Revised classification of a group of small species of *Cytharomorula* Kuroda, 1953 (Muricidae: Ergalataxinae) from the Indo-West Pacific

Roland HOUART
Research associate
Institut royal des Sciences naturelles de Belgique, rue Vautier, 29, B-1000 Bruxelles, Belgium
roland.houart@skynet.be

Keywords. Gastropoda, Muricidae, Ergalataxinae, *Cytharomorula*, Indo-West Pacific.

Abstract. Five similar looking species of Muricidae from the Indo-West Pacific are reviewed, illustrated and commented: *Cytharomorula ambonensis* (Houart, 1996), *C. benedicta* (Melvill & Standen, 1895), *C. dollfusi* (Lamy, 1938), *C. lefevreiana* (Tapparone Canefri, 1880)) and *C. paucimaculata* (Sowerby, 1903). The type material is illustrated for all the species. A lectotype is designated for *Cytharomorula lefevreiana*. The radula morphology is described.

Résumé. Cinq espèces de Muricidae morphologiquement très proches, vivant dans l'Indo-Pacifique occidental, sont révisées, illustrées et commentées: *Cytharomorula ambonensis* (Houart, 1996), *C. benedicta* (Melvill & Standen, 1895), *C. dollfusi* (Lamy, 1938), *C. lefevreiana* (Tapparone Canefri, 1880) et *C. paucimaculata* (Sowerby, 1903). Le matériel type est illustré pour toutes les espèces. Un lectotype est désigné pour *Cytharomorula lefevreiana*. La morphologie de la radula est décrite.

INTRODUCTION

A small group of tiny muricid species occurring in the Indo-West Pacific and here reviewed includes only five species, but these were once classified in several genera, occasionally misidentified, and are still little known, except for a more common species found mainly in the Philippine Islands but occurring worldwide.

None of these species is really rare except *Cytharomorula paucimaculata* from Japan of which few specimens are currently known. In this group of species not only the genus, but also the synonymy differs between published works. That was the reason for studying this group very carefully and to clear up its classification.

All the types were examined as well as an impressive number of specimens studied throughout the years.

The terminology used to describe the spiral cord configuration follows Merle (1999, 2001) and is illustrated in Figs 4-6. **P1:** shoulder cord; **P2-P6:** primary cords of the convex part of the teleoconch whorl.

Material and methods

Much of the material examined was collected during the expeditions conducted by MNHN and IRD (formerly ORSTOM) in the Tropical Indo-Pacific. Specimens were collected during following cruises: MD32 (1982) in Reunion, MONTROUZIER (1993) in New Caledonia, MUSORSTOM 9 (1997) in The Marquesas Islands, SUVA 4 (1999) in Fiji, ATELIER LIFOU (2000) in New Caledonia, PANGLAO 2004 (2004) in the Philippines, SANTO (2006) in Vanuatu, SALOMONBOA 3 (2007) in the Solomon Islands and ATIMO VATAE (2010) in Madagascar. Other studied species belong to the author's collection. All the specimens are listed and were examined by the author. No mention of living or empty shell is given, mostly because in many cases it was quite impossible to decide whether the shell was collected dead or alive, the living specimens having their operculum deeply retracted inside of the shell. However, the species live in depths of 3-20 m, except *C. lefevreiana* for which specimens, rarely collected alive in the examined samples, were dredged in 55-73 m and *C. dollfusi* which is usually dredged in tangle nets with shell grit, in 50-150 m in the Philippine Islands.

The complete data is given for many stations of the MNHN-IRD expeditions, but when there is an extensive list of stations only the name of the expedition and the number of the station is given. The number of examined specimens is mentioned between brackets for all the samples.

Additional references are added only when it concerns a misidentification.

Abbreviations

IRD: Institut de Recherche pour le Développement.
MNHN: Muséum national d'Histoire naturelle, Paris, France.
MZUF: Museo di Storia Naturale, Sezione di Zoologia "La Specola", Università di Firenze, Italy.
NHMUK: Natural History Museum, London, United Kingdom.

ORSTOM: Office de la Recherche Scientifique et Technique Outre-Mer.
RH: collection of the author.
RMNH: Nationaal Natuurhistorisch Museum, Leiden, the Netherlands (now in Naturalis Biodiversity Center, Leiden, the Netherlands).

Discussion

In a recent paper (Claremont *et al.*, 2013), a subclade contains nominal species of *Pascula*, *Orania* and *Cytharomorula*. Based on the species included in their study, all these genera, as currently defined, are polyphyletic. It is possible that the entire clade should be assigned to one genus, but because the oldest name is *Orania* (type species not yet included in the analyses), followed by *Pascula* (type species not yet included in the analyses), then *Cytharomorula*, the authors were unable to determine which name to propose. Pending a complete revision of this subclade, they conservatively retained all species in the genera to which they were previously assigned. Only *C. dollfusi* is included in their molecular analyses (as *Cytharomorula paucimaculata*). This misidentification is strictly my fault because this was the name I used for the Philippine shell before the present review was undertaken.

My decision to maintain these species in *Cytharomorula* while one or more species included in the present study were once classified in *Pascula* (Cernohorsky, 1982, Tröndlé & Houart, 1992, Houart, 1995, Higo, Callomon & Gotō, 1999, Tsuchiya, 2000, Mienis, 2003, Heiman & Mienis, 2003, Houart, 2008) or in *Cytharomorula* (Houart, 2008, Houart & Tröndlé, 2008, Houart & Héros, 2008, Houart & Gofas, 2012, Claremont *et al.*, in press), is also based on this molecular study. I decided to retain these species in *Cytharomorula* as was done in the more recent papers.

The most recent classification known of these species was submitted as follows by Houart and Gofas (2012) (WoRMS):
Cytharomorula ambonensis (Houart, 1996).
Cytharomorula lefevreiana (Tapparone Canefri, 1880)
=*Murex* (*Ocinebra*) *benedictus* Melvill & Standen, 1895.
Cytharomorula paucimaculata (Sowerby, 1903)
= *Murex dollfusi* Lamy, 1938.

The updated classification after examination of the type material and of specimens originating from throughout their geographical distribution looks now as follows:
Cytharomorula ambonensis (Houart, 1996).
Cytharomorula benedicta (Melvill & Standen, 1895).
Cytharomorula dollfusi (Lamy, 1938).
Cytharomorula lefevreiana (Tapparone Canefri, 1880).
Cytharomorula paucimaculata (Sowerby, 1903).

