Review of the Indo-West Pacific species of *Haustellum* Schumacher, 1817 and comments on *Vokesimurex* Petuch, 1994 (Gastropoda: Muricidae) with the description of *H. bondarevi* n.sp.

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ABSTRACT. Eight Recent species and two subspecies are included in *Haustellum*. The species are described and discussed. A new species, *Haustellum bondarevi* n. sp. is described from Saya de Malha Bank, Western Indian Ocean. Fourteen species and three subspecies from the Indo-West Pacific are included in *Vokesimurex* Petuch, 1994.

RESUME. Huit espèces et deux sous-espèces récentes sont incluses dans le genre *Haustellum* Schumacher, 1817. Les espèces sont décrites, commentées et comparées. *Haustellum bondarevi* n. sp. est décrit du Banc Saya de Malha, Océan Indien Occidental. Quatorze espèces et trois sous-espèces actuelles de l'Indo-Ouest Pacifique sont incluses dans *Vokesimurex* Petuch, 1994.

INTRODUCTION

Since the revision of *Murex* s.s. and *Haustellum* (PONDER & VOKES, 1988), I examined many Recent specimens belonging to *Haustellum*, and analyzed recent literature (VOKES, 1990, PETUCH, 1994, PARTH, 1995). In a previous paper (HOUART, 1990), the genus *Haustellum* (*sensu* PONDER & VOKES, 1988) was considered to be divided into two groups: the group of *Haustellum haustellum* (Linnaeus, 1758), characterized by a globose, and spineless last teleoconch whorl, rounded varices, large, roundly-ovate aperture, without labral tooth, with a raised peristome and projecting inner lip, and a long, slender, often spineless, or almost spineless, siphonal canal ; and another group including species without labral tooth but more similar in appearance to species of *Murex* s.s. or *Siratus* Jousseaume, 1880.

Haustellum, and particularly *H. haustellum* has been studied and discussed by several authors (VOKES, 1971, 1990, FAIR, 1976, RADWIN & D'ATTILIO, 1976, KOSUGE, 1980, PONDER & VOKES, 1988, HOUART, 1990, HOUART, 1993, PARTH, 1995). PARTH (1995) considered "all the various populations scattered throughout the Indo-Pacific parts of just one species" (i.e. *Haustellum haustellum*). He mentioned the work of PONDER & VOKES (1988), who considered the various populations to be a form of a single species, and HOUART (1990, 1993) who splits *H. haustellum* into no less than seven species (*H. haustellum*, *H. longicaudum*, *H. fallax*, *H. kurodai*, *H. vicdani*, *H. barbieri*, and *H. langleitae*).

The problem will perhaps not be definitively resolved, but at least I hope to show that more than one species is involved in this group of gastropods.

MATERIAL

Hundreds of specimens have been examined throughout many years from BMNH, IRSNB, MNHN, private collections, and the author's collection. No extensive list of material is given.

RESULTS

Genus : *Haustellum* Schumacher, 1817

I. There is no known case of poecilogony (different larval development in a same species) in Prosobranchia, so that a single species will not have shells with a multispiral (planktotrophic) protoconch together with specimens with a paucispiral (non-planktotrophic) protoconch (BOUCHET, 1989; HOAGLAND & ROBERTSON, 1988). A planktotrophic protoconch is characterized by the presence of a protoconch I, with a small diameter, followed by a protoconch II, ending with a sinusigeral notch (terminal varix of sinusigera type). A non-planktotrophic protoconch is characterized by the absence of protoconch I/protoconch II discontinuity, and by the larger diameter of the first protoconch whorl, than in planktotrophic species.

As a first conclusion, *Haustellum haustellum* (Figs 23-26) may be separated from any other species of *Haustellum*.

II. The microsculpture of the protoconch whorls is another valuable tool for species separation [many personal observations; P. Middelfart (in litt.); SABELLI & TOMMASINI, 1982], so that, once more, *H. haustellum* may be separated from any other species of *Haustellum* (Fig. 26). The protoconch of *H. longicaudum* is also different from the other species by its particular microsculpture, consisting of numerous, small pustules (Fig. 43), which are smaller than in *H. haustellum*, and by its broad, irregularly shaped, protoconch.

One of the examined juvenile specimens of *H. langleitae* has very few, sporadic, small pustules on the last whorl, close to the terminal varix; all other examined specimens of *H. langleitae* have smooth protoconchs.

To my knowledge, the microsculpture of the protoconch of *Haustellum* has never been observed in any other species of *Haustellum*. However, microsculpture has been observed in *Vokesimurex* (BANDEL, 1975).

III. Three species have a protoconch with the characteristic morphology of intracapsular metamorphosis (few whorls, broad, irregular shape): *H. longicaudum*, *H. fallax*, and *H. wilsoni*. However, the protoconch of *H. longicaudum* has a keeled last whorl, ornamented with microsculpture, while those of *H. fallax* and *H. wilsoni* are smooth.

Species with intracapsular larval development have a restricted geographical distribution. *H. longicaudum* is indeed restricted to the southern part of the Red Sea and adjacent localities, *H. fallax* seems to live only from Durban, South Africa, to southern Mozambique, and *H. wilsoni* is known from a small area off West Australia.

After having separated *H. haustellum*, *H. longicaudum*, *H. fallax*, and *H. wilsoni*, we still have a group consisting of *H. barbieri*, *H. franchii*, *H. langleitae*, *H. kurodai*, and *H. vicdani*.

H. franchii and *H. barbieri* can be clearly separated from the other species by their teleoconch characters (see description and Table 1). *H. langleitae*, *H. kurodai*, and *H. vicdani* are somewhat similar, although having different teleoconch characters. The protoconch morphology of *H. vicdani* is not known, but both *H. langleitae* and *H. kurodai* have a rounded protoconch of 2-2.5 whorls. These three taxa appear to have a different geographical distribution (Fig. 14).

At first sight the three taxa differ in teleoconch morphology but it would be useful to observe specimens (if any) from adjacent and intermediate localities to fill the gaps between the different geographical distributions.

- If these forms are sympatric, then they may be considered at a specific level.
- If each form is isolated, then two solutions are conceivable:
  * There are three different species, clearly separated by natural barriers and teleoconch characters.
  * There is one species with two morphologically divergent local populations (subspecies).

Currently, having these forms geographically separated as three distinct populations (Fig. 14), I will use trinominal nomenclature.

List of (sub)species: *H. barbieri* Houart, 1993
H. bondarevi n. sp.
H. fallax (Smith, 1901)
H. franchii Bozzetti, 1993
H. haustellum (Linnaeus, 1758)
H. kurodai kurodai (Shikama, 1964)
H. k. vicdani Kosuge, 1980
H. k. langleitae Houart, 1993
H. longicaudum (Baker, 1891)
H. wilsoni D'Attilio & Old, 1971

Genus : ***Vokesimurex*** Petuch, 1994

PETUCH (1994) introduced *Vokesimurex*, for the American long-canalled "*Murex*" species without labral tooth like *Murex messorius* Sowerby, 1841, included in *Haustellum* by PONDER & VOKES (1988). He observed that *Vokesimurex* lived together with true *Haustellum* species in the Pliocene. *Haustellum* s.s. became extinct in the Americas by the beginning of the Pleistocene, but survives in the Indo-West Pacific. *Vokesimurex* appears to be a younger group than *Haustellum* s.s., and is known in the western Atlantic and the Eastern Pacific.

These considerations, personal observations, and clear similarities in shell and radula morphology (Figs 1-2, 3-8) between the West Atlantic and East Pacific *Vokesimurex* and Indo-West Pacific *Murex*-like species without labral tooth, have led me to consider the following Indo-West Pacific species as belonging to *Vokesimurex* :

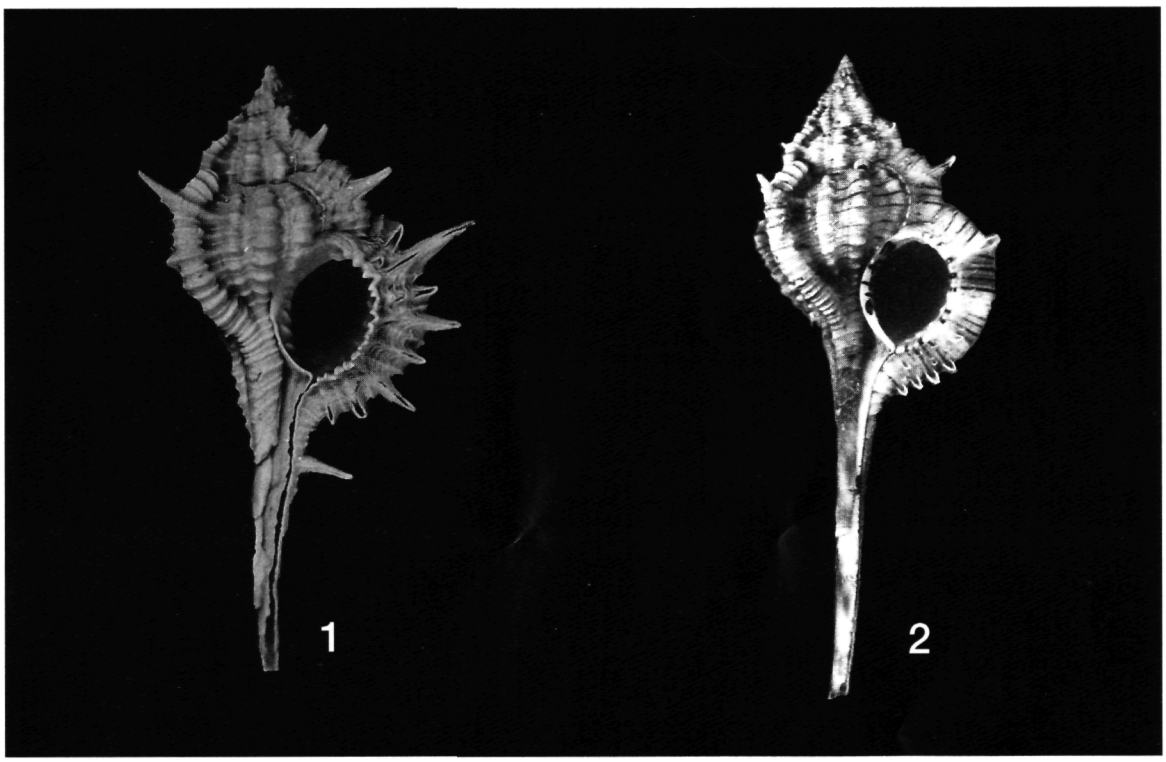
V. bobyini (Kosuge, 1983)
V. dentifer dentifer (Watson, 1883)
V. dentifer coriolis (Houart, 1990)
V. danilai (Houart, 1992)
V. dolichourus (Ponder & Vokes, 1988)
V. gallinago gallinago (Sowerby, 1903)
V. gallinago fernandesi (Houart, 1990)

V. hirasei (Dautzenberg in Hirase, 1915)
V. kiiensis (Kira, 1959)
V. malabaricus (E. A. Smith, 1894)
V. mindanaoensis (Sowerby, 1841)
V. multiplicatus multiplicatus (Sowerby, 1895)
V. multiplicatus bantamensis (Martin, 1895)
V. purdyae (Radwin & D'Attilio, 1976)
V. rectirostris (Sowerby, 1841b)
V. sobrinus (A. Adams, 1863)
V. tweedianus (Macpherson, 1962)

As stated in PONDER & VOKES (1998: 13), this group of species also have similarities with *Siratus* Jousseaume, 1880. They suggest that the group must have evolved from *Siratus* well before the appearance of *V. messorius* because *V. messorius* has a paucispiral protoconch whereas some Recent Indo-Pacific species have a multispiral protoconch. However, some Indo-Pacific species, i.e *V. dentifer*, *V.rectirostris*, *V. sobrinus*, *V. tweedianus*, and others, also have a paucispiral protoconch of 1.5 – 1.75 whorls as in the West Atlantic species.

Radula.

The radula of both *Haustellum* and *Vokesimurex* are typical muricine, consisting of a sickle shaped, unicuspid lateral tooth on each side, and of a rachidian tooth with a long central cusp, small lateral denticles, and long lateral cusps. No intermediate denticles were ever observed in any radula studied.



Figs. 1-2. (Rem: All specimens in the figures are in the coll. R. Houart, unless stated). Fig. 1. *Vokesimurex olssoni* (Vokes, 1967). Oregon, stn 4896, holotype USNM 67704, 52 mm. Shell whitened. Photo courtesy E.H. Vokes. Fig. 2. *V. dolichourus* (Ponder & Vokes, 1988). South Africa, Zululand, NM E4416, 67.1 mm.

Character	*H. haustellum*	*H. longicaudum*	*H. fallax*
Protoconch (see Figs 23-26, 42-48, 54)	Conical, keeled, with 2.25-2.75 whorls. Last whorl with micro sculpture. Terminal varix of sinusigera type. Very regular in shape. Planktotrophic larval development.	Irregular, broad, 2-2.5 whorls. Last whorl keeled, with micro sculpture. Strong, high carina. The form and breadth of the protoconch is typical for intracapsular development	Rounded, with 1.5-2.25 broad, smooth whorls. No micro sculpture. Twice the size of the protoconch of *H. haustellum*. Most probably intracapsular larval development, relative to the size, and the form of the protoconch. Terminal varix high, broad.
Number of spiral threads on first teleoconch whorl	4	4	5-6
Last teleoconch whorls	Broad, rounded, with 3 or 4 axial nodules. Spiral sculpture of numerous, regular threads. Aperture pink.	Broad, rounded, 3 or 4 low axial nodules. Spiral sculpture of numerous, shallow threads. Aperture white.	Broad, angulate, with 2 or 3 high, broad axial nodules. Spiral sculpture of numerous, shallow, low threads (fewer than in *H. haustellum*, *H. langleitae* and *H. longicaudum*). Aperture white.
Siphonal canal	Usually without spines, rarely with small, short spinelets at the base.	Smooth.	With short, weakly adapically curved spines on the base.

