Dépôt légal :
Mars 1986

Date de distribution,
le 31 mars 1986

**14**

# Mollusca Gastropoda : Taxonomical notes on tropical deep water Buccinidae with descriptions of new taxa

Philippe BOUCHET * and Anders WARÉN **

ABSTRACT

This paper presents the results from examination and determination of tropical species of Buccinidae from deep water, collected by several expeditions, mainly in the Indo-Pacific area. The material comprises 14 genera and the following new taxa are described : *Calliloconcha knudseni* (Kermadec Trench, 5 480 m), *Costaria crosnieri* (SW Indian Ocean, 1 740-3 760 m), *Eosipho coriolis* (Philippines, 880 m), *Eosipho engonia* (SW Indian Ocean, 600-1 125 m), *Eosipho thorybopus* (Mozambique Channel, 400-500 m), *Kapala bathybius* (SE Atlantic, 3 550 m), *Manaria clandestina* (SE Asia, 440-1 490 m), *Manaria makassarensis* (SE Asia, 490-875 m), *Manaria formosa* (Mozambique Channel, 400-500 m).

For the preparation of this paper we have examined material and/or types of almost all previously described deep sea species of tropical buccinids and these are figured and commented on.

An appendix lists all Neogene and Recent supraspecific names of Buccinidae proposed after the publication of WENZ' " Handbuch der Paläozoologie " (1941-43).

RÉSUMÉ

Ce travail rassemble les résultats de l'étude des Buccinidae de grande profondeur des régions tropicales, récoltés par de nombreuses expéditions, essentiellement dans le domaine Indo-Pacifique. Le matériel comprend 14 genres et les taxa suivants sont décrits comme nouveaux : *Calliloconcha knudseni* (Fosse des Kermadec, 5 480 m), *Costaria crosnieri* (SW Océan Indien, 1 740-3 760 m), *Eosipho coriolis* (Philippines, 880 m), *Eosipho engonia* (SW Océan Indien, 600-1 125 m), *Eosipho thorybopus* (Canal du Mozambique, 400-500 m), *Kapala bathybius* (SE Océan Atlantique, 3 550 m), *Manaria clandestina* (Asie du Sud-Est, 440-1 490 m), *Manaria makassarensis* (Asie du Sud-Est, 490-875 m), *Manaria formosa* (Canal du Mozambique, 400-500 m).

Pour ce travail, nous avons examiné du matériel et/ou les types de pratiquement tous les Buccinidae profonds des régions tropicales déjà nommés ; ces espèces sont figurées et discutées.

Un appendice donne la liste de tous les noms supraspécifiques de Buccinidae néogènes et actuels introduits après la publication du « Handbuch der Paläozoologie » de WENZ (1941-43).

* Muséum national d'Histoire naturelle, Laboratoire de Biologie des Invertébrés marins et Malacologie, 55, rue de Buffon, 75005 Paris.

** Zoologiska Institutionen, Box 25059, 40031 Göteborg, Suède.

## INTRODUCTION

During the last fifteen years several French expeditions have collected marine fauna, especially in the NE Atlantic and Indo-Pacific areas. The material from the first mentioned area forms the basis for a series of monographs (BOUCHET & WARÉN, 1980, 1985, in prep.), while the Indo-Pacific material largely remains undetermined, only sorted to genera or families, in the department of malacology, Muséum National d'Histoire Naturelle. In the course of our treatment of the NE Atlantic Buccinidae (BOUCHET & WARÉN, 1985), it became necessary to compile much information about the tropical deep sea species of the family and to supplement this with an examination of radulae of groups where the radular morphology had not been described. We then obtained much information of which only a small part was published and we realized how confused and incomprehensible available information on the family is. We therefore decided to bring together our notes supplemented with some descriptions of new species and the results of examinations of further type material, in order to clarify some of the problems and to draw attention to several little known taxa.

Our results are presented as a list of the genera and species we have examined, with comments and descriptions. This list includes all tropical deep sea buccinids from between 35° N and 35° S of which we have been able to obtain material. As an appendix we have compiled a list of about 70 generic and subgeneric names published after WENZ' (1941-43) treatise of the prosobranchs.

Since the monographs of the late 19th century, the Buccinidae have not been revised on a world wide basis, although several monographs on a regional or generic basis have appeared : GOLIKOV (1963, 1980) revised *Neptunea* and *Buccinum* ; TIBA & KOSUGE (1979-83) revised several genera from the cold parts of the N. Pacific ; BOUCHET & WARÉN (1985) revised the NE Atlantic deep sea species ; CERNOHORSKY (1971, 1975) and PONDER (1972) contributed important papers on tropical Indo-Pacific species. The Antarctic region has been dealt with by POWELL and DELL in several papers.

Based on anatomical investigations, PONDER (1973) suggested that Buccinidae, Fasciolaridae, Nassaridae and Melongenidae should be considered subfamilies within the family Buccinidae. We have found (1985) that several genera combine characters considered to be typical for Buccinidae *or* Fasciolaridae (*Kryptos, Troschelia* and *Belomitra*). To that list can now be added *Costaria, Thalassoplanes* and *Pararetifusus*. A possible interpretation of this is that these genera belong to an ancestral stock of less modified (in radular characters at least) species.

We have however used the name Buccinidae in a " classic " sense and do not treat typical fasciolarids and nassarids.

The family Buccinidae is one of the dominant gastropod families in Arctic and Antarctic areas, it is well represented in tropical shallow water, but it is comparatively rare in tropical deep water. We do not know to what extent this rarity in tropical deep water can be ascribed to the poor knowledge of tropical deep water faunas in general, but judging from the rarity in our matrial of tropical deep sea gastropods it seems likely that the family is much less dominant here, both in number of specimens and species.

The fairly small number of specimens known of each species suggests that still only a small part of the species are known and the generic concept will necessarily change when more species are known. We have therefore not changed the concept of the genera except in some obvious cases of synonymy.

In addition to the taxa discussed here, the Buccinidae are represented on the deep part of the continental shelf and the upper slope of tropical regions by the genera *Hindsia, Phos* and *Metula*. *Hindsia* was monographed by CERNOHORSKY (1981), the American species of *Metula* by OLSSON & BAYER (1972) and the Indo-Pacific species were listed by VAN REGTEREN ALTENA (1949). *Phos* is not discussed here because most species are quite shallow.

## MATERIAL STUDIED

The material on wich this paper is based originated mostly from French expeditions conducted in the Indo-Pacific after 1972 :

1) material collected by Dr A. CROSNIER off NW Madagascar in 1972-73 aboard R. V. *Vauban* ; this material had been in part identified by Dr R. KILBURN (Natal Museum) ;
2) material collected during the MUSORSTOM I expedition in 1976 aboard R. V. *Vauban* under the direction of Dr J. FOREST (Philippines) (cf. FOREST, 1981) ;
3) material collected by one of us (PB) during the BENTHEDI expedition, 1977, aboard R. V. *Suroit* under the direction of Dr B. THOMASSIN (N. Mozambique channel) ;
4) material collected by the authors off S. New Caledonia in 1978-79 aboard R. V. *Vauban* ;
5) material collected during the CORINDON II expedition, 1980, aboard R. V. *Coriolis* (straits of Makassar) ;
6) material collected by one of us (PB) during the MUSORSTOM II expedition, 1980, aboard R. V. *Coriolis* under the direction of Dr J. FOREST (Philippines) (cf. FOREST, 1985) ;
7) material collected by the authors during the cruise 32 of R. V. *Marion-Dufresne* under the direction of Dr A. GUILLE (Réunion I.) ;
8) material collected during the WALVIS expedition, 1978-79, aboard R. V. *Jean-Charcot* under the direction of Dr M. SIBUET (SE Atlantic) ;
9) material collected during the SAFARI I and SAFARI II expeditions (1979, 1981) aboard R. V. *Marion-Dufresne* under the direction of Dr C. MONNIOT (Indian ocean).

All the above mentioned material is deposited in MNHN.
In addition some material from other museums and expeditions was examined :

10) material from the Danish *Galathea* expedition (1950-52) in ZMC (Indian and Pacific oceans) ;
11) material from the *Albatross* survey in the Philippines (1908-1909) in USNM.

The material from the John MURRAY deep sea expedition (NW Indian ocean) was examined in BMNH but it did not contain buccinids. There appears to be no buccinids in the material from the International Indian Ocean Expedition (USNM, ANSP).

The origin of other material is mentioned under the species. It has not been possible to examine any types of species described by SHIKAMA. The types are said to be deposited in the Geological Institute of Yokohama National University (T. OKUTANI in litt.), but several requests did not give any response.

## KEY TO BUCCINID DEEP WATER GENERA BASED ON RADULAR CHARACTERS

Two genera are not included in the key, *Kanamarua* (p. 482) and *Cantharus* (p. 470). The radula of *Kanamarua* is not known and *Cantharus* is a very heterogenous assemblage of species, mainly more shallow than the species treated here.

A. Central tooth narrow, with only two small median cusps ..... *Costaria*, page 460
*Thalassoplanes*, p. 463

A. Central tooth broad, with 1-5 cusps ..... B

B. Lateral tooth with long basal process ..... *Belomitra*, p. 472

B. Lateral tooth without long basal process ..... C

C. Lateral tooth arched, with 3 or more, equally strong cusps ..... *Callyloconcha*, p. 462
*Bayerius*, p. 484
*Kryptos*, p. 481
*Pararetifusus*, p. 483
*Euthriostoma*, p. 484

C. Lateral tooth with fewer than 3 big cusps ..... D
D. Lateral tooth with 2 strong equal cusps ..... *Eosipho*, p. 466
*Manaria*, p. 475
D. Lateral tooth with a much stronger outer cusp and smaller inner cusps ..... *Kapala*, p. 464
*Bathyancistrolepis*, p. 460
*Americominella*, p. 481

## Genus **Bathyancistrolepis** Habe & Ito, 1968

TYPE SPECIES : (by original designation) *Chrysodomus trochoideus* Dall, 1907

The genus contains a single species, characterized by a shell with a short spire, strongly curved siphonal canal, a central plate of the radula with three unequal (central stronger) cusps, lateral teeth with a strong outer, mediumsized inner and a few small intermediate cusps. This radula is not very informative regarding systematic position. The operculum resembles that of *Thalassoplanes* and *Calliloconcha knudseni*, of which at least the latter species also resembles *B. trochoideus* in shell characters.

### **Bathyancistrolepis trochoideus** (Dall, 1907)

(Figs. 7, 34, 35, 38)

*Chrysodomus trochoideus* Dall, 1907 : 156.
*Ancistrolepis trochoideus*, DALL 1921 : 214, pl. 9, fig. 5.
*Ancistrolepis trochoideus tokyodaensis* Ozaki, 1958 (fide OKUTANI 1966 : 19).
*Ancistrolepis trochoideus ovoideus* Habe & Ito, 1965 (fide OKUTANI 1966 : 19).
*Ancistrolepis (Bathyancistrolepis) trochoideus*, TIBA & KOSUGE 1981 : 12.

Type material : Holotype USNM 110494 (figured by KOSUGE 1975 : pl. 15, fig. 7).
Type locality : *Albatross*, st. 4972, off Yokohama, Japan, 1 100 m.

MATERIAL

The type material and 1 spm, Sagami Bay (leg. OKUTANI).

DISTRIBUTION

S Japan, 550-2 050 m (Okutani 1964, 1966), N Japan, 40-90 m.

REMARKS

The geographical variation has been described by OKUTANI (1966 : 19, text figs 9-10) and TIBA & KOSUGE (1981).

Conchologically *B. trochoideus* resembles *Costaria crosnieri* (see that name) but that species has a very distinct radula (cf. figs 6 & 7).

## Genus **Costaria** Golikov, 1977

*Costaria* Golikov, 1977 : 102.

TYPE SPECIES : (by original designation) *Costaria borealis* Golikov, 1977

The genus *Costaria* was based on a single species from the bathyal zone of the Kuriles characterized by a large (81 mm) bucciniform shell with short siphonal canal and a fusinid type of radula.

The lateral tooth is pectinate with 7 subequal cusps, the central tooth has only 2 equal median cusps. This combination of buccinid and fusinid characters is shared with *Troschelia* Mörch, 1876 (shell with long siphonal canal, pectinate lateral teeth and single-cusped central tooth), *Thalassoplanes* Dall, 1908 (bucciniform shell with very short siphonal canal ; pectinate arched lateral teeth, narrow central tooth with 2 cusps), and *Callilococha* Lus, 1978 (bucciniform shell with rather short siphonal canal, arched 3-cusped lateral teeth, broad central tooth with 3 cusps). We have included *Costaria crosnieri* in the genus *Costaria* because *Thalassoplanes* has a different, narrow, pointed operculum (fig. 25) and because *Troschelia* has a long siphonal canal and different, buccinid central tooth. *Callilococha* however comes very close to *Costaria* and differs mostly by its buccinid central tooth with 3 cusps. The operculum of *Callilococha* is paucispiral as in *Mohnia* ; that of *C. crosnieri* was badly corroded so the early parts are not known.

**Costaria crosnieri** n. sp.
(Figs 6, 37-38)

Type material : holotype in MNHN.

Type locality : R. V. *Vauban* station 138, 13°49 S, 47°29 E, 1 800-2 000 m (northern Mozambique channel), collected by A. Crosnier.

MATERIAL

Mozambique channel : R. V. *Vauban* station 127, 18°00 S, 43°00 E, 1 715-1 750 m, 1 spm, 1 sh ; BENTHEDI, st 87, 11°44 S, 47°35 E, 3 716 m, 2 spms ; Réunion I. : MD 32/REUNION, st 105, 20°47 S, 55°04 E, 1 740-1 850 m, 1 spm ; st 140, 20°41 S, 55°38 E, 1 610-1 690 m, 1 spm.

DISTRIBUTION

Only known from the material examined from the bathyal and abyssal zones of SW Indian ocean.

DESCRIPTION

Shell large, solid, fusiform, consisting of about 6 convex whorls. The apex is corroded and the protoconch and outer shell layers of earlier 4 whorls are missing. Teleoconch with rounded, convex whorls. The sculpture consists of strong spiral keels and fainter intermediate spiral lirae ; on the penultimate whorl there are 2 keels on the median part of the whorl, one subsutural keel, and one suprasutural keel more or less covered by the abapical suture. There are about 15 spiral keels on the body whorl. The axial sculpture consists of incremental lines. Aperture large, occupying more than half of total shell height, broad, with rather short, open, curved siphonal canal. Siphonal fasciole weak but distinct. Inner lip a thin polished callus on parietal wall. Outer lip thin, simple. Periostracum thin, with incremental lines not forming hairy projections. Colour of shell chalky white, periostracum yellowish brown.

Dimensions : height 33.9 mm, breadth 20.2 mm ; aperture height 19.0 mm, breadth 10.0 mm.

Operculum with nuclear zone severely corroded, only the inner and upper sides were intact, but it probably resembled that of *Bathyancistrolepis*.

Radula with a narrow central tooth having two bigger outer cusps and a smaller central cusp ; lateral tooth with 4 equal cusps ; the 2 inner cusps are free, the 2 outer cusps have their bases fused (fig. 6).

REMARKS

The largest specimen, from *Vauban* st 127, is 40 mm high ; the specimens from BENTHEDI are 24 (fig. 38) and 27 mm high and they differ a little in their shorter siphonal canal, more distinct fasciole, more numerous spiral keels (5 on penultimate whorl) and hairy periostracum. The radulae however are identical.

*Costaria crosnieri* resembles closely *Bathyancistrolepis trochoideus* (Dall, 1907) from deep water of Japan but *B. trochoideus* has a more curved siphonal canal, with no fasciole, more numerous spiral keels (6-7 on the spire of a 28 mm high shell) and the periostracum has stronger incremental lines. The radulae of the 2 species are quite distinct (figs 6 and 7).

## Genus **Calliloconcha** Lus, 1978

TYPE SPECIES : (by original designation) *Calliloconcha solida* Lus, 1978

The genus *Calliloconcha* was erected for a single abyssal (6 770-6 850 m) species, characterized by a small (22 mm) bucciniform shell, paucispiral operculum and a radula with pectinate lateral and normal tricuspidate central teeth.

These characters approach those of *Costaria, Troschelia, Thalassoplanes* and *Parancistrolepis*, but the number of species (2, 1, 1 and 2) is too small to distinguish any patterns in the distribution of the characters, which could help to establish a more reliable generic classification, a classification showing relations and not only expressing differences. *Bayerius* has a radula similar to that of *Calliloconcha*, but the shell differs rather considerably and the larval shell and operculum are not known.

### **Calliloconcha knudseni** n. sp.

(Figs 1, 32, 36)

Type material : holotype in ZMC.

Type locality : *Galathea*, st 661, 36°07 S, 178°52 W, 5 480 m (Kermadec trench).

MATERIAL

Only known from the holotype.

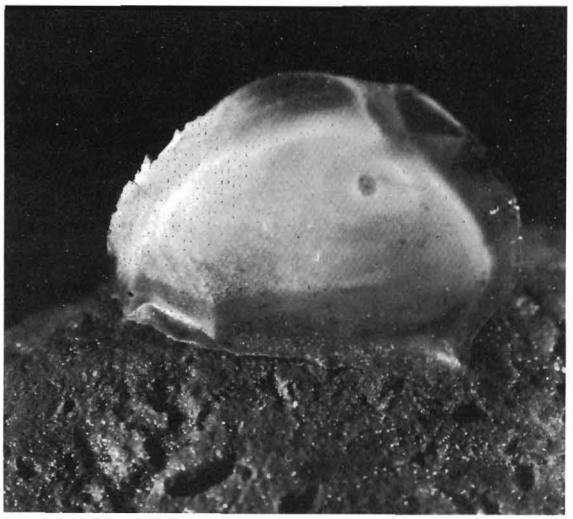
DESCRIPTION

Shell thin, fragile, fusiform, consisting of 4 convex whorls. Protoconch with a small initial whorl, the nuclear portion is a little corroded, but otherwise the protoconch appears smooth. Teleoconch sculpture appears gradually and there is a very indistinct transition between proto- and teleoconch. Teleoconch with rounded, very convex whorls. The sculpture consists of spiral cords that do not form keels ; there are 5 such cords on the earlier whorls, 6 (plus 2 fainter ones) on the penultimate whorl, 14 on the body whorl, plus 7 on the canal. Secondary cords appear on the body whorl between the major spiral cords. Axial sculpture reduced to incremental lines. Aperture large ; occupying more than half of total shell height ; broad ; with rather short, open, curved siphonal canal. Siphonal fasciole indistinct. Inner lip not visible. Outer lip thin, simple (chipped). Periostracum rather thick, not hairy. Colour of the shell whitish, periostracum greenish yellow.

Dimensions : height 20.6 mm, breadth 14.9 mm ; aperture height 12.5 mm, breadth 7.4 mm.

Operculum with nuclear zone corroded ; fan-shaped (fig. 32).

Radula with broad central tooth with 3 subequal cusps ; lateral tooth fusinid-like, arched with 5 equally strong cusps (fig. 1).



TEXT-FIG. 1. — Egg capsule of *Calliloconcha knudseni ?, Galathea*, st. 661. 15 mm.

REMARKS

*C. knudseni* differs from *C. solida* by its broader shell, still more convex whorls, absence of axial sculpture and radular characters. The central tooth appears similar in both species, but *C. solida* has only 3 cusps on the laterals. Conchologically, *C. knudseni* also resembles *Bathyancistrolepis trochoideus* and *Costaria crosnieri* (which both differ by their spiral sculpture forming keels), and *Thalassoplanes moerchi* (which differs by its very short siphonal canal and distinct axial sculpture).

In the same *Galathea* station, two egg capsules of buccinid appearance were found (text-fig. 1). They were attached to a piece of pumice, were 12 mm high and had been drilled by some predator, probably a gastropod. The capsules were empty so their identity could not be ascertained, but there is a high probability that they belong to *C. knudseni*.