SYSTEMATICS

Family **MURICIDAE** Rafinesque, 1815
Subfamily **ERGALATAXINAE** Kuroda, Habe & Oyama, 1971
Genus ***Cytharomorula*** Kuroda, 1953
Type species by monotypy: *Cytharomorula vexillum* Kuroda, 1953, Japan.

Description of this group. Shell small, up to 12 mm in length at maturity, lanceolate, narrow, nodose. Subsutural ramp broad, strongly sloping. Spire high with 3.5-4.5 protoconch whorls and teleoconch of up to 5 weakly convex, shouldered, nodose whorls. Protoconch conical, with sinusigeral notch, whorls smooth (Fig. 7).
Axial sculpture of last teleoconch whorl consisting of 7-10 low or moderately high ribs and varices, crossed by primary, secondary and tertiary spiral cords, P1-P3 high, broad and obvious, P3 usually strongest, P4 smaller, narrow, P5 and P6 very small or obsolete. Intersection of axial and spiral cords giving rise to small nodes or broad, low, open spinelets.
Aperture small, ovate. Columellar lip narrow, occasionally with 2 or 3 knobs abapically, with low parietal tooth at adapical extremity. Outer lip with weak or strong, occasionally split, broad or elongate denticles within. Siphonal canal very short, dorsally recurved, with P5 and P6.
Operculum light brown, ovate-elongate with subapical nucleus.
Three-dimensional radula (Figs 1-3) with rachidian tooth bearing a long, narrow, prominent central cusp, a single small lateral denticle, a short, relatively broad lateral cusp and occasionally few marginal folds. Lateral tooth sickle-shaped with broad base.

Cytharomorula ambonensis (Houart, 1996)
Figs 2-3, 4, 8-9, 14-19

Pascula ambonensis Houart, 1996: 383, figs 17-18.

Additional reference

Pascula lefevreiana – Houart, 2008: 204, pl. 397, figs 1a, 1b (not *Tritonidea lefevreiana* Tapparone Canefri, 1880).

Type material. Holotype RMNH 57155.

Type locality. Indonesia, Ambon Id, Hitu, Suli, in sand, near coral.

Other material examined. Mozambique: Quissimajula, N Mozambique, 2-3 m, in sand and coral, RH (4); Nacala Bay, dived in 2-4 m, RH (6); Nacala Bay, dived in 2-3 m, RH (3); Fernão Veloso Bay, 3-4 m, in dead coral, RH (1); **Madagascar.** Tulear, MNHN (2); ATIMO VATAE, stn TB01, MNHN (1); stn TS02, MNHN (1); stn TS03, MNHN (1); stn TS04, MNHN

(1); stn TV07, MNHN (2); stn TS17, MNHN (1); stn BP41, MNHN (1); **Maldives**: Maagau Kandu, Ari Atoll, 20-25 m, RH (1); **Papua New Guinea**: Hansa Bay (Madang Province) Laing Island, RH (1); **Philippines**: PANGLAO 2004, stn S1, MNHN (4); stn B5, MNHN (1); stn B7, MNHN (1 lv); stn B10, MNHN (1); stn B13, MNHN; stn S32, MNHN (1); stn B37, MNHN (1); stn B39, MNHN (2); stn L50, MNHN (1) **Vanuatu**: SANTOS, stn ZB06, MNHN (3); stn DB08, MNHN (3); stn ZB09, MNHN (4); stn FS51, MNHN (1); stn FB92, MNHN (1); **New Caledonia**: ATELIER LIFOU, Loyalty Islands, Lifou, stn 1457, MNHN (8); 20°47' S, 167°03' E, 5-10 m, MNHN IM-2010-21107 (2); **Marquesas**: Motu One, MUSORSTOM 9, stn DW1291, 7°48' S, 140°21' W, 450-455 m, MNHN (1).

Distribution. Mozambique, Madagascar, Maldives, Indonesia (Ambon Island and Papua New Guinea), Philippines, Vanuatu, New Caledonia and Freneh Polynesia (Marquesas).

Remarks. *Cytharomorula ambonensis* is a small, spiny speeies reaching 6-10 mm in length. It differs from *C. benedicta* in having a more spiny appearanee and in having a relatively larger shell for the same number of teleoeoneh whorls, reaehing a length of 10 mm *vs* 8 mm in *C. benedicta*; the primary spiral eords are broader and higher, moreover, P1-P3 are of an almost similar strength in *C. ambonensis* while P1 and P2 are mueh narrower and lower than P3 in *C. benedicta*; the secondary spiral cords between P1 and P2, and P2 and P3 are broader and less numerous, 2 or 3 cords in *C. ambonensis vs* 3-6 in *C. benedicta*; the primary spiral eords P5 and P6 are also broader and higher in *C. ambonensis* while the P4 eord is smaller but still mueh stronger than the P4-P6 eords in *C. benedicta*; the area between P3 and P6 in *C. ambonensis* is also less eoneave than in *C. benedicta*.
The eolour also differs, being whitish with some dark brown seeondary spiral eords and oeeasionally dark blotehes on the primary eords in *C. ambonensis vs* having brown blotehes on the subsutural ramp and between P3 and P6 in *C. benedicta*.
Cytharomorula ambonensis is sympatrie with *C. benedicta* and *C. paucimaculata* in New Caledonia and Guam and with *C. paucimaculata* in the Philippines.

Cytharomorula benedicta (Melvill & Standen, 1895)
Figs 1, 6-7, 20-26

Murex (*Ocinebra*) *benedictus* Melvill & Standen, 1895: 108, pl. 2, fig. 13.

Additional references

Pascula lefevreiana — Houart, 1995: 274, fig. 142; Tsuehiya, K. 2000: 385, fig. 105 (not *Tritonidea lefevreiana* Tapparone Canefri, 1880).
Cytharomorula lefevreiana — Houart, 2011: 280, fig. 6 (not *Tritonidea lefevreiana* Tapparone Canefri, 1880).
NOT *Pascula benedicta* — Cernohorsky, 1982: fig. 20 only (= *Tritonidea lefevreiana* Tapparone Canefri, 1880).

Type material. Lectotype Manchester Mus. EE.3708, (originally figured speeimen. See also remarks) and 18 paraleetotypes, Manchester Mus. E.7667, EE.7668, EE.7669 and EE.8115.

Type locality. Lifou, in shell-sand.

