New species and new records of Calliostomatidae (Gastropoda: Trochoidea) from eastern and central Indo-Pacific

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ABSTRACT. New records of five known Calliostomatidae species from eastern and central tropical Pacific are listed, extending the distribution area of some of them. Four new species are described and compared with similar species: *Calliostoma haapaiensis* n. sp., *C. vaubanoides* n. sp., *C. mesemorinon* n. sp. and *C. polysarkon* n. sp.

RESUME. De nouveaux relevés de cinq espèces connues de Calliostomatidae provenant de l'est et du centre du Pacifique tropical sont listés, étendant ainsi l'aire de distribution d'un certain nombre d'entre elles. Quatre nouvelles espèces sont décrites et comparées avec des espèces similaires : *Calliostoma haapaiensis* n. sp., *C. vaubanoides* n. sp., *C. mesemorinon* n. sp. et *C. polysarkon* n. sp.

INTRODUCTION

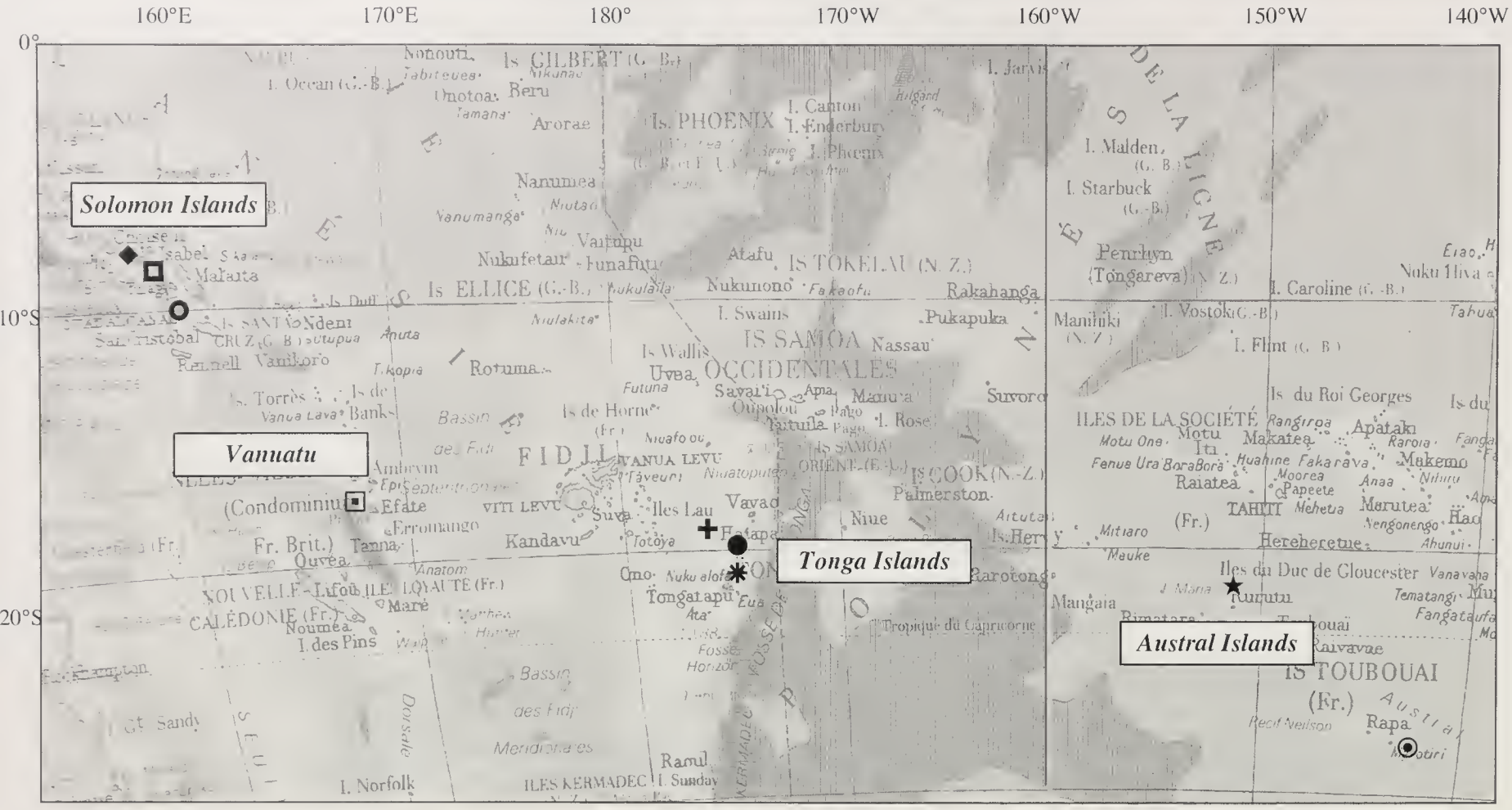
The malacofauna, especially Trochoidea species, of eastern tropical Pacific is still rather poorly known. Only a few dredging, like those of IRD (Institut de Recherche pour le Développement, Paris - ex-ORSTOM) and MNHN (Muséum national d'Histoire naturelle, Paris) campaigns in Frcnch Polynesia (Vilvens, 2012) or in Tonga Islands (Vilvens, 2005), and local samplings (Stratmann & Stahlschmidt, 2007, Vilvens, 2009a) have brought a limited amount of samples.

On the contrary, numerous campaigns have been conducted in central tropical Pacific, espccially again the ones organized by IRD-MNHN in New Caledonia, Vanuatu, Fiji and Solomon Islands, bringing a huge material (Héros et al., 2007; Bouchet et al., 2008), notably Calliostomatidae (Trochoidea) samples with numerous new species (e.g.: Marshall, 1995; Vilvens, 2009b).

While studying various Trochoidea and Seguenzoidea from all these campaigns, a few Calliostomatidae samples were found among other trochids samples, bringing additional records of known species but also more surprisingly some new species. The present paper presents the results of this recent study.

Material and methods

The material studied in the present paper was brought mainly by some IRD-MNHN expeditions: BORDAU 2 (6/2000), BENTHAUS (11/2002), SALOMON 2 (10-11/2004), BOA 1 (9/2005) and SALOMONBOA 3 (9-10/2007) (see Map 1).
Regarding the distribution of the new species and the extension of the distribution of known species, the range is taken from the internal intervals of the two extremes values. This range of the known and new species is provided for all the available specimens and also for the only living specimens if they have been found; when these ranges are the same, the common range is cited once with the "(living)" annotation; if all the specimens are dcad collected, the range is cited with the "(dead)" annotation.