Character	*H. kurodai kurodai*	*H. kurodai langleitae*	*H. kurodai vicdani*
Protoconch (see Figs 23-26, 42-48, 54)	Rounded, with 2-2.25 smooth whorls. Terminal varix high. Similar to *H. fallax* but relatively smaller.	Cylindrical or rounded, with 2-2.5 smooth whorls.	Examined protoconch partly broken. Whorls rounded, smooth. Apparently no micro sculpture.
Number of spiral threads on first teleoconch whorl	3-4	3	4
Last teleoconch whorls	Broad, angulate, with 3 or 4 narrow axial nodules. Spiral sculpture of numerous, shallow, low threads, fewer than in *H. haustellum*, *langleitae* and *longicaudum*. Aperture white or light pink.	Broad, rounded or angulate, with 2-4, occasionally broad, high axial nodules. Spiral sculpture of numerous, shallow, low, irregular threads. Aperture yellow or pink.	Broad, angulate or rounded, with 3 or 4 axial nodules. Spiral sculpture of numerous, shallow threads, more apparent than in *kurodai* or *fallax*. Aperture light orange or yellowish.
Siphonal canal	Adapically curved small spines on the base.	Smooth.	Smooth.

Table 1. Comparison of four species of *Haustellum*.

SYSTEMATICS

Family **MURICIDAE** Rafinesque, 1815

Subfamily **Muricinae** Rafinesque, 1815

Genus ***Haustellum*** Schumacher, 1817

Type species (by tautonomy) *Murex haustellum* Linnaeus, 1758, Recent, Indo-West Pacific.

Brontes Montfort, 1810 (not Fabricius, 1801)

Brontesia Reidenbach, 1828 (new name for *Brontes* Montfort, 1810)

Haustellaria Swainson, 1833

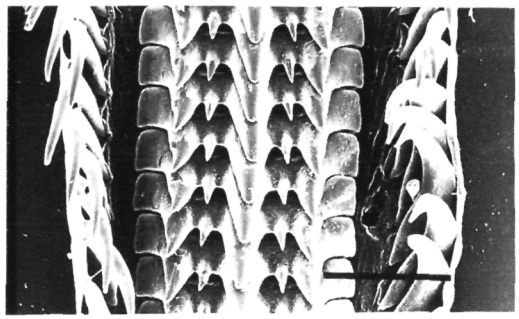
Distribution.

Throughout the tropical and subtropical Indo-West Pacific.

Description.

Shell medium-sized to relatively large, up to 165 mm in length. Last teleoconch whorl globose, rounded. Axial sculpture of last teleoconch whorl consisting of 3, usually high, rounded, spineless varices.

Aperture rounded, large. Outer lip crenulate, erect, without labral tooth. Columellar lip strongly projecting, flaring, weakly adherent adapically, otherwise erect.



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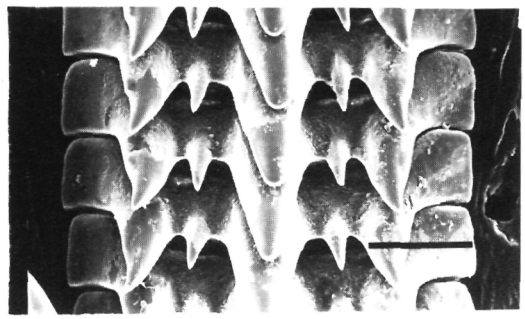

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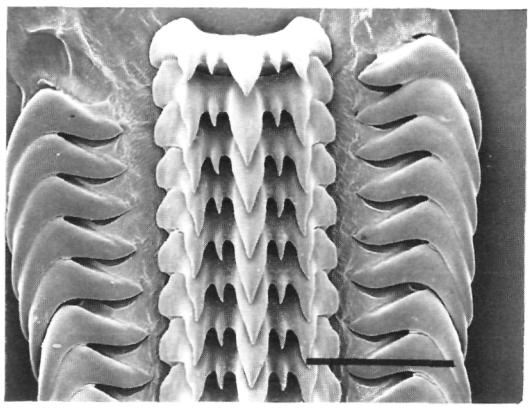

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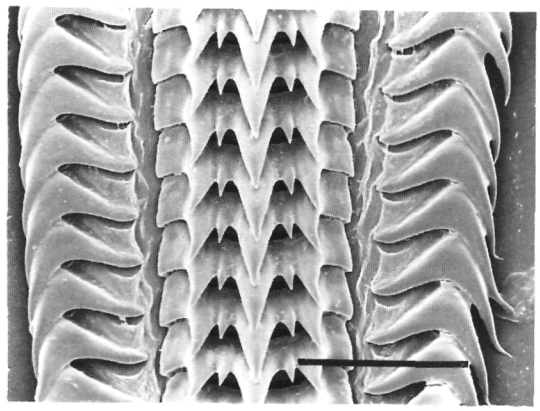

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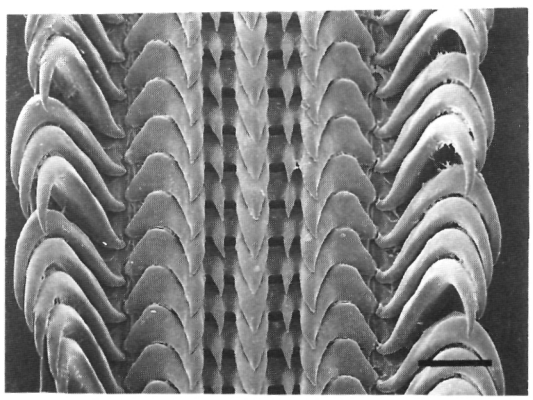

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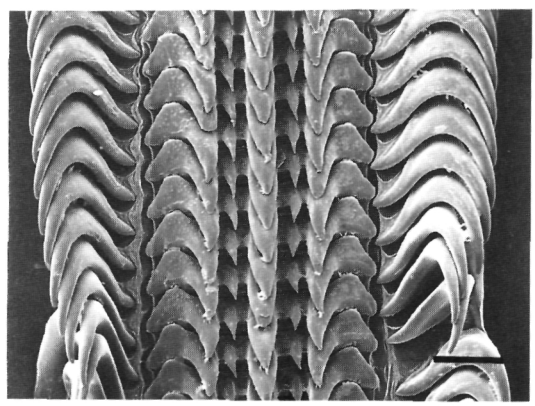

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Figs. 3-8. Radulae of *Haustellum*, and *Vokesimurex* species (scale bars: 100 µm). Figs. 3-4. *Vokesimurex dentifer coriolis* (Houart, 1990) (New Caledonia) (Fig. 4: scale bar 50 µm). Fig. 5. *V. dolichourus* (Ponder & Vokes, 1988) (Madagascar). Fig. 6. *V. olssoni* (Vokes, 1967) (Colombia). Figs. 7-8. *Haustellum haustellum* (Linnaeus, 1758) (New Caledonia).

Siphonal canal long to very long (52-73 % of total shell length), straight, narrowly open, smooth or occasionally with 1 or 2 small spines adaperturally.

Haustellum barbieri Houart, 1993
Figs 9, 40-41, 55

Haustellum barbieri Houart, 1993: 147, figs 6-9.

Protoconchs examined: Off Madagascar (3 specimens) (private collections).

Distribution.

The species is known in the vicinity of the type locality: Sainte-Marie (Nosy-Boraha), Madagascar, 30-35 m.

Description.

Shell up to 90 mm in length with 7 teleoconch whorls; protoconch smooth, consisting of 1 ½ whorls. Axial sculpture of last teleoconch whorl with 3 low, rounded, nodose, spineless varices. Other axial sculpture of 4 nodose ribs and numerous narrow, nodose, irregular threads. Spiral sculpture of 8 low, tuberculate cords and numerous threads. Aperture broad, rounded. Outer lip weakly crenulate, erect, smooth within. Columellar lip smooth, strongly raised, adherent adapically.

Siphonal canal long, spineless, straight, open.

Pinkish-brown with darker blotches on spiral cords and lighter coloured axial threads. Aperture glossy white.

Remarks.

Haustellum barbieri differs markedly from the other species of the genus by its colour and sculpture. All specimens known to date come from Madagascar.

Haustellum bondarevi n.sp.
Figs 10, 49-51

Material Examined.

Western Indian Ocean, Saya de Malha Bank, approximately 10°30' S, 60°00' E, holotype MNHN (79 mm) and paratype coll. R. Houart (60 mm); NE part of lagoon, 40-45 m, paratype coll. I. Bondarev [1] (101.2 mm).

Protoconchs examined: Paratype I. Bondarev (partially broken); paratype R. Houart.

Distribution.

Indian Ocean, Saya de Malha Bank, 40-45 m.

Description.

Shell medium sized for the genus, up to 101.2 mm in length at maturity, heavy, nodose. Spire high with 2.25 protoconch whorls and 7 broad, rounded, nodose teleoconch whorls. Suture impressed. Protoconch small, whorls rounded (weakly eroded in examined specimen); terminal varix high, weakly convex.

Axial sculpture of teleoconch whorls consisting of rounded, nodose, broad ribs on first to third whorl: 11 ribs on first whorl, 12 on second, 13 on third; fourth and fifth whorl with 3 strongly abaperturally excavated varices and 3 intervarical ribs; sixth and seventh whorl with three varices and 4 or 5 intervarical ribs. Varices more prominent at the intersection of spiral cords and threads, giving a strongly nodose sculpture. Spiral sculpture of low, narrow, nodose cords, and threads: 3 cords and one shoulder thread from first to third whorl, 3 cords and 2 shoulder threads on fourth whorl, 3 cords with 1 thread between each pair, and 2 shoulder threads on fifth and sixth whorl, last whorl with 5 cords, 2-3 threads between each pair, and 2 shoulder threads.

Aperture large, roundly-ovate; columellar lip narrow, strongly flaring, smooth with small parietal tooth at adapical end; lip strongly erect, adherent at adapical small portion; anal notch narrow, constricted, deep; outer lip erect, crenulate, with 12 or 13 weak lirae within. Siphonal canal long, narrow, straight, narrowly open, with 7 or 8 strong spiral cords adapically, almost smooth abapically.

Protoconch and first whorls creamy-white or light brown, other whorls white. Last whorl with three light orange or light brown bands, more apparent on varices. Single orange band on previous whorls. Light orange or light brown tinge on spiral cords of siphonal canal, and on columellar and outer apertural edges.

Operculum and radula unknown.

Remarks.

H. bondarevi differs from *H. barbieri* in having a more rounded last teleoconch whorl, a smaller aperture, narrower varices and axial ridges, a narrower siphonal canal, in lacking the wrinkled micro-sculpture, and in having a narrow, constricted anal notch relatively to the broad notch in *H. barbieri*. From *H. longicaudum*, *H. bondarevi* differs in its more nodose sculpture, narrower siphonal canal, more numerous axial intervarical ridges (4 or 5 vs 3 or 4) and deep narrow, constricted anal notch, relatively to the more shallow, broad, bell-shaped notch in *H. longicaudum*. From *H. franchii* it differs in having a higher spire, more numerous spiral cords on spire whorls, a more nodose shell, a constricted anal notch, and a different colour,

[1] Fadeev Str., 21-B, fl. 17, Sevastopol 335038, Crimea, Ukraine

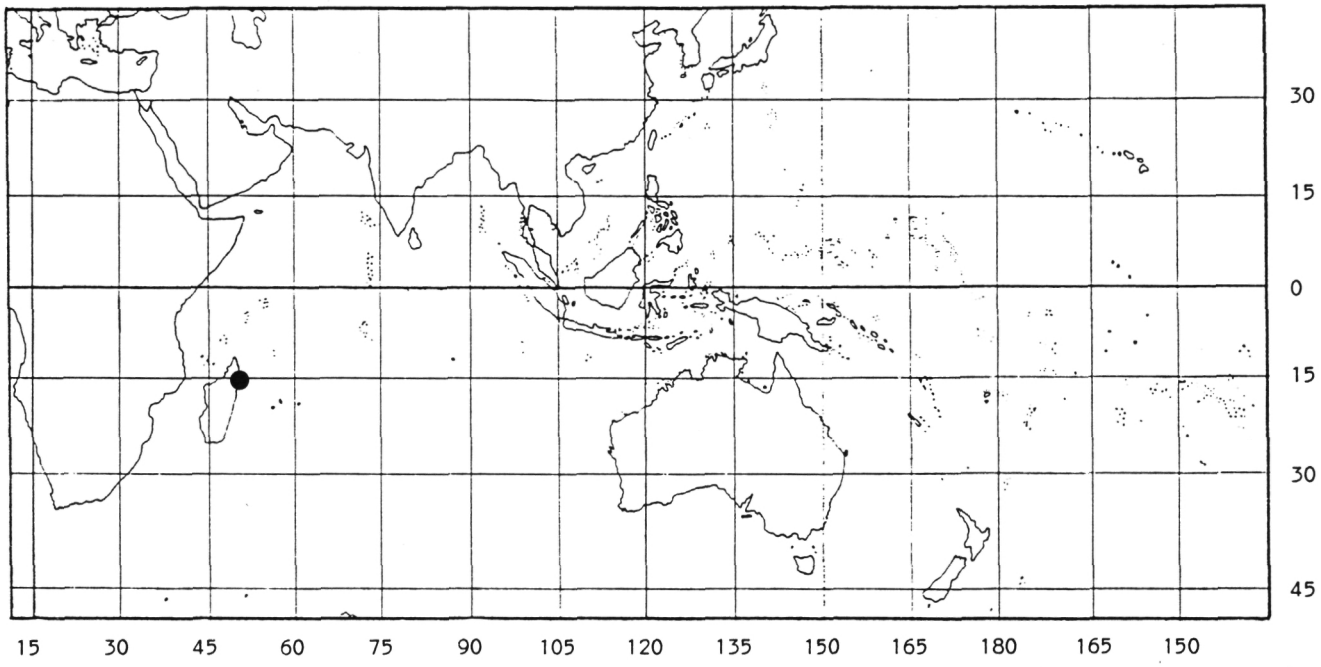

Fig. 9. Distribution of *Haustellum barbieri*.