Other material examined. New Caledonia. EXPEDITION MONTROUZIER, Touho, stn 1237, MNHN (1); stn 1240, MNHN (2); stn 1245, MNHN (7); stn 1255, MNHN (2); stn 1259, MNHN (7); stn 1260, MNHN (1); stn 1261, MNHN (4); stn 1268, MNHN (1); stn 1269, MNHN (23); stn 1270, MNHN (7); stn 1271, MNHN (12); stn 1273, MNHN (7); Koumae, stn 1302, MNHN (2); stn 1308, MNHN (1); stn 1310, MNHN (1); stn 1311, MNHN (5); stn 1312, MNHN (5); stn 1315, MNHN (5); stn 1316, MNHN (26); stn 1318, MNHN (18); stn 1319, MNHN (17); stn 1331, MNHN (16); stn 1333, MNHN (1); ATELIER LIFOU, Loyalty Islands, Lifou, stn 1413, MNHN (1); stn 1420, MNHN (9); stn 1421, MNHN (2); stn 1422, MNHN (1); stn 1423, MNHN (3); stn 1425, MNHN (7); stn 1427, MNHN (4); stn 1429, MNHN (16); stn 1430, MNHN (1); stn 1432, MNHN (26); stn 1434, MNHN (2); stn 1432, MNHN (15); stn 1436, MNHN (8); stn 1438, MNHN (1); stn 1441, MNHN (4); stn 1442, MNHN (4); stn 1443, MNHN (2); stn 1444, MNHN (4); stn 1446, MNHN (3); stn 1449, MNHN (3); stn 1450, MNHN (7); stn 1451, MNHN (21); stn 1453, MNHN (4); stn 1454, MNHN (14); stn 1455, MNHN (1); stn 1456, MNHN (3); stn 1457, MNHN (4); stn 1459, MNHN (2); Lifou (without any other data), MNHN (58); Touho, 15-20 m, RH (5); Koumae, 15-20 m, RH (2); **Vanuatu.** SANTO, stn DS06, MNHN (1); stn ZB06, MNHN (1); stn DB08, MNHN (1); stn ZB09, MNHN (1); stn DB12, MNHN (2); stn ZB20, MNHN (1); stn DB33, MNHN (1); stn DB63, MNHN (2); stn FB64, MNHN (2); **Guam.** W of Coeos Island, among dead coral, 19-28 m, RH (1).

Distribution. New Caledonia (Lifou and Koumae), Vanuatu, Guam, Japan (Kii Peninsula and southward) (Tsuehiya, K. 2000, as *Pascula lefevreiana*), Freneh Polynesia (Tuamotu Archipelago) (Cernohorsky, 1982), and Hawaii (Houart, 2011, as *Pascula lefevreiana*).

Remarks. This speeies is only known from a few loealities but it probably lives in other parts of the Western and Central Pacifie, maybe overlooked due to its small size and less known subfamily. It was eonfused with and illustrated as *C. lefevreiana* in a few publieation. See under *C. lefevreiana* for a comparison with that speeies.
Cernohorsky (1982: 128), in a study of somc Indo-Paeifie Mollusca, elassified *C. benedicta* in *Pascula*, he illustrated the lectotype of *C. benedicta* (Cernohorsky,

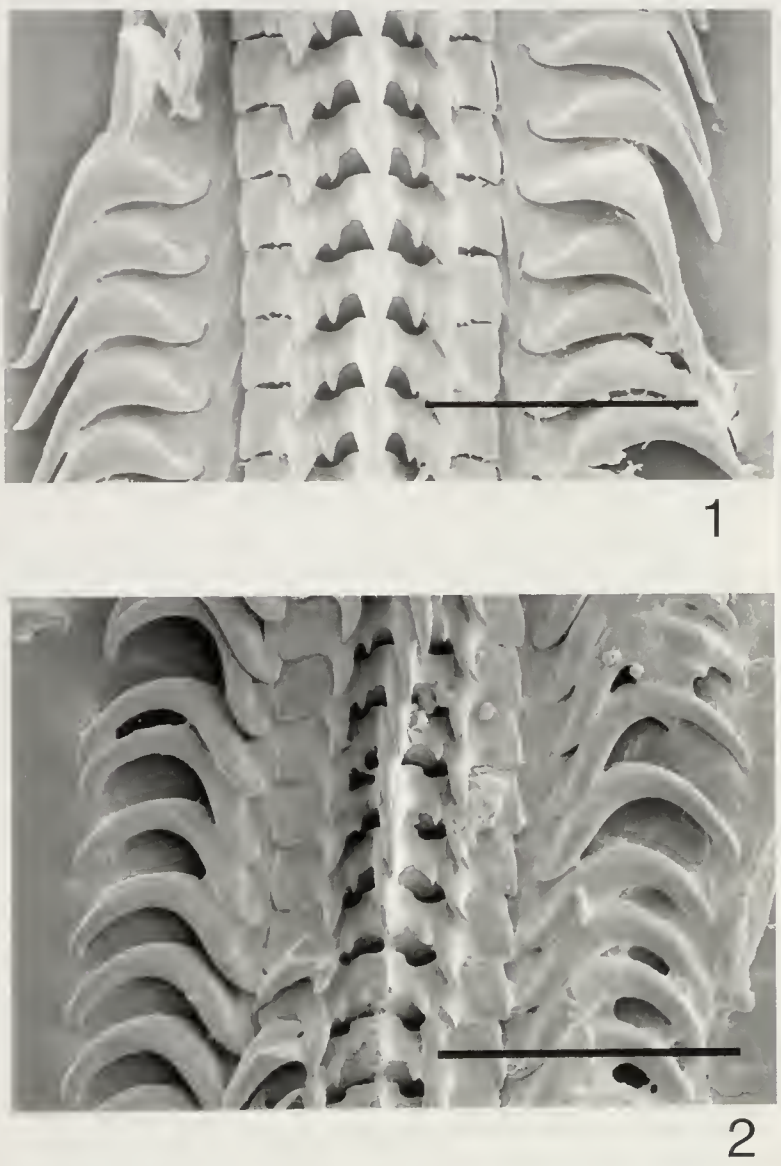
1982: figs 12-13) and the holotype of *C. paucimaculata* (figs 18-19) but he synonymised both names. He figured the lectotype of *C. benedicta* as being the holotype, but no holotype was designated by the authors, while there are 18 other "possible" syntypes in the Manchester Museum (Machin, in litt.). In fact, Melvill & Standen (1895: 108) noted "A very small but exquisite shell of which we have only seen one full-grown specimen". This sentence implies that there were other specimens examined by the authors but that none of those were full-grown.