Map 1. Records of cited Calliostomatidae species in eastern and central tropical Pacific :

★ *Calliostoma mesemorinon* n. sp. (BENTHAUS)
⦿ *C. paradigmatum* Marshall, 1995 (BENTHAUS)
✱ *C. arx* Vilvens, 2005 (BORDAU 2)
✚ *C. haapaiensis* n. sp. (BORDAU 2)
● *C. vaubanoides* n. sp. (BORDAU 2)
◆ *C. hexalyssion* Vilvens, 2009 (SALOMON 2)
◘ *C. aporia* Vilvens, 2009 (SALOMONBOA 3)
O *C. suduirauti* Bozzetti, 1997 (SALOMONBOA 3)
⊡ *C. polysarkon* n. sp. (BOA 1)

Regarding the description methodology, the main conchological features used are (see Fig. 1 below):

- general shape of the shell (spire high spired or depressed – conical, cyrtoconoidal, coeloconoidal);
- size and shape of the protoconch;
- shape of the whorls (convex, concave, straight - with or without shoulder or keel);
- spiral cords of the whorls (ontogeny, number, beaded or smooth, distance between cords);
- shape of the aperture, features of the outer and the inner lip;
- shape of the base and spiral cords : number, beaded or smooth, distance between cords;
- features of the umbilicus : open or covered with a callus, relative size, spiral cords around or inside umbilicus;
- columella : thickened or not;
- colour of the protoconch, of the whorls, of the base.

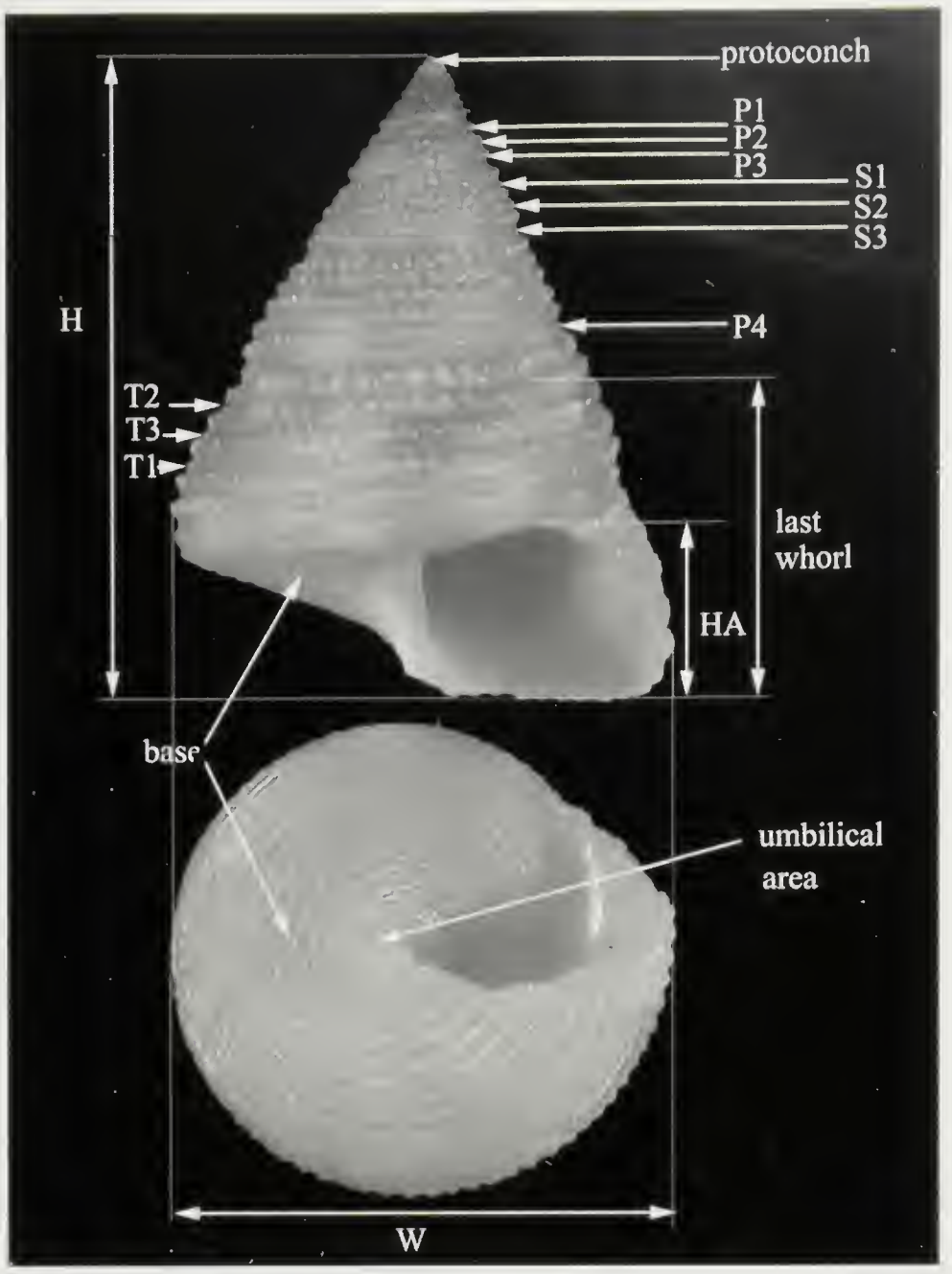


Figure 1. Features of Calliostomatidae shells; H : height; W : width; HA : height of the aperture; P1, P2, P3, ... : primary cords; S1, S2, S3, ... : secondary cords; T1, T2, ... : tertiary cords (shell : *Calliostoma (Fautor) chlorum* Vilvens, 2005, Fiji, BORDAU 1, stn DW1454, 13.6 x 10.4 mm).

Abbreviations

Repositories
IMT: Institute of Malacology of Tokyo, Tokyo, Japan.
MNHN: Muséum national d'Histoire naturelle, Paris, France.

Other abbreviations (see Fig. 1 above)

H: height.
W: width.
HA: height of the aperture.
TW: number of teleoconch whorls.
P1, P2, P3, ...: primary cords (P1 is the most adapical).
Pi: generic name for the primary cords (i=1,2,3, ...).
S1, S2, S3, ...: secondary cords (S1 is the most adapical).
Si: generic name for the secondary cords (i=1,2,3, ...).
T1, T2, T3, ...: tertiary cords (numbered following appearing order).
stn: station.
lv: live-taken specimens present in sample.
dd: no live-taken specimens present in sample.
sub: subadult specimen.
juv: juvenile specimen.