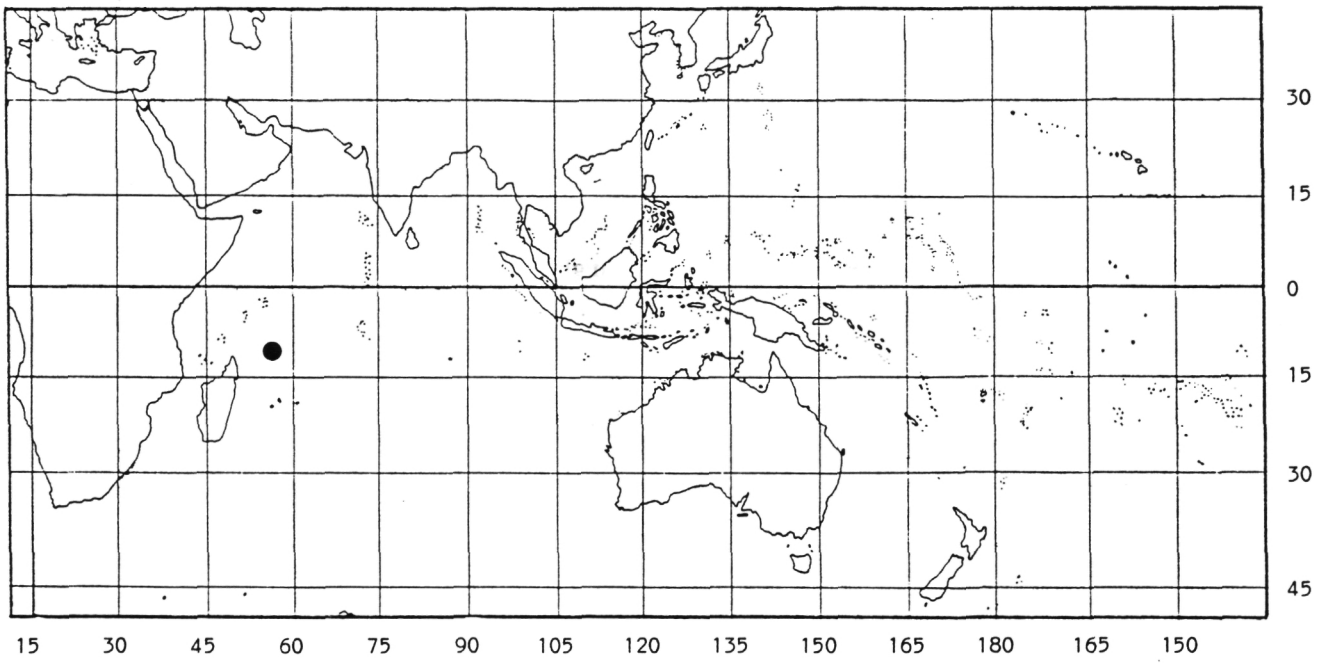

Fig. 10. Distribution of *Haustellum bondarevi*

H. franchii having particular reddish-brown spiral threads, and a pure white aperture.

Other Mollusca with non-planktotrophic larval development are apparently endemic to Saya de Malha Bank (BOUCHET & BAIL, 1991, OKUTANI, 1991, HOUART, 1992).

Etymology.

Named after Igor Bondarev, Sevastopol, Ukraine, who discovered, and donated the type material.

Haustellum fallax (Smith, 1901)
Figs 11, 20-22, 54

Murex fallax Smith, 1901: 113, pl. 1, fig. 9.

Protoconchs examined: S. Africa, off Natal (1 sp.); Mozambique, off Quissico (1 sp.); Mozambique, Zavora Pt (1 sp.) (Coll. R. Houart), Mozambique (2 sp.) (private coll.).

Distribution.

Durban, South Africa (type locality) to Zavora Point, Mozambique, 40-175 m.

Description.

Shell up to 95 mm in length with 1.5-2.25 protoconch whorls and 6 teleoconch whorls. Protoconch globose, smooth. Whorls rounded.

Axial sculpture of last teleoconch whorl consisting of 3 moderately high, rounded, spineless varices. Other axial sculpture of 3 high, strong ribs. Spiral sculpture of numerous, weak, smooth, shallow threads.

Aperture broad, rounded; outer lip weakly crenulate, smooth within. Columellar lip smooth, strongly raised, adherent adapically.

Siphonal canal long, with a single, acute, short spine adaperturally.

Light tan to light brown with some darker coloured blotches. Aperture glossy white.

Remarks.

Haustellum fallax was considered a subspecies of *H. haustellum* by PONDER & VOKES (1988). It is rarely seen in collections but it is much appreciated due to its scarcity and beauty. *H. fallax* is one of the three *Haustellum* species with probable intracapsular metamorphosis, but the teleoconch characters are almost invariable, and obviously different from the two other species, *H. longicaudum* and *H. wilsoni* (see also Table 1).

Haustellum franchii Bozzetti, 1993
Figs 12, 52-53

Haustellum franchii Bozzetti, 1993: 107, figs 1, 2.

Protoconchs examined: paratype (coll. R. Houart), and original description.

Distribution.

Ras Hafun, Somalia, 200-250 m.

Description.

Shell up to 67 mm in length, with 1.5-2 protoconch whorls and 6 teleoconch whorls. Protoconch globose, smooth, whorls rounded.

Axial sculpture of last teleoconch whorl consisting of 3 high, rounded, spineless varices. Other axial sculpture of 4 or 5 high, narrow, rounded ribs. Spiral sculpture of numerous, weak, smooth threads.

Aperture broad, rounded. Outer lip weakly crenulate, with 13-15 elongate lirae within. Columellar lip smooth, strongly raised, adherent adapically.

Siphonal canal long, open, spineless.

Creamy-white with dark brown or reddish-brown spiral threads. Aperture white.

Remarks.

Haustellum franchii differs markedly from *H. haustellum* in having a white aperture, in the colour of the shell and different protoconch (rounded and smooth, with 1.5-2 whorls in *H. franchii* while conical, minutely punctate, with 2.25-2.75 whorls in *H. haustellum*) . It differs from *H. longicaudum* and *H. fallax*, both known from the western Indian Ocean, in its more rounded shell contour, weaker axial cords, and apertural lirations.

Haustellum haustellum (Linnaeus, 1758)
Figs 7-8, 13, 17-19, 23-26

Murex haustellum Linnaeus, 1758: : 746.

Murex scolopaceus Röding, 1798: 144 (ref. to Favanne, 1784).

Aranea denudata Perry, 1811: pl. 45, fig. 1.

Haustellum laevae Schumacher, 1817: 213 (ref. to Martini, 1777).

?*Murex erythrostoma* Swainson, 1840: 296 (non *Murex erythrostomus* Swainson, 1831).

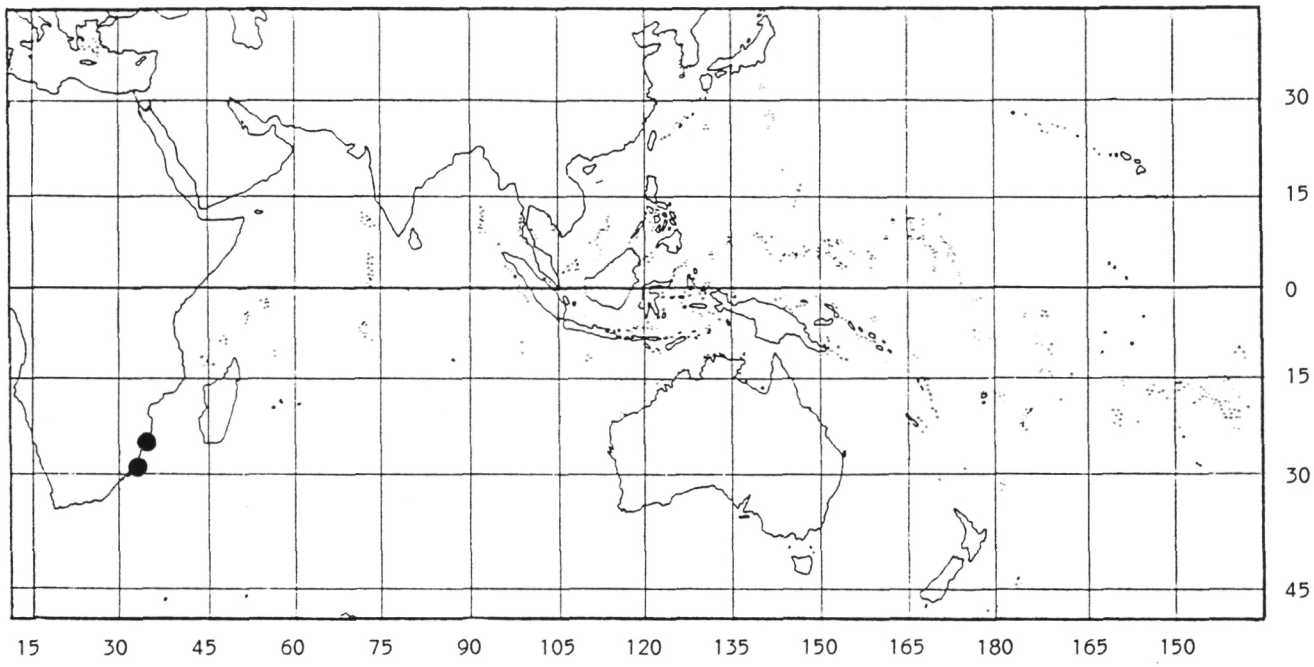

Fig. 11. Distribution of *Haustellum fallax*.

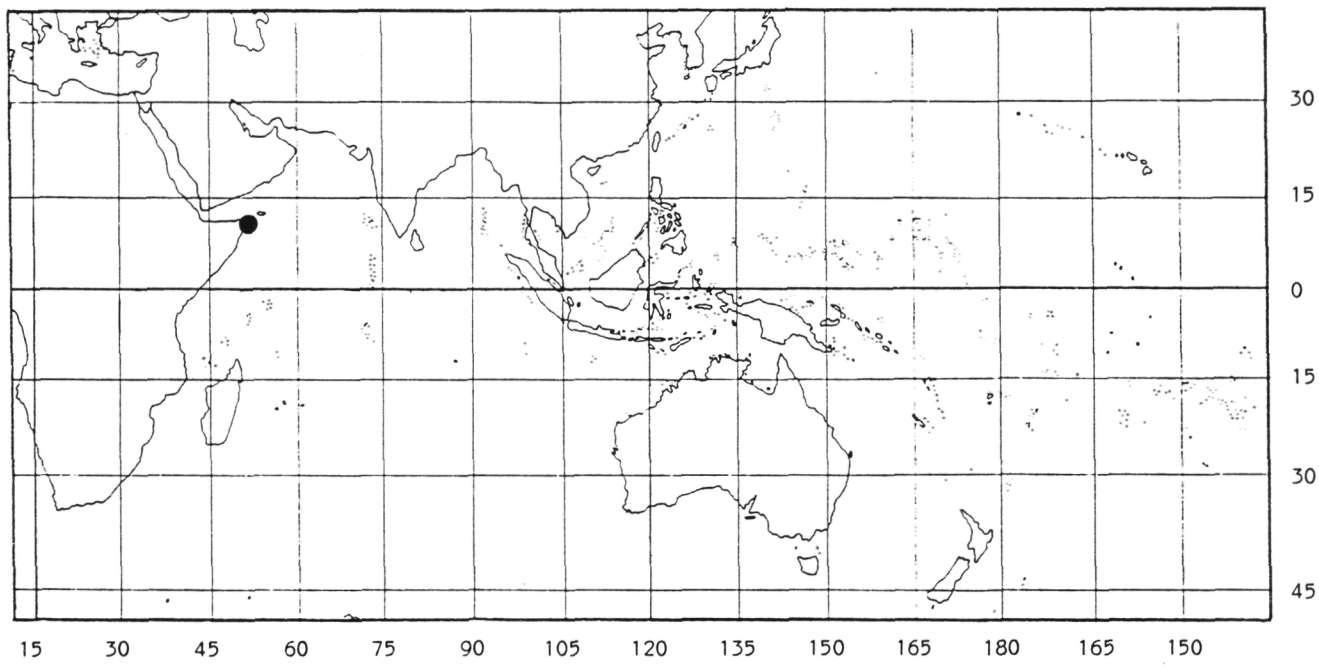

Fig. 12. Distribution of *Haustellum franchii*.

Protoconchs examined: Papua New Guinea, and Philippines (many specimens) (Coll. R. Houart, and private coll.).

Distribution.

Singapore, throughout the Philippines, Taiwan, Ryukyus, Papua New Guinea, Solomon Islands, North Queensland, New Caledonia, and Fiji.

Description.

Shell up to 165 mm in length with 2.25-2.75 protoconch whorls and 8 teleoconch whorls.

Protoconch weakly conical, last whorl minutely punctate, with spiral keel abapically.

Axial sculpture of last teleoconch whorl consisting of 3 moderately high, rounded, spineless varices. Other axial sculpture of 3 or 4 low, weakly rounded, nodose ribs, crossed by low, weak, smooth primary and secondary spiral threads.

Aperture broad, rounded. Outer lip weakly crenulate, erect, with weak elongate lirae within. Columellar lip smooth, strongly raised, adherent adapically.

Siphonal canal long, straight, open, smooth or occasionally with small spinelets adaperturally.

Creamy-white to light brown with dark brown or reddish-brown spiral threads, and 3 dark brown to bluish-brown blotches on varices. Aperture apricot or pale pink.

Remarks.

Haustellum haustellum is a common species with globose body whorl and long, usually spineless siphonal canal. *H. longicaudum*, *H. kurodai kurodai*, and *H. k. vicdani* Kosuge, 1980 have been tentatively synonymised by PONDER & VOKES (1988: 86) and *H. fallax* was synonymised in RADWIN & D'ATTILIO (1976: 49). *H. haustellum* is separated here on basis of morphological differences in shell structure and type of larval development. *H. haustellum* is the most common species of the genus.