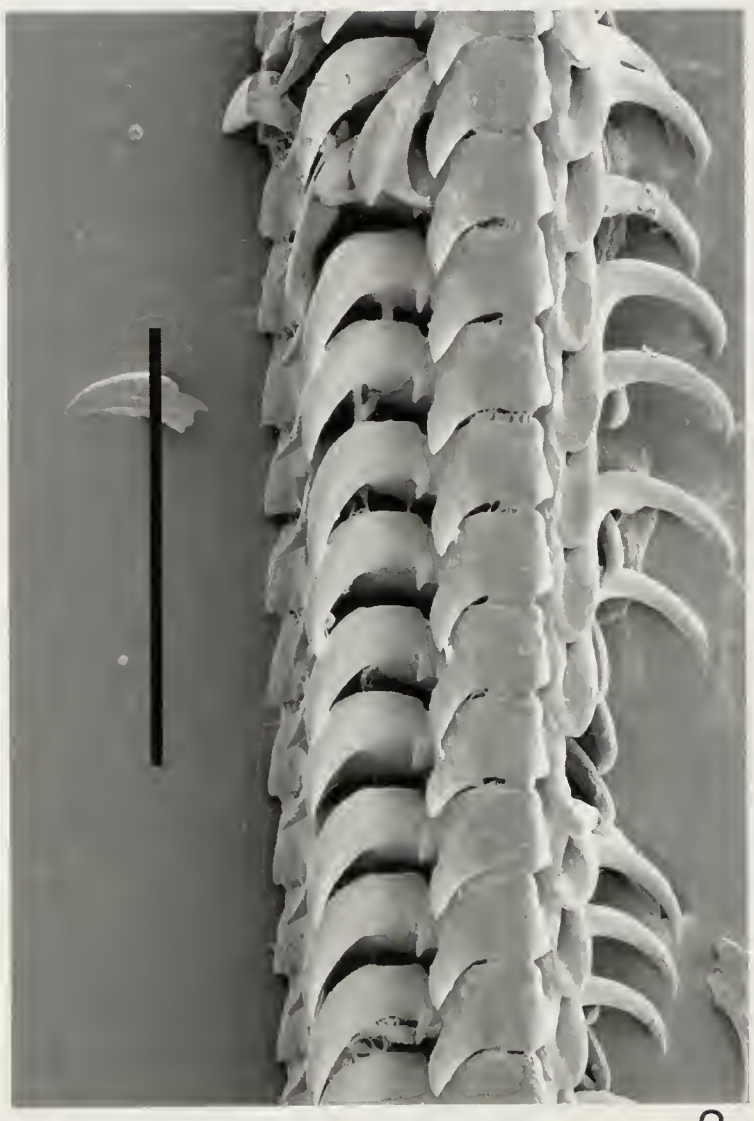
Therefore, in accordance with ICZN (Art. 74.6) the specimen figured by Cernohorsky (1982) as being the holotype is deemed to have been designated as the lectotype (Figs 20-21).

Cernohorsky (1982: fig. 20) also illustrated a slenderer specimen from an unknown locality, from the National Museum of Wales. This specimen is not *C. benedicta* but *C. lefevreiana* which is narrower and slenderer with lower apertural denticles, fewer cords on the subsutural ramp, a lower and less obvious P3 spiral cord and a less concave area between P3 and P6 as observed in Cernohorsky's figure 20. Cernorhorsky's figure 21 on the same plate is another species currently known as *Pascula darrosensis* (E.A. Smith, 1884).

The shell illustrated by Tröndlé & Houart (1992: 87, fig. 45) is misidentified, see Houart & Tröndlé (2008: 71). Nevertheless, the presence of *C. benedicta* in French Polynesia is confirmed by Cernohorsky (1982: 128, figs 14-15).

Also see under *C. paucimaculata* for a comparison with that species.





Figures 1-3. Radulae

1. *Cytharomorula benedicta* (scale bar 50 μm); **2-3.** *Cytharomorula ambonensis* (Houart, 1996) (scale bars 100 μm).

Cytharomorula dollfusi (Lamy, 1938)
Figs 33-40

Murex dollfusi Lamy, 1938: 54, fig. 1.

Additional reference

Cytharomorula pancimaculata — Houart, 2008: 198, pl. 394, figs 2-5; Houart & Héros, 2008: 459 (not *Pentadactylus paucimaculatus* Sowerby, 1903).

Type material. Holotype MNHN 0103.

Type locality. Jubal Island (Juzur Jabal, 27°40' N, 33°48' E, Egypt).

Other material examined. Madagascar. ATIMO VATAE, stn DW3606, MNHN (1); **Maldives.** Maagau Kandu, Ari Atoll, 20-25 m, RH (1); **Philippines.** PANGLAO 2004, stn P1, MNHN (3); stn S1, MNHN (12); stn R3, MNHN (3); stn P4, MNHN (64); stn B7, MNHN (2); stn S1, MNHN (11); stn T11, MNHN (3); stn B10, MNHN (7); stn B12, MNHN (2); stn B14, MNHN (1); stn B15, MNHN (2); stn B16, MNHN (4); stn B17, MNHN (2); stn B19, MNHN (2); stn B21, MNHN (2); stn B24, MNHN (2); stn B25, MNHN (1); stn B28, MNHN (1); stn S28, MNHN (6); stn S1, MNHN (1); stn B32, MNHN (2); stn B36, MNHN (5); stn B37, MNHN (4); stn B38, MNHN (2); stn B39, MNHN (7); stn B40, MNHN (4); stn B41, MNHN (3); stn L41, MNHN (1); stn B42, MNHN (10); stn L42, MNHN (2); stn L46, MNHN (29); stn L50, MNHN (3); stn L51-60, MNHN (27); stn L65-68, MNHN (5); stn L69-73, MNHN (14); stn L74-75, MNHN (9); stn L76, MNHN (213); stn L79, MNHN (11). Between Bohol and Cebu, 50-100, local fishermen, MNHN (117); Panglao, 80 m, RH (13); Cebu, Mactan Island, Punta Engaño, in tangle nets, RH (43); Balut, RH (1); Between Bohol and Cebu, 50-150 m, RH (3); Bohol, tangle nets, RH (9); Sulu Sea, RH (61); Balicasag Island, 160 m, rocky sand bottom, RH (1); S Mindanao, Aliguay, Dipolog, 150-180 m, tangle nets, RH (8); **New Caledonia.** ATELIER LIFOU, Loyalty Islands, Lifou, stn 1435, MNHN (1); stn 1465, MNHN (1); **Vanuatu.** SANTO, stn ZB13, MNHN (1); stn FB68, MNHN (1); stn DS99, MNHN (1); stn DS103, MNHN (9); mixed, MNHN (1); **Solomon Islands.** W San Cristobal, SALOMONBOA 3, 10°25' S, 161°22' E, 121-180 m, MNHN (1); **Fiji.** SUVA 4, stn DW 09, 18°21'S, 178°06'E, 37-41 m MNHN (1); stn DW 12, 18°21'S, 178°10'E, 39 m, MNHN (1); stn DW 25, 18°27'S, 178°01'E, 48-51 m, MNHN (1); **French Polynesia.** Marquesas, MUSORSTOM 9, stn DW1148, MNHN (1); stn DW1154, MNHN (3); stn DW1170, MNHN (1); stn CP1177, MNHN (1); stn CP1178, MNHN (1); stn DR1182, MNHN (2); stn DR1200, MNHN (8); stn DW1204, MNHN (8); stn DW1208, MNHN (1); stn DW1210, MNHN (3); stn DR1223, MNHN (1); stn DW1224, MNHN (3); stn CP1228, MNHN (1); stn DW1242, MNHN (2); stn DR1315, MNHN (3); Austral Archipelago, BENTHAUS, stn DW1869, 28°58' S, 140°15' W, 40-440 m, MNHN (2); DW1926, 24°38' S, 146°00' W, 50-90 m, MNHN (2); DW1952, 23°49' S, 147°53' W, 300-372 m, MNHN (1); DW1959, 23°19' S, 149°30' W, 95-380 m, MNHN (1); DW1996, 22°29' S, 151°22' W, 489-1050 m, MNHN (1); DW2013, 22°39' S, 152°50' W, 80- 93 m, MNHN (2).