SYSTEMATICS

We follow here Marshall (1995), Bouchet & Rocroi (2005) and Williams et al. (2008, 2010) where Calliostomatidae, earlier treated as a subfamily of Trochidae (Hickman & McLean, 1990), are now ranked as a family of superfamily Trochoidea, with the two subfamilies Calliostomatinae and Thysanodontinae.
Regarding subgenera of the genus *Calliostoma*, we decide to not use them here, because they seem today rather artificial considering the information brought by DNA studies. One can however refer to Marshall (1995) regarding Indo-Pacific subgenera.

Superfamily **TROCHOIDEA** Rafinesque, 1815
Family **CALLIOSTOMATIDAE** Thiele, 1924
Subfamily **CALLIOSTOMATINAE** Thiele, 1924
Tribe **Calliostomatini** Thiele, 1924 [= Ziziphininae Gray, 1847]
Genus ***Calliostoma*** Swainson, 1840
Type species *Trochus conulus* Linnaeus, 1758 (by s.d. Herrmannsen, 1846) – Recent, Mediterranean Sea.

Calliostoma arx Vilvens, 2005
Figs 30-31

Calliostoma (Benthastelena) arx Vilvens, 2005: 14-16, figs 41-44. Type locality: Tonga Islands, south of Eua Island, 483-531 m.

Material examined. Tonga Islands. BORDAU 2: stn CP1644, 21°05'S, 175°23'W, 501 m, 1 dd.

Distribution. Tonga, 483-531 m (dead); Fiji, 450-500 m (dead).

Remarks. The main characteristics of this species are:
– height up to 18 mm, width up to 16 mm;
– coeloconidal in shape, slightly higher than wide; angulate periphery;
– protoconch about 350 μm wide, of 1.25 whorl;
– teleoconch with up to 8.5 convex whorls with spiny spiral cords; P2 and P3 appearing first while P1 appears a quarter of whorl later; P4 slightly emerging from suture on fourth whorl; S4 and S1 appearing on sixth whorl, S2 on seventh whorl, S3 absent;
– weakly convex base with 12 rather thin granular spiral cords;
– narrow and deep umbilicus;
– cream white.

Calliostoma haapaiensis n. sp.
Figs 2-4

Type material. Holotype (14.1 x 11.5 mm) MNHN (IM-2000-27238).

Type locality. Tonga Islands, north of Ha'apai group, BORDAU 2, stn DW1595, 19°03'S, 174°19'W, 523-806 m.

Distribution. Tonga Islands, 523-806 m (dead).

Diagnosis. A *Calliostoma* species of medium size with a conical spire, concave whorls with up to 14 granular, close spiral cords, the two most abapical cords being the strongest and making a keel, a weakly convex base with up to 20 granular spiral cords, an umbilicus partly closed by the columella, an off white colour with irregular brownish orange flames and a peripheral cord alternating white and brown segments.

Description. *Shell* of medium size for the genus (height up to 14.1 mm, width up to 11.5 mm), higher than wide, conical to weakly coeloconoidal in shape; spire elevated, height 1.2x width, 4.1x aperture height; angulate periphery; umbilicate.
Protoconch about 300 μm wide, of 1.25 whorl, rounded, covered by a network of ridges producing large polygonal areas; thin, poorly visible terminal varix.
Teleoconch of 8.5 whorls, early whorls flat, next ones concave. Suture very poorly visible, not canaliculate.
First whorl moderately convex, sculptured by rather thick, almost orthocline ribs and 3 spiral cords; P2 and P3 appearing immediately, P1 appearing a quarter of whorl later; P3 stronger and P1 weaker than other cords; distance between cords about 3x width of cords; distance between ribs 4x width of ribs; axial ribs making the cords granular. Second whorl only weakly convex to almost flat; all cords stronger, with thick beads; P3 very stronger than other cords, with pointed beads; distance between P1 and P2 similar in size to cords, distance between P2 and P3 about 2x width of P2; axial ribs prosocline; suture poorly visible. Third whorl flat with P3 much stronger with sharp beads, producing keel; P1 weaker than P3, but stronger than P2; S2 appearing, very thin; P4 partly visible, almost completely hidden by succeeding whorl; axial ribs still strong, distance between similar in size to width of ribs. On fourth whorl, S1 appearing; S2 similar in size to P2; T1 appearing between P2 and S2; P4 almost fully visible; beads of P3 thick, bluntly pointed; axial ribs between P2 and P3 thicker than other cords; whorl slightly concave in shape, with a basal keel made by P3. On fifth whorl, beads of P1 axially elongated; all cords similar in size except P1 stronger and P3 much stronger; axial ribs weaker, reduced to thin threads; whorl strongly concave between suture and P3; P3 and P4 making a strong peripheral keel. On sixth whorl, T2 appearing between S2 and P3, quickly as strong as S2; axial threads no more visible. On last whorls, additional thin, smooth cords appearing elsewhere between P1 and P3, number of cords reaching about 14; angular periphery.
Aperture subquadrangular; outer lip thin, curved, with a basal part rounded, meeting inner lip with rounded angle. Columella oblique, almost straight, without tooth.
Base weakly convex, with about 20 spiral cords; outer cords very thin, subgranular; cords thickening towards umbilicus and becoming granular, innermost cords twice thicker than outermost cords; fine axial threads on the whole surface.
Umbilicus narrow (about 7% of shell width), funnel shaped with gentle slope, half covered by an expansion of columella.
Colour of teleoconch globally off white, with brownish orange flames; P3 with regular brown patches covering two or three beads and separated by four or five whitish coloured beads; base nacreous pinkish white; protoconch white translucent.

Discussion. *Calliostoma haapaiensis* n. sp. is rather close to *C. heros* Marshall, 1995 from Loyalty Islands (Figs 5-7), but this similar in size and in spiral cords ontogeny species has a smaller H/W ratio for specimens of the same size, a protoconch with a strong terminal varix, only weakly (not strongly) concave whorls with a very much less prominent peripheral keel, thicker spiral cords on whorls and base, thicker and not similar in size beads on P3.
The new species is close to *C. katoi* Sakurai, 1994 from Japan (Figs 8-9) but this similar in size species has an umbilicus, has less numerous, thicker spiral cords on the whorls and only 6-7 smooth spiral cords on the base.