Haustellum kurodai kurodai (Shikama, 1964)
Figs 14, 35-37, 47-48

Murex kurodai Shikama, 1964: 33, pl. 3, figs 1, 2.

Protoconchs examined: Philippines, Siasi Id (2 sp.) (Coll. R. Houart), and a few specimens in private coll.

Distribution.

The Arafura Sea and the Philippine Islands (Sulu Sea and Zamboanga).

Description.

Shell up to 93 mm in length with 2-2.25 protoconch whorls and 7 teleoconch whorls. Protoconch globose, smooth, glossy, whorls rounded.

Axial sculpture of last teleoconch whorl consisting of 3 narrow, high, nodose, almost spineless varices, each with occasionally 1 acute, short spine on shoulder. Other axial sculpture of 3 or 4 nodose ribs. Spiral sculpture of 4 or 5 weak, tuberculate cords, more apparent on axial ribs, and numerous, low, smooth lirae between cords.

Aperture broad, rounded. Outer lip crenulate, with numerous, weak elongate lirae within. Columellar lip smooth, strongly raised, adherent adapically.

Siphonal canal long, straight, open, with a single, acute, short spine adaperturally.

Creamy-white with light to dark brown blotches on varices, axial ribs and siphonal canal. Occasionally occurs with darker coloured shoulder and/or siphonal canal or darker coloured teleoconch whorls. Aperture white, light peach or light pink.

Remarks.

Haustellum k. kurodai is here separated from *H. haustellum* in having a different protoconch (rounded and smooth in *H. k. kurodai* while conical, minutely punctate, with 2.25-2.75 whorls in *H. haustellum*) (Figs 47-48), a more fragile and lighter shell with lower spire, more shouldered teleoconch whorls, narrower varices, small spines on the siphonal canal. It is also usually smaller. For other remarks see Table 1.

Haustellum kurodai langleitae Houart, 1993
Figs 14, 27-32, 45-46

Haustellum langleitae Houart, 1993: 145, figs 5, 10-12.

Protoconchs examined: Mozambique, Nacala (3 sp.); Madagascar (1 sp.) (Coll. R. Houart), and a few specimens in private coll.

Distribution.

Tulear, Madagascar, Mozambique, Tanzania, Pakistan, India, Sri Lanka, SW Java, West Sumatra.

Description.

Shell up to 94 mm in length with 2-2.5 protoconch whorls and 8 teleoconch whorls. Protoconch smooth, high, weakly shouldered.

Axial sculpture of last teleoconch whorl consisting of 3 rounded, strong, spineless varices. Other axial sculpture of 2 or 3 strong ribs. Spiral sculpture of

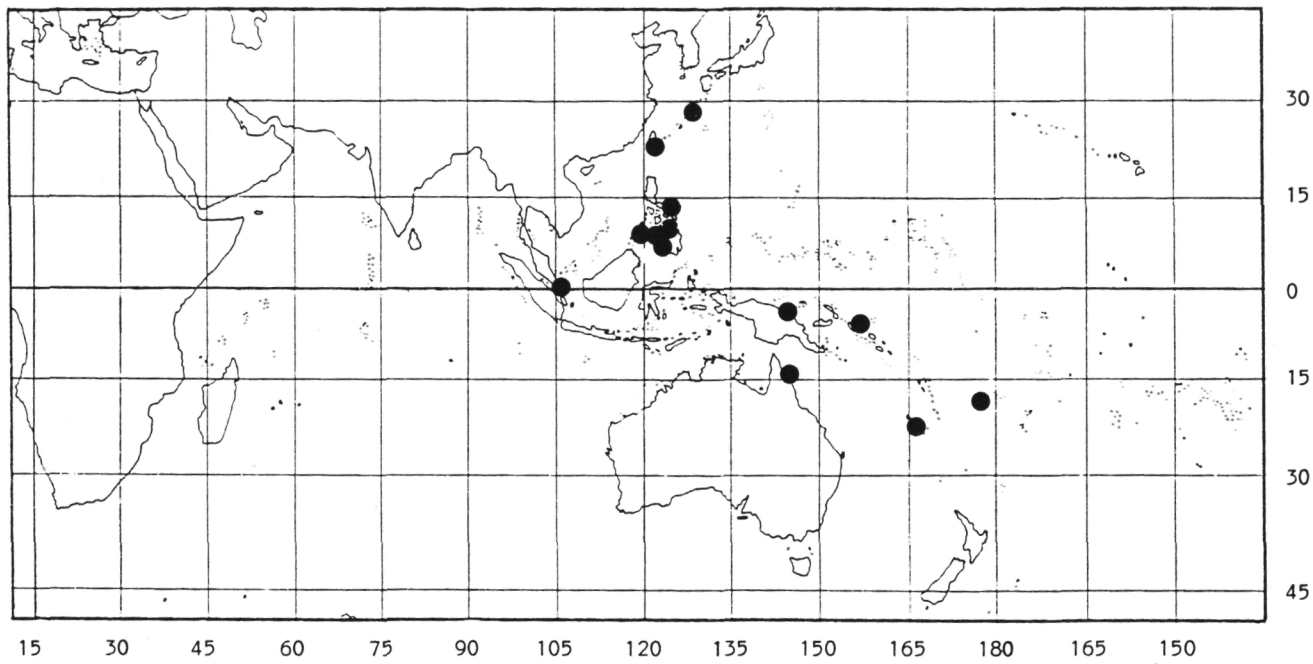

Fig. 13. Distribution of *Haustellum haustellum*.

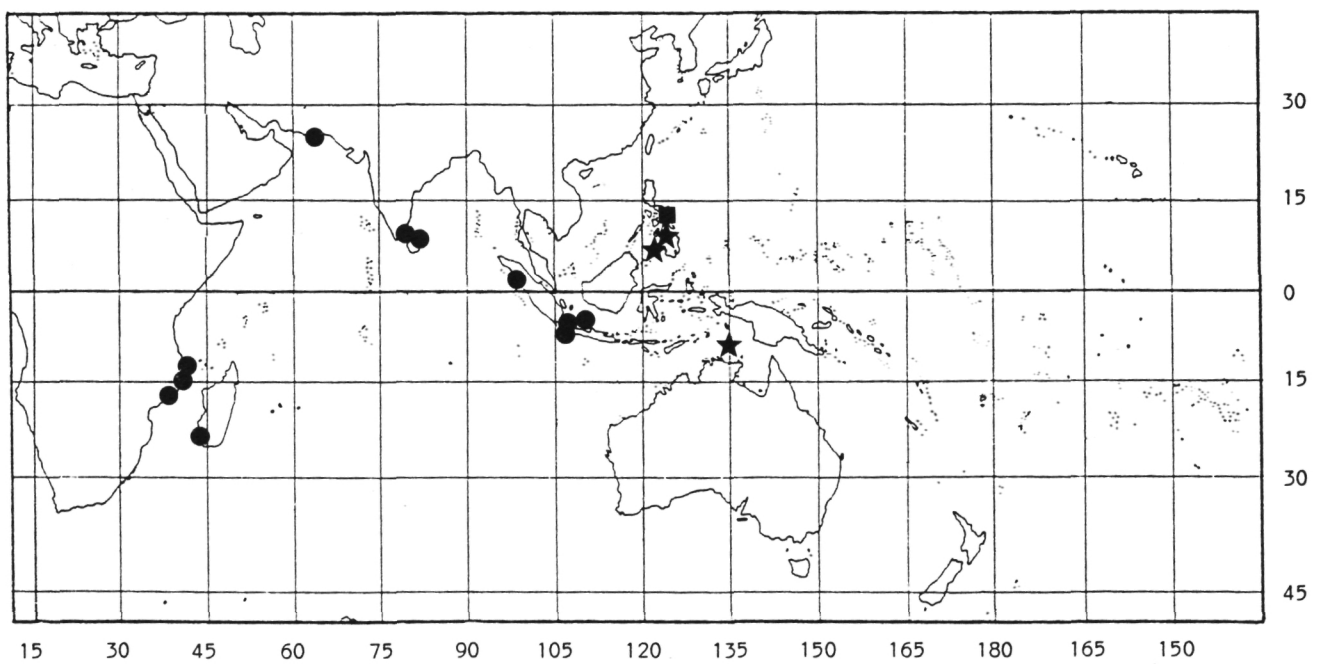

Fig. 14. Distribution of *Haustellum kurodai kurodai* (stars), *H. k. vicdani* (square), and *H. k. langleitae* (circles).

numerous, low, indistinct, smooth threads, more developed on axial ribs.

Aperture broad, rounded. Outer lip crenulate, erect with numerous, weak, elongate lirae within. Columellar lip smooth, strongly raised, adherent adapically. Siphonal canal long, straight, open, spineless.

Greyish-brown with bluish-black or brown blotches on spire and on siphonal canal. Aperture light yellow or pink.

Remarks.

H. k. langleitae differs from *H. haustellum* in having a different larval development, coarser, irregular, spiral sculpture, consisting of similar sized cords. Other shell characters, such as thickness, height of the intervarical ribs, breadth of the varices, are quite variable. For differences with *H. k. kurodai* see Table 1.

Haustellum kurodai vicdani Kosuge, 1980
Figs 14, 33-34

Haustellum vicdani Kosuge, 1980: 57, pl. 17, figs 2, 4.

Protoconchs examined: Philippines, Sorsogon (1 sp., partially broken) (Coll. R. Houart).

Distribution.

Currently known from a small area in the Philippine Islands: Sorsogon and Bulan, Luzon Island.

Description.

Shell up to 117 mm in length with 7 teleoconch whorls. Protoconch partially broken in examined specimens, globose, smooth, whorls rounded.

Axial sculpture of last teleoconch whorl consisting of 3 high, rounded, spineless varices. Other axial sculpture of 3 or 4 low or moderately high, strong, nodose ribs. Spiral sculpture of numerous, low, weak, smooth threads.

Aperture broad, rounded. Outer lip crenulate with very weak elongate lirae within. Columellar lip smooth, strongly raised, adherent adapically. Siphonal canal long, straight, open, spineless.

Lavender with scattered light or dark brown blotches on varices, shoulder, axial ribs and siphonal canal. Aperture light orange or orange-yellow.

Remarks.

The absolutely spineless siphonal canal and lavender colour separate that species from *H. k. kurodai* and *H. haustellum*, two other species occuring in the Philippines. The shell is smoother, and spineless. For other differences see Table 1.

Haustellum longicaudum (Baker, 1891)
Figs 15, 38-39, 42-43, 57-58

Murex haustellum var. *longicaudum* Baker, 1891: 56.

Protoconchs examined: Ethiopia, Malajus (1 sp.); Gulf of Aden (1 sp.) (coll. R. Houart); Gulf of Aden (2 sp.) (coll. Wilhelm-Pieck-Universität, Rostock).

Distribution.

Southern Red Sea, the Gulf of Aden, the Gulf of Oman and the Persian (Arabian) Gulf.

Description.

Shell up to 87 mm in length with 2-2.5 protoconch whorls and 8 teleoconch whorls. Protoconch large, globose, irregularly shaped, smooth.

Axial sculpture of last teleoconch whorl consisting of 3 narrow, high, spineless varices. Other axial sculpture of 3 or 4 low, nodose ribs. Spiral sculpture of numerous, low, smooth threads.

Aperture broad, rounded. Outer lip crenulate, erect with very weak, elongate lirae within. Columellar lip smooth, strongly raised, adherent adapically. Siphonal canal long, straight, open, spineless.

Light tan with dark brown blotches on varices and scattered blotches on teleoconch whorls. Aperture white.

Remarks.

Haustellum longicaudum is also occasionally synonymised with *H. haustellum*. For differences in shell morphology with the other species see discussion under *Haustellum* and Table 1. The species is illustrated in D. & E. BOSCH (1989: 57) as *H. haustellum*.

Haustellum wilsoni D'Attilio & Old, 1971
Fig. 56

Haustellum wilsoni D'Attilio & Old,1971: 316, figs 1,2.

Protoconchs examined: West Australia, Jurien Bay (1 sp.); West Australia, Augusta (1 sp.) (coll. R. Houart); original description and subsequent literature.

Distribution.

Geographe Bay to Jurian Bay, West Australia.

Description.

Shell up to 80 mm in length with 1.75-2 protoconch whorls and 6 or 7 teleoconch whorls. Protoconch broad, globose, smooth, glossy. Whorls rounded.

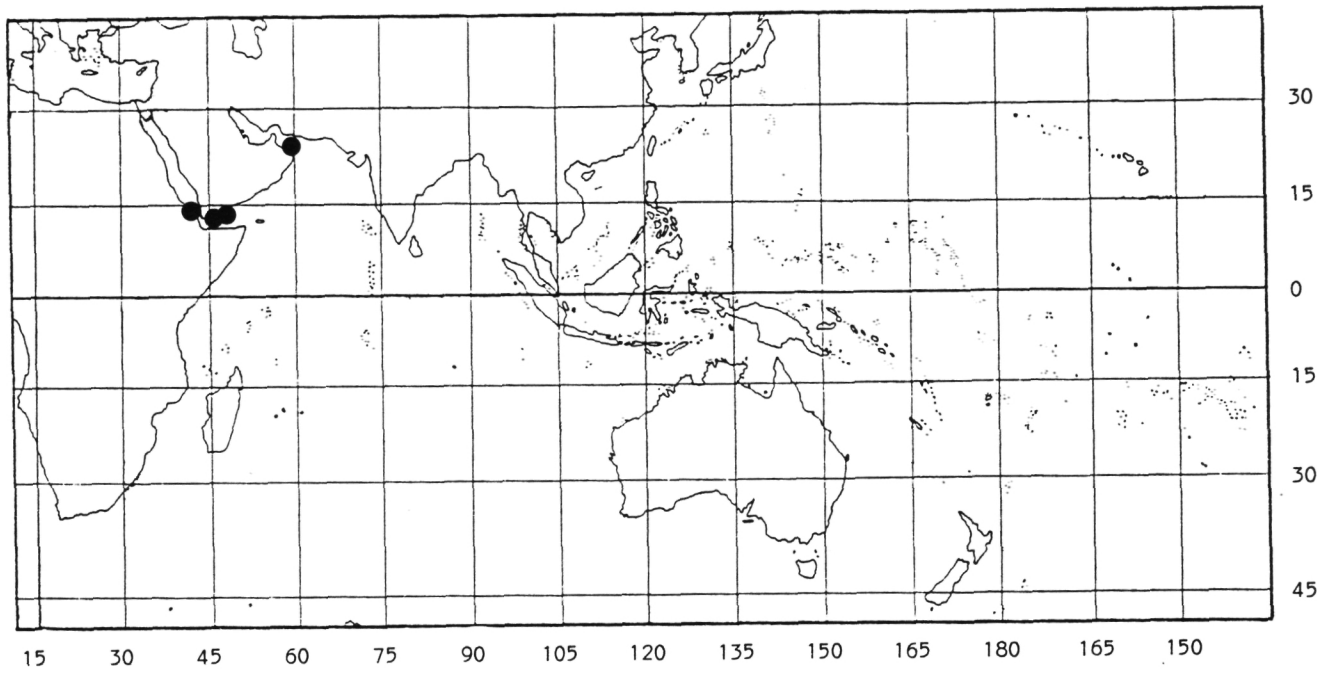

Fig. 15. Distribution of *Haustellum longicaudum*.