Distribution. Red Sea (type locality), Madagascar, Maldives, Philippine Islands, New Caledonia, Solomon Islands, Fiji, French Polynesia (The Marquesas and the Austral Archipelago).

Remarks. *Cytharomorula dollfusi* was incorrectly synonymised with *C. benedicta* by Tröndlé & Houart (1992: 87, fig. 45). Mienis (2003) and Heiman and Mienis (2003) illustrated a specimen from the Gulf of Aqaba with its correct name.
See under *C. pancimaculata* for a comparison with that species.

Cytharomorula lefevreiana (Tapparone Canefri, 1880
Text Fig. 1, Figs 5, 27-32

Tritonidea lefevreiana Tapparone Canefri, 1880: 65, pl. 3, figs. 7-8.

Additional references

Pascula benedicta — Cernohorsky, 1982: fig. 20 only (not *Murex benedictus* Melvill & Standen, 1895).
Morula squamilirata — Jarrett, 2000: 60, fig. 247 (not *Sistrum squamiliratum* E.A. Smith, 1903).
NOT *Pascula lefevreiana* — Houart, 1995: 274, fig. 142; Tsuchiya, K. 2000: 385, fig. 105 (= *Murex benedictus* Melvill & Standen, 1895).
NOT *Pascula lefevreiana* – Houart, 2008: 204, pl. 397, figs 1a, 1b (= *Pascula ambonensis* Houart, 1996).
NOT *Cytharomorula lefevreiana* — Houart, 2011: 280, fig. 6 (= *Murex benedictus* Melvill & Standen, 1895).

Type material. Two syntypes MZUF 24524, here selected as lectotype MZUF 24524/1 and paralectotypes MZUF 24524/2.

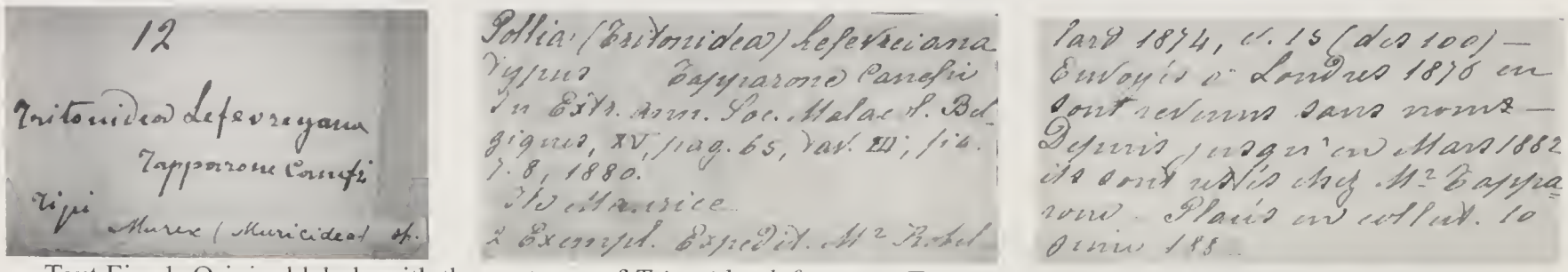
Type locality. Mauritius.

Other material examined. Reunion. MD32, stn DC26, 21°22' S, 55°46' E, 310m, MNHN (1); stn DC41, 21°21' S, 55°27' E, 75m, MNHN (3); stn CP43, 21°21' S, 55°27'E, 73-77m, MNHN (1); stn DR47, 21°23'S, 55°36'E, 205-215 m, MNHN (4); stn DC56, 21°05'S, 55°12'E, 170-225m, MNHN (10); stn DC85, 20°59'S, 55°15'E, 58-70m, MNHN (47); stn DC86 20°59'S, 55°15'E, 75-90m, MNHN (1); stn CP97, 19°41'S, 54°09'E, 55m, MNHN (1); Reunion, Saline, 5-20 m, MNHN (1); Reunion (no other data) (5), RH; **Mauritius.** ex coll. Jousseaume (5), MNHN.

Distribution. Seychelles (Jarrett, 2000, as *Morula squamilirata*), Mauritius and Reunion.

Remarks. *Cytharomorula lefevreiana* differs from *C. benedicta* in being narrower and slenderer. The secondary and tertiary spiral cords are broader in *C. lefevreiana* and less numerous. The subsutural ramp is less concave with fewer and broader spiral sculpture, 3 or 4 cords in *C. lefevreiana vs* 5 or 6 in *C. benedicta*. There are also fewer spiral cords between P1 and P2: 2 in *C. lefevreiana vs* 3 in *C. benedicta*, and between P2 and P3: 2 or 3 in *P. lefevreiana vs* 4-6 in *C. benedicta*. The area between P3 and P6 is less concave than in *C. benedicta*.

Cytharomorula lefevreiana is correctly identified and illustrated by Drivas & Jay (1988: 72, pl. 21, fig. 16). Another specimen was illustrated as *Pascula benedicta* by Cernohorsky (1982) (see under *C. benedicta*).



Text Fig. 1. Original labels with the syntypes of *Tritonidea lefevreiana* Tapparone Canefri, 1880 (photos Saulo Bambi)

Cytharomorula paucimaculata (Sowerby, 1903)
Figs 10-13

Peutadactylus paucimaculatus Sowerby, 1903: 496.