Etymology. From the type locality, Ha'apai islands, one of the three islands groups of Tonga archipelago.

Calliostoma vaubanoides n. sp.
Figs 14-16

Type material. Holotype (14.8 x 15.3 mm) MNHN (IM-2000-27239).

Type locality. Tonga Islands, south of Nomuka group, BORDAU 2, stn DW1548, 20°38'S, 175°03'W, 476-478 m.

Distribution. Tonga Islands, 476-478 m (dead).

Diagnosis. A *Calliostoma* species of medium size with a coeloconoidal spire, flat whorls with up to 9 granular spiral cords, the peripheral cords being the strongest and making a weak keel, an almost flat base with up to 14 granular spiral cords, no umbilicus, an orange colour with brow flames on the adapical area of the whorls and on the base.

Description. *Shell* of medium size for the genus (height up to 14.8 mm, width up to 15.3 mm), wider than high, coeloconoidal in shape; spire moderately elevated, height 0.97x width, 3.0x aperture height; angulate periphery; anomphalous.
Protoconch about 350 µm wide, of 1.25 whorl, rounded, covered by a network of ridges producing large polygonal areas; thin terminal varix.
Teleoconch of 7.0 whorls, all almost flat except the two last whorls weakly convex.
Suture visible, not canaliculate.
First whorl moderately convex, sculptured by prosocline ribs and 3 spiral cords; P2 and P3 appearing immediately, P1 appearing about a quarter of whorl later; P4 completely hidden by succeeding whorl; P1 slightly weaker than other cords; distance between cords about 2x width of cords; distance between ribs 1.5x width of ribs; axial ribs making the cords granular. Second whorl only weakly convex to almost flat; all cords stronger and similar in size, with thick beads; axial ribs similar in thickness to the cords, giving a reticulate pattern. Third whorl flat in shape; P2 weaker than other cords, P3 the strongest with weakly pointed beads; S2 appearing at mid whorl, very thin; S1 appearing at end of whorl, also very thin. On fourth whorl, S3 appearing; S1 and S2 still much thinner than Pi; P1 and P3 stronger than all other cords, P3 the strongest with bluntly pointed beads, making a weak keel; axial threads weakening. On fifth whorl, axial threads disappearing; all cords similar in size except P1 stronger and P3 the strongest. On sixth whorl, T1 appearing between P1 and S1 and T2 between S1 and P2; P4 partially emerging from suture; beads of all the cords pointed. On last whorl, S2, P3 and S3 stronger than other cords; P4 very weaker than other cords; angular periphery.
Aperture subtriangular; outer lip rather thin, slightly curved, with a basal part almost straight, meeting inner lip with a distinct angle. Columella vertical, slightly curved, without tooth.
Base very weakly convex to almost flat, with 14 spiral cords; innermost cords slightly thicker than outermost, all granular; interspaces between cords as wide as cords. No umbilicus.
Colour of two first teleoconch whorls off white, other whorls orange with brow flames on the adapical area; base off white to light orange, with axial brown flames; protoconch off white.

Discussion. *Calliostoma vaubanoides* n. sp. is close to *Calliostoma vaubani* Marshall, 1995 from Northern New Caledonia (Figs 10-11), but the latter species is smaller for a similar number of whorls, is higher than wide, has a larger protoconch (400-430 µm) and has a different spiral cords ontogeny with S1 appearing much more later,
The new species looks also a little like *Calliostoma monikae* Stratmann & Schwabe, 2007 from Samoa Islands, but the latter species is smaller (height up to 8.5 mm) for a similar number of whorls, is higher than wide with a strictly conical shape and an oblique, thickened columella.

Etymology. Similar in shape (Greek suffix: -οιδης) - from the closest *Calliostoma* species, *C. vaubani* Marshall, 1995.

Calliostoma mesemorinon n. sp.
Figs 17-19, Table 1

Type material. Holotype (13.3 x 10.6 mm) MNHN (IM-2000-27240). Paratypes 2 MNHN (IM-2000-27241).

Type locality. French Polynesia, Austral Archipelago, eastern coast of Rurutu, BENTHAUS, stn CAS2008, 22°27'S, 151°19'W, 280-300 m.

Material examined. Austral Archipelago. BENTHAUS: stn CAS2008, 22°27'S, 151°19'W, 280-300 m, 4 dd (holotype and 2 paratypes).

Distribution. French Polynesia, Austral Archipelago, 280-300 m (dead).

Diagnosis. A *Calliostoma* species of medium size, with a conical spire, up to 5 strongly granular, close spiral cords, the most adapical cord finally the strongest, an almost flat base with up to 9 strong granular spiral cords; no umbilicus; nacreous white.

Description. *Shell* of medium size for the genus (height up to 13.3 mm, width up to 10.6 mm), higher than wide, conical in shape; spire elevated, height 1.2 x to 1.3 x width, 3.2x to 4.0x aperture height; angulate periphery; anomphalous.
Protoconch about 260-270 μm wide, of 1 whorl, rounded, covered by a network of ridges producing polygonal areas; rather strong terminal varix.
Teleoconch of up to 8.5 more or less flat whorls. Suture very poorly visible, not canaliculate.
First whorl convex, sculptured by thick axial, orthocline ribs and 3 spiral cords appearing almost simultaneously; P1 weaker than P2 and P3; distance between cords similar in size to cords; axial ribs making the cords granular; distance between ribs 1.5 times larger than width of ribs. Second whorl flat; P2 and P3 much stronger with thick sharp beads. On third whorl, P4 partly visible, almost completely hidden by succeeding whorl; axial ribs weaker, prosocline, distance between ribs 2 times larger than width of ribs; S2 appearing near end of whorl; S1 and S3 absent. On fourth whorl, beads of P3 pointed; axial ribs vanishing. On fifth whorl, P1 slightly weaker than P3, stronger than P2 and S2; no axial ribs still visible. On next whorls, all cords similar in strength; beads of cords axially elongated. On last whorl, P4 visible, P3 peripheral; P1 dividing into two cords, the most adapical slightly thicker; distance between cords much smaller than cords; angular periphery.
Aperture subquadrangular; outer lip rather thin at rim, thickened within, with a weak angle and an almost straight basal part, meeting inner lip with obtuse angle; inner lip thickened in its adapical part. Columella slightly oblique, curved in its abapical part. Base almost flat, with 8-9 strong, granular spiral cords; beads subrectangular; distance between cord similar to thickness of cords; innermost cords slightly thicker. Umbilicus closed by an expansion of the columella.
Colour of teleoconch nacreous white with pinkish shade; protoconch white.