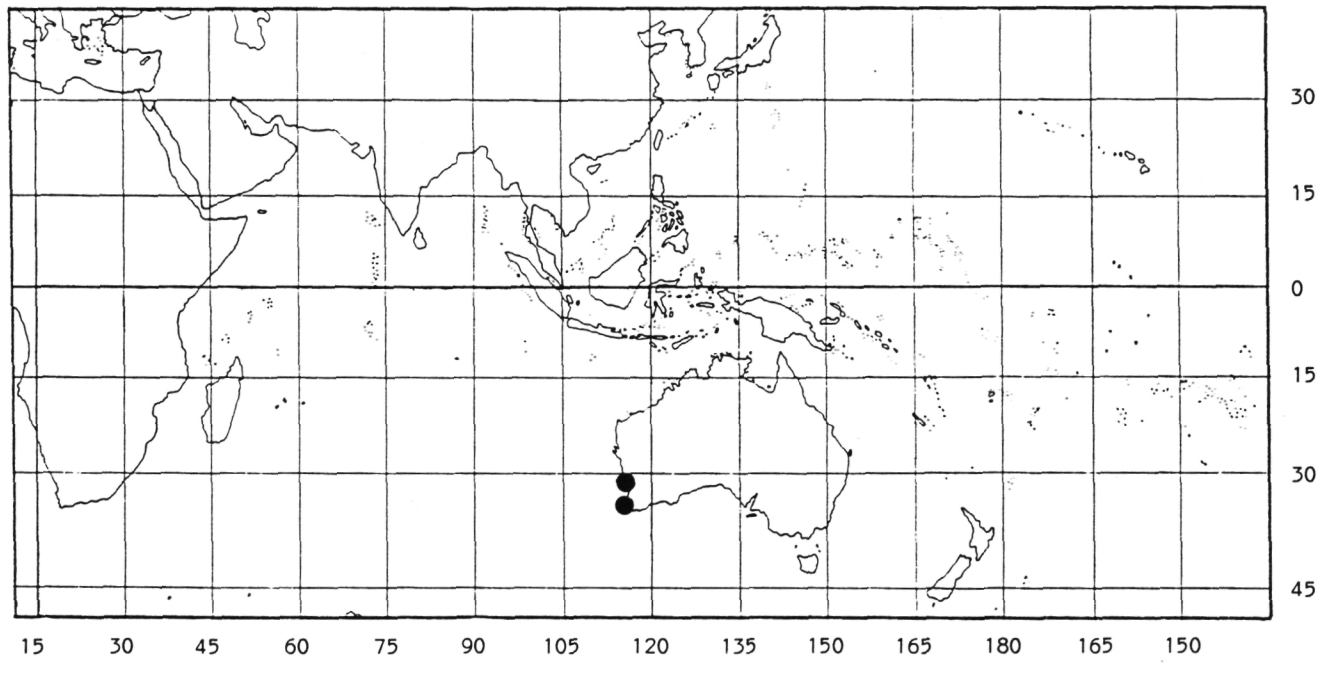

Fig. 16. Distribution of *Haustellum wilsoni*.

Axial sculpture of last teleoconch whorl consisting of 3 rounded, spineless varices. Last varix more prominent, others low or almost flat and undistinguishable in some specimens. Other axial sculpture of several, low, nodose ribs. Spiral sculpture of 10 or 11 low, rounded, tuberculate cords with numerous smooth threads on and between the cords.

Aperture broad, roundly-ovate or rounded. Outer lip crenulate with several weak elongate lirae within. Columellar lip smooth, raised, adherent adapically. Siphonal canal moderately long, straight, open, spineless with some knobs (or nodules) adaperturally.

Ivory-white or creamy-white with some darker coloured (brown) blotches on and between varices and on siphonal canal. Aperture white.

Remarks.

A rare and remarkable species. It cannot be confused with any other species of the genus thanks to its broad, rounded protoconch, rounded and nodose whorls with deeply channeled suture, broadly developed apertural varix, and nodose base of the siphonal canal.

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REFERENCES

BAKER, F.C. 1891. Remarks on the Muricidae with descriptions of new species of shells. *Proc. Acad. Nat. Sci. Philadelphia* 43: 56-61.

BANDEL, K. 1975. Embryonalgehäuse karibischer Meso-und Neogastropoden (Mollusca). Abhandlungen der Matemetich-Naturwissenschaftlichen Klasse, Akademie der Wissenschaften un der Literatur. 1: 1-133.

BOSCH, D. & E. BOSCH. 1989. *Seashells of Southern Arabia*. Motivate, Dubai: 95.

BOUCHET, P. 1989. A review of poecilogony in gastropods. *J. Moll. Stud.* 55: 67-78.

BOUCHET, P. & P. BAIL. 1991. Volutes from Saya de Malha Bank: The saga of *Lyria surinamensis* and a new species. *The Nautilus* 105(4): 159-164.

BOZZETTI, L. 1993. Description of a new species of the genus *Haustellum* Schumacher, 1817 (Gastropoda: Muricidae) from the Western Indian Ocean. *Apex* 8(3): 107-110.

D'ATTILIO, A. & W.E. OLD. 1971. A new muricid gastropod from Western Australia. *The Veliger* 13(4): 316-318.

FAIR, R.H. 1976. *The Murex Book, an illustrated catalogue of Recent Muricidae* (Muricinae, Muricopsinae, Ocenebrinae), Sturgis Printing Co., Honolulu, Hawaii: 1-138.

HOAGLAND, K.E, & R. ROBERTSON. 1988. An assessment of poecilogony in marine invertebrates: phenomenon or fantasy? *Biol. Bull.* 174: 109-125.

HOUART, R. 1990. New taxa and new records of Indo-Pacific species of *Murex* and *Haustellum* (Gastropoda, Muricidae, Muricinae). *Bull. Mus. natn. Hist. nat.*, Paris, 4° sér., 12, sect A, n° 2: 329-347.

HOUART, R. 1992. Description of a new species of *Haustellum* (Gastropoda: Muricidae) from the western Indian Ocean. *Apex* 7(1): 31-33.

HOUART, R. 1993. Description of two new species of *Haustellum* Schumacher, 1817 (Gastropoda: Muricidae) from the Western Indian Ocean. Apex 8(4): 145-149.

KOSUGE, S. 1980. Studies on the collection of Mr. Victor Dan (2) Description of a new species of the genus *Haustellum* (Gastropoda: Muricacea). *Bull. Inst. Malac. Tokyo* 1(4): 57-58.

LINNAEUS, C. von 1758. *Systema naturae per regna tria natura*. editio decima, reformata. Stockholm, vol. 1, Regnum animale: 1-824.

OKUTANI, T. 1991. Mistaken localities for some shells "from Surinam". *The Nautilus* 105(4): 165.

PARTH, M. 1995. Remarks on the infraspecific varieties of *Haustellum dentifer* (Watson, 1883) and *Haustellum haustellum* (L., 1758). *La Conchiglia* 27 (277): 61-65.

PERRY, G. 1811. Conchology, or the natural history of snails... : 1-4, 61 pls., Miller, London.

PETUCH, E.J. 1994. *Atlas of Florida fossils shells*. The Graves Museum of Archaeology and Natural History: 394 pp.

PONDER, W.F. & E.H. VOKES. 1988. Revision of the Indo-West Pacific fossil and Recent species of *Murex* s.s. and *Haustellum* (Mollusca: Gastropoda: Muricidae). *Rec. Australian Mus.*, suppl. 8: 1-160.

RADWIN G. & A. D'ATTILIO. 1976. *Murex shells of the world. An illustrated guide to the Muricidae*. Stanford University Press, Stanford: 1-284.

RÖDING, J.F. 1798. Museum Boltenianum... Hamburg: i-vii, 1-199.

SABELLI, B. & S. TOMMASINI. 1982. Osservazioni sulla radula e sulla protoconca di *Bolinus brandaris* (L., 1758) e *Phyllonotus trunculus* (L., 1758). *Boll. Malac.* 18 (9-12): 291-300.

SCHUMACHER, H.C.F. 1817. Essais d'un nouveau système des vers testacés. Schultze, Copenhagen: 1-287.

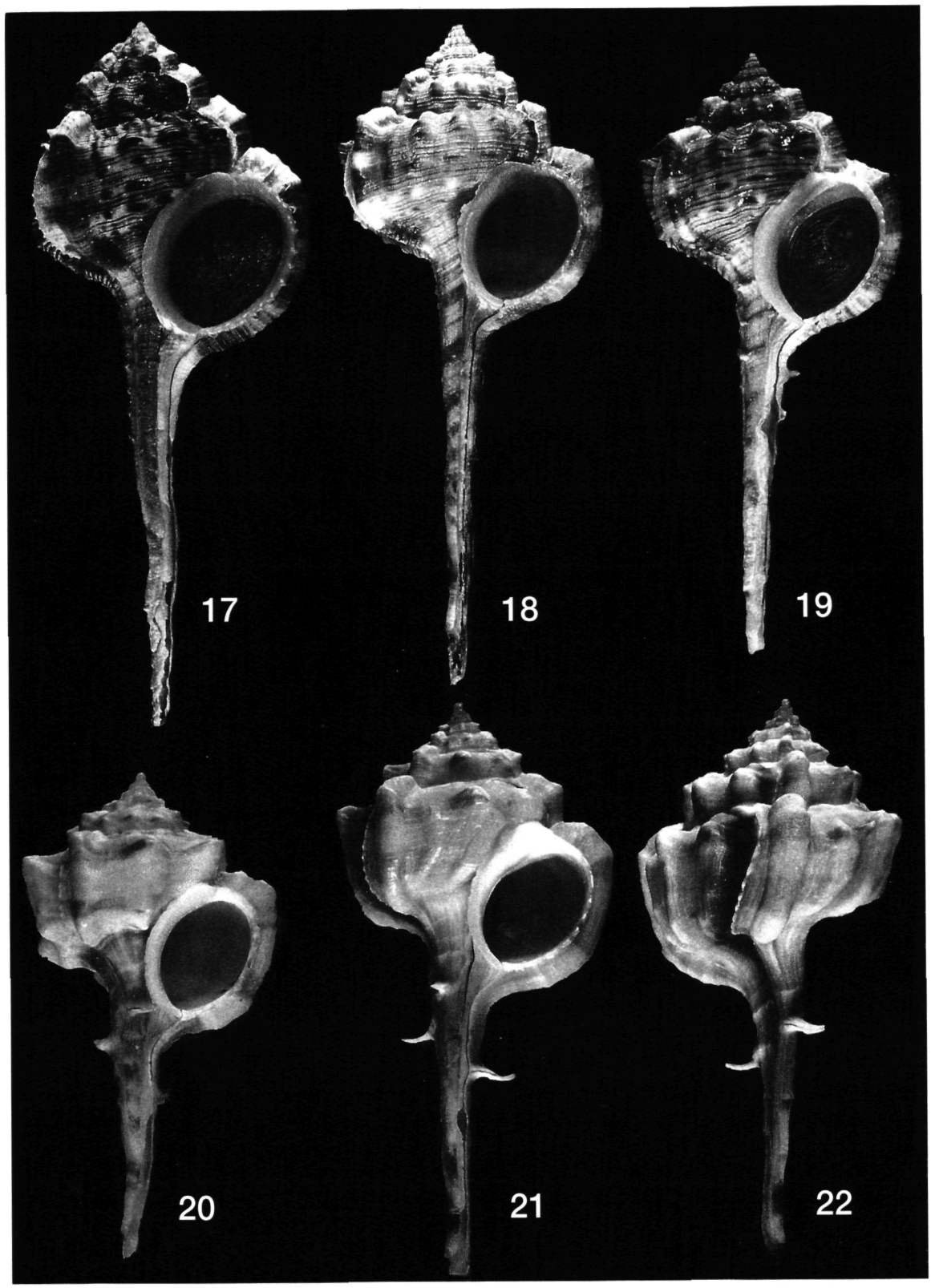
SHIKAMA, T. 1964. Description of new species of *Murex* and *Conus* from the Arafura Sea. *Venus* 23 (1): 33-37, pl. 3.

SMITH, E.A. 1901. On South African marine shells, with descriptions of new species. *J. Conch.* 10 (4):104-116.

