of *O. buckuporum* Thomé 1966 (Figures 15D–F) from Cassino, Brazil suggested that it is a local variant of *O. carcellesi* and therefore the name is a junior synonym, as previously reported by Rios (1970) and Thomé *et al.* (2004).

*Oliva steeriae* Reeve, 1850 (Figures 14C–D) with type locality the Republic of Gambia, was reported from the coast of Brazil by several authors (*i.e.*: Lange de Morretes 1949, Rios 1970, 1975) however it was not found in any of the revised collections. Given the shell size and the completely uncovered channeled suture, it could belong to *Agaronia*. However soft parts were not available to analyze anatomical characteristics (*e.g.* the morphology of the seminal vesicle) that differentiates both genera (Pimenta 2005).



**FIGURE 17.** Canonical variates analysis of the nine groups on the first two axes.





**FIGURE 18.** *Voluta gibbosa* Born 1778. A–B, type material NHMW 14209; C–D, type material NHMW 14208; scale bar = 1 com.

Lange de Morretes (1949) and Rios (1970, 1975) mentioned *Olivancillaria steeriae* from some localities between São Paulo and Espírito Santo states, Brazil based on some doubtful specimens. Later Rios (1985) cited those specimens as *Olivancillaria vesica vesica*. Shell shape (Figures 15G–J), penes and siphon morphology of these specimens identified as “*O. steeriae*” by Lange (*non* Reeve) are comparable to *O. carcellesi*, suggesting that this material is only a variation of the latter species at the northern limit of its distribution. When this material (here cited as *O. cf. carcellesi*) is included in the geometric morphometric analysis with all the species of the genus, the CVA shows a separated group closer to *O. carcellesi* than to the other species (Figure 17). In addition, no differences in centroid size were found between these two groups (Tukey tests  $P = 0.29$ , Table 1).

As a result of CVA of all species two groups are differentiated: *O. vesica* and *O. teaguei* on one side and *O. cf. carcellesi*, *O. contortuplicata*, *O. orbignyi* and *O. carcellesi* on the other. However, DFA revealed significant differences among all groups (pairwise comparisons,  $P < 0.0001$ ). This analysis correctly classified 94% of the species mentioned above. However, a detailed study of the anatomy and genetics of the population of *O. cf. carcellesi* is required. If this material is confirmed as *O. carcellesi* the range of the latter species extends to Praia do Forte, Bahia state, Brazil.

### Species excluded from *Olivancillaria*

*Oliva nana* Lamarck, 1811 (Figures 14H–I), described from the coast of Angola was included in the genus *Olivancillaria* by Fischer (1887) and later cited by many authors in the same genus (*e.g.* Dautzenberg 1912, Odhner 1923, Nickles 1950, Klappenbach 1965, Burnay & Conceição 1983, etc.). However, the presence of operculum excludes it from *Olivancillaria*. Abbott & Dance (1986) included it in *Olivella*, which appears to be a more accurate assignment.

*Oliva acuminata* Lamarck, 1811, distributed between Mauritania and Angola was included in *Olivancillaria* by Lamy (1908), and later cited by Burnay & Conceição (1983) when they described the subspecies *Olivancillaria acuminata boavistensis* (Figures 14E–G). It was included, afterward, in *Agaronia* by Abbott & Dance (1986), Tursch (1988), and Tursch & Greifeneder (2001). The shell has a less marked basal fold than *Olivancillaria* and the channeled suture is completely uncovered.

*Oliva cauta* Marrat, 1871 with type locality of West Africa, was cited by Webb (1986) as “*Olivancillaria cauta*” without locality. As far as we can see from Marrat’s illustration (1871: pl. 20, figs. 327–329) this species does not belong in *Olivancillaria* because the channeled suture is completely uncovered and the basal fold is less marked.

## Discussion

Shell characters are used as a primary tool for species identification in most taxonomic works since Linnaeus' time. However quantifying the boundaries between two species is always difficult. Geometric morphometric methods applied to this problem are a good tool to reduce these difficulties. Armbruster (1995) reported an effective separation among four species of the genus *Cochlicopa* Férussac, 1821 (Pulmonata: Cochlicopidae) based on a canonical discriminant analysis and Caetano *et al.* (2010) differentiated four species of the genus *Gadila* Gray, 1847 by the same technique. Conde-Padín *et al.* (2007) demonstrated through a discriminant analysis that geometric morphometric methods are very efficient for diagnosing differences among sympatric populations of the genus *Littorina*. These methods used here, based on morphometric variability of shell size and shape, allows considerable differentiation among all the species of the genus *Olivancillaria*.

Eight living species belonging to the genus *Olivancillaria* were recognized as valid and restricted to the Southwestern Atlantic from Bahia State in Brazil (12°15'S; 37° 47'W) to Punta Pardelas (42°37'S, 64°15'W), Chubut province in Argentina. We consider most of the *Olivancillaria* species representatives of the Argentine Malacological Province and the genus, endemic to the region.

Several species were described from Tertiary deposits from Patagonia and Chile that undoubtedly belong to *Olivancillaria* (Brunet 1997; Nielsen 2004). This, in fact, confirms the presence of the genus since at least the Miocene in South American waters. The only species still under study and with some remarkable similarities with the ones described here is what is called by authors "*Olivancillaria*" *gibbosa* (Born, 1778) (Figure 18), with an Indo-Pacific distribution. The only available dead specimens have very similar shell morphology that calls our attention despite the large geographic distance from the species discussed here. Whether this species belongs in *Olivancillaria* or in a different genus may be resolved once soft parts or genetics are studied. As far as we know there are no fossil representatives of this genus outside of South America. This, together with the clear presence of several fossil species in the same region where living ones are common, reinforces the idea of endemism. However, this is somewhat speculative.