## Genus **Thalassoplanes** Dall, 1908

TYPE SPECIES : (by original designation) *Troschelia moerchii* Dall, 1908
SYNONYM : *Brevisiphonia* Lus, 1973. Type species : (by original designation) *B. circumreta* Lus, 1973.

*Thalassoplanes* is a monotypic genus characterized by its buccinid-like shell with a very short siphonal canal, narrow pointed operculum and its rather typically fusinid radula. It seems to be most closely allied to *Troschelia* Mörch, 1876 which, however, has a radula with a buccinid-like central tooth and a shell with a long siphonal canal. The apical whorls of the shell and lateral teeth of the radula are similar in the two genera (see BOUCHET & WARÉN 1985 : figs 484-485, 510). For comparison with other buccinid/fusinid genera, see under *Costaria*.

### **Thalassoplanes moerchi** (Dall, 1908)
(Figs 5, 25, 39-40)

*Troschelia (Thalassoplanes) moerchii* Dall, 1908 : 303.
*Brevisiphonia circumreta* Lus, 1973 : 204, figs. 1-3.

Type material : *T. moerchi*, holotype USNM 110750 ; *B. circumreta*, holotype in the Institute of Oceanography, Moscow (not seen by us).

Type locality : *T. moerchi, Albatross*, st 3684, 00°50 N, 137°54 W, 4 532 m (central Pacific) ; *B. circumreta, Vityaz*, st 6088, 53°58 N, 157°36 W, 5 740 m (NE Pacific).

### MATERIAL

The type material of *T. moerchi* (figured by KOSUGE 1975 : pl. 15 fig. 2) ; 1 spm from 15° N, 125° W, 3 962 m (E. Pacific) cited by BERTSCH & MYERS (1980) ; *Galathea*, st 664, 36°34 S, 178°57 W, 4 510 m (Kermadec trench), 6 spms + shs.

### DISTRIBUTION

The abyssal parts of the Pacific. Besides the material cited above, *T. moerchi* is known from 5 other *Vityaz* stations in the NW Pacific in 5 500-6 300 m (LUS, 1973) and from 9 stations in 4 160-6 340 m also in the NW Pacific (OKUTANI 1982 : 12, pl. 17 fig. 3).

### REMARKS

*T. moerchi* was not figured before KOSUGE (1975 : pl. 15 fig. 2) and this is probably the reason it was not considered by LUS when she described *Brevisiphonia circumreta*. It seems to be a species characteristic for the oligotrophic zones of the Pacific.

The shell is very distinctive ; the combination of a short siphonal canal and reticulated sculpture is not shared with any deep sea buccinid known to us.

## Genus **Kapala** Ponder, 1982
(Fig. 41)

TYPE SPECIES : (by original designation) *Kapala kengrahami* Ponder, 1982

*Kapala* was introduced for a bathyal species from S Australia with pagodiform shell, multispiral larval shell and a radula with a mono- or tricuspidate central tooth and lateral teeth with a large outer cusp and 3-5 smaller inner cusps. A similar lateral tooth occurs in the type species of *Volutopsius* Mörch, 1857 (BOUCHET & WARÉN 1985), in the type species of *Neoberingius* Habe & Ito, 1965, in species of *Japelion* Dall, 1918 (HABE & SATO 1973) and in the type species of *Ancistrolepis* Dall, 1895 (*Chrysodomus eucosmius* Dall, 1891, described by Dall, but not figured).

The two species here referred to *Kapala* have a radula similar to *K. kengrahami* but the shells look very different. This is, however, not so appearent when the two are compared with young specimens of *K. kengrahami* (PONDER, 1982 : pl. 1, fig. 4), and we have preferred *Kapala* to the other genera with similar radulae, which we find less similar in shell characters.

When describing *K. bonaespei* Barnard (1963 : 433) wrote " The assignation of this Cape species to the old boreal genus *Neptunea* may seem strange ; it is admittedly somewhat unsatisfactory, but it is an alternative to instituting a new genus ". This may to some extent be true also for our allocation of *K. bonaespei* and *K. bathybius* in *Kapala*, but we find this position much less unsatisfactory than in *Neptunea*.

**Kapala bonaespei** (Barnard, 1963)
(Fig. 42)

*Neptunea bonaespei* Barnard, 1963 : 432, fig. 6a, b.

Type material : Syntypes in BMNH and SAM.
Type locality : 32°52 S, 16°51 E, 2 540-2800 m (W of Cape Town, South Africa).

MATERIAL

One syntype in BMNH.

DISTRIBUTION

Only known from the material examined by BARNARD (1963), off South Africa in 2 540-3 240 m.

**Kapala bathybius** n. sp.
(Figs 8, 43)

Type material : Holotype in MNHN.
Type locality : WALVIS, st CP13, 32°18 S, 13°16 E, 3 550 m, SE Atlantic, Cape Basin.

DISTRIBUTION

Only known from the holotype.

DESCRIPTION

Shell large, solid, fusiform, consisting of at least 6 convex whorls. The apex is corroded and the larval shell and outer layer of the uppermost whorls are missing. Teleoconch with rounded whorls, no subsutural ramp. On the upper whorls the sculpture consists of axial and spiral ribs of equal strength, giving the shell a reticulate appearance. The axial sculpture gradually fades on the penultimate whorl and there is only spiral sculpture on the body whorl. The penultimate whorl has about 12 spiral ribs, the body whorl about 40. Between the ribs there are several finer threads. Aperture large, corresponding to more than half the height of the shell. Siphonal canal long, open, curved. No siphonal fasciole. Parietal callus thin, rather broad. Outer lip not thickened. Periostracum rather thick with hairy or scale-like projections where incremental lines cross spiral sculpture. Shell chalky white, periostracum yellowish brown.

Dimensions : height 60.5 mm, breadth 29.3mm, height of aperture 34.0 mm, breadth 15.5 mm.

Operculum with badly corroded nuclear zone, but it has evidently had a nuclear zone situated with its longitudinal axis at a right angle to that of the adult operculum, as in *Manaria*.

Radula. Central tooth square with a single broad cusp ; laterals with a large outer and 1-4 smaller, inner cusps (fig. 8).

REMARKS

*Kapala bathybius* differs from *K. bonaespei*, which was found in the same area, by having an axial sculpture of close-set sharp ribs that give the upper whorl a reticulated appearence. In *bonaespei* the axial sculpture consists of distant broad ribs that do not form a reticulate pattern on the apical whorls.

## Genus **Eosipho** Thiele, 1929

*Eosipho* Thiele, 1929 : 307.

TYPE SPECIES : (by original designation) *Chrysodomus (Sipho) smithi* Schepman, 1911

The genus *Eosipho* has been used to harbour two species beside the type, *Neptunea asphaltodes* Beets, 1942 and *Eosipho pygmaeus* Shikama & Hayashi, in SHIKAMA, 1977.

*Neptunea asphaltodes* originates from the Oligocene of Indonesia. We have examined the holotype (fig. 47) and it is indeed very similar to *E. smithi*, and is probably an ancestral form of *smithi*.

*Eosipho pygmaeus* was described from off Daio-zaki cape (34°16 N, 136°55 E, southern Honshu, Japan) in 400 m. We have not been able to borrow any material of this species, but the figure shows a short, rather rounded buccinid shell, evidently not very similar to *E. smithi* ; however the figure is too unclear to allow any conclusions about a better placement.

BEETS (1943 : 4) considered *Ootoma* Koperberg, 1931 (preoccupied ; renamed *Ootomella* Bartsch, 1933) a section of *Eosipho*, but POWELL (1966) transferred the genus to Turridae. We agree with this conclusion.

We here describe three new species that we tentatively place in *Eosipho* because of similarities in the radula. They all have a squarish central plate with three cusps and laterals with two strong cusps. The shells differ considerably from *E. smithi* but we find this more acceptable than introducing new generic names. The shells of *E. thorybopus* and *E. aldermenensis* resemble closely the shells of species of *Manaria* but have a proportionally higher aperture and less curved columella. *Eosipho coriolis* and *E. engonia* resemble some species here included in *Kapala* but the radula in *Kapala* has a single cusp on the central plate and lateral teeth with one large outer cusp and 4-6 smaller inner cusps.

The radulae of the species here included in *Eosipho* are similar to those of *Manaria* and differ only in having a more narrow central tooth (figs 13-17 and 19-24). The opercula are ovate with a slight tendency to being spirally coiled (fig. 29-30).

### **Eosipho smithi** (Schepman, 1911)
(Figs 15, 44-46)

*Chrysodomus (Sipho) smithi* Schepman, 1911 : 300, pl. 19, fig. 6, pl. 23, fig. 11.

Type material : 3 syntypes in the Zoölogisch Museum, Amsterdam.
Type locality : *Siboga*, st 122, 01°58 N, 125°00 E, 1 165-1 264 m (Celebes sea).

MATERIAL

The type material and MUSORSTOM II, st 77, 13°49 N, 120°30 E, 529-552 m (South China sea), 1 sh ; CORINDON II, st 212, 00°10 N, 117°54 E, 710-820 m (Makassar Straits), 1 sh ; *Vauban*, st 131, 13°46 S, 47°33 E, 1 490-1 600 m (Mozambique Channel), 2 spms.

DISTRIBUTION

Only known from the material examined in the bathyal zone of SE Asia and the western Indian ocean.

REMARKS

SCHEPMAN'S largest (figured) syntype was 20.4 mm (fig. 44). Our largest specimen is from the Makassar Straits and is 53.4 mm high and 23.7 mm broad. The apex is corroded in all material exa-

mined and no shell has more than 6 intact whorls. In the 35.8 and 39 mm high specimens from off Madagascar the sutural ramp is distinctly concave compared to the rest of the whorl (fig. 45) ; there is also a tendency to this in one of the syntypes.

The operculum closely resembles that of *E. engonia* (fig. 29).

The radula is identical to that figured by SCHEPMAN with 3 equal cusps on the central plate and two strong cusps on the lateral tooth (fig. 15).

**Eosipho coriolis** n. sp.
(Figs 16, 50)

Type material : holotype in MNHN.

Type locality : MUSORSTOM II, st 81, 13°34 N, 120°31 E, 856-884 m (South China Sea) ; collected by R. V. *Coriolis* (1980).

MATERIAL

The holotype and *Albatross*, st 5467, 13°35 N, 123°37 E, 880 m, 1 sh (USNM 238553).

DESCRIPTION.

Shell large, solid, fusiform, consisting of about 7 convex whorls. The apex is corroded and the protoconch and outer layers of the earliest 4 whorls are partly missing. Teleoconch with slightly shouldered whorls. Sculpture of broad, regularly spaced axial ribs extending only in the upper half of the whorl (not covered by next whorl). There are 24 such ribs on the penultimate whorl, 29 on body whorl. Spiral sculpture of 5-6 weak cords above sutural ramp, and about 26 strong cords below sutural ramp of the body whorl ; in addition there are many inconspicuous spiral threads between these major spiral cords. Aperture large, occupying more than half of total shell height, broad, with open, moderately long, twisted siphonal canal. Inner lip a very thin polished callus on parietal wall. Outer lip thin, simple (slightly chipped). Periostracum rather thick, forming hairy projections at the intersection of periostracal incremental lines with shell spiral sculpture. Colour of the shell chalky white, periostracum olive brown.

Dimensions : height 39.0 mm, breadth 20.7 mm ; aperture height 23.0 mm, breadth 10.0 mm.

Operculum closely resembling that of *E. engonia*, but the nucleus is badly corroded.

Radula having a broad central tooth with 3 subequal cusps (the smaller extra cusps present on some teeth are regarded as accidental) ; lateral tooth with big outer cusp and slightly smaller inner cusp (fig. 16).

REMARKS

*Eosipho coriolis* has a thinner and more inflated shell than *E. engonia* and a less developed subsutural ramp. We are not aware of any other buccinids that can be confused with this species.

**Eosipho engonia** n. sp.
(figs 14, 29, 48-49)

Type material : holotype in MNHN.

Type locality : R. V. *Vauban*, st 139, 13°50 S, 47°37 E, 850-1 125 m (Northern Mozambique Channel).

MATERIAL

The holotype and MD 32/REUNION, st CA 116, 20°52 S, 55°05 E, 760 m, 1 sh ; Baie de la Possession, Réunion, ca. 600 m (KOPP leg.), 1 sh.

DISTRIBUTION

Only known from the material examined in the bathyal zone of the SW Indian Ocean.

DESCRIPTION

Shell large, rather solid, fusiform, consisting of about 7 shouldered whorls. The apex is corroded and the protoconch is missing. Teleoconch with distinctly shouldered whorls, the sutural ramp being slightly concave. Sculpture predominantly of broad, regularly spaced axial ribs reaching from one suture to the next. There are 17-18 such ribs on the penultimate and body whorls. Spiral sculpture of 5-6 cords on the sutural ramp ; a strong spiral cord marks the periphery of the whorl and forms slightly spiny projections where it intersects the axial ribs. Below it there are about 25 spiral cords, often with weaker and stronger ones alternating. Aperture large, occupying more than half of total shell height, with open, moderately long, slightly curved siphonal canal. Inner lip a very thin polished callus on parietal wall. Outer lip thin, simple (slightly chipped). Periostracum thin, forming only a few very small hair-like projections at the intersection of periostracal incremental lines with shell spiral sculpture. Colour of the shell chalky white, periostracum yellowish brown.

Dimensions : height 32.8 mm, breadth 15.0 mm ; aperture height 18.7 mm, breadth 7.0 mm.

Operculum oval, marginal nucleus zone corroded (fig. 29).

Radula having a broad central tooth with 3 subequal cusps ; lateral tooth with big outer cusp and smaller inner cusp (fig. 14).

REMARKS

The shouldered whorls with a slightly concave subsutural ramp resemble those of *Belomitra torquata* (Barnard, 1963) and specimens of the same size are easy to confuse. In *B. torquata* however, the sutural ramp is smooth with a single sutural cord just below the suture. The spiral sculpture is also sharper in *Eosipho engonia*. The two species have completely different radulae.

The holotype is subadult but the shell from Baie de la Possession, Réunion (fig. 49) has a heavier shell with a thickened outer lip with internal spiral ribs corresponding to the furrows on the outside and a more well developed siphonal fasciole. Its height is 30.5 mm.

**Eosipho thorybopus** n. sp.
(Figs 56, 57)

Type material : Holotype in MNHN.

Type locality : R. V. *Vauban*, st 114, 22°15 S, 43°04 E, 470-475 m (Mozambique Channel).

MATERIAL

The holotype and R. V. *Vauban*, st 28, 12°43 S, 48°12 E, 445-455 m, 1 sh ; st 46, 15°19 S, 46°12 E, 400 m, 1 sh (Mozambique Channel).

DESCRIPTION

Shell of moderate size, solid, fusiform, consisting of 7 whorls. The larval shell is smooth and consists of a single whorl of a diameter of 0.7 mm. Teleoconch with rounded, convex whorls, sculptu-

red by axial ribs and spiral cords of about equal strength and producing small nodules at the intersections. This gives the shell a reticulated appearance. There are 6 spiral cords on the penultimate and spire whorls, 18 on the body whorl. The axial ribs reach from suture to suture and disappear at this level on the body whorl. There are about 20 of them on the penultimate whorl. The strong incremental lines are present only between the spiral cords. Aperture large, occupying more than half of the total height of the shell. Siphonal canal short, open, curved. Fasciole present. Parietal callus thin and smooth, with two small ridges close to the outer lip. Outer lip thickened with 12 internal ribs. Periostracum thin with strong incremental lamellae. Shell white, periostracum yellowish brown.

Dimensions : height of the shell 22.0 mm, breadth 10.2 mm, height of the aperture 12.0 mm, breadth 4.5 mm.

Operculum and radula not known.

REMARKS

*Eosipho thorybopus* occurs sympatrically with *E. aldermenensis* in the Mozambique Channel, although they have not been found in the same haul. They are very similar to each other, but *thorybopus* has more convex whorls with more dominant axial sculpture and more narrow spiral ribs, at least in adult specimens.

**Eosipho aldermenensis** (Powell, 1971)
(Figs 13, 30, 51-55)

*Cantharus aldermenensis* Powell, 1971 : 221, fig. 22.

Type material : Holotype in Auckland Institute and Museum, New Zealand.
Type locality : E of the Aldermen Islands, New Zealand, 366-475 m.

MATERIAL

The holotype and R. V. *Vauban*, st 52, 15°21 S, 46°12 E, 150 m, 3 shs ; st 90, 21°24 S, 43°13 E, 640-710 m, 1 spm ; st 91, 21°25 S, 43°14 E, 425-550 m, 1 sh ; st 122, 12°43 S, 41°12 E, 500 m, 1 spm (all Mozambique Channel) ; MD 32/REUNION, st DC 159, 20°59 S, 55°45 E, 755-770 m, 4 shs ; Baie de la Possession, Réunion, 600 m,1 sh (leg Kopp) ; MUSORSTOM II, st 82, 13°47 N, 120°29 E, 550 m, 1 sh ; *Albatross*, st 5197, 09°52 N, 123°41 E, 320 m, 1 sh (USNM 280800) ; st 5621, 00°15 N, 127°25 E, 545 m, 3 spms (USNM 239268) (SE Asia).

DISTRIBUTION

Only known from the material examined, from N New Zealand, the Philippines and the SW Indian Ocean.

REMARKS

For differences from *E. thorybopus* see under that species. The generic position of these two species is uncertain ; they could probably just as well have been placed in *Manaria* as in *Eosipho*. Presently this is mainly a question of which genus we wanted to keep more uniform and we preferred to keep *Manaria* in that way.

The identification of our material with POWELL's species is somewhat uncertain ; the shells agree in detail, but the distance between the localities is great. *Colus hayashii* Shikama, 1971 described from 180 m off S. Japan resembles very much our material from the Philippines ; it is probably a synonym, but we have not been able to examine the type material.

### **Eosipho dentatus** (Schepman, 1911)
(Figs 17, 58-61)

*Tritonidea dentata* Schepman, 1911 : 303, pl. 19, fig. 8.
*Axymene philippinensis* Petuch, 1979 : 8, figs 14-15.

Type material : *T. dentata*, holotype in ZMA ; *A. philippinensis*, holotype DMNH 126394.

Type locality : *T. dentata*, SIBOGA st 116, W of Kuandang Bay entrance, S Celebes Sea, 72 m ; *A. philippinensis*, off Panglao, Bohol, Philippines, 250 m.

MATERIAL

The type material and MUSORSTOM I, st 25, 14°02 N, 120°19 E, 190-200 m, 2 spms ; MUSORSTOM II, st 15, 13°55 N, 120°29 E, 326-330 m, 2 spms ; st 75, 13°51 N, 120°30 E, 300-330 m, 1 sh ; *Albatross*, st 5256, 07°22 N, 125°07 E, 290 m, 1 sh (USNM 237407) ; st 5268, 13°42 N, 120°57 E, 313 m, 1 sh (USNM 237504) ; st 5297, 13°41 N, 120°58 E, 364 m, 1 sh (USNM 237601) ; st 5410, 10°29 N, 124°05 E, 708 m, 1 sh (USNM 231031) ; st 5541, 08°50 N, 123°34 E, 403 m, 1 sh (USNM 238930).

DISTRIBUTION

Only known from the material examined, from the area around the Celebes and Sulu Seas, 70-700 m.

REMARKS

The holotype of *T. dentata* has a well developed axial sculpture that is less distinct than in the specimens taken by the *Albatross*. The larval shell consists of a little more than one smooth whorl, and indicates lecithotrophic larval development.

The radula (fig. 17) has an almost square central tooth with three cusps, and lateral teeth with a larger outer and smaller inner cusp.

PETUCH (1979) described this species in *Axymene* Finlay, 1927, but this genus was shown to belong to Muricidae by PONDER (1972 b), and to be a synonym of *Xymene* Iredale, 1915.