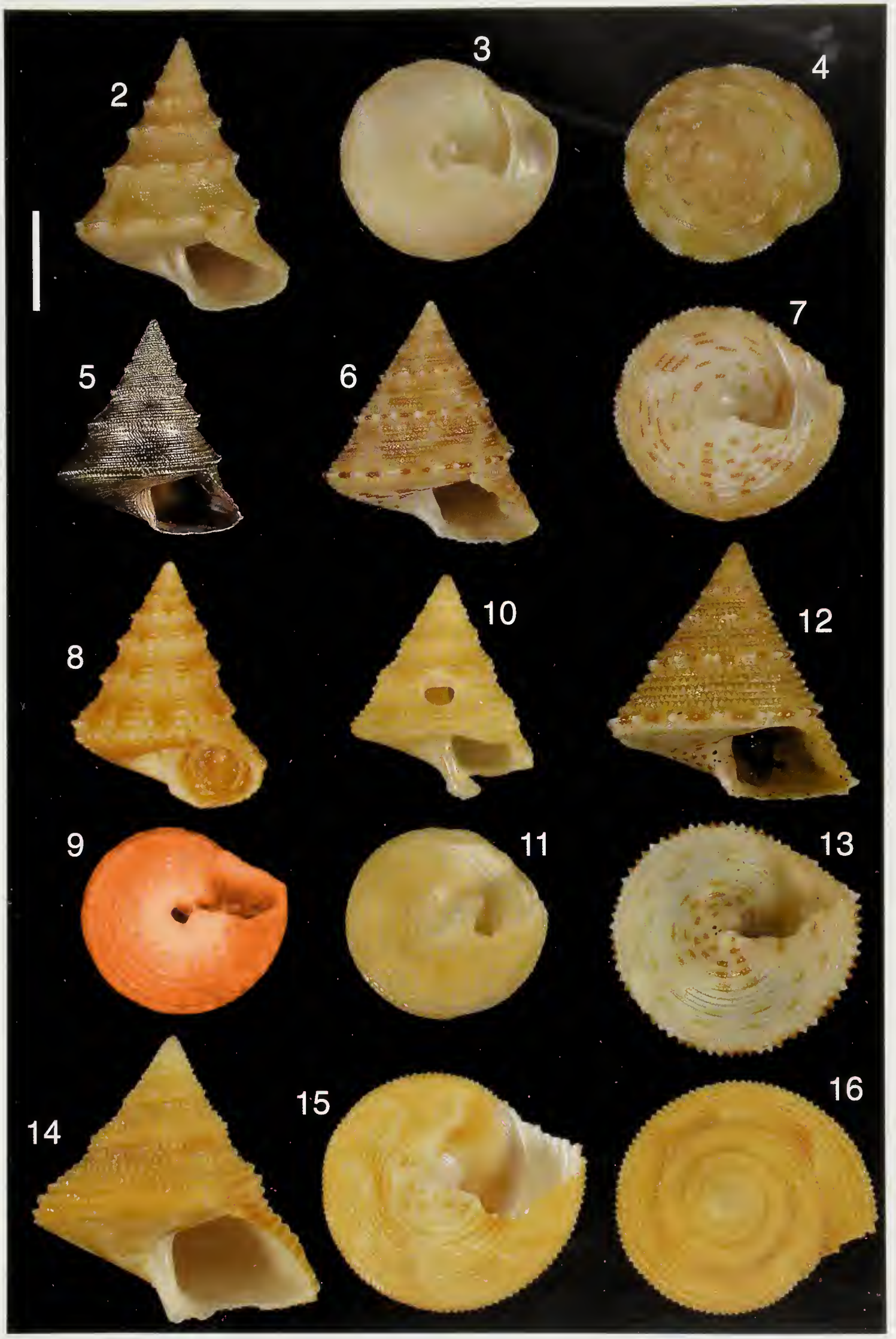
	TW	H	W	HA	H/W	H/HA
holotype	7.8	13.3	10.6	3.6	1.25	3.69
paratype 1	7.7	12.5	10.2	3.1	1.23	4.03
paratype 2	7.0	12.0	9.5	3.7	1.26	3.24

Table 1. *Calliostoma mesemorinon* n. sp.: Shells measurements in mm for types (TW and H estimated for paratype 2).

Discussion. *Calliostoma mesemorinon* n. sp. is rather close to *Calliostoma lepton* Vilvens, 2012 from Tuamotu Archipelago (Figs. 20-21), but this similar in size species has a different shape (coeloconoidal in shape in upper part and cyrtoconoidal in lower part with a subangular periphery), spiral cords S1 and S4 with tertiary cords and a moderately convex base.

Figures 2-16 (scale bar: 5 mm)

2-4. *Calliostoma haapaiensis* n. sp., holotype MNHN (IM-2000-27238), Tonga Islands, 523-806 m [BORDAU 2, stn DW1595], 14.1 x 11.5 mm.
5-7. *Calliostoma heros* Marshall, 1995, Loyalty Ridge. **5.** Holotype MNHN (MNHN 27159], 375 m [MUSORSTOM 6, stn DW482], 11.4 x 10.0 mm (gilded for SEM); **6-7.** Paratype MNHN (MNHN 27161), 255 m [SMIB 5, stn DW93], 13.0 x 11.4 mm.
8-9. *Calliostoma katoi* Sakurai, 1994, holotype NSMT (ex collection Sakurai), Japan, Kochi prefecture, Okinoshima Islet, 13.1x11.2 mm.
10-11. *Calliostoma vaubani* Marshall, 1995, paratype MNHN, New Caledonia, 415-460 m [LAGON, stn 475], 11.4 x 9.1 mm.
12-13. *Calliostoma suduirauti* Bozzetti, 1997, Solomon Islands, 134-272 m [SALOMONBOA 3, stn DW2827], 13.3 x 10.6 mm.
14-16. *Calliostoma vaubanoides* n.sp., holotype MNHN (IM-2000-27239),Tonga Islands, 476-478 m [BORDAU 2, stn DW1548], 14.8 x 15.3 mm.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The new species resemble *Calliostoma takujii* Kosuge, 1986 from Japan (Figs. 22-23), but this slightly smaller species has a less elevated spire, a spiral cord S3, a distance between spiral cords of the last whorl similar in size to cords and adapical cords much stronger than abapical ones.
Calliostoma mesemorinon n. sp. may be compared to *C. strobilos* Vilvens, 2005 from Fiji (Figs. 24-25), but this more or less similar in size species has a different spiral cords ontogeny, with S1 and S3 cords presents, and more numerous, thinner spiral cords on the base.