Additional reference

NOT *Cytharomorula paucimaculata* — Houart, 2008: 198, pl. 394, figs 2-5; Houart & Héros, 2008: 459 (= *Murex dollfusi* Lamy, 1938).

Type material. Holotype NHMUK 1903.12.7.8

Type locality. Hachijojima (Hachijojima Island), Japan.

Other material examined. Japan, Okinawa, Seragaki, 19-25 m, under rocks, RH (2).

Distribution. Currently known from Japan in two localities: Seragaki (Okinawa) and Hachijojoma Island (east of Central Japan) (type locality).

Remarks. *Cytharomorula paucimaculata* differs from *C. dollfusi* in having a relatively broader shell with a broader, less elongate aperture, a comparatively shorter and broader siphonal canal and a higher spire. The primary spiral cords are broader, almost of a same strength, while the P3 cord is usually weakly higher and stronger than P1 and P2 in *C. dollfusi*. The secondary and the tertiary cords are also broader and less numerous in *C. paucimaculata*.

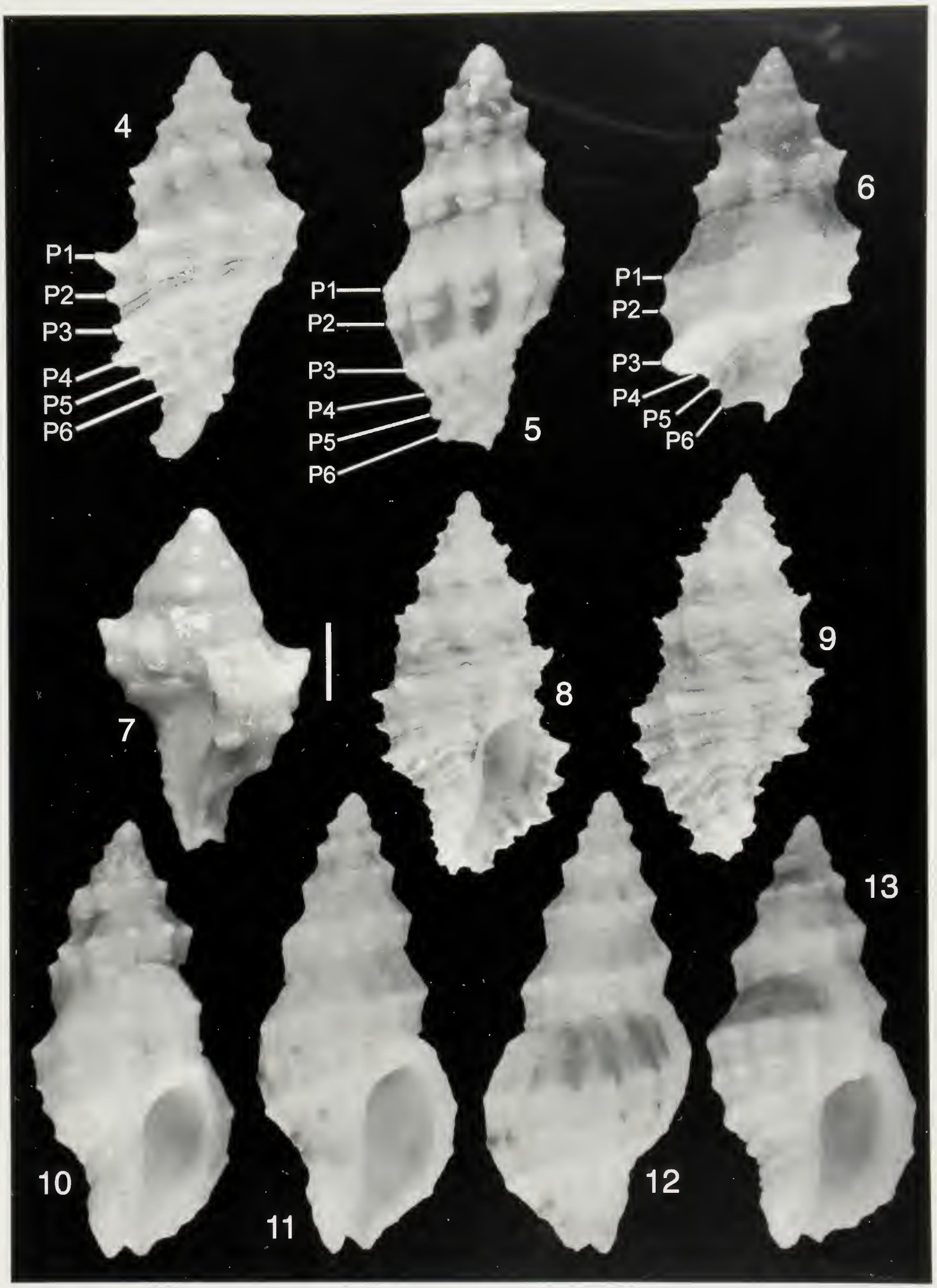
The colour also differs, *C. paucimaculata* having a subsutural ramp with broad, light or dark brown coloured blotches, somewhat like in *C. benedicta*, and occasionally some brown dots on or between the primary spiral cords. *C. dollfusi* is usually uniformly light tan, rarely with some darker dots on and between the primary spiral cords.

The holotype of *C. paucimaculata* was illustrated by Kaicher (1980: card 2542) as *Evokesia paucimaculata* and by Cernohorsky (1982: 129, figs 18-19) as *Pascula benedicta* forma *paucimaculata*. However, *C. paucimaculata* differs from *C. benedicta* in having a comparatively larger shell with a higher spire, a broader aperture, a broader and shorter siphonal canal relative to the shell length, in having smaller and lower apertural denticles and in the P1-P4 spiral cords approximately similar in size, while the P3 cord is more obvious in *C. benedicta* and the P4 cord very small. The area between P3 and P6 is also much less concave than in *C. benedicta*.

Cytharomorula paucimaculata also has more numerous and lower axial ribs, 8-10 *vs* 6 or 7 in *C. benedicta*.

Figures 4-13

4. Spiral cord morphology of *Cytharomorula amboneusis* (Houart, 1996); **5.** Spiral cord morphology of *Cytharomorula lefevreiana* (Tapparone Canefri, 1880); **6.** Spiral cord morphology of *Cytharomorula benedicta* (Melvill & Standen, 1895).
7. Protoconch and first teleoconch whorl of *Cytharomorula benedicta* (Melvill & Standen, 1895) (scale bar 500 µm).
8-9. *Cytharomorula amboneusis* (Houart, 1996). Indonesia, Ambon Id, Hitu, Suli, in sand, near coral, holotype RMNH 57155, 9.4 mm (scanned from a black and white photograph).
10-13. *Cytharomorula paucimaculata* (Sowerby, 1903)
10. Hachijojima, Japan, holotype NHMUK 1903.12.7.8, 11.5 mm (scanned from a black and white photograph);
11-13. Japan, Okinawa, Seragaki, 19-25 m, under rocks. **11-12.** 12.4 mm; **13.** 11.5 mm.