The position of *E. dentatus* in *Eosipho* is tentative ; the shell and the radula resemble closely *E. aldermenensis* and *E. thorybopus*, but none of these species have a labial tooth as *E. dentatus*. Such a tooth occurs in some species of *Cantharus* (SCHEPMAN, 1911 : 303), but the radulae known in *Cantharus* (CERNOHORSKY, 1971, ROBERTSON, 1957) differ drastically from that of *E. dentatus* (cf. figs 17 and 18). A labial tooth on the other hand occurs in several different groups of Gastropods (Muricidae, Buccinidae, and Fasciolaridae, cf. ANKEL, 1976) and must evidently have a high adaptive value. Therefore we pay less attention to this as a systematic character and place the species in *Eosipho* together with *E. aldermenensis* and *E. thorybopus*.

## Genus **Cantharus** Röding, 1798

TYPE SPECIES : *Buccinum tranquebaricum* Gmelin, 1790 (shallow water, Indian Ocean)

The taxonomy of tropical shallow water buccinids is rather confused with species more or less randomly assigned to *Cantharus, Pisania, Pollia, Tritonidea* and other genera. The identity of several generic names has been elucidated by CERNOHORSKY (1971) and PONDER (1972). It is not our intention to discuss the generic concepts among these primarily shallow water groups. Only a single species is present in the deep water collections we have examined : *Cantharus delicatus*.

**Cantharus delicatus** (E. A. Smith, 1899)
(Figs 62-64)

*Tritonidea delicata* E. A. Smith, 1899 : 242.
*Tritonidea delicata*, ALCOCK et al. 1901 : pl. 10, fig. 7.
*Tritonidea agalma* Smith, 1906 : 164.

Type material : *T. delicata*, holotype Zool. Surv. India, Calcutta M925 ; *T. agalma*, holotype Zool. Surv. India, Calcutta M785.

Type localities : *T. delicata, Investigator*, 13°17 N, 93°07 E, 165 m ; *T. agalma, Investigator*, 08°23 N, 76°28 E, 190 m (N Indian Ocean).

MATERIAL

The type material and MUSORSTOM II, st 19, 14°00 N, 120°16 E, 189-192 m, 1 sh ; st 51, 14°00 N, 120°17 E, 2 shs ; st 53, 14°01 N, 120°17 E, 215 m, 1 sh ; st 54, 14°00 N, 120°10 E, 170-174 m, 1 sh ; *Albatross*, st 5255, 07°03 N, 125°39 E, 180 m, 1 sh (USNM 237389) ; st 5392, 12°13 N, 124°03 E, 248 m, 3 shs (USNM 232587, 281820) (all from the Philippines) ; R. V. *Vauban*, st 63, 23°36 S, 43°32 E, 250 m, 2 shs (Mozambique Channel).

DISTRIBUTION

Only known from the material examined, the Philippines and Mozambique Channel.


TEXT-FIG. 2-4. — Protoconchs of *Cantharus*. 2, *C. sowerbyanus*, syntype ; 3, *C. delicatus, Vauban*, st. 63 ; 4, *C. delicatus, Albatross*, st. 5255.

REMARKS

A very similar species, *Tritonidea sowerbyana* Melvill & Standen, 1903 from NW Indian O., has a broader shape and more convex whorls (see fig. 65). Also the larval shells differ (text figs 2-4), as probably also the modes of larval development ; *T. delicata* probably having lecithotrophic and *T. sowerbyana* probably planktotrophic development.

## Genus **Belomitra** P. Fischer, 1882

TYPE SPECIES : (by monotypy) *Belomitra paradoxa* P. Fischer, 1882 (= *B. quadruplex* (Watson)).
SYNONYMS : *Pleurobela* Monterosato in Locard, 1897 ; *Bathyclionella* Kobelt, 1905 ; *Cryptomitra* Dall, 1924 ; *Morrisonella* Bartsch, 1945 ; *Dellina* Beu, 1970 (see BOUCHET & WARÉN 1985).

REMARKS

The shell of *Belomitra* resembles several genera in the family Turridae and the species have been described in the families Turridae, Buccinidae, Columbellidae and Cancellariidae. The resemblance of *B. quadruplex* to several Indo-Pacific species was already pointed out by POWELL (1966 : 139 ; 1969 : 225).

The genus *Belomitra* is characterized by its shell with small aperture and concave sutural ramp and its radula with a tricuspidate central tooth and lateral teeth with 2 cusps and very long basal plate. It resembles shells of the mitrid genus *Charitodoron* Tomlin, 1932 and of the volutid genus *Tractolira* Dall, 1896. Both of these genera, however, lack the concave sutural ramp. Another buccinid with a concave sutural ramp is *Eosipho* but its radula is typically buccinid. The radula most resembling that of *Belomitra* is found in the Antarctic genus *Prosipho* Thiele, 1912 (see for instance POWELL 1951 : fig. 56). The shell of *Prosipho* however, has a more typical buccinid appearance.

### **Belomitra torquata** (Barnard, 1963)

(Fig. 75)

*Prosipho torquatus* Barnard, 1963 : 433, fig. 6c, d, e.

Type material : Holotype and 2 paratypes in SAM.
Type locality : 34°37 S, 17°03 E, 2 910-2 980 m (off Cape Town, South Africa).

MATERIAL

The type material.

DISTRIBUTION

Only known from the type locality.

REMARKS

The specific status of this short-spired form of *Belomitra* is uncertain. It may finally turn out to be a form of *B. pacifica* or *B. climacella*, but the material available is too small to show this. The radula was figured by BARNARD (his slide was reexamined by us) and shows clearly it is a *Belomitra*.

The shell resembles closely *Eosipho engonia* but that species has 5-6 cords on the subsutural

ramp, while *B. torquata* only has a single cord here. The radulae are strikingly different (fig. 14 and BARNARD'S fig. 6e), that of *Eosipho* being of typical buccinid type with three cusps on the central and two on the lateral tooth.

**Belomitra pacifica** (Dall, 1908)
(Figs 11, 67-73)

*Leucosyrinx ? pacifica* Dall, 1908 : 213, 270, pl. 12, fig. 3 (here fig. 67).
*Surcula brachytoma* Schepman, 1913 : 424, pl. 27, fig. 11 (here fig. 68).
*Mangelia paschalis* Thiele, 1925 : 244, pl. 26, fig. 23 (here fig. 69).

Type material : *L. pacifica*, holotype USNM 122590 ; *S. brachytoma*, 2 syntypes in ZMA ; *M. paschalis*, holotype in Zoologisches Museum, East Berlin.

Type locality : *L. pacifica, Albatross*, st 2859, 55°20 N, 136°20 W, 2 860 m (NE Pacific) ; *S. brachytoma, Siboga*, st 284 and 300, respectively 08°43 S, 127°17 E, 828 m and 10°49 S, 123°23 E, 918 m (Timor sea) ; *M. paschalis, Valdivia*, st 245, 05°28 S, 39°19 E, 463 m (NE of Zanzibar).

MATERIAL

The type material ; INDIAN OCEAN : *Galathea*, st 176, 35°12 S, 27°35 E, 4 350 m, 1 spm (fig. 73) ; st 279, 01°00 N, 76°17 E, 4 300 m, 1 sh ; SAFARI I, st 7, 30°47 S, 48°20 E, 4 245-4 400 m, 1 spm ; SAFARI II, st 5, 06°59 N, 78°50 E, 2 540 m, 4 spms ; st 11, 01°41 N, 87°06 E, 4 360 m, 1 spm ; *Vauban*, st 135, 13°01 S, 48°01 E, 1 075-1 110 m, 1 spm (fig. 70) ; 17°50 S, 43°07 E,1 475-1 530 m, 1 sh ; SOUTH-EAST ASIA : MUSORSTOM II, st 55, 13°54 N, 119°58 E, 865 m, 4 shs (fig. 72) ; *Galathea*, st 489, 07°38 S, 116°08 E, 1 135-1 165 m, 1 sh ; *Albatross*, st 5609, 00°11 S, 121°16 E, 2 010 m, 1 sh ; PACIFIC OCEAN : off New Caledonia, 22°30 S, 166°24 E, 250-350 m, 1 sh (fig. 71).

DISTRIBUTION

The bathyal and abyssal zones of the Indo-Pacific. Cited by POWELL (1969 : 225) from 2 other *Albatross* stations in the Philippines in 910-1 040 m and by ROKOP (1972 : 17) from off N. California in 3 615-3 820 m.

REMARKS

The material available is not sufficient to show complete transitions between the various forms named, but the known variation of *Belomitra quadruplex* (Watson) in the North Atlantic (BOUCHET & WARÉN 1985) makes this synonymy probable. Shallow water specimens, down to ca. 1 500 m, are more slender, with yellowish white shells and strong spiral sculpture (almost spiny in SE Asian shells). In deeper water in the Indian ocean, the periostracum becomes greenish brown, the shell is thinner with less distinct spiral sculpture, and they then resemble the E. Pacific abyssal shells. This variation parallels the bathymetrical variation of *B. quadruplex* and it can not be excluded that the N. Atlantic and the Indo-Pacific species will prove to be synonyms when material from intermediate areas is known.

We have treated as distinct species *B. climacella* and *B. torquata* because they have a shorter spire ; the problem, however, can not be considered settled.

*Mangelia ? problematica* Thiele, 1925 (pl. 40, fig. 7) from New Amsterdam in the Indian ocean is probably another synonym. We have not examined the type material.

### **Belomitra climacella** (Dall, 1895)

(Figs 76-78)

*Pleurotomella ? climacella* Dall, 1895 : 679, pl. 31, fig.14.
*Antizafra aoteana* Dell, 1956 : 111, fig. 110.
*Waipaoa munida* Ponder, 1968 : 46, pl. 4, fig. 57.

Type material : *P. climacella*, holotype USNM 127123 ; *A. aoteana* and *W. munida*, both in National Museum of New Zealand, Wellington.

Type locality : *P. climacella*, USFC st 3475, 21°08 N, 157°43 W, 640 m (off Hawaiian Is.) ; *A. aoteana*, Chatham Rise, New Zealand, 405 m ; *W. munida*, off Taiaroa Heads, 45°54 S, 171°03 E, New Zealand, 635-690 m.

MATERIAL

The type material.

REMARKS

*P. climacella* was described as a turrid, *A. aoteana* was described as a columbellid and *W. munida* (type species of *Dellina* Beu) was described as a cancellarid. Although no radula was available for examination, there seems to be no doubt that they belong to *Belomitra* judging from shell characters.

The relations of *B. climacella* and *aoteana* are difficult to evaluate, but compared with the variation of the N. Atlantic *B. quadruplex*, which is somewhat better known, the two species seem to be very close. Challenging this closeness are the widely separated localities, separated by vast abyssal areas, and the fact that both forms have direct or lecithotrophic development. The three forms on which the names are based are however so similar and belong to a group where the only more closely known species is unusually variable, so we have seen no possibility of keeping them as separate species without any other evidence for such a distinction. It should, however, be kept in mind that the synonymy by no means is proved. The synonymy of *aoteana* and *munida* is much less questionable ; the specimens originate from not very distant localities and are very similar.

### **Belomitra pourtalesi** (Dall,1881)

(Fig. 66)

*Pleurotoma (Mangilia) pourtalesii* Dall, 1881 : 79.
*Pleurotoma (Drillia) exsculpta* Watson, 1882 : 247.
*Pleurotoma (Clionella) exsculpta*, WATSON 1886 : 371, pl. 24, fig. 2.
*Pleurotoma pourtalesi*, DALL 1886 : pl. 9, fig. 6.
*Mangilia ? areia* Dall, 1927 : 41.

Type material : *P. pourtalesii*, holotype USNM 412227 ; *P. exsculpta*, holotype BMNH 1887.2.9.1128 ; *M. areia*, syntypes USNM 107954.

Type locality : *P. pourtalesii*, " Bed of the Gulf Stream ", 822 m ; *P. exsculpta, Challenger*, st 24, 18°38 N, 65°05 W, 715 m ; *M. areia, Albatross*, st 2668, 30°58 N, 79°38 W, 678 m (off Fernandina, Florida).

MATERIAL

The type material ; one shell from Yucatan Strait, 1 165 m (USNM 87443) cited by DALL (1889 : 117).

DISTRIBUTION

Only known from one additional shell, from 17°37 N, 64°48 W, 450 m, figured by DALL (1889 : pl. 15, fig. 9). This shell could not be found in USNM. The species is thus known only from the tropical W. Atlantic in bathyal depths.

REMARKS

We have kept this species distinct from *B. quadruplex* although we have very little evidence to support this. The main reason is that we have not seen W. Atlantic material from bathyal depths connecting the abyssal form of *B. quadruplex* with the shallow bathyal *pourtalesi*. Such specimens can, however, be expected, judging from the distribution and variation in the E. Atlantic. There is probably a single bathyal and abyssal N. Atlantic species, and *pourtalesi* is the oldest of the 13 available specific names.

### **Belomitra richardi** (Dautzenberg & Fischer, 1906)
(Fig. 74)

*Pleurotoma (Clionella ?) richardi* Dautzenberg & Fischer, 1906 : 13, pl. 1, fig. 1-4.

Type material : Holotype in MOM.
Type locality : MONACO st 1193, 15°17 N, 23°02 W, 1 311 m (Cape Verde Is.).

MATERIAL

The type material.

REMARKS

*B. richardi* has not been found since the original description and we have not been able to decide whether it is a valid species or only a local form of the variable NE Atlantic *B. quadruplex* (Watson, 1882). It does, however, differ considerably in having a much more rounded sculpture than any specimen of *Belomitra* that we have seen.

## Genus **Manaria** Smith, 1906

TYPE SPECIES : *Manaria thurstoni* Smith, 1906 (original designation)

*Manaria* has for a long time been used for the type species only and was originally described as a fasciolarid. KURODA & HABE (1954 : 96, fig. 16) figured the radula of a then unnamed species (probably *M. lirata* Kuroda & Habe, 1961) and transferred the genus to Buccinidae.

The species of *Manaria* resemble closely those belonging to *Fusinus* in shell characters, but the radula is of classical buccinid type, and very similar to that of *Eosipho*.

In addition to the species discussed here, two more species of *Manaria* have been described from Japan :

*Manaria insularis* Okutani, 1968 (Central Japan, 460-480 m). We have examined the holotype (in NSMT) and suppose that it is a Fasciolaridae. It resembles closely *Fusus chrysodomoides* Schepman, 1911.

*Manaria inflata* Shikama, 1971, from the Taiwan area (?). We have not been able to examine any type material or other specimens, but judging from the figure it is probably a species of *Siphonalia* or *Siphonofusus*.

KEY TO THE SPECIES OF **Manaria**

A. Sculpture of elevated spiral ribs ..... D
A. Sculpture of incised spiral grooves ..... B
B. Aperture high, occupying half total shell height, periostracum with distant incremental lamellae ..... *M. makassarensis*
B. Aperture occupying less than half the height ; periostracum with close-set incremental wrinkles ..... C
C. Few (4-6 on penultimate whorl) spiral grooves of irregular breadth ; no parietal tooth ..... *M. brevicaudata*
C. Many (9 on penultimate whorl) spiral grooves of even breadth ; a distinct parietal tooth ..... *M. thurstoni*
D. Shell slender, breadth less than a third of height ..... *M. formosa*
D. Shell broader than a third of the height ..... E
E. All whorls evenly convex ..... *M. clandestina*
E. Upper part of whorls less convex than lower ..... F
F. Earlier whorls with angular periphery ..... *M. lirata*
F. Subsutural area concave ..... *M. kuroharai*

## **Manaria lirata** Kuroda & Habe, 1961
(Figs 20, 23, 82-86)

*Manaria lirata* Kuroda & Habe in Habe, 1961 : 90, pl. 29, fig. 4.

Type material : Holotype NSMT 53362.
Type locality : Ashizuri-misaki, Kochi Pref., Shikoku, Japan, 100 m.

### MATERIAL

The holotype and a topotype from coll. Azuma ; MUSORSTOM II, st 46, 13°26 N, 122°17 E, 445-520 m, 1 sh ; st 49, 13°38 N, 121°43 E, 416-425 m, 5 shs ; st 50, 13°37 N, 120°33 E, 810-820 m, 1 spm ; st 75, 13°51 N, 120°30 E, 300-330 m, 1 spm ; st 78, 13°49 N, 120°28 E, 440-550 m, 1 sh ; *Albatross*, st 5407, 10°52 N, 124°20 E, 645 m, 1 sh (USNM 288850) ; st 5513, 08°17 N, 124°03 E, 930 m, 1 spm (USNM 290210) ; st 5527, 09°22 N, 123°43 E, 720 m, 1 spm, 1 sh (USNM 286822) ; st 5587, 04°11 N, 118°40 E, 565 m, 1 spm (USNM 278646) ; st 5592, 04°13 N, 118°28 E, 560 m, 2 spms (USNM 278968) (all from the Philippines).

### DISTRIBUTION

Only known from S Japan (100-180 m) and the present material from the Philippines (300-930 m).

### REMARKS

The larval shell consists of slightly more than one smooth whorl and its diameter is 0.8 mm. The outer lip has 4-6 internal ribs. The columella sometimes has a small columellar tooth, but this varies, also in the same population (MUS. II st 49). The periostracum is yellowish brown, and has small bristles on the spiral cords. Radula, see figs 20, 23.

*Manaria lirata* can be recognized by its small adult size (20-26 mm), very convex whorls and

high spire. It has been found in the same hauls as *M. clandestina* (MUS. 2 st 78) and *M. makassarensis* (*Albatross* st 5587).

The name *M. lirata* was first published by Azuma (1960 : 40, pl. 3, fig. 7), but not accompanied by a description and therefore not valid (ICZN § 13).

Three shells from Mozambique Channel (*Vauban*, st 46, 15°19 S, 46°12 E, 400 m and st 50, 15°19 S, 46°12 E, 405 m) differ in having a shorter siphonal canal and higher spire. Absence of intermediate localities makes it difficult to evaluate this difference.

### **Manaria kuroharai** Azuma, 1960
(Figs 87-88)

*Manaria kuroharai* Azuma, 1960 : 101, pl. 2, fig. 7.

Type material : Holotype and one paratype in Azuma's collection.
Type locality : Tosa Bay, Shikoku, Japan, 180 m.

MATERIAL

One paratype from the collection of Azuma, one young topotype in NSMT.

DISTRIBUTION

Known only from the Shikoku area, Japan, in 100-480 m (Habe 1961 : 91, Okutani 1964 : 406, 1968 : 32).

REMARKS

HABE (1961) synonymized *Siphonalia laddi* McNeil, 1960, from the Neogene formations of Okinawa, with *M. kuroharai*. We have seen no type material of this species and have no opinion about this.

*Manaria kuroharai* occurs sympatrically with *M. lirata*, and may be recognized by its large size (50 mm) and concave subsutural area. We have not been able to examine the radula of *M. kuroharai* and consider its position in *Manaria* uncertain.

### **Manaria brevicaudata** (Schepman, 1911)
(Figs 21, 79-81)

*Fusus brevicaudata* Schepman, 1911: 292, pl. 19, fig. 3.

Type material : Syntypes in ZMA.
Type locality : SIBOGA st 45, 07°24 S, 118°15 E, 794 m (Flores sea).

MATERIAL

The type material and CORINDON II, st 231, 00°05 S, 119°48 E, 1 080 m, 1 spm (Makassar Straits) ; MUSORSTOM II, st 55, 13°54 N, 119°58 E, 865 m, 1 sh ; st 56, 13°54 N, 119°57 E, 970 m, 1 spm (China Sea off Mindoro) ; *Albatross*, st 5585, 04°07 N, 118°50 E, 876 m, 1 sh (USNM 258545) ; st 5619, NW of March Id., Molucca Pass, 800 m, 1 sh (USNM 229342).

DISTRIBUTION

Only known from the material examined, from S. E. Asia, bathyal.

REMARKS

*Manaria brevicaudata* has a characteristic sculpture of grooves, resembling that of *M. makassarensis*, but that species has a higher aperture and an almost straight siphonal canal. In *M. thurstoni*, the spiral grooves are finer and more numerous, the whorls are less convex, and there is a distinct fold at the base of the parietal callus. All other species of *Manaria* have a sculpture of elevated spiral cords, i.e. the ribs have a rounded surface and are more narrow than the grooves.