Etymology. Southern, from the South (Greek: μησεμορινοζ, η, ον) – with reference to the geographic area of the type locality.

Calliostoma paradigmatum Marshall, 1995
Figs 26-27

Calliostoma (Fautor) paradigmatum Marshall, 1995b: 395-397, figs 13-15, 119, 155. Type locality: Southern New Caledonia, 505-550 m.
Calliostoma (Fautor) paradigmatum – Vilvens, 2005: 2.
Calliostoma (Fautor) paradigmatum – Vilvens, 2009a: 132, figs 25-26.
Calliostoma (Fautor) paradigmatum – Vilvens, 2012: 18, figs 51-54.

Material examined. Austral Archipelago. BENTHAUS: stn DW1884, 27°54'S, 143°33'W, 570-620 m, 1 dd.

Distribution. Off Ile Surprise, northern New Caledonia, 585 m (living); South of Ile des Pins, southern New Caledonia, northern Norfolk Ridge, 470-795 m, living at 550-795 m (range computed using data of Marshall, 1995); Tonga, 342-500 m (dead); Tarava Seamounts, 660-670 m (dead); Austral Archipelago, 570-620 m (dead).

Remarks. The main characteristics of this species are:
– height up to 14 mm, width up to 11.5 mm;
– conical in shape, higher than wide; rounded periphery;
– protoconch about 400-430 μm wide, of 1.25 whorl;
– teleoconch with up to 7.6 slightly convex whorls; Pi (i=2,3,4) appearing on first whorl, P1 on second whorl, S2 on third whorl, S1 on fourth whorl, S3 on sixth whorl; P4 visible on last whorl;
– weakly convex base with 12-17 granular spiral cords;
– no umbilicus;
– white.

The fact that there is a huge gap between the type locality (southern New Caledonia) and the large area from Tonga Islands to French Polynesia was already pointed out (Vilvens, 2005; Vilvens, 2012). This sample from Austral Archipelago is slightly taller than the New Caledonian samples but confirms that the Polynesian samples have a spiral cord P4 emerging later, a spiral cord S3 absent (but this can happen, *fide* original description) and a smaller protoconch (about 250-300 μm for the Polynesian specimens).

Calliostoma hexalyssion Vilvens, 2009
Figs 32-33

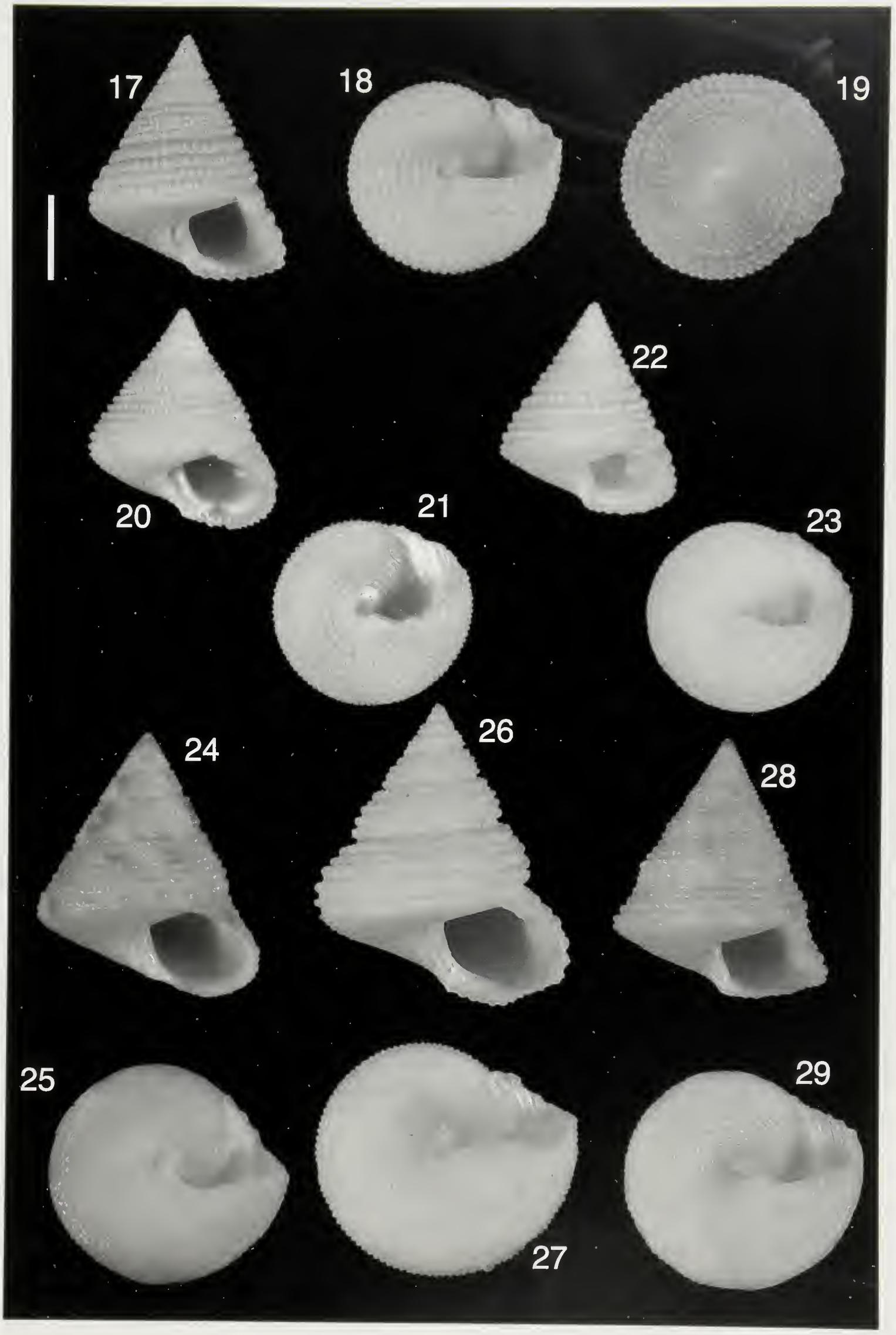
Calliostoma (Benthastelena) hexalyssion Vilvens, 2009B: 142-146, figs A1-A2, 73-78. Type locality: Solomon Islands, Vella Gulf, 460 487 m.