4
P1
P2
P3
P4
P5
P6
5
P1
P2
P3
P4
P5
P6
6
P1
P2
P3
P4
P5
P6
7
8
9
10
11
12
13

Acknowledgements

I was able to examine the huge material of MNHN thanks to Philippe Bouchet (Muséum national d'Histoire naturelle, Paris) who permits me to study the Muricidae collected during the expeditions conducted by MNHN and IRD in the Tropical Indo-Pacific and to Virginie Héros who helped me to search the *Cytharomornla* and *Pascula* specimens in their collections. Thanks also to Virginie Héros and Philippe Maestrati for the digital photographs of *Murex dollfusi*.

Thanks also to Shawn Miller, Okinawa, Japan, for the two specimens of *Cytharomorula paucimaculata* he kindly sent to me.

The photo of the holotype of *C. paucimaculata* was taken during my visit to the National Museum of Natural History, in the late eighties.

I was able to illustrate the type material of *Murex benedictus* thanks to Henry Mcghie and Rebecca Machin, The Manchester Museum, UK, who provided the digital photos of the figured syntype.

The search for the type material of *Tritonidae lefevreiana* lasted several months and ended successfully thanks to Philippe Bouchet, Muséum national d'Histoire naturelle, Paris, France; for useful information, to Marco Oliverio, Universita di Roma "La Sapienza" Dipartimento di Biologia Animale e dell'Uomo, Roma, Italy; to Giuliano Doria from the Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy, and to Simone Cianfanelli, Museo di Storia Naturale, Università di Firenze, Italy for also giving me useful information about possible contacts; and finally, thanks to the kindness of Cecilia Volpi and Antonio Callea, Museo di Storia Naturale, Sezione di Zoologia "La Specola", Università di Firenze, Italy, for searching and finding these types and to Saulo Bambi for the very fine digital photographs.

I am also very grateful for the continuing help of Anders Warén, Natural History Museum, Stockholm, Sweden, in the preparation and SEM work of the radula.

I also really appreciate the help of John Wolff, Lancaster, Pennsylvania, USA, who regularly checks and corrects my English and brings other comments to my papers, including this one.

Finally, thanks to an unknown referee for some linguistic suggestions

REFERENCES

Cernohorsky, W.O. 1982. The taxonomy of some Indo-Pacific Mollusca, part 10, *Records of the Auckland Institute and Musenm* 19: 125-147.

Claremont M., Houart, R., Williams S.T. & Reid D.G. 2013. A molecular phylogenetic framework for the Ergalataxinae (Neogastropoda: Muricidae). *Journal of Molluscan Studies*, 79: 19-29.

Drivas, J. & Jay, M. 1988. *Coquillages de la Réunion et de l'Ile Maurice*. Delachaux & Niestlé, Neuchâtel-Paris: 1-159.

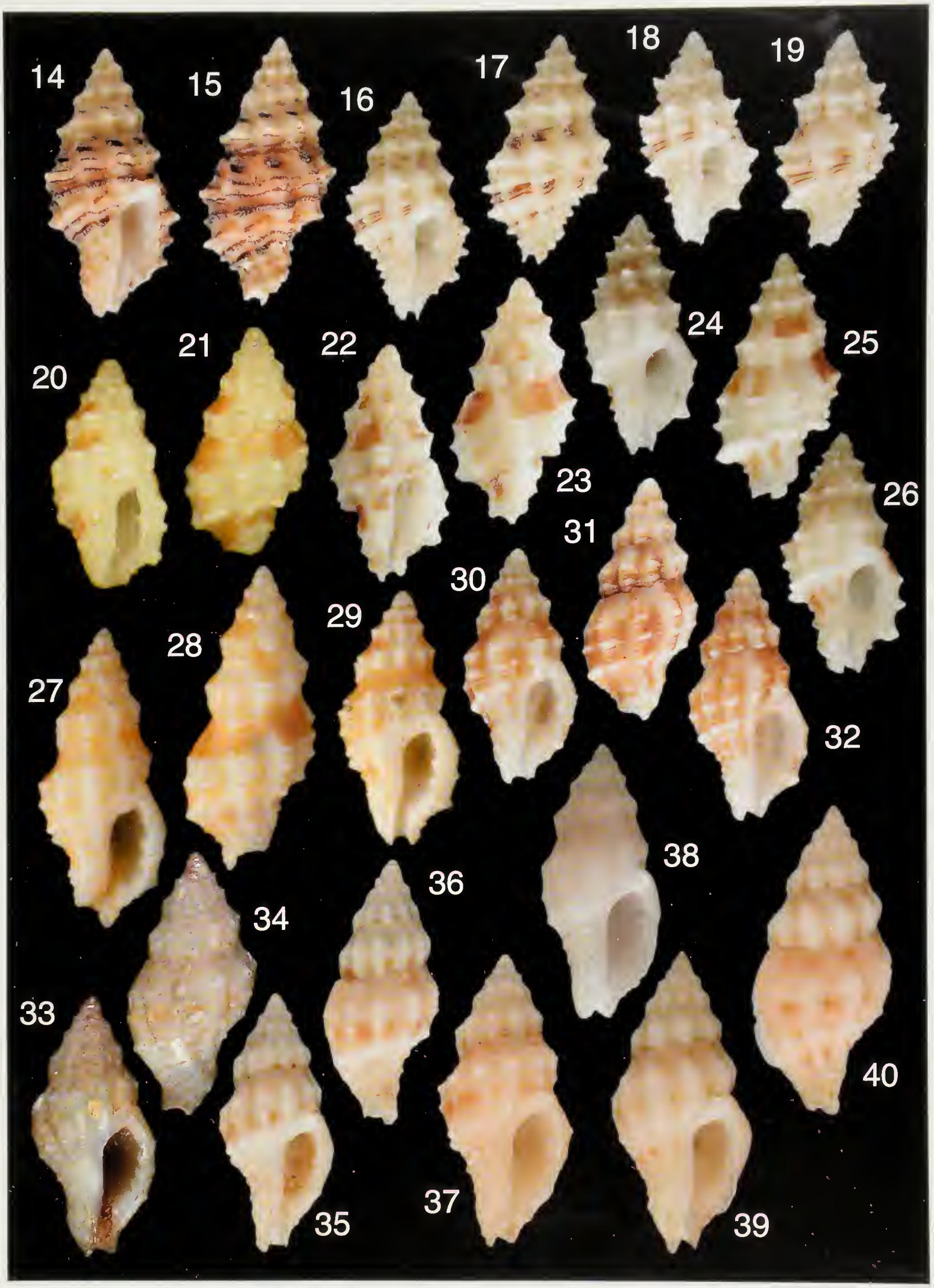
Heiman, E.L. & Mienis, H.K. 2003. Shell of East Sinai, an illustrated list, Muricidae (2). *Triton* 8: 22-24.