The radula resembles that of other species of *Manaria* (fig. 21).

Specimens from deeper water have a shorter siphonal canal than those from more shallow water, judging from our material.

**Manaria thurstoni** Smith, 1906
(Fig. 86)

*Manaria thurstoni* Smith, 1906 :167.
*Manaria thurstoni*, ANNANDALE *et al.* 1909 : pl. 26, fig. 6.

Type material : Holotype in Zoological Survey of India, Calcutta, M3727/1.
Type locality : *Investigator*, st 333, 06°31 N, 19°39 E, 730 m (gulf of Manar).

MATERIAL

The type and only known material.

REMARKS

The holotype of *M. thurstoni* is a rather old and corroded shell, but it seems however to differ from all other *Manaria* species we have examined. A better understanding of the species should await collection of more specimens from the N. Indian ocean.

*M. thurstoni* is recognized by its sculpture of numerous, fine spiral grooves, short aperture and rather strong parietal fold on the columella.

**Manaria clandestina** n. sp.
(Figs 19, 91-93)

Type material : Holotype and one paratype in MNHN, paratypes from MUSORSTOM II, st 44 in NSMT, AMS and USNM.

Type locality : MUSORSTOM II, st 36, 13°31 N, 121°24 E, 570-595 m (Sibuyan Sea, Philippines).

MATERIAL

MUSORSTOM II, st 25, 13°39 N, 120°43 E, 520-550 m, 2 spms, 2 shs (South China Sea, off Mindoro) ; st 39, 13°03 N, 122°36 E, 1 030-1 190 m, 1 sh (Sibuyan Sea) ; st 44, 13°23 N, 122°20 E, 760-820 m, 1 spm, 2 shs (paratypes, Sibuyan Sea) ; st 78, 13°49 N, 120°28 E, 440-550 m, 1 sh (Sibuyan

Sea) ; CORINDON II, st 214, 00°31 N, 117°50 E, 595 m, 2 shs (Makassar Strait) ; *Galathea*, st 443, 08°48 N, 124°09 E, 1 490 m, 1 spm, 1 sh (Mindanao Sea).

DESCRIPTION

Shell large, solid, fusiform, consisting of about 8 whorls. The apex of the holotype is corroded so at least the larval shell is missing. The larval shell of a paratype consists of slightly more than one, smooth whorl of a diameter of 0.7 mm. Teleoconch with rounded, convex whorls of slowly increasing diameter. The sculpture consists of axial ribs and spiral cords. There are 17 axial ribs on the body whorl, 16 on the penultimate whorl. They are crossed by very uniform spiral cords ; 9-10 on the spire whorls, about 30 on the body whorl. There are no secondary spiral lines between the cords. The aperture is comparatively small, occupying less than half height of the shell and it has a long, open, slightly curved siphonal canal, but no fasciole. Parietal callus very thin and polished with a inconspicuous columellar fold close to the siphonal canal. Outer lip thin, no distinct internal ridges (except in one of the paratypes, which has 9 ridges deep inside the aperture). Periostracum thin, with incremental lines which produce small hairs where they cross the spiral cords. Shell white, periostracum yellowish brown.

Dimensions : height of the shell 42.7 mm, breadth 15.0 mm, height of the aperture 19.5 mm, breadth 6.0 mm.

Operculum very similar to that of *Eosipho engonia*.

Radula (fig. 19).

REMARKS

From shell characters one would be inclined to place *M. clandestina* in Fusinidae, but from the radula it is evident that it belongs to Buccinidae ; hence the specific name. It differs from *M. brevicaudata* by having a longer siphonal canal and evenly spaced spiral cords, instead of irregular spiral grooves. *M. clandestina* has a broader spire, more curved columella and more numerous axial ribs compared with *M. formosa*. *Manaria makassarensis* has a longer aperture, flatter whorls and spiral grooves instead of cords, compared with *M. clandestina*.

The material of *M. clandestina* shows little variation, but the axial ribs vary in number between 13 and 18 on the body whorl. There is a slight tendency towards a broader shell with more numerous axial ribs in shallow water, but our material is too small to be certain.

*Manaria clandestina* occurs sympatrically with *M. lirata* (MUSORSTOM II, st 78) and *M. makassarensis* (CORINDON II, st 214).

**Manaria makassarensis** n. sp.

(Figs 24, 31, 94)

Type material : Holotype in MNHN, one paratype in National Institute of Oceanology, Djakarta.

Type locality : CORINDON II, st 214, OO°31 N, 117°50 E, 595 m (Makassar Strait).

MATERIAL

The live taken holotype and CORINDON II, st 209, 00°07 S, 117°53 E, 490 m, 1 sh (paratype) ; *Albatross*, st 5585, 04°07 N, 118°50 E, 876 m, 1 sh (USNM 239050) ; st 5587, 04°11 N, 118°37 E, 763 m, 1 spm (USNM 218646) (both Sulu Sea).

DESCRIPTION

Shell large, solid, fusiform, consisting of 6 whorls. The apex is corroded so that the protoconch and outer shell layers of the two upper teleoconch whorls are missing. Teleoconch with rather flat whorls of slowly increasing diameter. The sculpture consists of dominant axial ribs and smaller spiral grooves. On the last two whorls there are 14 axial ribs. The penultimate whorl has 11 spiral ribs, narrow and broad ones uniformly alternating. On the upper whorls their number is lower. Aperture high, occupying a little more than half the height of the shell. Siphonal canal long, open, almost straight. No fasciole or columellar tooth. Parietal callus very thin and polished. Outer lip thin with no trace of internal ribs. Periostracum thick, coarse, with strong incremental folds ; no projecting hairs or spines. Shell chalky white, periostracum olive brown.

Dimensions : height of the shell 33.0 mm, breadth 12.5 mm, height of the aperture 17.5 mm, breadth 5.5 mm.

Operculum and radula (figs 31 and 24) similar to other species of *Manaria*.

REMARKS

In the 23 mm high paratype the spiral cords and axial ribs form small nodules at the intersections. Both the holo- and paratype carry numerous chitinuous thecae on the periostracum, probably of cnidarian origin.

*Manaria makassarensis* is the only species of *Manaria* with an aperture higher than half the shell height. It is also characterized by its rather flat whorls, and peculiar sculpture of regularly alternating broader and more narrow ribs. The holotype was collected in the same haul as two specimens of *M. clandestina*, which supports our opinion that they are distinct species.

**Manaria formosa** n. sp.

(Figs 89-90)

Type material : Holotype in MNHN, one paratype in Natal Museum, Pietermaritzburg.

Type locality : R. V. *Vauban*, st 39, 12°46 S, 48°10 E, 495-500 m (Mozambique Channel).

MATERIAL

1 spm (the holotype) and 1 sh (paratype) from the type locality ; *Vauban*, st 28, 12°43 S, 48°12 E, 445-455 m, 1 spm ; st 46, 15°19 S, 46°12 E, 400 m, 2 shs (Mozambique Channel).

DESCRIPTION

Shell large, solid, fusiform, consisting of 9.5 whorls. The larval shell is not preserved in any specimen. Teleoconch with rounded, convex whorls of slowly increasing diameter. The sculpture consists of dominant axial ribs and spiral cords. There are 11-12 ribs on the penultimate whorl and body whorl. The ribs are crossed by spiral cords of somewhat varying size, more crowded in the subsutural area and rather evenly spaced on the rest of the whorl. There are 13 cords on the penultimate whorl and about 40 on the body whorl. Aperture comparatively small, occupying less than half the height of the shell, with a long, open, slightly curved siphonal canal. No fasciole. Parietal callus very thin and polished with a inconspicuous columellar tooth. Outer lip thickened, equipped with 10-12 internal ridges. Periostracum thin, with incremental lines producing small bristles where they cross the spiral sculpture. Shell white, periostracum light yellowish brown.

Dimensions : height of the shell 46.4 mm, breadth 13.7 mm, height of the aperture 19.5 mm, breadth 5.5 mm.

Operculum and radula similar to other species of *Manaria*.

REMARKS

*Manaria formosa* resembles *Fusinus* even more than *M. clandestina* and may be distinguished from other species of *Manaria* by its *Fusinus*-like appearance. The sculpture resembles that of *M. makassarensis*, but the latter species is broader, has fewer whorls, and a higher aperture at the same size.

## Genus **Kryptos** Jeffreys in Dautzenberg & Fischer,1896

TYPE SPECIES : *Kryptos elegans* Jeffreys in Dautzenberg & Fischer, 1896 (= *K. koehleri* (Locard, 1896) : see BOUCHET & WARÉN 1985), by monotypy.

The taxonomical history of the genus was summarized by BOUCHET & WARÉN (1985), who transferred it to Buccinidae. The radula of *Kryptos koehleri* has a squarish central tooth with a broad, indistinct central cusp and laterals with 3 subequal strong cusps (fig. 12). We have only found one additional species referrable to *Kryptos, Pleurotoma tholoides* Watson.

### **Kryptos tholoides** (Watson, 1882)
(Fig. 96)

*Pleurotoma (Drillia) tholoides* Watson, 1882 : 248.
*Clionella tholoides*, WATSON 1886 : 372, pl. 24, fig. 1.

Type material : Holotype BMNH 1887.2.9.1129.
Type locality : *Challenger*, st 122, 09°05 S, 34°50 W, 630 m (off Recife, Brasil).

MATERIAL

The holotype.

DISTRIBUTION

Only known from the type locality.

REMARKS

The description of *tholoides* was based on an empty shell and we have not succeeded in procuring any additional specimens, so our transfer to *Kryptos* is based only on shell characters, especially the apex and the shape of the shell, which are virtually identical to *K. koehleri* (fig. 95). The differences between the two species consist of a higher spire and less distinct angulation of the whorls in *K. tholoides*.

## Genus **Americominella** Klappenbach & Ureta, 1972
(Figs 10, 97-99)

TYPE SPECIES : (original designation) *A. duartei* Kapplenbach & Ureta, 1972
SYNONYM : *Echinosipho* Kaiser, 1977. Type species : (original designation) *E. aculeatum* Kaiser, 1977.

The type material of *A. duartei* and *E. aculeatum* was collected during the same cruise of the German Fisheries R. V. WALTER HERWIG, off the east coast of South America. Apparently Kaiser

was unaware of the description of *A. duartei* because he did not refer to KLAPPENBACH & URETA'S paper. We have not examined the types of *A. duartei* (in Montevideo) ; our figures are based on paratypes and other specimens of *E. aculeatum* from the collections in Hamburg.

*Americominella* has a radula (fig. 10) with an arched, tricuspidate central tooth and laterals with strong outer and two smaller inner cusps.

Only a single species is so far known of *Americominella*, but the apex is quite similar to *Chrysodomus perminutus* Dall, 1927. The latter species was described from several immature shells, up to 9 mm high and still no adult specimens with a corresponding apex have appeared.

## Genus **Kanamarua** Kuroda, 1951

TYPE SPECIES : (original designation) *Colus adonis* Dall, 1919

The radula of *K. adonis* is not known and the shell characters (very thin periostracum ; fine, uniform spiral sculpture ; sinuous outer lip) are shared with several N Pacific and Atlantic species now in *Colus*, as *Colus verkruezeni* (Kobelt, 1876) (type species of *Anomalosipho* Dautzenberg & Fischer, 1912, N. Atlantic) and *Colus georgianus* (Dall, 1921) (NE Pacific, figs 104-105). *Kanamarua* also resembles the two genera *Ratifusus* Iredale, 1929 (New Zealand) and *Iredalula* Finlay, 1926 (New Zealand, figs 102-103) ; and CERNOHORSKY actually (1971 : 153) pointed out the similarity between *Ratifusus* and *Anomalosipho*. Because of lack of information about the soft parts of *Kanamarua adonis*, however, we have preferred to keep the name *Kanamarua*, although we expect it to end up as a synonym of *Anomalosipho*.

Two further SE Asian species have been described in *Kanamarua ; K. tazimai* Kuroda, 1951, from off S. Japan in 200-300 m, was described in Japanese. Through the courtesy of Dr T. OKUTANI (in litt.), we here give a translation of the original description : " There are two types if one does not represent a sexual dimorphism. The smaller type is given a new name *K. tazimai*. The shell is small, thin, slender with weak sculptures. Spires are small in number, 6.5. Siphonal canal strongly curved. Outer lip without inner denticulation (because of immaturity ?). Varices are also very weak. Height 21.0, diameter 8.3 mm ; height 21.5, diam. 8.0 mm. Collected by A. TERAMACHI from off Murotosaki, Shikoku, at 120-150 fms. " It has been figured in HABE & OKUTANI's " Kai I " (Gakken Co.) (not seen by us), and by OYAMA & SAKURAI (1958, in OYAMA 1957-58 ; plate " *Metula, Kanamarua, Babylonia* ", fig. 4).

*K. hyatinthus* Shikama, 1973 has been described from material obtained in Taiwan.

The radula of *Colus georgianus* (fig. 2) closely resembles that of *C. verkruezeni*, the operculum of *georgianus* is of the same type as *Manaria makassarensis* (fig. 31). (We have not compared our specimens of *C. georgianus* with type material, but they resemble closely the illustration of the type and they originate from close to the type locality).

### **Kanamarua adonis** (Dall, 1919)

(Figs 100-101)

*Colus adonis* Dall, 1919 : 316.
*Colus adonis*, DALL 1925 : pl. 1, fig. 8.
*Colus adonis*, KOSUGE 1975 : pl. 12, fig. 3.

Type material : Holotype USNM 205212.
Type locality : Suruga Bay, Japan, 900 m.

MATERIAL

The type material and MUSORSTOM II, st 82, 13°47 N, 120°29 E, 550 m, 2 shs (NW of Mindoro, Philippines) ; CORINDON II, st 214, 00°31 N, 117°50 E, 595 m, 1 sh (Makassar Strait) ; Kii-suido, Shikoku, Japan, 180 m, 1 sh.

REMARKS

The larval shell is paucispiral and indicates lecithotrophic or direct larval development.

*Kanamarua adonis* has been recorded from the American west coast (e.g. DALL 1921). We have not seen such material, but find it unlikely that a species from S Japan and Indonesia should also occur in NW USA.

## Genus **Pararetifusus** Kosuge, 1967

*Pararetifusus* Kosuge, 1967 : 62.

TYPE SPECIES : (by original designation) *Phymorhynchus ? tenuis* Okutani, 1966

*Pararetifusus* was introduced as a subgenus of *Retifusus* Dall, 1916 the type of which is a cold shallow water species from the N. Pacific. We cannot find any reason for considering *Pararetifusus* more closely related to *Retifusus* than to any other buccinid genus with unknown radula.

*Pararetifusus* has a radula (fig. 4) that to some extent resembles that of *Mohnia* and *Colus* ; the operculum is distinctly paucispiral, but the shell differs considerably from these genera in having a straight, slender siphonal canal and two strong angulations or keels at the periphery of the whorls, and a weaker one below these.

### **Pararetifusus tenuis** (Okutani, 1966)

(Figs 4, 26, 106-107)

*Phymorhynchus ? tenuis* Okutani, 1966 : 26, pl. 2, fig. 21, text-fig. 13.

Type material : Holotype and paratypes in National Science Museum, Tokyo.

Type locality : SOYO MARU st T21 (2), 34°57 N, 139°21 E, 1 470-1 500 m (Sagami bay, Japan).

MATERIAL

2 paratypes from the type locality and one additional spm from SOYO MARU st 17, 36°20 N, 141°09 E, 870m.

DISTRIBUTION

Only known from the 2 stations cited above, central Japan, bathyal.

### **Pararetifusus** sp.

(Figs 3, 108)

MATERIAL

CORINDON II, st 229, 00°02 S, 119°50 E, 411-445 m, 1 spm.

REMARKS

A small buccinid with thin outer lip and probably immature is present in our material ; the shell resembles a young *Manaria*, in having equally strong axial and spiral sculpture, and a long siphonal canal. The operculum is corroded in the nuclear region. The radula is quite remarkable : The central tooth is narrow with 3 long, projecting cusps ; the lateral tooth has strong inner and outer cusps, and a smaller median cusp. This radula resembles somewhat that of *P. tenuis* and we have, therefore, figured the specimen under this genus ; however, this does not express any opinion about where the species belongs. More than a single young specimen is needed to allow a conclusion on that.

## Genus **Bayerius** Olsson, 1971

TYPE SPECIES : (original designation) *Fusinus fragilissimus* Dall, 1908

In the original description of *Bayerius*, Olsson gave no diagnostic characters to separate it from other buccinid genera, but noticed the " fusiform " shell and the " buccinoid " radula. The operculum and protoconch are not known, but the radula resembles closely that of *Calliloconcha* and the two genera may prove to be synonyms.

### **Bayerius fragilissimus** (Dall, 1908)
(Fig. 109)

*Fusinus fragilissimus* Dall, 1908 : 302, pl. 12, fig. 6.

Type material : Holotype USNM 123007.
Type locality : *Albatross*, st 3398, 01°07 N, 80°21 W, 2 890 m (off Ecuador).

MATERIAL

The holotype.

DISTRIBUTION

Only known from the type locality and *Pillsbury*, st P-526, 06°53 N, 79°27 W, 3 200 m (Gulf of Panama) (OLSSON 1971).

## Genus **Euthriostoma** Marche-Marchad & Brebion, 1977

TYPE SPECIES : (original designation) *E. gliberti* Marche-Marchad & Brebion, 1977 (= *Euthria saharica* Locard, 1897)

The shell of the type species (and only species known) is remarkably similar to *Siphonalia lubrica* Dall, 1918 from Japan (type species of *Siphonofusus* Kuroda & Habe, 1952) but that species has a different radula.

Some genera around *Penion* Fischer, 1884, from New Zealand and Australia also show a resemblance both in shell and radular characters (cf. PONDER 1973, DELL 1956, POWELL, 1979) but this is beyond the scope of this paper.

The operculum of *E. saharica* is ovate with an apical nucleus, forming an angle of 30° whith the longitudinal axis of the adult operculum.

**Euthriostoma saharica** (Locard, 1897)

(Figs 9, 112-113)

*Euthria saharica* Locard, 1897 : 326, pl. 16, fig. 17-20.
*Euthriostoma gliberti* Marche-Marchad & Bébrion, 1977 : 339, fig. A-D.
*Metzgeria apodema* Bouchet & Talavera, 1981 : 177, fig. 1-2.

Type material : Type material of all 3 names in MNHN.

Type locality : *E. saharica, Talisman*, dr 71, 25°39 N, 15°58 W, 640 m ; *E. gliberti*, off Sénégal, 14°53 N, 17°30 W, 205-300 m ; *M. apodema, Meteor*, st 36-98, 25°31 N, 16°02 W, 700-900 m.

MATERIAL

The type material ; *N'diago*, st 5, 17°26 N, 16°39 W, 500 m, 1 sh ; st 33, 20°11 N, 17°40 W, 400 m, 1 spm, 1 sh ; st 34, 20°34 N, 17°49 W, 400 m, 3 spms ; *Meteor*, st 60-80, 17°27 N, 16°41 W, 330-370 m, 1 spm (all collected by B. Richer de Forges).

DISTRIBUTION

The continental slope of NW Africa ; only known from the material examined.

## INSUFFICIENTLY KNOWN SPECIES

**Metula fusiformis** Clench & Aguayo, 1941

(Figs 116-117)

*Metula fusiformis* Clench & Aguayo, 1941 : 180, fig.
*Buccinofusus surinamensis* Okutani, 1982 : 113, pl. 2, figs 1-2.

Type material : *M. fusiformis*, holotype MCZ 135290 ; *B. surinamensis*, holotype NSMT Mo 60028.

Type localities : *M. fusiformis, Atlantis*, st 3344, 21°38 N, 80°12 W, 2 650 m (off Cuba) ; *B. surinamensis*, off Surinam.