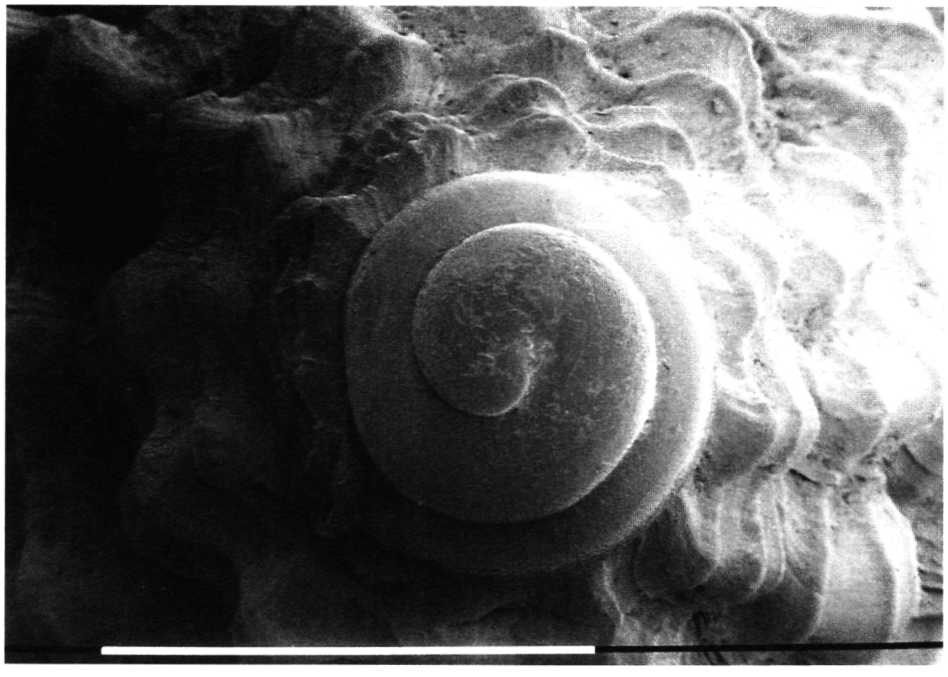
SWAINSON, W. 1840. A treatise on malacology or the natural classification of shells and shell-fish. Longman et al., London: 1- 419.

VOKES, E.H. 1971. Catalogue of the genus *Murex* Linnaeus (Mollusca: Gastropoda. Muricinae, Ocenebrinae. *Bull. Am. Paleont.*, 61 (268): 1-141.

VOKES, E.H. 1990. Cenozoic Muricidae of the western Atlantic, Part VIII, *Murex* s.s., *Haustellum, Chicoreus, Hexaplex:* additions and corrections. *Tulane Stud. Geol. Paleont* 23(1-3):1-96, pls. 1-12, 2 text figs.



Figs. 17-19. *Haustellum haustellum* (Linnaeus, 1758). Fig. 17. Philippines, Cebu, 144.8 mm. Fig. 18. West Sumatra, near Sibolga, 95 mm. Fig. 19. New Caledonia, 86.6 mm. **Figs. 20-22.** *Haustellum fallax* (Smith, 1901). Fig. 20. South Africa, off Natal, 63.1 mm. Fig. 21-22. Mozambique, between Cabo das Correntes and Zavora Point, 78.7 mm



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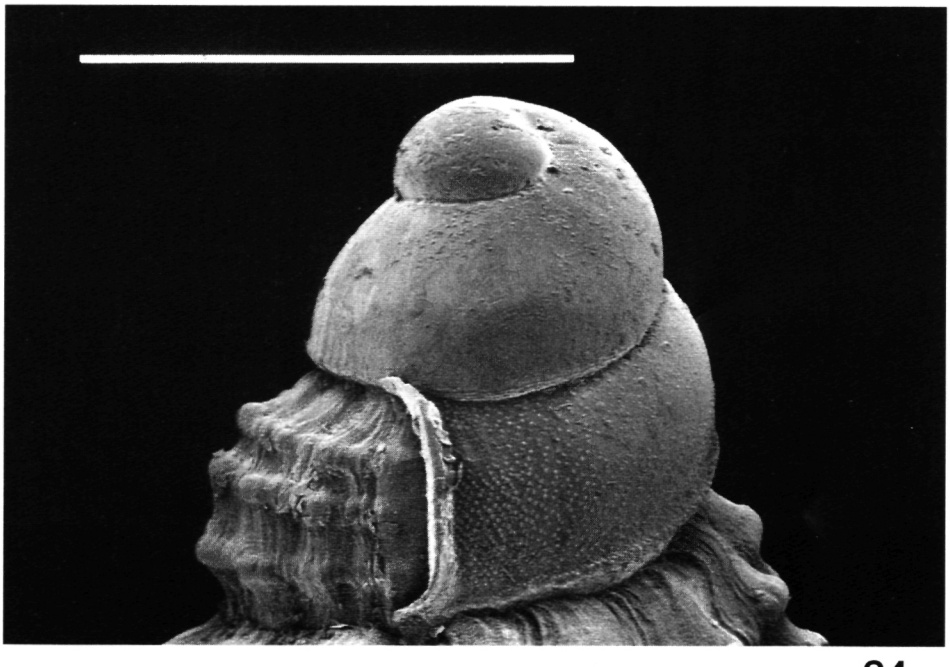

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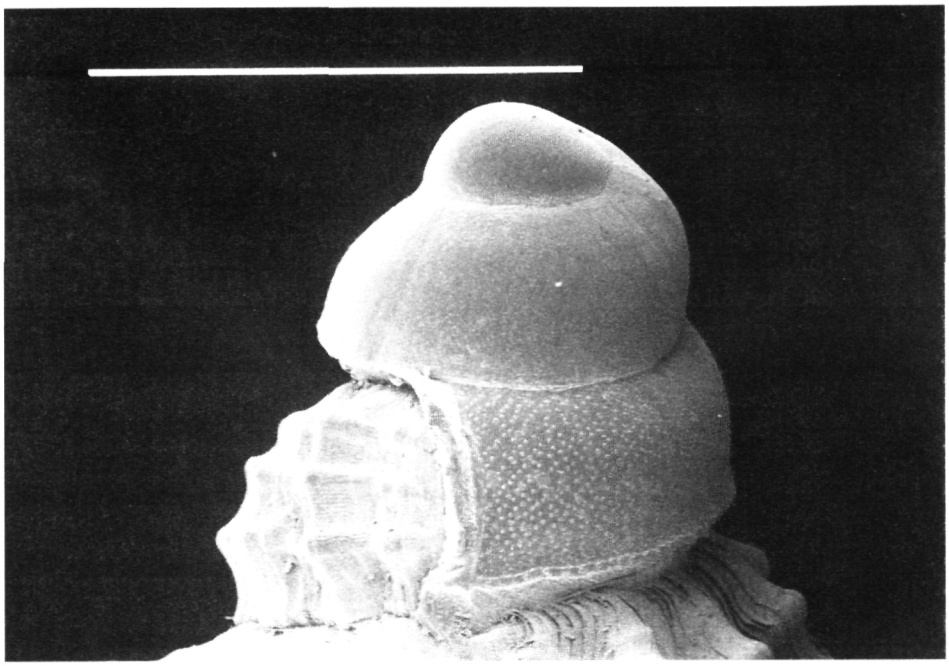
Figs. 23-24. Protoconchs of *Haustellum haustellum* (Linnaeus, 1758), Papua New Guinea. (scale bars: 1 mm)



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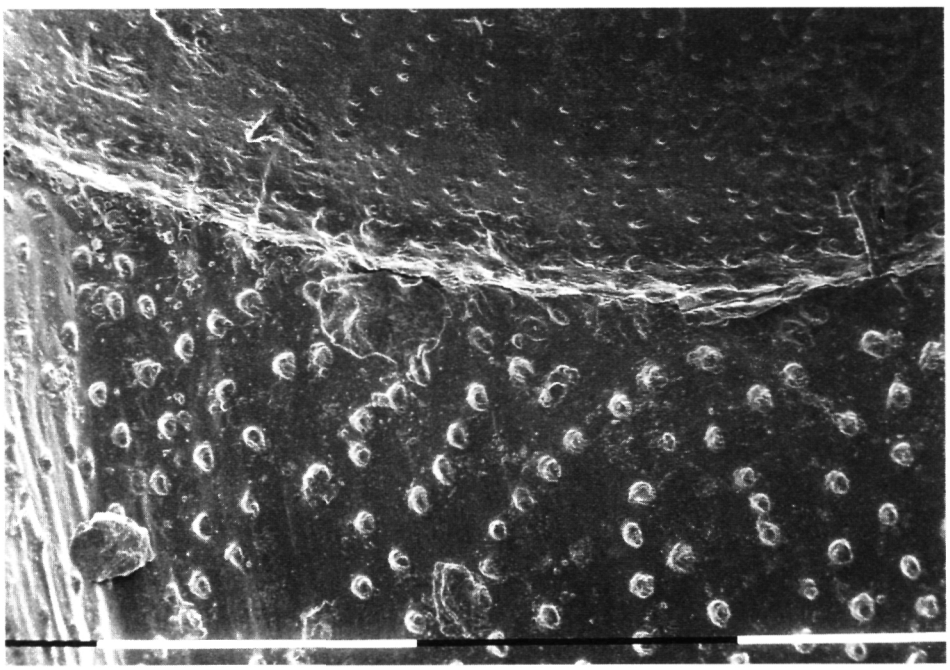

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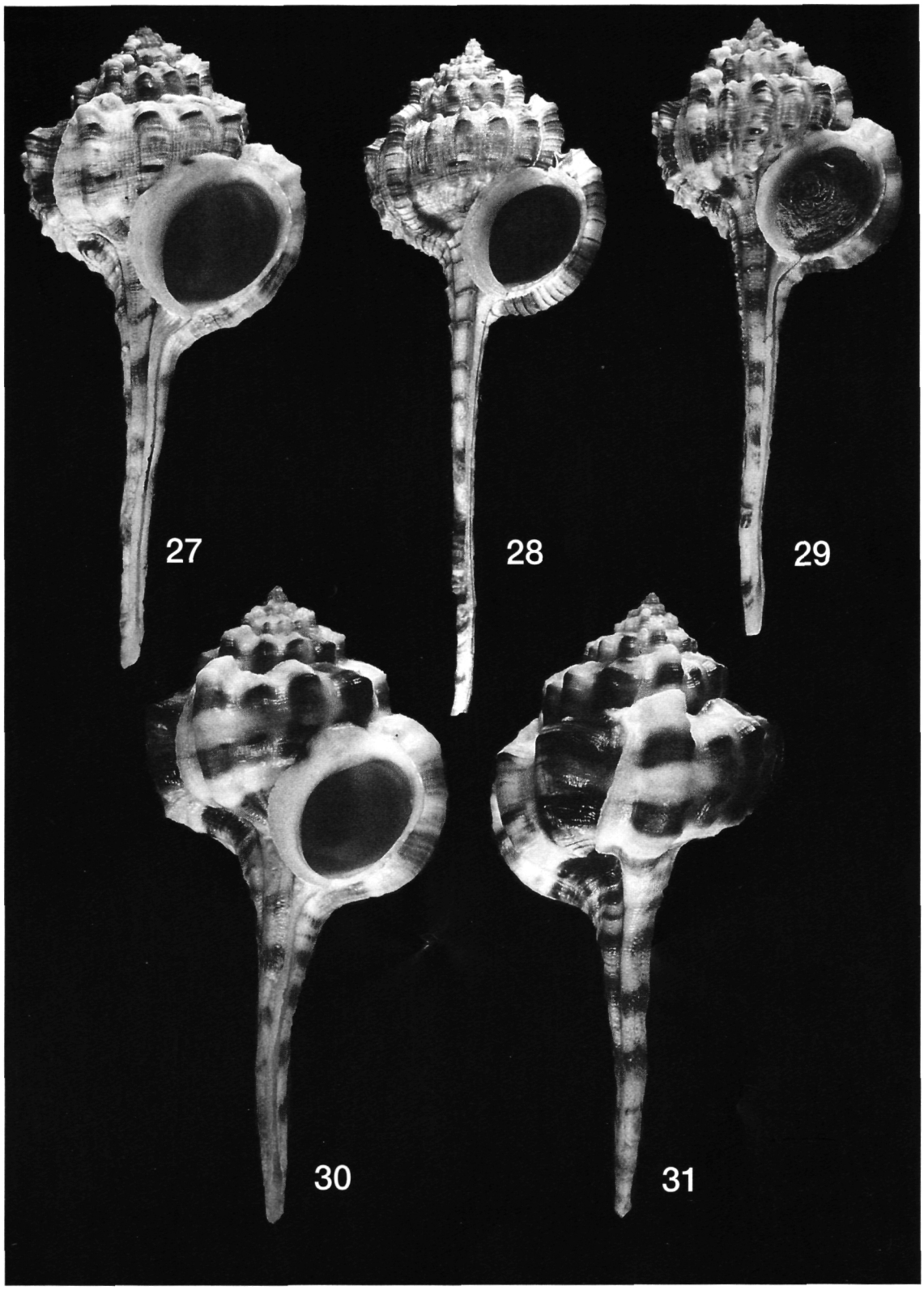
Figs. 25-26. Protoconchs of *Haustellum haustellum* (Linnaeus, 1758), Papua New Guinea. (scale bars: 25: 1 mm; 26: 100 µm).



Figs. 27-31. *Haustellum kurodai langleitae* Houart, 1993. Fig. 27. Mozambique, Bazaruta Island region, 104 mm. Fig. 28. Southwestern Java, 124 mm. Fig. 29. India, Rameswaram, 90.2 mm. Fig. 30-31. Tanzania, Dar-es-Salaam, paratype, 94.1 mm.