Material examined. Solomon Islands. SALOMON 2: stn CP2268, 07°49'S, 156°53'E, 632-640 m, 1 dd. – SALOMONBOA 3: stn CP2850, 09°37'S, 160°47'E, 502-621 m, 1 dd, 1 dd sub. – Stn CP2803, 09°14'S, 160°20'E, 150-160 m, 2 dd sub.

Distribution. Solomon Islands, 150-728 m, living at 397-650 m.

Figures 17-29 (scale bar: 5 mm)

17-19. *Calliostoma mesemorinon* n. sp., holotype (MNHN IM-2000-27240) Australes Archipelago, 280-300 m [BENTHAUS, stn CAS2008], 13.3 x 10.6 mm.
20-21. *Calliostoma lepton* Vilvens, 2012, holotype (MNHN 24976), Tuamotu Archipelago, 315-340 m [TARASOC, stn DW3370], 12.6 x 10.8 mm.
22-23. *Calliostoma takujii* Kosuge, 1986, holotype IMT (IMT-86-1), Japan, Ogasawara (Bonin) Islands, 12.0 x 9.7 mm.
24-25. *Calliostoma strobilos* Vilvens, 2005, holotype (MNHN 4560), Fiji, 300-450 m [BORDAU 1, stn DW1455], 14.4 x 11.9 mm.
26-27. *Calliostoma paradigmatum* Marshall, 1995, Australes Archipelago, 570-620 m [BENTHAUS, stn DW1884], 15.7 x 13.2.
28-29. *Calliostoma aporia* Vilvens, 2009, Solomon Islands, 320-330 m [SALOMONBOA 3, stn CP2859], 14.1 x 11.6 mm.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Remarks. The main characteristics of this species are:
– height up to 22 mm, width up to 18 mm;
– conical to weakly concave in shape, higher than wide; angulate periphery;
– protoconch about 350 μm wide, of 1 whorl;
– teleoconch with up to 9.1 nearly straight to weakly concave whorls; P2 and P3 appearing on first whorl, P1 half whorl later, S3 on third whorl, S1 and S2 on fourth whorl; P4 visible on last whorl;
– weakly convex base with up 12 spiral cords, with very low, very thin intermediate cords giving to this zone a smooth appearance;
– no umbilicus;
– pinkish white.

Calliostoma aporia Vilvens, 2009
Figs 28-29

Calliostoma (Ampullotrochus) aporia Vilvens, 2009B: 150-151, figs F1-F2, 107-110. Type locality: Solomon Islands, New Georgia Group, 105-128 m.

Material examined. Solomon Islands. SALOMONBOA 3: stn CP2859, 09°19'S, 160°19'E, 320-330 m, 7 dd, 2 dd juv.

Distribution. Solomon Islands, 128-330 m (dead).

Remarks. The main characteristics of this species are:
– height up to 11 mm, width up to 9 mm;
– conical in shape, higher than wide; angulate periphery;
– protoconch about 220 μm wide, of 1 whorl;
– teleoconch with up to 7.7 straight whorls; Pi (i=1, 2, 3) appearing on first whorl, S3 on second whorl, S1 on fourth whorl, S2 absent; P4 visible on last whorl;
– weakly convex base with up 10 granular spiral cords;
– no umbilicus;
– off-white to light grey.

Calliostoma suduirauti Bozzetti, 1997
Figs 12-13

Calliostoma suduirauti Bozzetti, 1997: 43, figs 1-4. Type locality: Philippines, Balicasag Island, 140 m.
Calliostoma suduirauti – Poppe, Tagaro and Dekker, 2006: 124, pl. 64, figs 5-6.

Material examined. Solomon Islands. North of San Cristobal, SALOMONBOA 3: stn DW2827, 10°26'S, 161°51'E, 134-272 m, 1 lv.

Distribution. Philippines, 50-150 m; Solomon Islands, 134-272 m.

Remarks. The main characteristics of this species are:
– height up to 15 mm, width up to 12 mm;
– coeloconidal in shape, higher than wide; angulate periphery;– teleoconch with up to 7 more or less flat whorls with beaded spiral cords; P2 and P3 appearing first while P1 appears half a whorl later; S2 appearing on third whorl, S1 on fourth or fifth whorl, S3 absent; P3 quickly thicker than other cords, with pointed beads; P4 visible on last whorl;
– weakly convex base with 9-10 beaded spiral cords;
– umbilicus closed;
– light brown with darker flames, suprasutural spiral cord alternating white and brown segments.

As it was noted for *C. paradigmatum* Marshall, 1995, one can wonder to find the Philippine *C. suduirauti* in Solomon Islands. But this SALOMONBOA shell shows all the main characteristics of this species, especially the same spiral cords ontogeny and similar colour. The only weak differences are a slightly less elevated spire and somewhat smaller beads on the spiral cords of the teleoconch whorls.

Calliostoma polysarkon n. sp.
Figs 34-36

Type material. Holotype (30.7 x 33.3 mm) MNHN (IM-2000-27242).

Type locality. Vanuatu, South-East of Malekula, BOA1, stn CP2467, 16°45'S, 167°59'E, 750-850 m.

Distribution. Vanuatu, 750-850 m (dead).

Diagnosis. A *Calliostoma* species of large size, with a globose shape, a moderately elevated spire, 4 strong, smooth spiral cords, one of them making shoulder at first third, a convex base with very weak smooth spiral cords, a rather wide umbilicus; light hazel with a beige base.