REMARKS

We have examined the holotypes and agree with OLSSON & BAYER (1972 : 925) that this species does not belong to *Metula*. These authors referred it to *Fusinus*, while ABBOTT (1974) placed it in *Bartschia*. We agree with ABBOTT that it belongs to Buccinidae, but absence of soft parts makes it difficult to give an opinion about the generic position. The shape of the aperture shows some resemblance to that of *Euthriostoma* in having a distinctly wedgeshaped upper part, caused by the concave subsutural area.

**Buccinum canetae** Clench & Aguayo, 1944

(Figs 114-115)

*Buccinum canetae* Clench & Aguayo, 1944 : 67, fig.
*Plicifusus jamarci* Okutani, 1982 : 111, pl. 1, figs 4-6 ; pl. 2, figs 1-2.
*Plicifusus jamarci*, TAKEDA & OKUTANI 1983 : 285, text fig.

Type material : *B. canetae*, holotype MCZ 145740 ; *P. jamarci*, holotype NSMT Mo 60025.
Type localities : *B. canetae, Atlantis*, st 3003, 23°12 N, 82°12 W, 440-550 m (off Cuba) ; *P. jamarci*, 07°39 N, 54°09 W, 420 m (off Surinam).

MATERIAL

The type material.

REMARKS

No soft parts have been available for examination of the radula. The operculum resembles that of *Bathyancistrolepis*, but is more slender. The upper part of the aperture resembles that of " *Metula* " *fusiformis*, but this character is obvious in adult specimens only. It is obvious from the operculum that this species does not belong to *Buccinum* (always central or subcentral nucleus and concentric growth lines) and the shape of the aperture contradicts a position in *Plicifusus* (no wedge shaped corner and flaring outer lip in adult specimens) but we can not suggest any alternative position.

**Volutopsius (?) amabilis** Dall, 1908
(Fig. 111)

*Volutopsius* (?) *amabilis* Dall, 1908 : 305, pl. 11, fig. 9.

Type material : Holotype USNM 123008.
Type locality : *Albatross*, st 3392, 07°06 N, 79°40 W, 2 311 m (Gulf of Panama).

MATERIAL

The holotype.

REMARKS

The holotype is a badly corroded shell, from which the soft parts have been removed. Dall (1908) mentioned that " the operculum is not Columbelloid or Purpuroid " and pointed out that the specimen " had a peculiar blunt spire ". The latter is caused by corrosion and evidently there are several whorls missing. The aperture gives no clues about systematic position, except that it could just as well be a turrid as a buccinid.

## Index to specific names

(valid taxa in italics)

aculeatum Kaiser, 1977 (Echinosipho) = duartei ..... 481
*adonis* Dall, 1919 (Colus) : Kanamarua ..... 482
agalma Smith, 1906 (Tritonidea) = delicatus ..... 471
*aldermenensis* Powell, 1971 (Cantharus) : Eosipho ..... 469
*amabilis* Dall, 1908 (Volutopsius) ..... 486
aoteana Dell, 1956 (Antizafra) = climacella ..... 474
apodema Bouchet & Talavera, 1981 (Metzgeria) = saharica ..... 485
areia Dall, 1927 (Mangilia ?) = pourtalesi ..... 474
asphaltodes Beets, 1943 (Neptunea) : see ..... 466

*bathybius* n. sp. (Kapala) ..... 465
*bonaespei* Barnard, 1963 (Neptunea) : Kapala ..... 465
*borealis* Golikov, 1977 (Costaria) ..... 460
brachytoma Schepman, 1913 (Surcula) = climacella ..... 473
*brevicaudatus* Schepman, 1911 (Fusus) : Manaria ..... 477

*canetae* Clench & Aguayo, 1944 (Buccinum) : see ..... 485
circumreta Lus, 1973 (Brevisiphonia) = moerchi ..... 463
*clandestina* n. sp. (Manaria) ..... 478
*climacella* Dall, 1895 (Pleurotomella) : Belomitra ..... 474
*coriolis* n. sp. (Eosipho) ..... 467
*crosnieri* n. sp. (Costaria) ..... 461

*delicatus* Smith, 1899 (Tritonidea) : Cantharus ..... 471
*dentata* Schepman, 1911 (Tritonidea) : Eosipho ..... 470
*duartei* Klappenbach & Ureta, 1972 (Americominella) ..... 481

*engonia* n. sp. (Eosipho) ..... 467
exsculpta Watson, 1882 (Pleurotoma) = pourtalesi ..... 474

*fragilissimus* Dall, 1908 (Fusinus) : Bayerius ..... 484
*fusiformis* Clench & Aguayo, 1941 (Metula) : see ..... 485
*formosa* n. sp. (Manaria) ..... 480

*georgianus* Dall, 1921 (Aulacofusus) : see ..... 482
gliberti Marche-Marchad & Brébion, 1977 (Euthriostoma) = saharica ..... 484

hayashii Shikama, 1971 (Colus) ? = aldermenensis ..... 469
*hyatinthus* Shikama, 1973 (Kanamarua) ..... 482

inflata Shikama, 1971 (Manaria) : relocated, see ..... 476
insularis Okutani, 1968 (Manaria) : relocated, see ..... 475

jamarci Okutani, 1982 (Plicifusus) = canetae ..... 485

*kengrahami* Ponder, 1982 (Kapala) ..... 464
*knudseni* n. sp. (Calliloconcha) ..... 462
*kuroharai* Azuma, 1960 (Manaria) ..... 477

laddi McNeil, 1960 (Siphonalia) : Manaria, see ..... 477
*lirata* Kuroda & Habe, 1961 (Manaria) ..... 476

*makassarensis* n. sp. (Manaria) ..... 479
*moerchi* Dall, 1908 (Troschelia) : Thalassoplanes ..... 463
munida Ponder, 1968 (Waipaoa) = climacella ..... 474

ovoideus Habe & Ito, 1965 (Ancistrolepis trochoideus) = trochoideus ..... 460

*pacifica* Dall, 1908 (Leucosyrinx) : Belomitra ..... 473
paradoxa P. Fischer, 1882 (Belomitra) = quadruplex ..... 472
paschalis Thiele, 1925 (Mangelia) = pacifica ..... 473
perminutus Dall, 1927 (Chrysodomus) : see ..... 482
philippinensis Petuch, 1979 (Axymene) = dentatus ..... 470
*pourtalesi* Dall, 1881 (Pleurotoma) : Belomitra ..... 474
problematica Thiele, 1925 (Mangelia) : Belomitra ..... 473
pygmaeus Shikama & Hayashi, 1977 (Eosipho) ..... 466

*quadruplex* Watson, 1882 (Pleurotoma) : Belomitra ..... 472

*richardi* Dautzenberg & Fischer, 1906 (Pleurotoma) : Belomitra ..... 475

*saharica* Locard, 1897 (Euthria) : Euthriostoma ..... 485
*smithi* Schepman, 1911 (Chrysodomus) : Eosipho ..... 466
*solida* Lus, 1978 (Calliloconcha) ..... 462
*sowerbyana* Melvill & Standen, 1903 (Tritonidea) : Cantharus ..... 472
surinamensis Okutani, 1982 (Buccinofusus) = fusiformis ..... 485

*tazimai* Kuroda, 1951 (Kanamarua) ..... 482
*tenuis* Okutani, 1966 (Phymorhynchus) : Pararetifusus ..... 483
*tholoides* Watson, 1881 (Pleurotoma) : Kryptos ..... 481
*thorybopus* n. sp. (Manaria) ..... 468
*thurstoni* Smith, 1906 (Manaria) ..... 478
tokoyodaensis Ozaki, 1959 (Ancistrolepis trochoideus) = trochoideus ..... 460
*torquata* Barnard, 1963 (Prosipho) : Belomitra ..... 472
*trochoideus* Dall, 1907 (Chrysodomus) : Bathyancistrolepis ..... 460

## Neogene and Recent supraspecific names proposed in the Buccinidae : 1941-1984

*Agassitula* Olsson & Bayer, 1972

Bull. mar. sci., 22 : 917
Type species (TS) : *Metula agassizi* Clench & Aguayo, 1941 (OD).
Caribbean to Brasil, 87-59 m. Recent.

*Amarophos* Woodring, 1964

Geol. surv. Prof. Pap. 306 C : 267
TS : *A. bothrus* Woodring, 1964 (OD).
Pliocene of Panama.

*Americominella* Klappenbach & Ureta, 1972 (This paper p. 481)

Com. Zool. Mus. hist. nat. Montevideo, 10 (134) : 2
TS : *A. duartei* Klappenbach & Ureta, 1972 (OD).
Shelf of Argentina, 100-600 m. Recent.
*Echinosipho* Kaiser, 1977 is a synonym.

Ancistrolepisinae Habe & Sato, 1973 (" 1972 ")

Proc. Jap. Soc. Syst. Zool., 8 : 6.

*Antarctodomus* Dell, 1972

Rec. Dominion Mus., 8 : 5
TS : *Bathydomus thielei* Powell, 1958 (OD).
Antarctic. Recent.

*Antarctoneptunea* Dell, 1972

Rec. Dominion Mus., 8 : 116
TS : *Fusitriton aurora* Hedley, 1916 (OD).
Antarctic, 188-603 m. Recent.

*Antemetula* Rehder, 1943

Proc. U.S. natn. Mus., 93 : 199
TS : *Buccinum metula* Hinds, 1844 (OD).
See comments by OLSSON & BAYER, Bull. mar. sci., 22 : 903.

*Bailya* Smith, 1944

Panamic marine shells (Beal-Maltby Shell Museum, Winter Park, Florida) : 22
TS : *Triton anomalus* Hinds, 1884 (OD).
West central America, intertidal. Recent.

*Bartschia* Rehder, 1943

Proc. U.S. natn. Mus., 93 : 199
TS : *B. significans* Rehder, 1943 (OD).
Florida, 115-185 m. Recent.

*Bathyancistrolepis* Habe & Ito, 1968 (This paper p. 460)

Venus, 27 : 7
TS : *Chrysodomus trochoideus* Dall, 1907 (OD).
Japan, 50-1 500 m. Recent.

*Bayerius* Olsson, 1971 (This paper p. 484)

Bull. mar. sci., 21 : 57
TS : *Fusinus fragilissimus* Dall, 1908 (OD).
off western central America, 2 877-3 200 m. Recent.

Beringiidae Golikov & Starobogatov, 1975

Beringioidea Golikov & Starobogatov, 1975

Malacologia, 15 : 213, 221.

*Beringion* Habe & Ito, 1965

Venus, 24 :35
TS : *Beringius marshalli* Dall, 1919 (OD).
Behring sea. Recent.

*Boreokelletia* Anderson, 1964

Fortschr. Geol. Rheinld. Westf., 14 : 249
TS : *Fusus hosiusi* Beyrich, 1856 (OD).
Miocene of W. Europe.

*Brevisiphonia* Lus, 1973

Trud. Inst. Oceanol., 91 : 204
TS : *B. circumreta* Lus, 1973 (= *Thalassoplanes moerchi* Dall, 1908) (OD).
North Pacific, 5 500-6 300 m. Recent.

Brevisiphoninae Lus, 1973

Trud. Inst. Oceanol., 91 : 203.

*Calliloconcha* Lus, 1978 (This paper p. 462)

Trud. Inst. Oceanol., 113 : 147
TS : *C. solida* Lus, 1978 (OD).
Japan Trench, 6 770-6 850 m. Recent.

*Calophos* Woodring, 1964

Geol. Surv. Prof. Pap., 306 C : 262
TS : *C. ectyphus* Woodring, 1964 (OD).
Miocene of Panama.

*Cavineptunea* Powell, 1951

Discovery Repts, 26 : 145
TS : *C. monstrosa* Powell, 1951 (OD).
South Georgia, 160 m. Recent.

*Chauvetiella* Nordsieck, 1968

Die europäischen Meeres-Gehäuseschnecken (G. FISCHER, Stuttgart) : 137
TS : *Lachesis vulpecula* Monterosato, 1874 (OD).
Mediterranean, shallow water. Recent.

*Chlanificula* Powell, 1958

BANZAR Exp. Rept, (B) 6 : 193
TS : *C. thielei* Powell, 1958 (OD).
Antarctic, 220 m. Recent.

*Colubrarina* Kuroda & Habe, in KURODA, HABE & OYAMA, 1971

The Sea Shells of Sagami bay (Maruzen, Tokyo) : 173
TS : *Antemetula (C.) metulina* Kuroda & Habe, in KURODA, HABE & OYAMA, 1971
Central Japan, 90-200 m. Recent.

*Corneobuccinum* Golikov & Gulbin, 1977

Coast waters of the Kurile Islands (O. KUSSAKIN Ed., Moscow, Science Publishers) : 217
TS : *Colus lepidus* Dall, 1918 (OD).
NW Pacific, continental shelf. Recent.

*Costaria* Golikov, 1977 (This paper p. 460)

Issl. Faun. Mor., 21 (29) : 102
TS : *Costaria borealis* Golikov, 1977 (OD).
off Kuriles, 440 m. Recent.

*Crassicantharus* Ponder, 1972

J. Malac. Soc. Austr., 2 (3) : 262
TS : *C. norfolkensis* Ponder, 1972 (OD).
Norfolk I., shallow water. Recent.

*Cymatophos* Pilsbry & Olsson, 1941

Proc. Acad. Nat. Sci. Phil., 93 : 33
TS : *C. galerus* Pilsbry & Olsson, 1941 (OD).
Pliocene of Ecuador.

*Dellina* Beu, 1970

Trans. R. Soc. N.Z. (Earth Sci.), 7 :
TS : *Waipaoa munida* Ponder, 1962 (OD).
New Zealand, deep water. Recent. Described in Cancellariidae, but transferred by BOUCHET & WARÉN (1985) in synonymy of *Belomitra* (Buccinidae).

*Donovaniella* Nordsieck, 1968

Die europäischen Meeres-Gehauseschnecken (G. Fischer, Stuttgart) : 136
TS : *Buccinum minimum* Montagu, 1803 (here designated). It has the same type species as *Donovania* Bucquoy, Dautzenberg & Dollfus, 1883, and is therefore an objective synonym.

*Echinosipho* Kaiser, 1977

Mitt. Hamburg. Zool. Mus. Inst., 74 : 27-30
TS : *E. aculeatum* Kaiser, 1977 (OD).
Argentinian continental slope, 150-1 250 m. Recent.
The species is a synonym of *Americominella duartei* Klappenbach & Ureta, 1972 and *Echinosipho* becomes a synonym of *Americominella*.

*Enzinopsis* Iredale, 1940

Austr. Zool., 9 (4) : 434
TS : *Engina gannita* Hedley, 1915 (OD).
Regarded as a synonym of *Engina* by PONDER (1972 : 252).

*Euthriostoma* Marche-Marchad & Brebion, 1977 (This paper p. 484)

C. R. Acad. Sci. Paris, 285 : 339
TS : *E. gliberti* Marche-Marchad & Brebion, 1977 (OD).
Senegal, 200-300 m. Recent.

*Falsimohnia* Powell, 1951

Discovery Repts, 26 : 137
TS : *Buccinum albozonatum* Watson, 1882 (OD).
Subantarctic, continental shelf. Recent.

*Floritula* Olsson & Bayer, 1972

Bull. mar. sci., 22 : 921
TS : *Metula roberti* Olsson, 1967 (OD).
Pliocene of Florida.

*Fusipagoda* Habe & Ito, 1965

Shells of the world in colour, vol. 1 (Hoikusha, Osaka) : 48 ; Venus, 24 : 21
TS : *Mohnia exquisita* Dall, 1913 (by monotypy). Figured 1921, Bull. U.S. natn. Mus., 112 : pl. 10, fig. 10 and Kosuge 1975 : pl. 17, fig.6.
Behring sea, 2 500 m. Recent.

*Fusivolutopsius* Habe & Sato, 1973 (" 1972 ")

Proc. Jap. Soc. Syst. Zool., 8 : 7
TS : *Volutopsius hirasei* Pilsbry, 1907 (OD).

*Gemophos* Olsson & Harbison, 1953

Monogr. Acad. Nat. sci. Phil., 8 : 225
TS : *Buccinum gemmata* Reeve, 1846 (OD).
W. coast of America, shallow water. Recent.
Considered by CERNOHORSKY (1971) a synonym of *Cantharus*.

*Golikovia* Habe & Sato, 1973 (" 1972 ")

Proc. Jap. Soc. Syst. Zool., 8 : 6
TS : *Neptunea fukuae* Kuroda in KIRA, 1955 (OD).
Northern Japan, 100 m. Recent.

*Habevolutopsius* Kantor, 1983

Zool. Zh., 62 (3) : 339
TS : *Volutopsius hirasei* Pilsbry, 1907 (OD).
See also *Fusivolutopsius*.

*Harpofusus* Habe & Ito, 1965

Venus, 24 : 34
TS : *Strombella melonis* Dall, 1891 (OD).
Behring sea, 400 m. Recent.

*Hypojapelion* Okutani, 1968

Bull. Tokai Reg. Fish. Lab., 56 : 33
TS : *Clinopegma hachijoensis* Okutani, 1964 (OD).
Southern Japan, 430 m. Recent.

*Kanamarua* Kuroda, 1951 (This paper p. 482)

Venus, 16 : 69
TS : *Colus adonis* Dall, 1919 (OD).
central Japan, 900 m. Recent.

*Kapala* Ponder, 1982 (This paper p. 464)

J. Malac. Soc. Austr., 5 (3-4) : 201-207
TS : *K. kengrahami* Ponder, 1982 (OD).
SW Australia, bathyal. Recent.

*Liohindsia* Coen, 1947

Acta Pontif. Acad. Sci., 11 : 85
TS : *Liohindsia dimidiata* Coen, 1947 (monotypy).
COEN did not assign the genus to a family, but the suffix *-hindsia* suggests a buccinid affinity. We have examined the holotype (this paper fig. 110) in the Hebrew University of Jerusalem : it is a synonym of *Priene scabrum* (King, 1832), a cymatid, type species of *Priene*.

Liomesusinae Habe & Sato, 1973 (" 1972 ")

Proc. Jap. Soc. Syst. Zool., 8.

*Loochooia* MacNeil, 1960

Geol. Surv. Prof. Pap., 339 : 68
TS : *L. hanzawai* MacNeil, 1960 (OD).
Neogene of Okinawa. MacNeil also includes in his new genus *Chrysodomus oncodes* Dall, 1907, N. Pacific, 100-400 m, Recent.

*Lussivolutopsius* Kantor, 1983

Zool. Zh., 62 (4) : 493
TS : *L. hydractiniferus* Kantor, 1983 (OD).
Okhotsk sea, 355-397 m. Recent.

*Metajapelion* Tiba & Kosuge, 1980

Northern Pacific Shells (Institute of Malacology, Tokyo), 6 : 2
TS : *Chrysodomus adelphicus* Dall, 1907 (OD).
Japan. Recent.

*Metaphos* Olsson, 1964

Neogene Molluscs from northwestern Ecuador (Paleontological Research Inst., Ithaca) : 154
TS : *Phos chelonia* Dall, 1917 (OD).
Galapagos, 70 m. Recent.

*Minitula* Olsson & Bayer, 1972

Bull. mar. sci., 22 : 915
TS : *Metula minor* Olsson & Bayer, 1972 (OD).
Caribbean off Colombia, 118-177 m. Recent.

*Morrisonella* Bartsch, 1945

Nautilus, 59 : 23
TS : *Leucosyrinx pacifica* Dall, 1908 (OD).
E. Pacific, abyssal. Recent.
Synonymized with *Belomitra* by BOUCHET & WARÉN (1985).

*Muricantharus* Olsson, 1971

Bull. mar. sci., 21 : 61
TS : *Pseudoneptunea panamica* Hertlein & Strong, 1951 (OD).
E. Pacific, continental shelf. Recent.
Treated by CERNOHORSKY (1975) as a synonym of *Cantharus*.

*Nawenia* Ladd, 1977

Geol. Surv. Prof. Pap., 553 : 51
TS : *Nawenia bartholomewi* Ladd, 1977 (OD).
Pliocene of Fiji.