Radular characters have been used broadly to separate generic and higher levels of caenogastropod taxonomy. In fact, it was the basis of several higher taxon names, *e.g.* Stenoglossa, Ptenoglossa, Taenioglossa, etc. (Ponder *et al.* 2007 and references therein). Olividae in general has a very conservative radula. According to the material studied here and those previously researched (see Burch & Burch 1964, Klappenbach 1965, Pimenta 2005, among others), *Olivancillaria* radulae do not differ markedly between species. Radular morphology in *Olivancillaria* is also similar to that in species of *Agaronia* but different from other genera of Olividae. Both genera have at least one small denticle outside the lateral cusps of the rachidian teeth as was reported by López *et al.* (1988).

Tursch & Greifeneder (2001) found some differences in the number of layers in the ultrastructure of the shell of several species of Olividae. Specifically, *Agaronia acuminata* and *Olivella japonica* Pilsbry, 1895 have two layers; *Olivella volutella* (Lamarck, 1811) and *O. biplicata* (Sowerby, 1825), three layers and *Ancilla lienardi* (Bernardi, 1858), four layers of CaCO<sub>3</sub> crystals. All *Olivancillaria* species showed always three layers. The main difference among the species appears to be the thickness of each layer, which is in agreement with the thickness of the whole shell. *O. auricularia* has the maximum thickness (~2.3 mm) and *O. contortuplicata* the minimum (~0.4 mm).

The color of the live animal allowed specific differentiation that could facilitate field work. Specifically, *O. urceus* is clearly different from the other species in which the color of live animals is not diagnostic.

The morphology of the siphon and its papillae appears to be a suitable character to differentiate some species. *O. deshayesiana* has a large siphon with numerous branched papillae on the distal tip and *O. vesica* has a short siphon with few distal papillae. The rest of the species have a larger siphon with numerous papillae of different degree of branching.

In terms of generic differentiation, *Agaronia* and *Olivancillaria* both lack the anterior mantle tentacle, which is present in *Oliva* and *Olivella* (Pimenta 2005). Kantor (1991) pointed out the resorption of the inner walls of the columella as an important feature to be considered in the phylogeny of the family Olividae. Two stages are found, *i.e.* partial, as in *Agaronia* and *Oliva* and total resorption as in *Olivella* (Tursch & Greifeneder 2001, Pimenta 2005). Partial resorption is recognized by the columella wall being thin and translucent or absent in parts. All *Olivancillaria* species showed partial resorption of the earlier volutions as it was previously reported by Pimenta (2005) for *O. urceus* and *O. auricularia*.



As it is common in soft bottom genera all *Olivancillaria* species lack opercula. Despite this, some species of *Olivella*, e.g. *O. puelcha* and *O. tehuelcha* have them (Pastorino, 2009).

Species of several genera of Olividae are blind, perhaps as an adaptation to live infaunally. *Olivancillaria*, as well as *Agaronia* and *Olivella*, are blind genera while *Oliva* usually possesses eyes.

Pastorino (2009) stated that differences in the morphology of the penes are a valuable taxonomic character among *Olivella* species from the southwestern Atlantic coast. *Olivancillaria* species only have two, very similar, types of penis morphology i.e. with the distal tip rounded (as in *O. deshayesiana*, *O. auricularia* and *O. carcellesi*, Figures 5C 7F and 16C) and slightly pointed (in *O. urceus*, *O. contortuplicata* and *O. orbignyi* Figures 9C, 11D and 13C). In addition, *Olivancillaria* and *Agaronia* species have the same morphology of penes with a straight and completely open sperm channel. In contrast, the genera *Oliva*, *Amalda*, *Eburna*, *Ancilla* and *Olivella* have penes with closed spermatic grooves, and sometimes with undulations (Pimenta 2005).

## Key of the species of *Olivancillaria*

### Key of shell characters

- A. Shell very small <25.8 mm total shell length [whitish; columellar folds and siphonal channel brownish, the thinnest (thickness ~0.4 mm)] ..... *O. teaguei*
- Shell >25.8 mm total shell length ..... B
- B. Columella with a conspicuous groove, posterior to columellar folds, apex never covered by callus [shell small, up to 35.1 mm, grayish in color] ..... *O. contortuplicata*
- Columella straight or slightly curved ..... C
- C. Shell subquadrangular, protoconch always visible, anterior columellar callus very thick, [shell up to 63.5 mm, dirty pinkish, with axial irregular clear or dark lines, thick (~1 mm)] ..... *O. urceus*
- Shell oval or oval-oblong, protoconch covered by callus ..... D
- D. Spire short ..... E
- Spire high ..... F
- E. Shell suboval, posterior columellar callus thick, aperture wide, outer lip wide, spire very short, apex slightly defined, [shell of medium size up to 35 mm] ..... *O. deshayesiana*
- Shell oval, columellar callus large, prominent, covering columellar folds, aperture very wide, outer lip strongly curved, spire short, apex always covered by callus, [shell large up to 57 mm and very thick (~2.3 mm); color grey with axial lines] ..... *O. auricularia*
- F. Apex never covered by callus, spire very high, columellar callus faint; shell grayish [medium size up to 35 mm, thick (~1 mm)] ..... *O. orbignyi*
- Apex usually covered by callus ..... G
- G. Columella slightly curved, shell grayish with zig-zag light brown axial lines, fasciolar band light brown [shell large up to 60 mm, thick (~1 mm)] ..... *O. vesica*
- Columella straight, shell bluish, fasciolar band dark brown [larger size up to 54 mm; thick (~1 mm)] ..... *O. carcellesi*

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