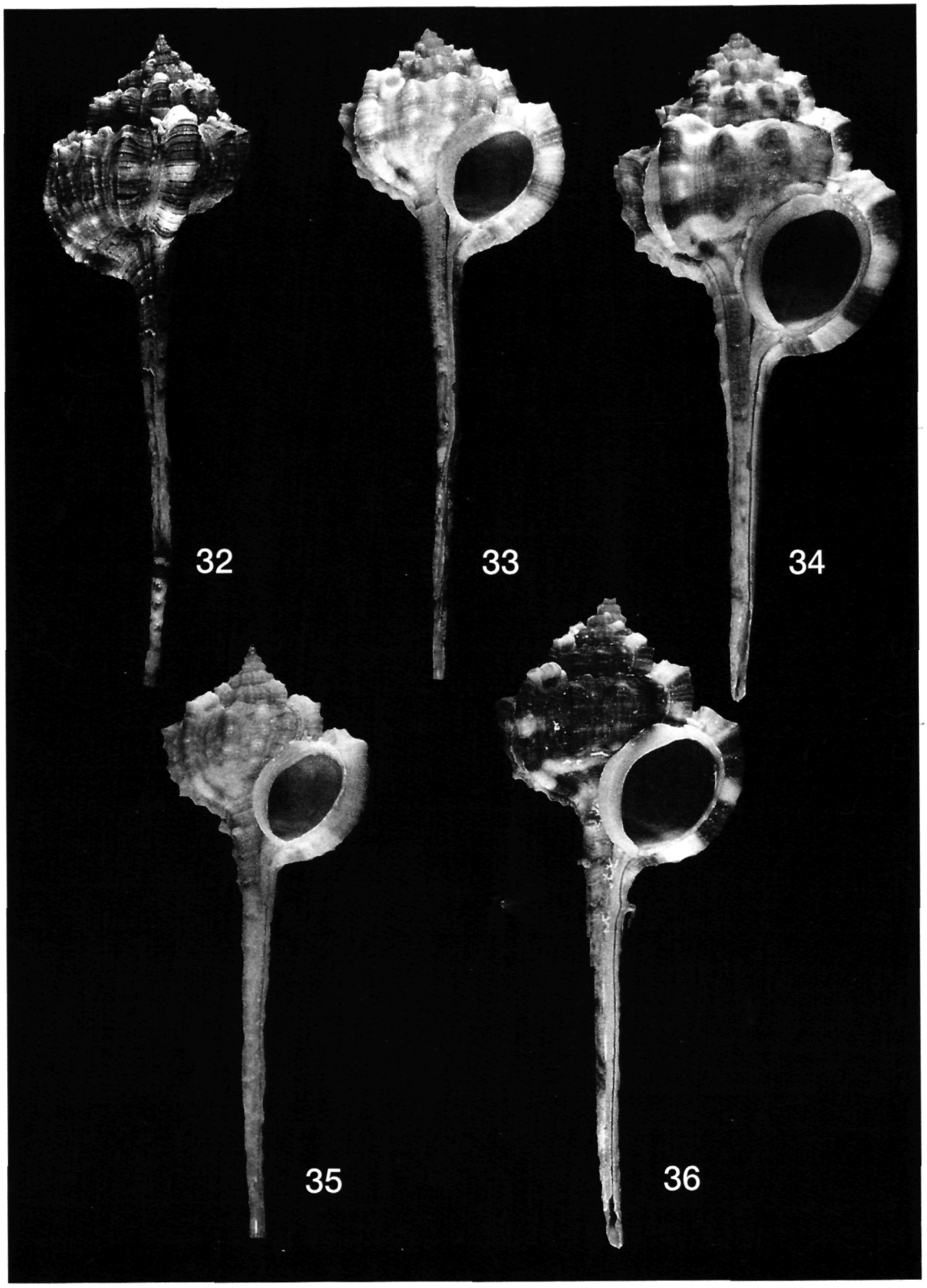


Fig. 32. *Haustellum kurodai langleitae* Houart, 1993, Java, Djakarta, 100 mm. **Figs. 33-34.** *H. kurodai vicdani* Kosuge, 1980, Philippines, Luzon Island, Sorsogon. Fig. 33. 93.5 mm. Fig. 34. 117 mm. **Figs. 35-36.** *H. kurodai kurodai* (Shikama, 1964), Philippines, Sulu, Siasi Island. Fig. 35. 62.3 mm. Fig. 36. 85.4 mm.

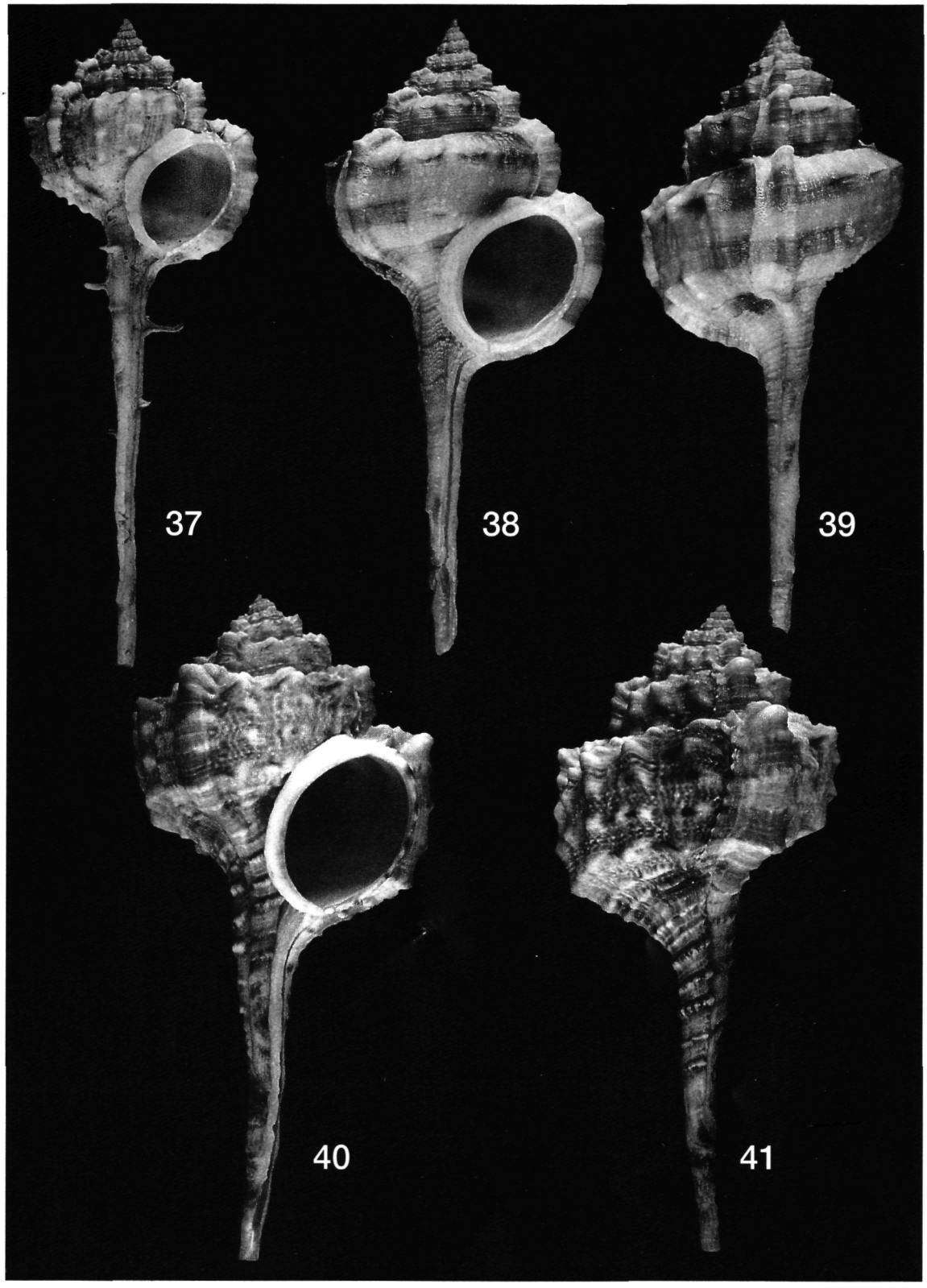
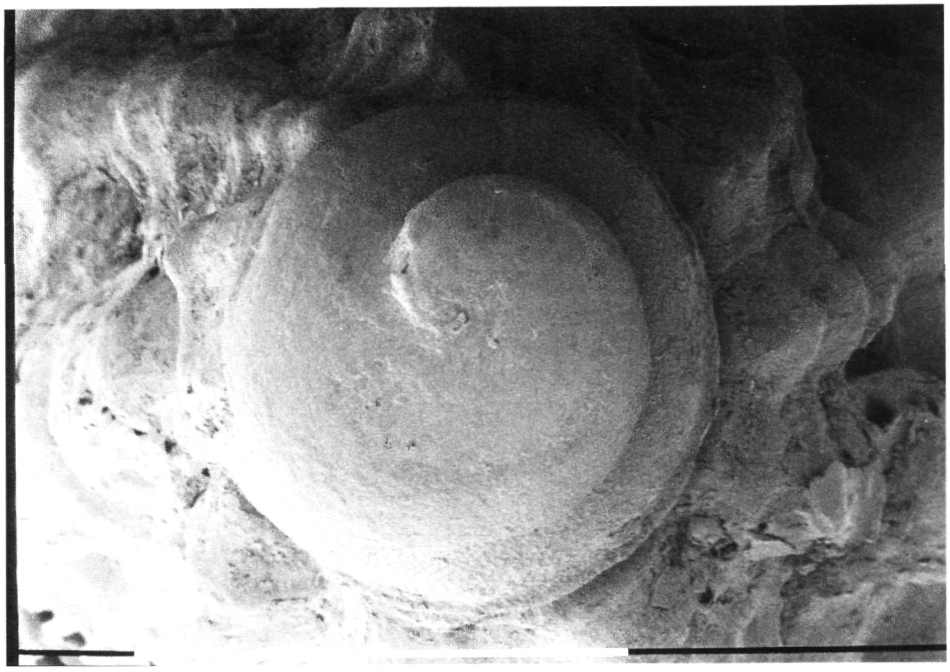


Fig. 37. *Haustellum kurodai kurodai* (Shikama, 1964), Philippines, 86.5 mm. **Figs. 38-39.** *H. longicaudum* (Baker, 1891), Ethiopia, Malajus, 86.7 mm. **Figs. 40-41.** *H. barbieri* Houart, 1993, Madagascar, Sainte-Marie (Nosy-Boraha), paratype, 90.4 mm.



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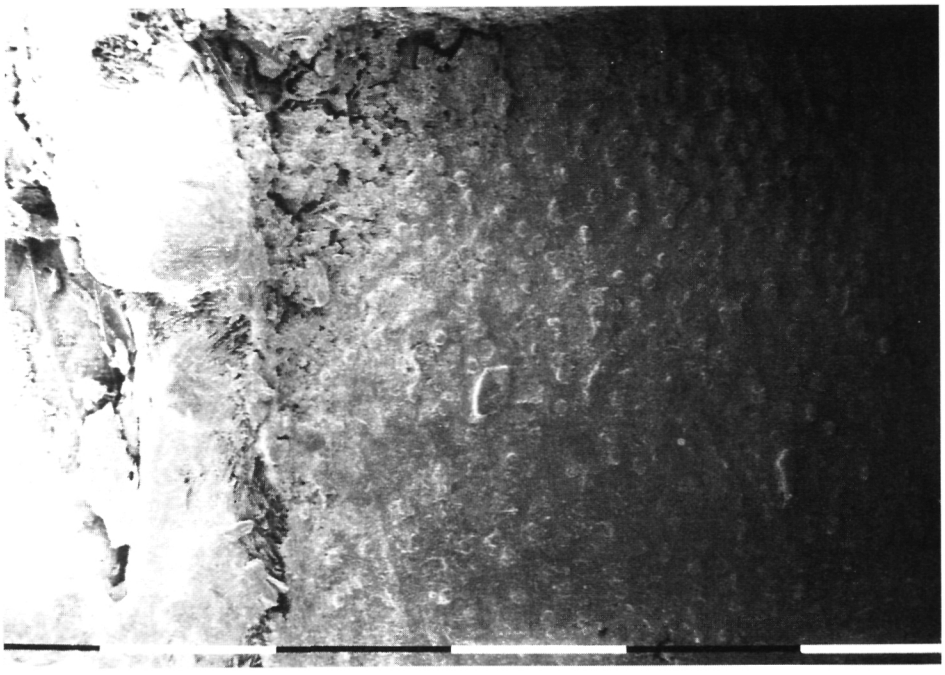

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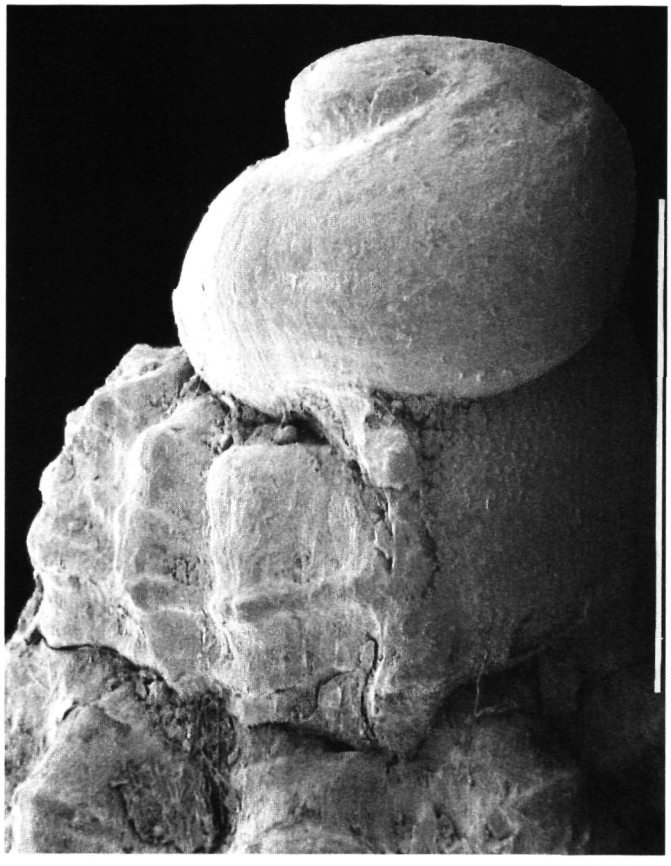
Figs. 42-43. Protoconchs of *Haustellum longicaudum* (Baker, 1891), Gulf of Aden. (scale bars: 42: 1 mm; 43: 100 µm).