*Neancistrolepis* Habe & Sato, 1973 (" 1972 ")

Proc. Jap. Soc. Syst. Zool., 8 : 6
TS : *Ancistrolepis beringianus* Dall, 1919 (OD).
Behring sea, 100 m. Recent.

*Neoberingius* Habe & Ito, 1965

Venus, 24 : 35
TS : *Beringius frielei* Dall, 1895 (OD).
NW Pacific, continental shelf. Recent.

*Nerva* Vokes, 1969

Tulane Stud. Geol. Paleont., 7 : 77
Described as a subgenus of the buccinid genus *Trajana*, it is however a nassarid according to CERNOHORSKY (1981 : 43).

*Nicema* Woodring, 1964

Geol. Surv. Prof. Pap., 306 C : 268
TS : *N. amara* Woodring, 1964 (OD).
Miocene of Panama.

*Nihonophos* MacNeil, 1960

Geol. Surv. Prof. Pap., 339 : 71
TS : *Nassaria magnifica* Lischke, 1871 (OD).
Continental shelf of Japan. Recent.
Synonymized by CERNOHORSKY (1981 : 31) with *Nassaria (Microfusus)*.

*Parancistrolepis* Azuma, 1965

Venus, 24 : 127
TS : *Japelion kinoshitai* Kuroda, 1931 (OD).
central Japan, deepish water. Recent.

Parancistrolepisinae Habe, 1972

Nautilus, 86 : 51.

*Pararetifusus* Kosuge, 1967 (This paper p. 483)

Venus, 25 : 62
TS : *Phymorhynchus tenuis* Okutani, 1966 (OD).
central Japan, 1 500 m. Recent.

*Parviphos* Sarasua, 1984

Poeyana, 272 : 2
TS : *Phos adelus* Schwengel, 1942 (OD).
Caribbean, continental shelf. Recent.

*Philindophos* Shuto, 1969

Mem. Fac. Sci. Kyushu Univ. (D) 19 (1) : 118
introduced as a subgenus of *Phos* Montfort, 1810.
TS : *Phos dijki* Martin (OD).
Neogene of SE Asia.

*Plicibuccinum* Golikov & Gulbin, 1977

Coast waters of the Kurile Islands (O. KUSSAKIN Ed., Moscow, Science Publishers) : 196
TS : *Plicibuccinum plicatum* Golikov & Gulbin, 1977 (OD).
NW Pacific, continental shelf. Recent.

*Pseudoliomesus* Habe & Sato, 1973 (" 1972 ")

Proc. Jap. Soc. Syst. Zool., 8 : 6
TS : *Tritonium ooides* Middendorff, 1848 (OD).
NW Pacific, continental shelf. Recent.

*Quasisipho* Petrov, 1982

Trans. Geol. Inst. Acad. Sci. USSR, 357 : 43
TS : *Quasisipho torquatus* Petrov, 1982 (OD).
Pleistocene of Kamchatka.

*Retibuccinum* Ito & Habe, 1980

Venus, 38 : 221
TS : *Buccinum shiretokoensis* Habe & Ito, 1976 (OD).
NW Pacific, deep shelf. Recent.

*Rhipophos* Woodring, 1964

Geol. Surv. Prof. Pap., 306 C : 266
TS : *Phos metuloides* Dall in GUPPY & DALL, 1896 (OD).
Miocene of Panama.

*Siphonofusus* Kuroda & Habe, 1952

Check list and bibliography of marine Mollusca of Japan : 86 ; see also Ill. Cat. Jap. Shells, 18 : 132 (1952) and Venus, 18 : 90 (1954)
TS : *Siphonalia lubrica* Dall, 1918 (OD).
central Japan, shelf. Recent.

*Streptodictyon* Tembrock, 1961

Bericht. geol. Gesell. Deutsche Dem. Rep., 5 : 373
TS : *Streptochetus elongatus* (Nyst) (OD).
Oligocene and Miocene of W. Europe.

*Strombinophos* Pilsbry & Olsson, 1941

Proc. Acad. Nat. sci. Phil., 93 : 35
TS : *S. loripanus* Pilsbry & Olsson, 1941 (OD).
Pliocene of Ecuador.

*Sukunaia* Cernohorsky, 1966

Veliger, 9 : 229
TS : *S. jenningsi* Cernohorsky, 1966 (OD).
Fiji, shallow water. Recent.
Synonymized with *Pisania* by CERNOHORSKY (1975 : 192).

*Tacita* Lus, 1971

Trud. Inst. Oceanol., 92 : 62
TS : *T. holosericea* Lus, 1971 (OD).
Kurile-Kamchatka trench, 6 100 m. Recent.

*Thysanobuccinum* Golikov & Gulbin in Golikov, 1980

Fauna USSR, 121 (Mollusks, 5 (2)) : 410
TS : no type species designated ; includes *Buccinum pilosum* Golikov & Gulbin, 1977 and *B. tunicatum* Golikov & Gulbin, 1977.
NW Pacific, shelf. Recent.
This name is attributed to GOLIKOV & GULBIN, 1977 by GOLIKOV (1980) but we could not find it cited in the volume where *Corneobuccinum* and *Plicibuccinum* Golikov & Gulbin, 1977 are introduced, nor in any other publication.

*Trajana* Gardner, 1948

Geol. Surv. Prof. Pap., 199 B : 221
TS : *T. pyta* Gardner, 1948 (OD).
Upper Miocene of North Carolina and Florida.
Also used by CERNOHORSKY (1981 : 45) for the Recent W. American species *Hindsia perideris* Dall, 1910.

*Tacita* Lus, 1971

Trud. Inst. Oceanol., 92 : 62
TS : *T. holosericea* Lus, 1971 (OD).
Kurile-Kamchatka trench, 6 100 m. Recent.

*Thysanobuccinum* Golikov & Gulbin in Golikov, 1980

Fauna USSR, 121 (Mollusks, 5 (2)) : 410
TS : no type species designated ; includes *Buccinum pilosum* Golikov & Gulbin, 1977 and *B. tunicatum* Golikov & Gulbin, 1977.
NW Pacific, shelf. Recent.
This name is attributed to GOLIKOV & GULBIN, 1977 by GOLIKOV (1980) but we could not find it cited in

the volume where *Corneobuccinum* and *Plicibuccinum* Golikov & Gulbin, 1977 are introduced, nor in any other publication.

*Trajana* Gardner, 1948

Geol. Surv. Prof. Pap., 199 B : 221
TS : *T. pyta* Gardner, 1948 (OD).
Upper Miocene of North Carolina and Florida.
Also used by CERNOHORSKY (1981 : 45) for the Recent W. American species *Hindsia perideris* Dall, 1910.

*Tyrannoberingius* Marincovich, 1981

J. Paleont., 55 (1) : 176
TS : *Tyrannoberingius rex* Marincovich, 1981
Miocene of Alaska.

*Undacolus* Nordsieck, 1968

Die europäischen Meeres-Gehauseschnecken (G. Fischer, Stuttgart) : 129
TS : *Sipho undulatus* Friele, 1881 (OD).
N. Atlantic, continental slope. Recent.
Synonymized with *Turrisipho* by BOUCHET & WARÉN (1985).

*Volutopsion* Habe & Ito, 1965

Venus, 24 :35
TS : *Buccinum castaneum* Dall, 1877 (OD).
Alaska, continental shelf. Recent.

ABBREVIATIONS USED IN THE TEXT.

| | |
|---|---|
| AMS | The Australian Museum, Sydney, Australia |
| ANSP | Academy of Natural Sciences, Philadelphia, USA |
| BMNH | British Museum (Natural History), London, UK |
| DMNH | Delaware Museum of Natural History, Greenville, USA |
| HUJ | Hebrew University, Jerusalem, Israël |
| MCZ | Museum of Comparative Zoology, Harvard, USA |
| MNHN | Museum National d'Histoire Naturelle, Paris, France |
| NMNZ | National Museum of New Zealand, Wellington |
| NSMT | National Science Museum, Tokyo, Japan |
| OD | original designation |
| SAM | South African Museum, Cape Town |
| TS | type species |
| USFC | United States Fisheries Commission |
| USNM | United States National Museum, Washington |
| ZMA | Zoölogisch Museum, Amsterdam, Netherlands |
| ZMC | Zoologisk Museum, Copenhagen, Denmark |
| ZMHU | Zoologisches Museum der Humboldt Universität, Berlin, DDR |

## ACKNOWLEDGEMENTS

The material on which this paper is based was generously placed at our disposal by Drs A. CROSNIER (Paris), J. FOREST (Paris), A. GUILLE (Paris), R. HOUBRICK (Washington D.C.), J. KNUDSEN (Copenhagen), P. KOPP (Reunion), C. MONNIOT (Paris), B. THOMASSIN (Marseille), and M. SIBUET (Brest). Most of the material from the French expeditions was sorted by Centre de Tri d'Océanographie Biologique (Brest) under the supervision of Dr. M. SEGONZAC.

For loan of material deposited in their institutions or collections, we thank M. AZUMA (Takarazuka, Japan), W. CERNOHORSKY (Auckland Institute & Museum), R. VON COSEL (Hamburg), R. HOUBRICK (USNM), A. JANSSEN (Rijksmuseum, Leiden), R. JENSEN (DMNH), R. KILIAS (ZMHU), W. LILTVED (SAM), B. MARSHALL (NMNZ), H. MIENIS (HUJ), R. MOOLENBEEK (ZMA), T. OKUTANI (NSMT), W. PONDER (AMS), SUBBA RAO (Zoological Survey of India, Calcutta), J. ROSEWATER (USNM), A. THOMSON (BMNH), A. TREW (National Museum of Wales, Cardiff) and R. TURNER (MCZ).

## REFERENCES


ALCOCK, A. & A. R. S. ANDERSON, continued by N. ANNANDALE & F. H. STEWART, 1897-1909. — Illustrations of the Zoology of the Royal Indian marine surveying steamer Investigator, under the command of commander C. F. Oldham, R. N. — Mollusca, parts 1-6, 23 plates. Calcutta.

ANKEL, W. E., 1976. — Das Gehäuse der Schnecken als Werkzug und Waffe. *Natur und Museum*, **106** : 102-111.

AZUMA, M., 1960. — A catalogue of the shell-bearing Mollusca of Okinoshima, Kashiwajima and the adjacent area (Tosa province), Shikoku, Japan. Published by the author. 101 + 17 pp.

BARNARD, K. H., 1963. — Deep Sea Mollusca from West of Cape Point, South Africa. *Ann. S. Afr. Mus.*, **46** : 407-452.

BEETS, C., 1943. — Die Gastropodengruppen *Ootoma* und *Eosipho* im indo-pacifischen Gebiet. *Basteria*, **8** : 2-8.

BERTSCH, H. & B. MYERS, 1980. — Abyssal specimens of *Spinula calcar* and *Brevisiphonia circumreta* from the Eastern Pacific. *Venus*, **38** : 252-258.

BOUCHET, P. & F. G. TALAVERA, 1981. — A new *Metzgeria* from North-West Africa. *Boll. Malac.*, **17** : 177-180.

BOUCHET, P. & WARÉN, 1980. — Revision of the North-East Atlantic bathyal and abyssal Turridae. *J. Moll. Stud.*, suppl. **8** : 1-120.

BOUCHET, P. & A. WARÉN, 1985. — Revision of the North-East Atlantic bathyal and abyssal Neogastropoda, excl. Turridae. *Boll. Malac.*, suppl. **1** : 121-296.

CERNOHORSKY, W. O., 1971. — Indo-Pacific Pisaniinae and related buccinid genera. *Rec. Auckland Inst. Mus.*, **8** : 137-167.

CERNOHORSKY, W. O., 1975. — Supplementary notes on the taxonomy of buccinid species of the subfamily Pisaniinae. *Rec. Auckland Inst. Mus.*, **12** : 175-211.

CERNOHORSKY, W. O., 1981. — The family Buccinidae, part 1 : the genera *Nassaria, Trajana* and *Neoteron. Monographs of marine Mollusca*, **2** : 1-52.

CLENCH, W. J. & C. G. AGUAYO, 1941. — Notes and descriptions of new deep-water Mollusca obtained by the Harvard-Havana expedition off the coast of Cuba, 4. *Mem. Soc. Cubana hist. nat.*, **15** : 177-181.

CLENCH, W. J. & C. G. AGUAYO, 1944. — A new tropical *Buccinum* from Cuba. *Rev. Soc. Malac. Carlos de la Torre*, **2** : 67-68.

DALL, W. H., 1881. — Reports on the results of dredging (...) in the Gulf of Mexico, and in the Caribbean Sea, 1877-79, by the U.S. Coast Survey steamer " Blake ", (...), 15. Preliminary report on the Mollusca. *Bull. Mus. Comp. Zool.*, **9** : 33-144.

DALL, W. H., 1886. — Reports on the results of dredging (...) in the Gulf of Mexico (1877-78) and in the Caribbean Sea (1879-80), by the U.S. Coast Survey steamer " Blake " (...), 29. Report on the Mollusca. Part 1, Brachiopoda and Pelecypoda. *Bull. Mus. Comp. Zool.*, **12** : 171-318, pl. 1-9.

DALL, W. H., 1889. — Reports on the results of dredging (...) in the Gulf of Mexico (1877-78) and in the Caribbean Sea (1879-80), by the U.S. Coast Survey steamer " Blake ", (...), 29. Report on the Mollusca. Part 2, Gastropoda and Scaphopoda. *Bull. Mus. Comp. Zool.*, **18** : 1-492.

DALL, W. H., 1907. — Descriptions of new species of shells, chiefly Buccinidae, from the dredgings of the U.S.S. " Albatross " during 1906, in the northwestern Pacific, Bering, Okhotsk and Japanese seas. *Smiths. Misc. Coll.*, **50** (2) : 139-173.

DALL, W. H., 1908. — Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U.S.S. " Albatross ", during 1891 (...), 14. The Mollusca and Brachiopoda. *Bull. Mus. Comp. Zool.*, **43** : 205-487.

DALL, W. H., 1919. — Descriptions of new species of Mollusca from the North Pacific ocean in the collection of the United States National Museum. *Proc. U.S. Nat. Mus.*, **56** : 293-371.

DALL, W. H., 1925. — Illustrations of unfigured types of shells in the collection of the United States National Museum. *Proc. U.S. Nat. Mus.*, **66** : 1-41, pl. 1-36.

DALL, W. H., 1927. — Small shells from dredgings off the southeast coast of the United States by the U.S. Fisheries steamer " Albatross " in 1885 and 1886. *Proc. U.S. Nat. Mus.*, **70** : 1-134.

DAUTZENBERG, P. & H. FISCHER, 1906. — Mollusques provenant des dragages effectués à l'ouest de l'Afrique. *Res. Camp. Sci. Albert I^er* **32** : 1-125.

DELL, R. K., 1956. — The archibenthal Mollusca of New Zealand. *Dominion Mus. Bull.*, **18** : 1-235.

FOREST, J., 1981. — Compte rendu et remarques générales / Report and general comments. *In* : Rés. Camp. MUSORSTOM. I. Philippines (18-28 mars 1976), **1**, 1. *Mém. ORSTOM*, **93** : 9-50, fig. 1-5.

FOREST, J., 1985. — La campagne MUSORSTOM II (1980). Compte rendu et liste des stations / The MUSORSTOM II Expedition (1980). Report and list of stations. *In* : Rés. Camp. MUSORSTOM. I et II. Philippines, **2**, 1. *Mém. Mus. natn. Hist. nat., Paris*, sér. A, Zool., **133** : 7-30, fig. 1-2.

GOLIKOV, A. N., 1963. — The gastropod mollusc genus *Neptunea* Bolten. *Fauna of the USSR, Mollusca*, **5** (1) : 1-217 (in Russian).

GOLIKOV, A. N., 1977 — Investigation of Prosobranchs of the family Fasciolariidae in temperate waters. *Issl. Faun. Mor.*, **21** (29) : 102-104 (in Russian).

GOLIKOV, A. N., 1980. — Buccininae Molluscs from the world ocean. *Fauna of the USSR, Mollusca,* **5** (2) : 1-465.

HABE, T., 1961. — Coloured illustrations of the shells of Japan, **2**. Hoikusha, Osaka. 183 pp.

HABE, T. & K. ITO, 1968. — Buccinid species from Rausu, Hokkaido. *Venus*, **27** : 1-8.

HABE, T. & J. SATO, 1973. — A classification of the family Buccinidae from the North Pacific. *Proc. Jap. Soc. Syst. Zool.*, **8** : 1-8.

KAISER, P., 1977. — Uber den Fund einer neuen Buccinidae *Echinosipho aculeatum* gen. n. und sp. n. in patagonischen Gewässern. *Mitt. Hamburg. zool. Mus. Inst.*, **74** : 27-31.

KIRA, T., 1962. — Shells of the western Pacific in color. Hoikusha, Osaka. 224 pp.

KLAPPENBACH, M. A. & E. H. URETA, 1972. — Nuevo genero y nueva especie de la familia Buccinidae de aguas uruguayas y argentinas. *Com. zool. Mus. hist. Nat. Montevideo*, **10** (134) : 1-6.

KOSUGE, S., 1967. — On the transfer of " *Phymorhynchus* ? " *tenuis* Okutani, 1966 to the family Buccinidae. *Venus*, **25** : 59-64.

KOSUGE, S., 1975. — Illustrations of Type Specimens of Molluscs described by William Healy Dall. 29 plates. Tokyo.

KURODA, T., 1951. — Descriptions of a new genus of a marine gastropod, *Kanamarua*, gen. n., and a new species of a bivalve, *Abra kanamarui*, sp. n. dedicated to Mr T. Kanamaru on his 60th birthday. *Venus*, **16** : 68-72.

KURODA, T. & T. HABE, 1954. — New genera of Japanese marine Gastropods. *Venus*, **18** : 84-97.

LOCARD, A., 1897. — Expéditions scientifiques du Travailleur et du Talisman. Mollusques Testacés, 1. Masson, Paris, 516 pp.

LUS, V. J., 1973. — New abyssal Fasciolariidae. *Trans. Shirshov Inst. Oceanol.*, **91** : 203-212 (in Russian).

LUS, V. J., 1978. — New genus and species of Buccinidae from the lower-abyssal zone of Idzu-Bonin Trench in Pacific zone. *Trans. Shirshov Inst. Oceanol.*, **113** : 147-156 (in Russian).

MARCHE-MARCHAD, I. & P. BREBION, 1977. — Sur un Buccinidé nouveau d'affinité miocène vivant au large du Sénégal. *C. R. Acad. Sc. Paris*, (D) **285** : 339-342.

MELVILL, J. C. & R. STANDEN, 1903. — Descriptions of Sixty-eight new Gastropoda from the Persian Gulf, Gulf of Oman, and North Arabian Sea, dredged by Mr. F. W. Townsend, of the Indo-European Telegraph Service, 1901-1903. *Ann. Mag. Nat. Hist.*, (7) **12** : 289-324.

OKUTANI, T., 1964. — Report on the archibental and abyssal Gastropod Mollusca mainly collected from Sagami bay and adjacent waters by the R. V. Soyo-Maru during the years 1955-1963. *J. Fac. Sci. Univ. Tokyo.*, (2) **15** (3) : 371-447.

OKUTANI, T., 1966. — Archibenthal and abyssal Mollusca collected by the R. V. Soyo-Maru from Japanese waters during 1964. *Bull. Tokai Reg. Fish. Lab.*, **46** : 1-35.

OKUTANI, T., 1968. — Bathyal and abyssal Mollusca trawled from Sagami bay and the South off Boso peninsula by the R. V. Soyo-Maru, 1965-1967. *Bull. Tokai Reg. Fish. Lab.*, **56** : 7-58.

OKUTANI, T., 1982. — Characteristics and distribution of abyssal megalobenthos fauna around the proposed dumping site St. B in the Northwest Pacific basin. Pp. 1-19, in : Survey Report on marine biota and background in connection with ocean dumping of low-level radioactive wastes (1977-1980). Tokai Regional Fisheries Research Laboratory, 59 pp.