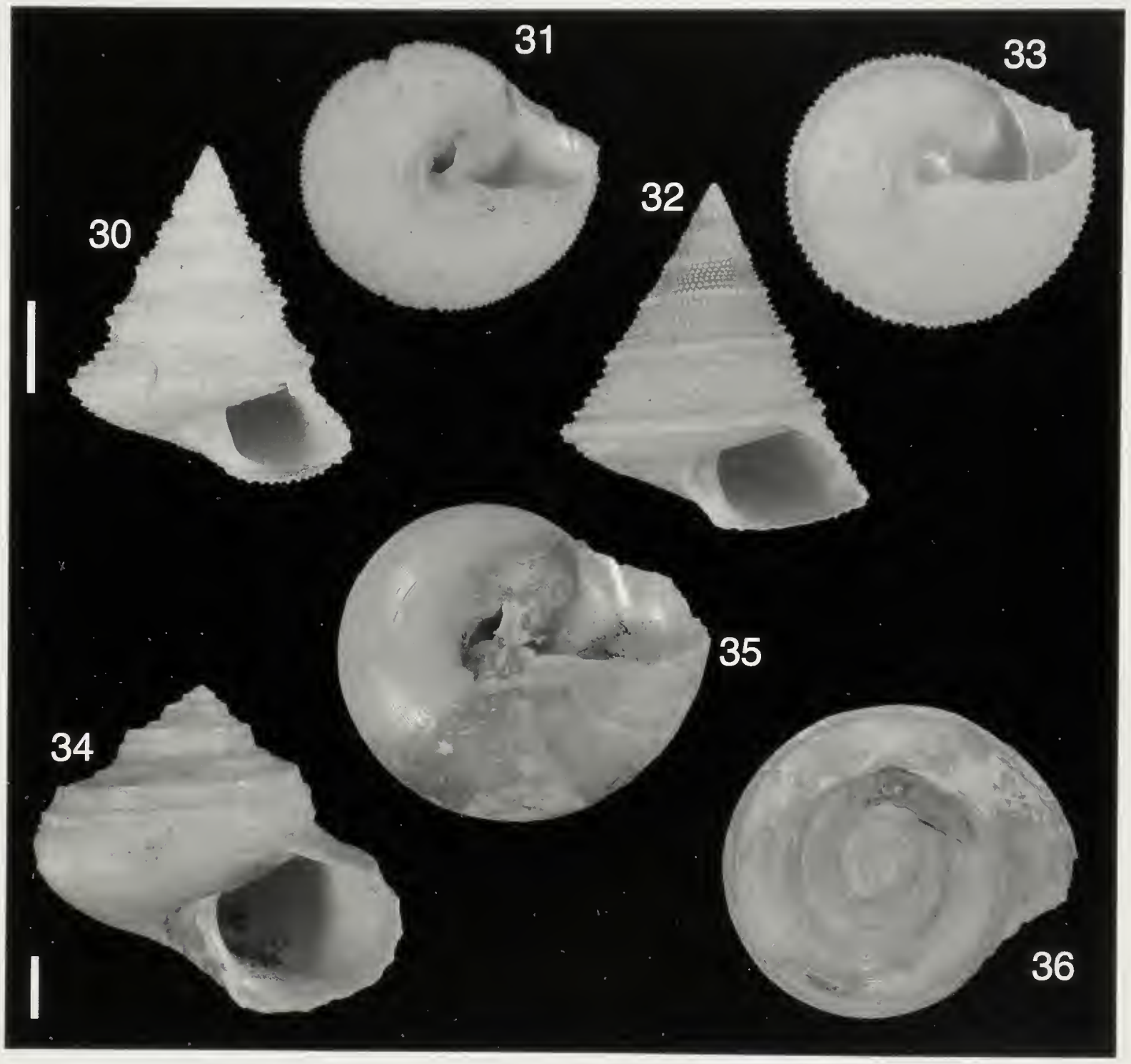
Description. *Shell* of great size for the genus (height 30.7 mm, width 33.3 mm), wider than high, globose in shape; spire moderately elevated, height 0.9x width, 1.7x aperture height; rounded periphery; rather wide umbilicus.
Protoconch about 350 μm wide, of 1.5 whorls, rounded, eroded.
Teleoconch of up to 6 convex whorls. Suture visible, not canaliculate.
First whorl convex, eroded, spiral cords poorly visible but indistinct at end of whorl. On second whorl, weak wide prosocline ribs and 4 subgranular spiral cords; P3 and P4 stronger than P1 and P2, P3 making weak shoulder; distance between cords similar in size to cords. On third whorl, P3 the strongest, making keel; P3 and P4 almost smooth; P3 making keel on shoulder; Si (i=1, 2, 3, 4) appearing, very thin, subgranular; P2 very weaker than other primaries; S4 poorly visible, almost completely hidden by succeeding whorl. On fourth whorl, axial ribs no more visible; P3 making stronger keel; P1 and P4 slightly weaker than P3, other cords much weaker; tertiary cords appearing everywhere on whorl. On fifth whorl,

S4 partly emerging from suture, stronger than P2 and other Si; secondary and tertiary cords of abapical half flat, rather wide; secondary and tertiary cords of adapical half rounded, thin, weak; distance between all cords smaller than cords. On last whorl, S4 fully visible; P3, P4 and S4 similar in strength, P1 slightly weaker; all other cords much weaker; rounded periphery.

Aperture subcircular; outer lip rather thin without any angle; inner lip thickened in its adapical part, making a basal flange. Columella almost vertical, slightly curved.

Base convex, with about 25 smooth spiral cords; outermost cord thick, smooth; other outer cords hard to distinguish, innermost cords more visible. Umbilicus rather wide (about 12% of total width), deep, funnel shaped umbilicus, partly covered by an expansion of the columella.

Colour of teleoconch whorls light hazel, base beige; protoconch white translucent.



Figures 30-36 (scale bars: 5 mm)

30-31. *Calliostoma arx* Vilvens, 2005, Tonga Islands, 501 m [BORDAU 2, stn CP1644], 21.1 x 17.2 mm.
32-33. *Calliostoma hexalyssion* Vilvens, 2009, Solomon Islands, 632-640 m [SALOMON 2, stn CP2268], 21.3 x 18.8 mm.
34-36. *Calliostoma polysarkon* n. sp., holotype (MNHN IM-2000-27242), Vanuatu, 750-850 m [BOA 1, stn CP2467], 30.7 x 33.3 mm.

Discussion. *Calliostoma polysarkon* n. sp. is rather close to *C. hajimeanum* Yoshida, 1948 from Japan, but this similar in size species has only 2 (not 4) main spiral cords, P4 (not P3) making keel on the shoulder and S4 peripheral, and much more numerous spiral cords (at least 50) on the base.

The new species may be compared to *Calliostoma nobile* (Hirase, 1922) from Japan, but this species has a less elevated spire, weaker main spiral cords and no shoulder on whorls, a nearly smooth base except some cords around the umbilicus and a wider umbilicus, without columellar projection on it.

Considering that *C. polysarkon* n. sp. looks a little like *Falsimargarita stephaniae* Rios & Simone, 2005 from Argentina (although this much smaller species is more depressed, has not the same main spiral cords on the whorls and less numerous, much stronger spiral cords on base), it could happen that the new species belong to the genus *Falsimargarita* Powell, 1951. Only soft part and radula studies of additional specimens might lead to use this genus for the new species.

Etymology. Stout, plump (Greek : πολυσαρχοζ, ον) – with reference to the very large and very convex last whorl of the shell.

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