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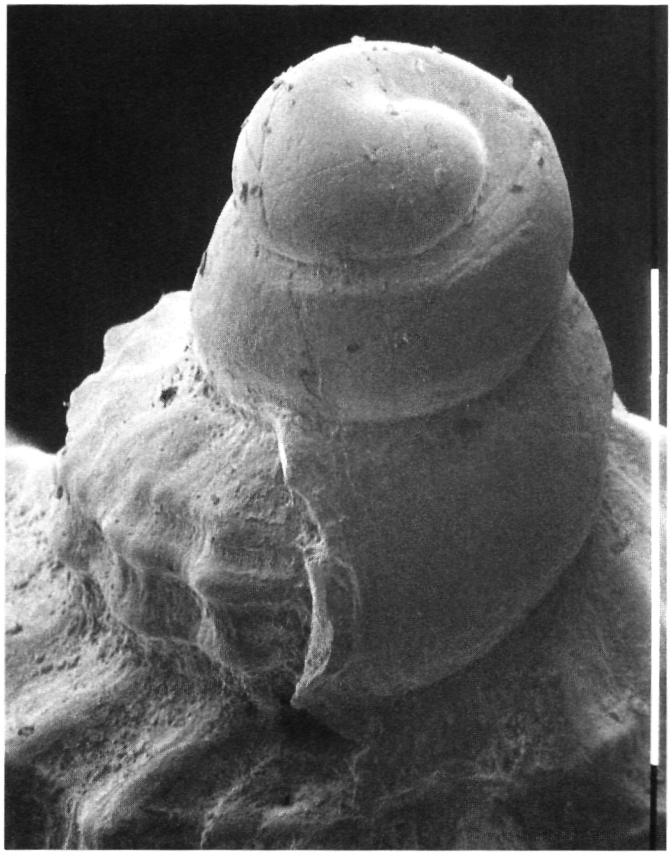

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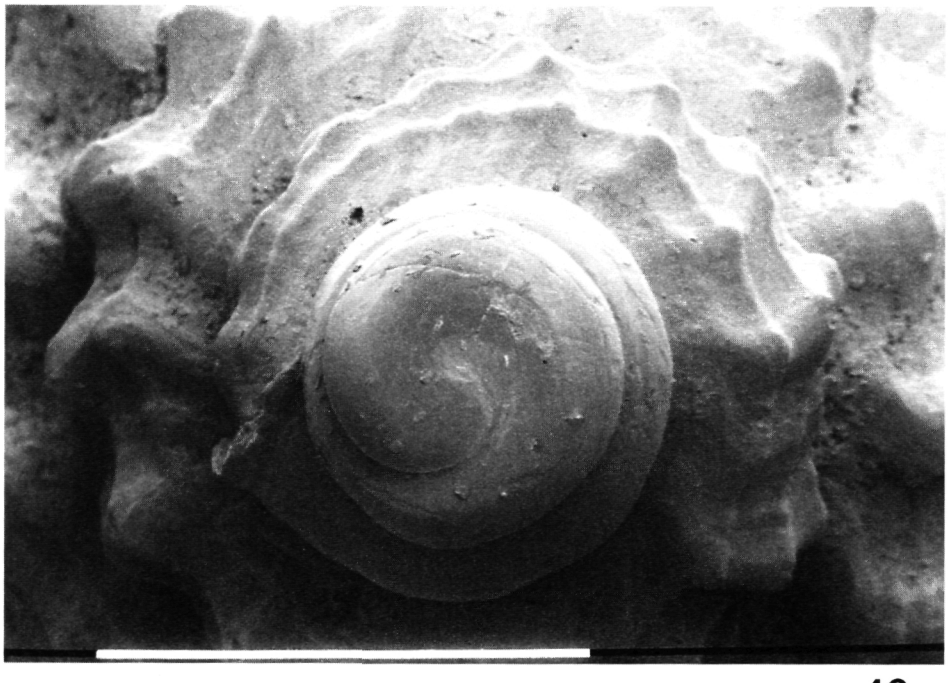

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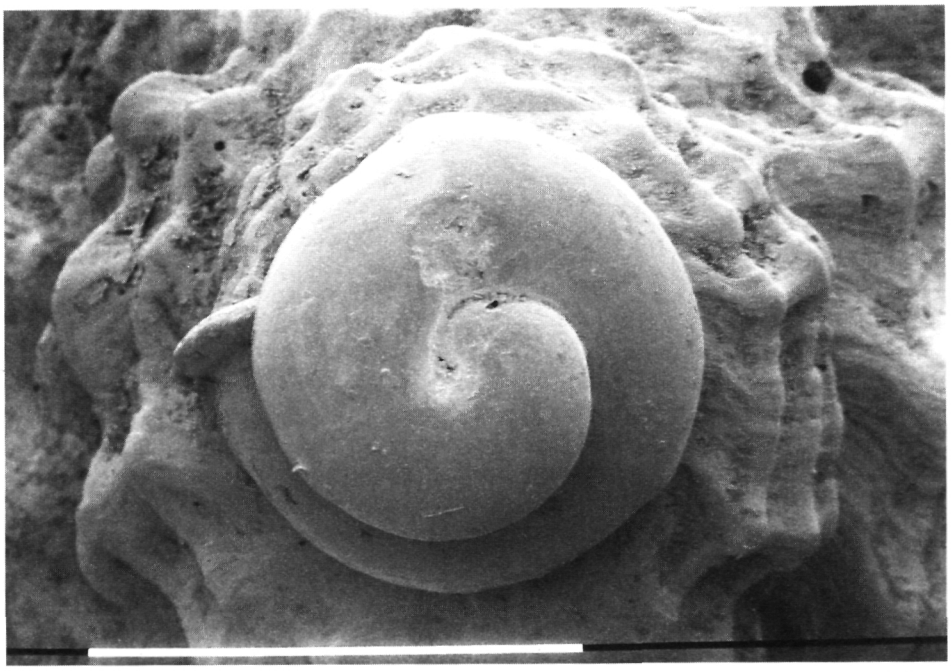
Fig. 44. Protoconch of *Haustellum longicaudum* (Baker, 1891), Gulf of Aden. (scale bars: 1 mm). **Figs. 45-46.** Protoconchs of *H. kurodai langleitae* Houart, 1993, Madagascar. (scale bars: 1 mm).



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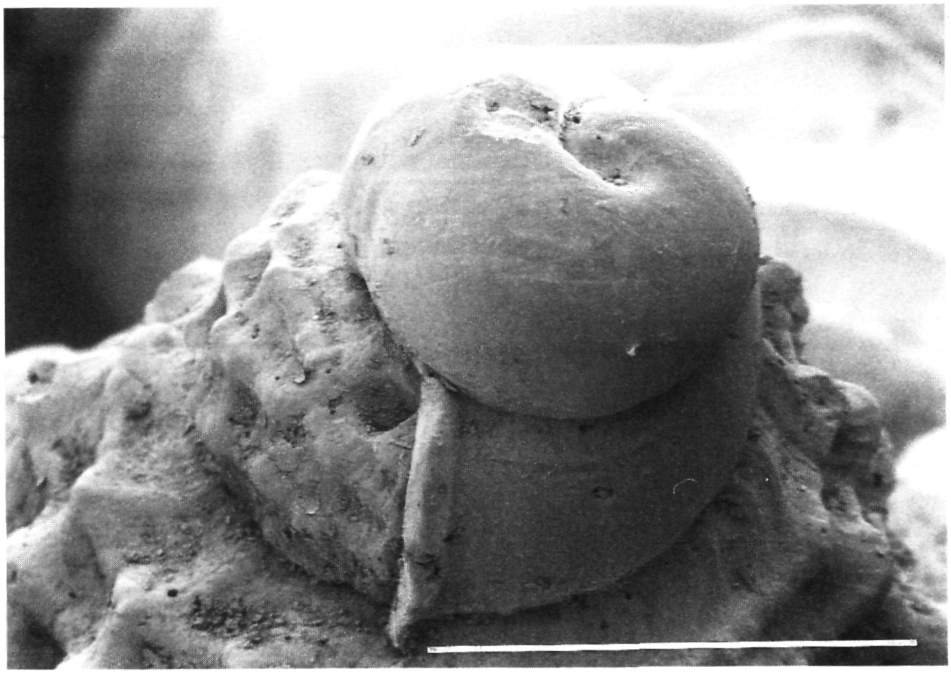

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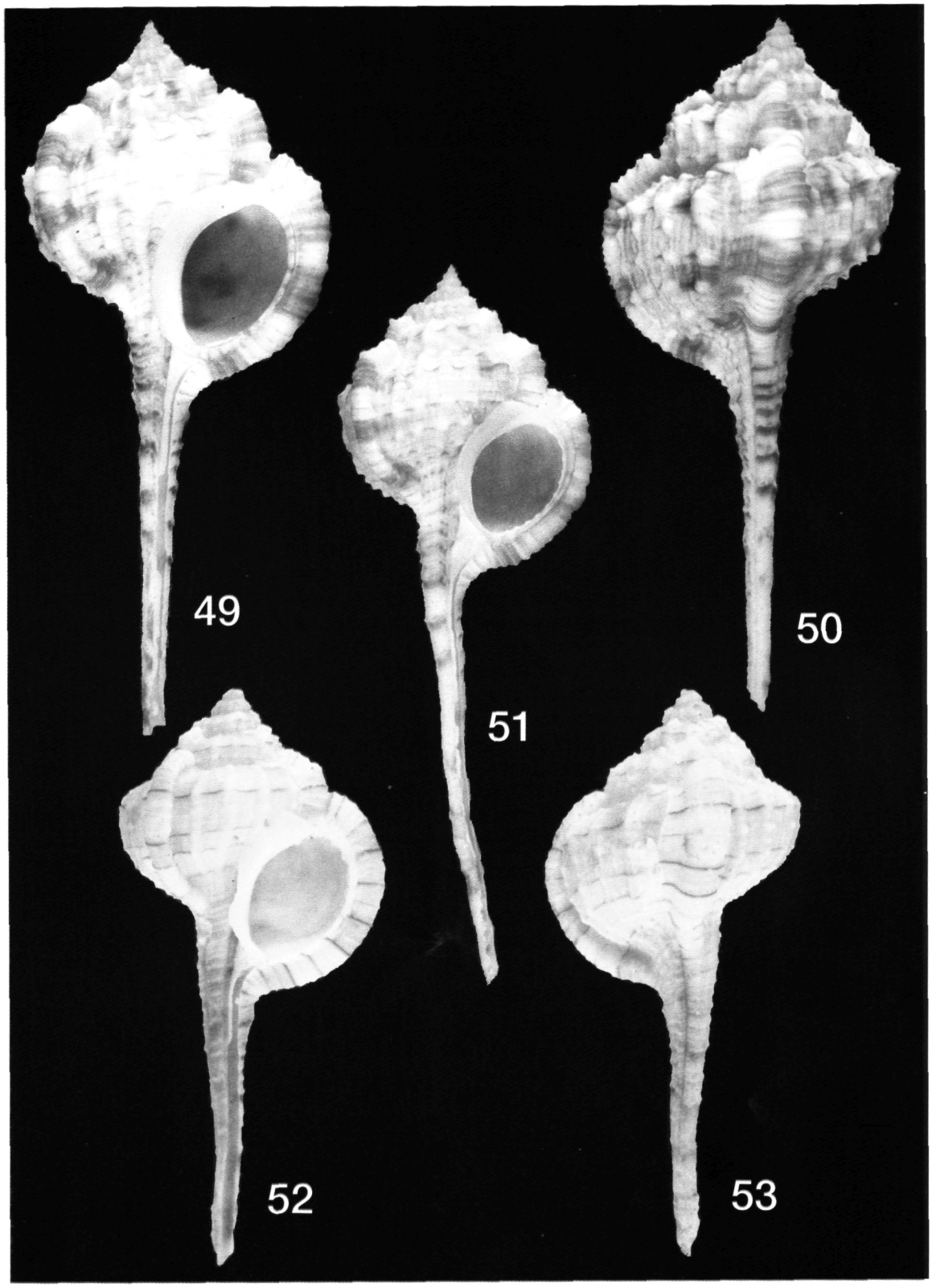
Figs. 47-48. Protoconchs of *H. kurodai kurodai* (Shikama, 1964). (scale bars: 1 mm).



Figs. 49-51. *Haustellum bondarevi* n.sp., Saya de Malha Bank. Fig. 49-50. Holotype MNHN, 79 mm. Fig. 51. Paratype coll. Bondarev, 101.2 mm. **Figs. 52-53.** *H. franchii* Bozzetti, 1993, Northeastern Somalia, off Ras Hafun, 59.8 mm, holotype IRSNB 27962/459.

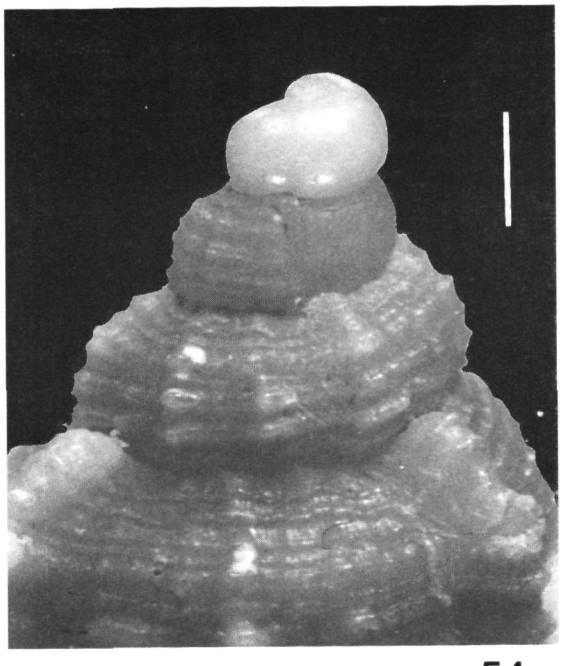


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Fig. 54. *Haustellum fallax* (E. A. Smith, 1901), Mozambique (protoconch) (scale bar: 1 mm). **Fig. 55.** *Haustellum barbieri* Houart, 1993, holotype, detail of shell sculpture (scale bar: 1 mm).