OKUTANI, T., 1982b. — A new genus and five new species of Gastropods trawled from off Surinam. *Venus*, **41** : 109-120.

OLSSON, A., 1971. — Mollusks from the gulf of Panama collected by R/V John Elliott Pillsbury, 1967. *Bull. Mar. Sci.*, **21** : 35-92.

OLSSON, A. & F. BAYER, 1972. — American Metulas. *Bull. Mar. Sci.*, **22** : 900-925.

OYAMA, K., 1957-58. — *The Molluscan Shells*, I. Science & Photography Club, Tokyo.

PETUCH, E., 1979. — Twelve New Indo-Pacific Gastropods. *Nemouria*, **23** : 1-21.

PONDER, W. F., 1968. — Nomenclatural Notes on some New Zealand Rachiglossan Gastropods with descriptions of five new species. *Rec. Dominion Mus.*, **6** (4) : 29-47.

PONDER, W. F., 1972. — Notes on some Australian species and genera of the family Buccinidae.*J. Malac. Soc. Austr.*, **2** (3) : 249-265.

PONDER, W. F., 1972b. — A review of the Genus *Xymene* Iredale of New Zealand. *J. Roy. Soc. New Zealand*, **2** (4) : 471-499.

PONDER, W. F., 1973. — The origin and evolution of the Neogastropoda. *Malacologia*, **12** : 295-338.

PONDER, W. F., 1982. — A new genus and species of Buccinidae from the continental slope of eastern and southern Australia. *J. Malac. Soc. Aust.*, **5** : 201-207.

POWELL, A. W. B., 1951. — Antarctic and subantarctic Mollusca : Pelecypoda and Gastropoda. *Discovery Repts*, **26** : 47-196.

POWELL, A. W. B., 1966. — The molluscan families Speightiidae and Turridae. *Bull. Auckland Inst. Mus.*, **5** : 1-184.

POWELL, A. W. B., 1969 — The family Turridae in the Indo-Pacific. Part 2. The Subfamily Turriculinae. *Indo-Pacific Mollusca*, **2** (10) : 207-415.

POWELL, A. W. B., 1971. — New Zealand Molluscan systematics with descriptions of new species : part 7. *Rec. Auckland Inst. Mus.*, **8** : 209-228.

ROKOP, F., 1972. — Notes on abyssal Gastropods of the Eastern Pacific, with descriptions of three new species. *Veliger*, **15** : 15-19.

SCHEPMAN, M., 1911. — The Prosobranchia of the Siboga Expedition, part 4 : Rachiglossa. *Siboga-Expeditie*, 49d : 245-363.

SCHEPMAN, M., 1913. — Ibid., part 5 : Toxoglossa. *Siboga-Expeditie*, 49e : 365-452.

SHIKAMA, T., 1971. — On some Noteworthy Marine Gastropoda from Southwestern Japan (II). *Sci. Rept. Yokohama Nat. Univ.*, (2) **18** : 27-35.

SHIKAMA, T., 1973. — Description of New Marine Gastropoda from the East and South China Seas. *Sci. Rept. Yokohama Nat. Univ.*, (2) **20** : 1-8.

SHIKAMA, T., 1977. — Descriptions of New and Noteworthy Gastropoda from Western Pacific and Indian Oceans. *Sci. Rept. Yokohama Nat. Univ.*, (2) **24** : 9-23.

SMITH, E. A., 1899. — Natural History Notes from H. M. Indian Marine Survey Steamer ' Investigator ', Commander T. H. Heming. (3) 1. On Mollusca from the Bay of Bengal and the Arabian Sea. *Ann. Mag. Nat. Hist.*, (7) **4** : 237-251.

SMITH, E. A., 1906. — Natural History Notes from R.I.M.S. ' Investigator '. (3) 10. On Mollusca from the Bay of Bengal and the Arabian Sea. *Ann. Mag. Nat. Hist.*, (7) **18** : 157-175.

TAKEDA, M. & T. OKUTANI, 1983. — Crustaceans and Mollusks trawled off Suriname and French Guiana. Tokyo, Japan Marine Fishery Resource Research Center. 354 pp.

THIELE, J., 1925. — Gastropoda der Deutschen Tiefsee-Expedition, 2. *Deutsche Tiefsee-Expedition*, **17** (2) : 35-382.

THIELE, J., 1929. — Handbuch der systematischen Weichtierkunde, 1. Jena. 376 pp.

TIBA, R. & S. KOSUGE, 1979-1983. — North Pacific Shells, 1-13 (in progress). *Occ. Publ. Inst. Malac. Tokyo.*

WATSON, R. B., 1882. — Mollusca of H.M.S. ' Challenger ' expedition, part 11. *J. Linn. Soc. Lond.*, **16** : 247-254.

WATSON, R. B., 1886. — Report on the Scaphopoda and Gasteropoda collected by H.M.S. ' Challenger ' during the years 1873-76. *Repts Sci. Res. Challenger Exp., Zool.*, **42** : 1-756.

PLANCHE I

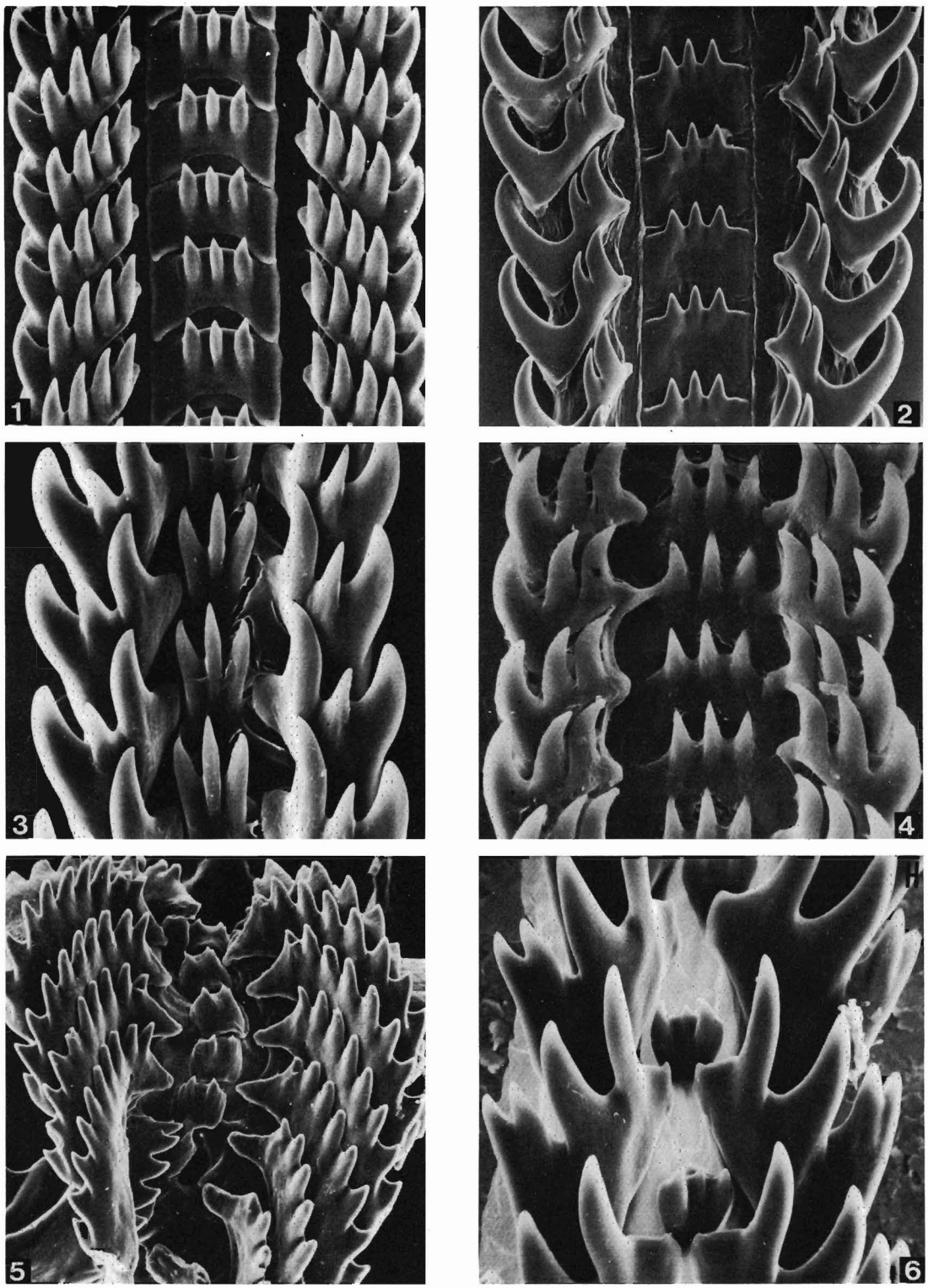



PLANCHE I

FIGS. 1-6. — Radulae. 1, *Calliloconcha knudseni*, holotype, × 225 ; 2, *Colus georgianus*, Georgia Straits, × 175 ; 3, *Pararetifusus* sp., CORINDON, st. 229, × 770 ; 4, *Pararetifusus tenuis, Soyo Maru*, st. 17, × 565 ; 5, *Thalassoplanes moerchi*, E. Pacific, × 210 ; 6, *Costaria crosnieri*, BENTHEDI, st. 87, × 575.

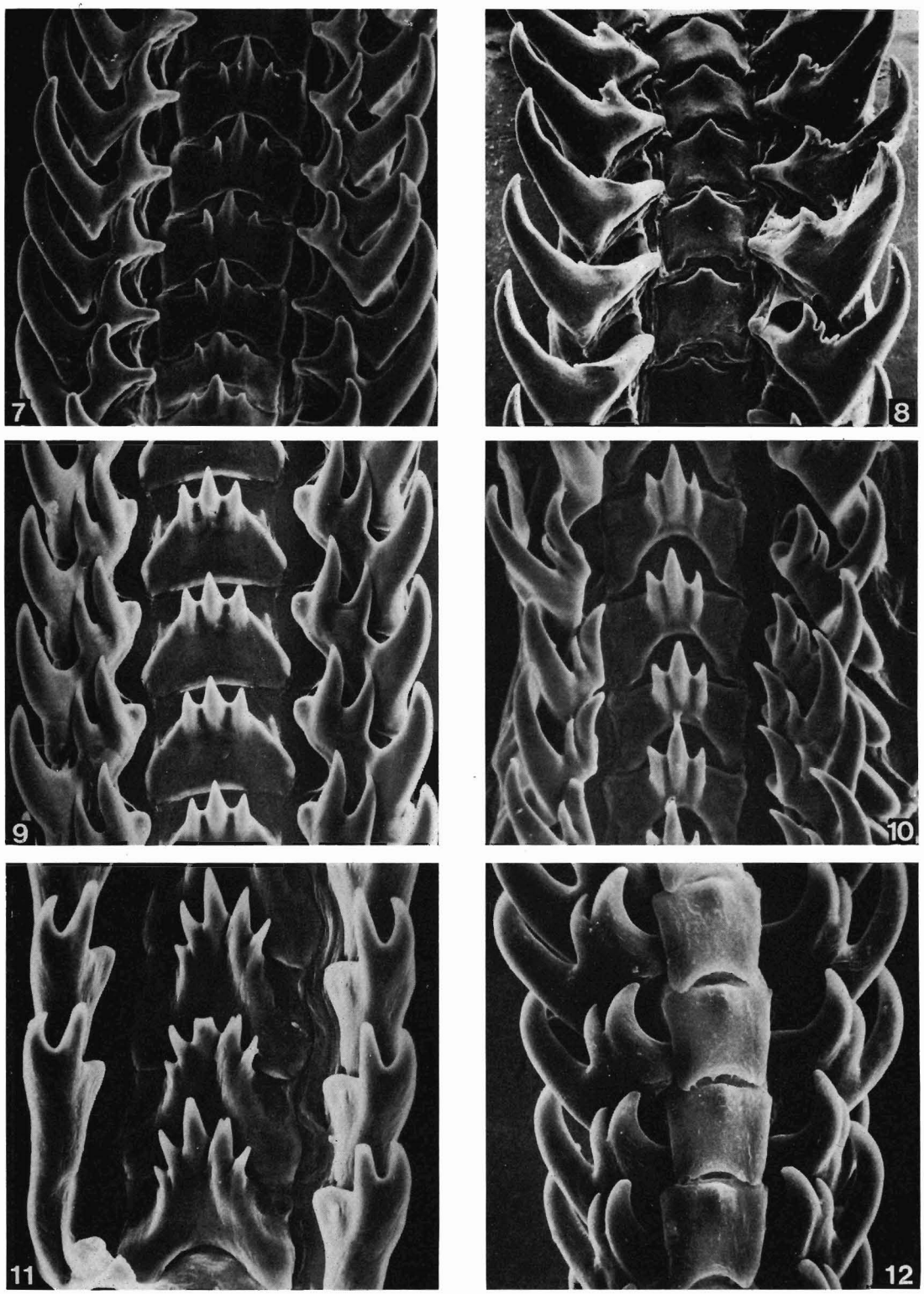



PLANCHE II

FIGS. 7-12. — Radulae. 7, *Bathyancistrolepis trochoideus*, Sagami bay, × 190 ; 8, *Kapala bathybius*, holotype, × 135 ; 9, *Euthriostoma saharica, Meteor*, st. 36-98, × 285 ; 10, *Americominella duartei*, type material of *Echinosipho*, × 270 ; 11, *Belomitra pacifica, Galathea*, st. 176, × 465 ; 12, *Kryptos koehleri*, off Portugal, × 960.

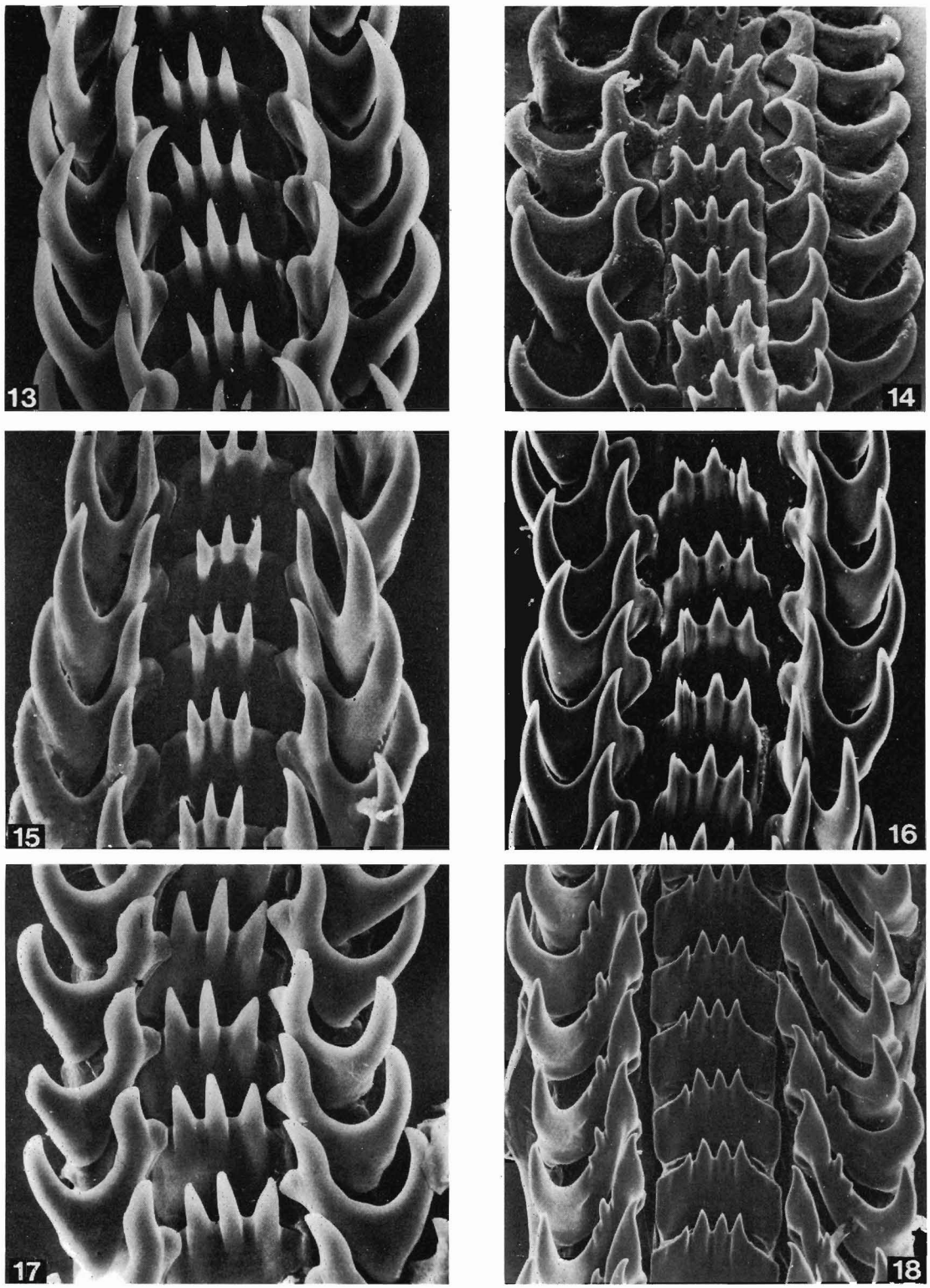



PLANCHE III

FIGS. 13-18. — Radulae. 13, *Eosipho aldermenensis, Albatross*, st. 5621, × 760 ; 14, *Eosipho engonia*, holotype, × 415 ; 15, *Eosipho smithi, Vauban*, st. 131, × 500 ; 16, *Eosipho coriolis*, holotype, × 235 ; 17, *Eosipho dentatus*, MUSORSTOM II, st. 15, × 530 ; 18, *Cantharus sowerbyanus*, syntype, × 155.

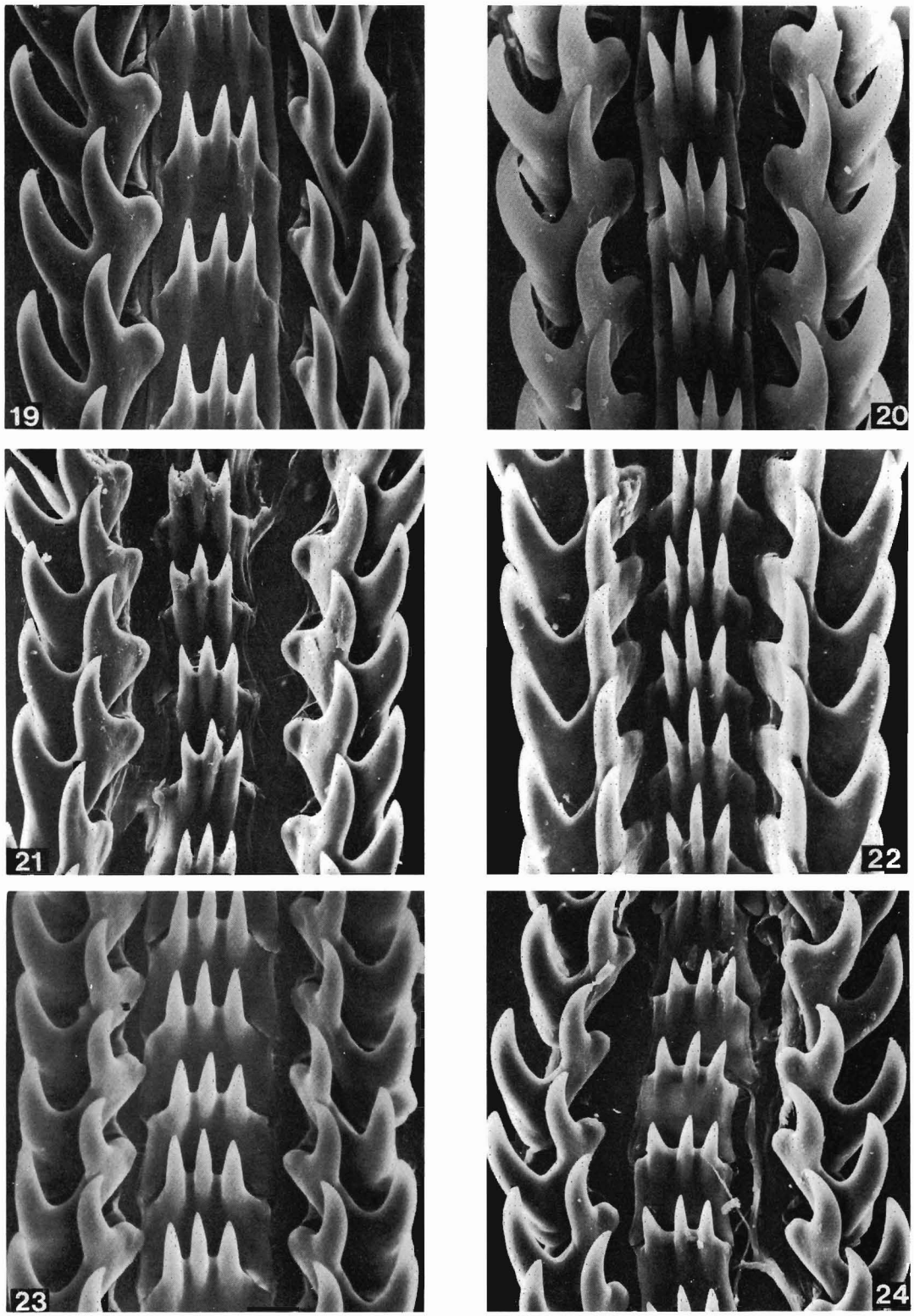



PLANCHE IV

FIGS. 19-24. — Radulae of *Manaria*. 19, *M. clandestina, Galathea*, st. 443, × 590 ; 20, *M. lirata, Albatross*, st. 5202, × 955 ; 21, *M. thurstoni*, CORINDON II, st. 231, × 425 ; 22, *M. thurstoni*, SAFARI II, st. 6, × 530 ; 23, *M. lirata*, MUSORSTOM II, st. 50, × 540 ; 24, *M. makassarensis*, CORINDON II, st. 209, × 550.