Higo, S., Callomon, P., & Gotō, Y. 1999. *Catalogue and bibliography of the marine shell-bearing Mollusca of Japan. Gastropoda. Bivalvia. Polyplacophora. Scaphopoda*. Elle Scientific Publications, Japan, 749 pp.

Houart, R., 1995 ("1994"). The Ergalataxinae (Gastropoda, Muricidae) from the New Caledonia region with some comments on the subfamily and the description of thirteen new species from the Indo-West Pacific. *Bulletin du Mnsénm national d' Histoire naturelle*, Paris, 4e sér., 16, section A, n° 2-4: 245-197.

Figures 14-40

14-19. *Cytharomorula ambonensis* (Houart, 1996)
14-15. Guam, Apra Harbor, among silty rocks; glass breakwater, 5-9 m, RH, 10.1 mm; **16-17.** Guam, near mouth of Apra Harbor, among rocks; glass breakwater, 5-8 m, RH, 8.8 mm; **18-19.** Lifou, New Caledonia, MNHN IM-2010-21107, 6.3 mm.
20-26. *Cytharomorula benedicta* (Melvill & Standen, 1895)
20-21. Lifou, New Caledonia, Lectotype Manchester Mus. EE.3708, 6.7 mm; **22-23.** Koumac, New Caledonia, RH, 7.4 mm; **24-25.** Koumac, 15-20 m, RH, 6.7 mm; **26.** New Caledonia, Loyalty Islands, Lifou, 20°48' S, 167°07' E, 8-18 m, MNHN IM-2010-21118, 7.4 mm.
27-32. *Cytharomorula lefevreiana* (Tapparone Canefri, 1880)
27-28. Mauritius, Lectotype MZUF 24524/1, 11 mm; **29.** Paralectotype MZUF 24524/2, 8.3 mm; **30-32.** Reunion, 21°00' S, 55°15' E, 58-70 m, MNHN. **30-31.** 6.6 mm; **32.** 7 mm.
33-40. *Cytharomorula dollfusi* (Lamy, 1938)
33-34. Jubal Island, holotype MNHN 0103, 8 mm; **35-36.** Philippines, Cebu, Mactan Id, Punta Engano, RH, 8.5 mm; **37.** Phillippines, Sulu Sea, RH, 10.4 mm; **38.** Maldives, Maagau Kandu, Ari Atoll, 20-25 m, RH, 9.8 mm; **39-40.** New Caledonia, Loyalty Islands, Santal Bay, 20°48' S, 167°08' E, 35-45 m, MNHN IM-2010-21111, 10.9 mm.


14
15
16
17
18
19
20
21
22
24
25
23
26
31
30
29
28
27
32
38
36
34
33
40
37
35
39

Houart, R. 1996. Results of the Rumphius Biohistorical Expedition to Ambon (1990). Part. 5. Mollusca, Gastropoda, Muricidae. *Zoologische Mededelingen* 70: 377-397.

Houart, R. 2008. Muricidae. *In*: Poppe G. (ed.), *Philippine Marine Mollusks* II, Conchbooks, Hackenheim, Germany: 132-220.

Houart, R. 2011. Family Muricidae –Review and comments. In Severns, M. *Shells of the Hawaiian Islands – The Sea Shells*: 280-294, pls 123-130. Conchbooks, Hackenheim, Germany: 1-564.

Houart, R. & Gofas, S. 2012. *Cytharomorula* Kuroda, 1953. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=138190 on 28 Nov. 2012.

Houart, R. & Héros, V. 2008. Muricidae (Mollusca: Gastropoda) from Fiji and Tonga, *in* Héros V, Cowie R.H. & Bouchet, P. (eds), Tropical Deep-Sea Benthos 25. *Mémoires du Muséum national d'Histoire naturelle* 196: 437-480.

Houart, R. & Tröndlé, J. 2008. Update of Muricidae (excluding Coralliophilinae) from French Polynesia with description of ten new species. *Novapex* 9(2-3): 53-93.

Jarrett, A.G. 2000. *Marine shells of the Seychelles*. Carole Green Publishing, Cambridge, U.K.: i-xiv, 1-149.

Kaicher, S.D. 1980. *Card catalogue of world-wide shells, Muricidae* V. Privately publ. St. Petersburg, Florida.

Lamy, E. 1938. Mission Robert Ph. Dollfus en Egypte: VII. Mollusca Testacea. *Mémoires de l'Institut d'Egypte* 37: 1-90.

Melvill, J.C. & Standen, R. 1895. Notes on a collection of shells from Lifu and Uvea, Loyalty Islands formed by the Rev. James and Mrs. Hadfield, with list of species. *Journal of Conchology* 8: 84-132.

Merle, D. 1999. *La radiation des Muricidae (Gastropoda : Neogastropoda) au Paléogène: approche phylogénétique et évolutive.* Paris. Unpublished thesis, Muséum national d'Histoire naturelle : i-vi, 499 pp.

Merle, D. 2001. The spiral cords and the internal denticles of the outer lip in the Muricidae: terminology and methodological comments. *Novapex* 2(3): 69-91.

Mienis, H.K. 2003. Notes on some muricid gastropods from the Gulf of Aqaba. *Triton* 8: 7-8.

Sowerby, G.B. 1903. Descriptions of fourteen new species of marine Mollusca from Japan. *The Annals and magazine of Natural History*. Vol. 12(7): 496-501.

Tapparone Canefri, C.M. 1880. Glanures dans la faune malacologique de l'Ile Maurice - catalogue de la famille des Muricidés (Woodward). *Mémoires de la Société Malacalogique de Belgique* 15: 1-103.

Tröndlé, J. & Houart, R.1992. Les Muricidae de Polynésie Française. *Apex* 7: 67-149.

Tsuchiya, K. 2000. Muricidae. *In*: Okutani, T. (ed.), *Marine Mollusks in Japan*, Tokai University Press, Tokyo: 364-421.