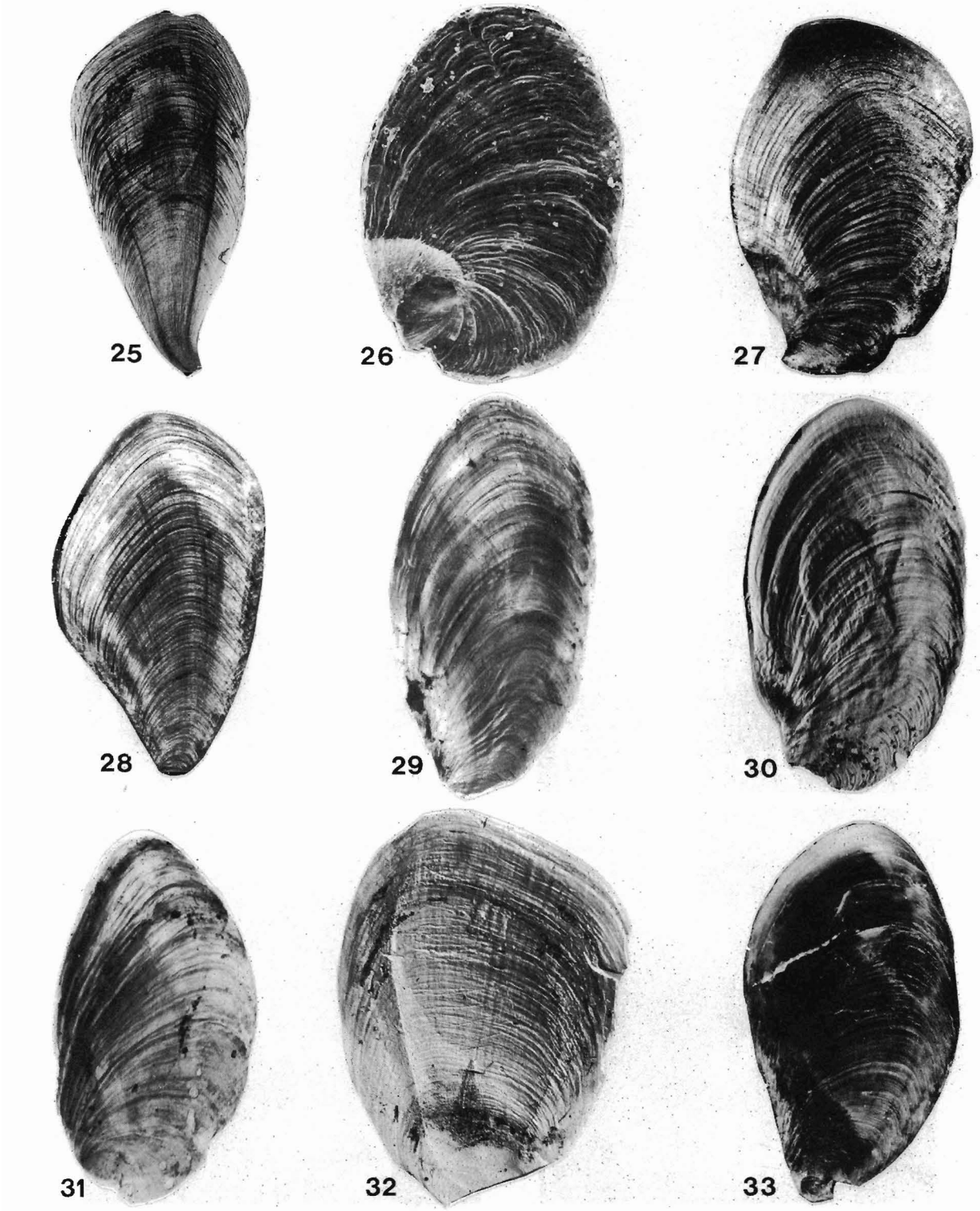



PLANCHE V

FIGS. 25-33. — Opercula. 25, *Thalassoplanes moerchi*, 15.2 mm ; 26, *Pararetifusus tenuis*, 3.9 mm ; 27, *Americominella duartei*, 13.5 mm ; 28, *Bathyancistrolepis trochoideus*, 11.7 mm ; 29, *Eosipho engonia*, 10.0 mm ; 30, *Eosipho aldermenensis* (juv.), 3.1 mm ; 31, *Manaria makassarensis*, 5.3 mm ; 32, *Calliloconcha knudseni*, 5.8 mm ; 33, *Cantharus sowerbyanus*, 9.4 mm.


PLANCHE VI

FIGS. 34-38. — Genera *Bathyancistrolepis, Calliloconcha, Costaria*. 34, *Bathyancistrolepis trochoideus*, holotype, USNM 110494, 19.7 mm ; 35, *B. trochoideus*, 36°59 N, 141°51 E, 960 m (Sagami bay), 27.8 mm ; 36, *Calliloconcha knudseni*, holotype, 19.8 mm ; 37, *Costaria crosnieri*, holotype, 33.8 mm ; 38, *C. crosnieri*,BENTHEDI, st. 87, 24 mm.

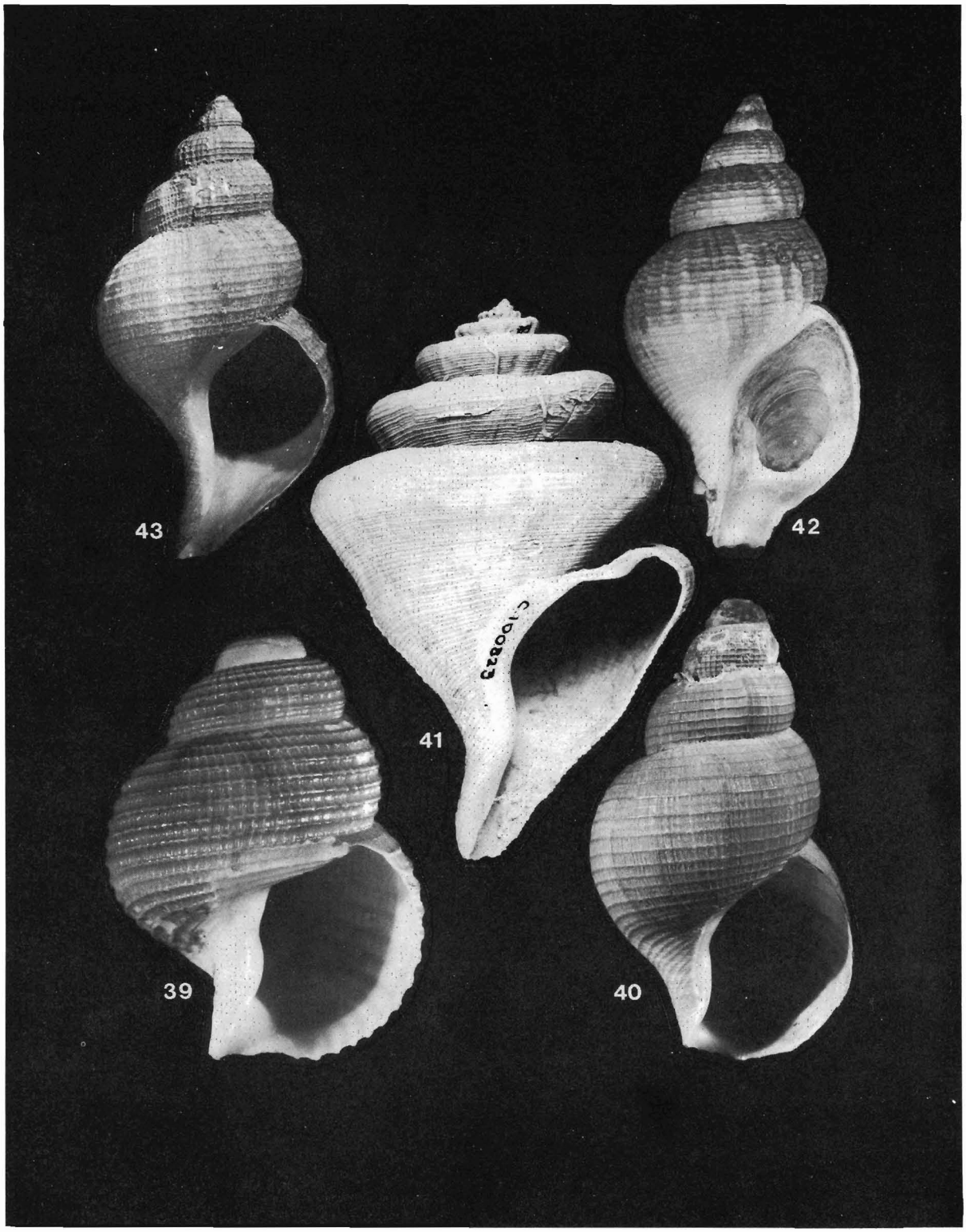



PLANCHE VII

FIGS. 39-43. — Genera *Thalassoplanes, Kapala*. 39, *Thalassoplanes moerchi*, holotype, USNM 110750, 16.3 mm ; 40, *T. moerchi, Galathea*, st. 664, 39.2 mm ; 41, *Kapala kengrahami*, holotype, AMS C100857, 73.3 mm ; 42, *K. bonaespei*, syntype, BMNH 1964.240, 47.4 mm ; 43, *K. bathybius*, holotype, 60.5 mm.

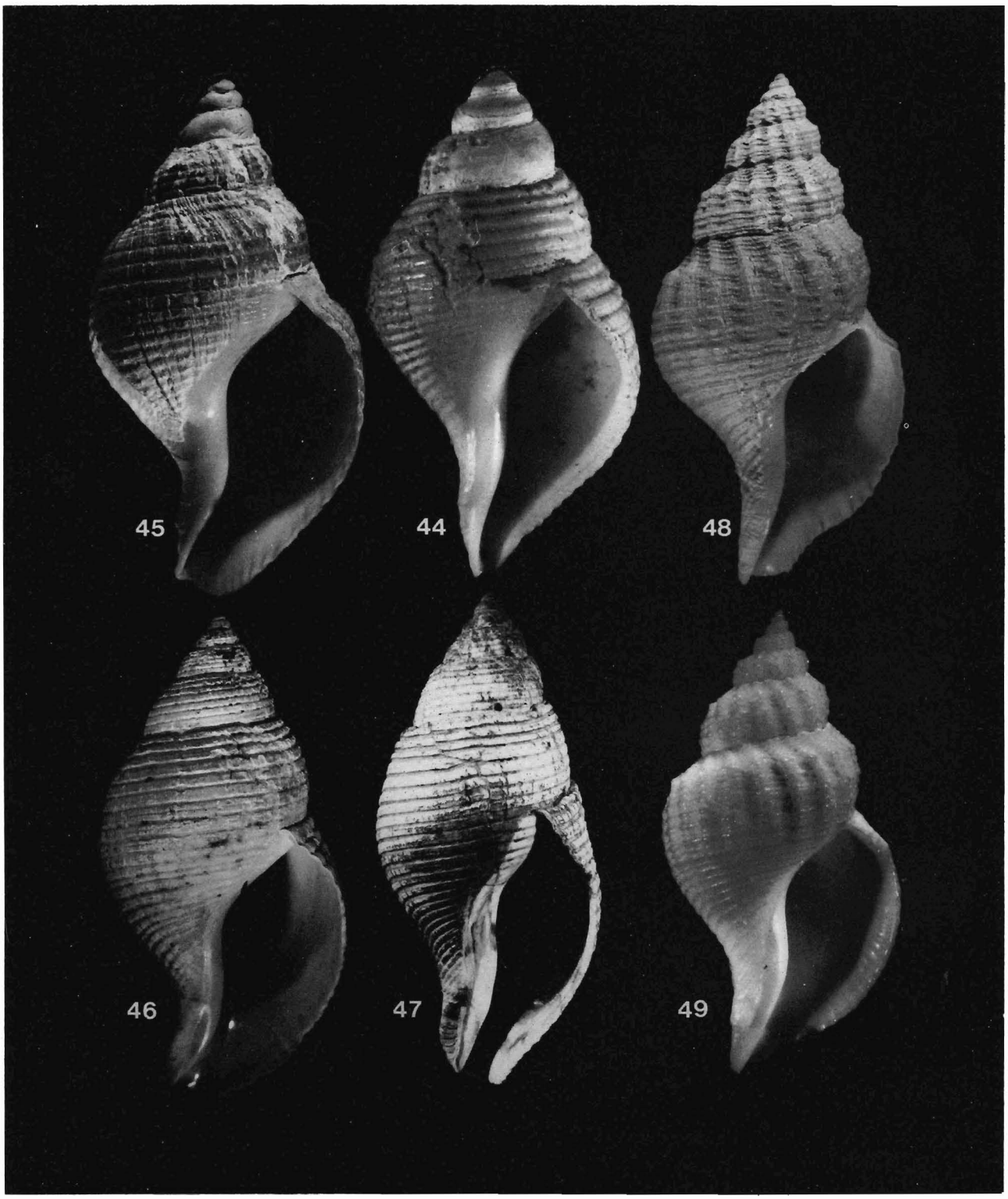



PLANCHE VIII

FIGS. 44-49. — Genus *Eosipho*. 44, *E. smithi*, syntype, ZMA 3.11.027, 20.4 mm ; 45, *E. smithi, Vauban*, st. 131, 35.8 mm ; 46, *E. smithi*, MUSORSTOM II, st. 77, 48.8 mm ; 47, *Neptunea asphaltodes* Beets, holotype, 42.4 mm ; 48, *E. engonia*, holotype, 32.9 mm ; 49, *E. engonia*, baie de la Possession, Réunion, 30.7 mm.

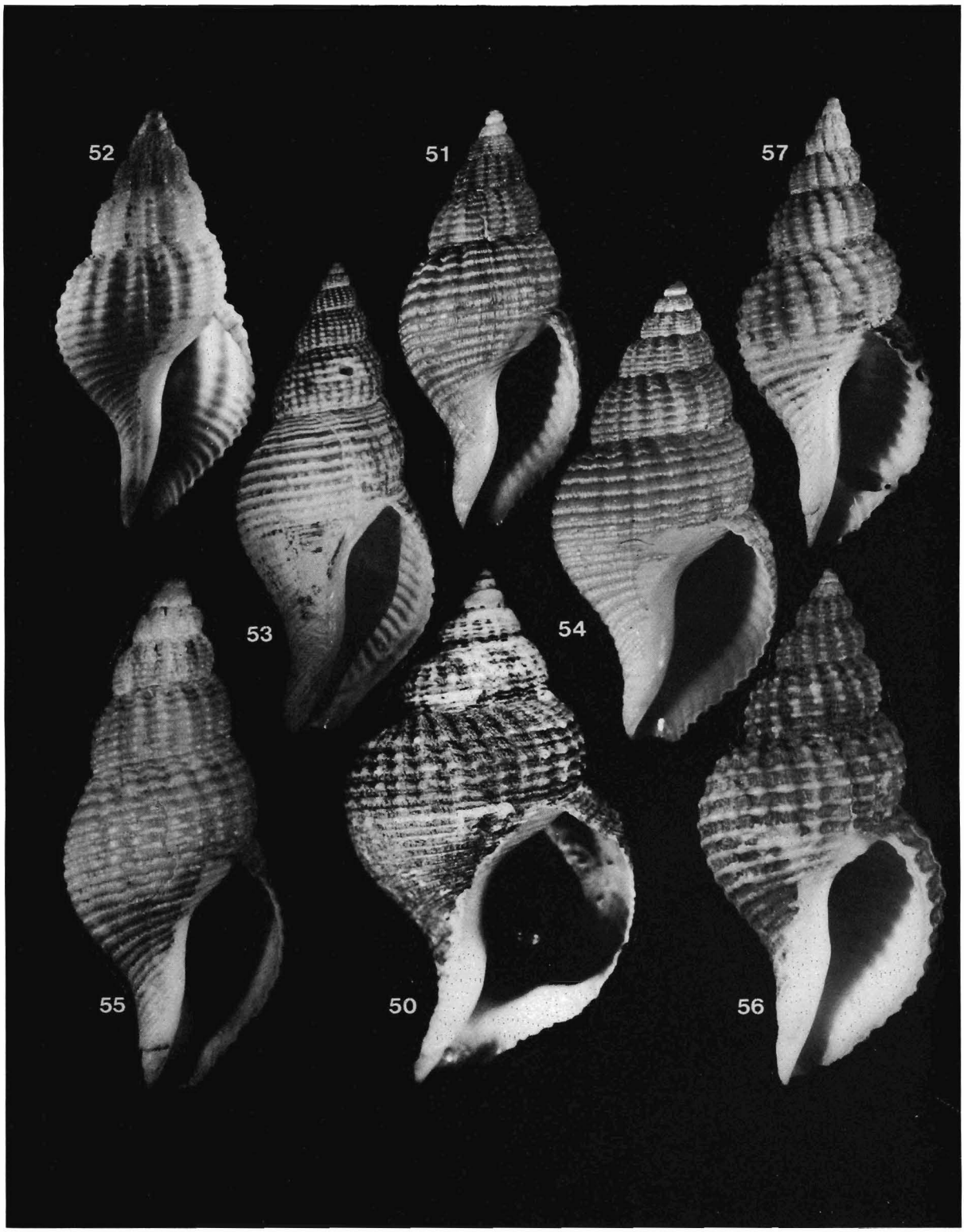



PLANCHE IX

FIGS. 50-57. — Genus *Eosipho*. 50, *E. coriolis*, holotype, 39.0 mm ; 51, *E. aldermenensis*, holotype, 16.6 mm ; 52, *E. aldermenensis, Vauban*, st. 122, 12.6 mm ; 53, *E. aldermenensis, Albatross*, st. 5197, 35.0 mm ; 54, *E. aldermenensis, Albatross*, st. 5621, 14.5 mm ; 55, *E. aldermenensis, Vauban*, st. 91, 24.3 mm ; 56, *E. thorybopus*, holotype, 22.2 mm ; 57, *E. thorybopus, Vauban*, st. 28, 23.3 mm.

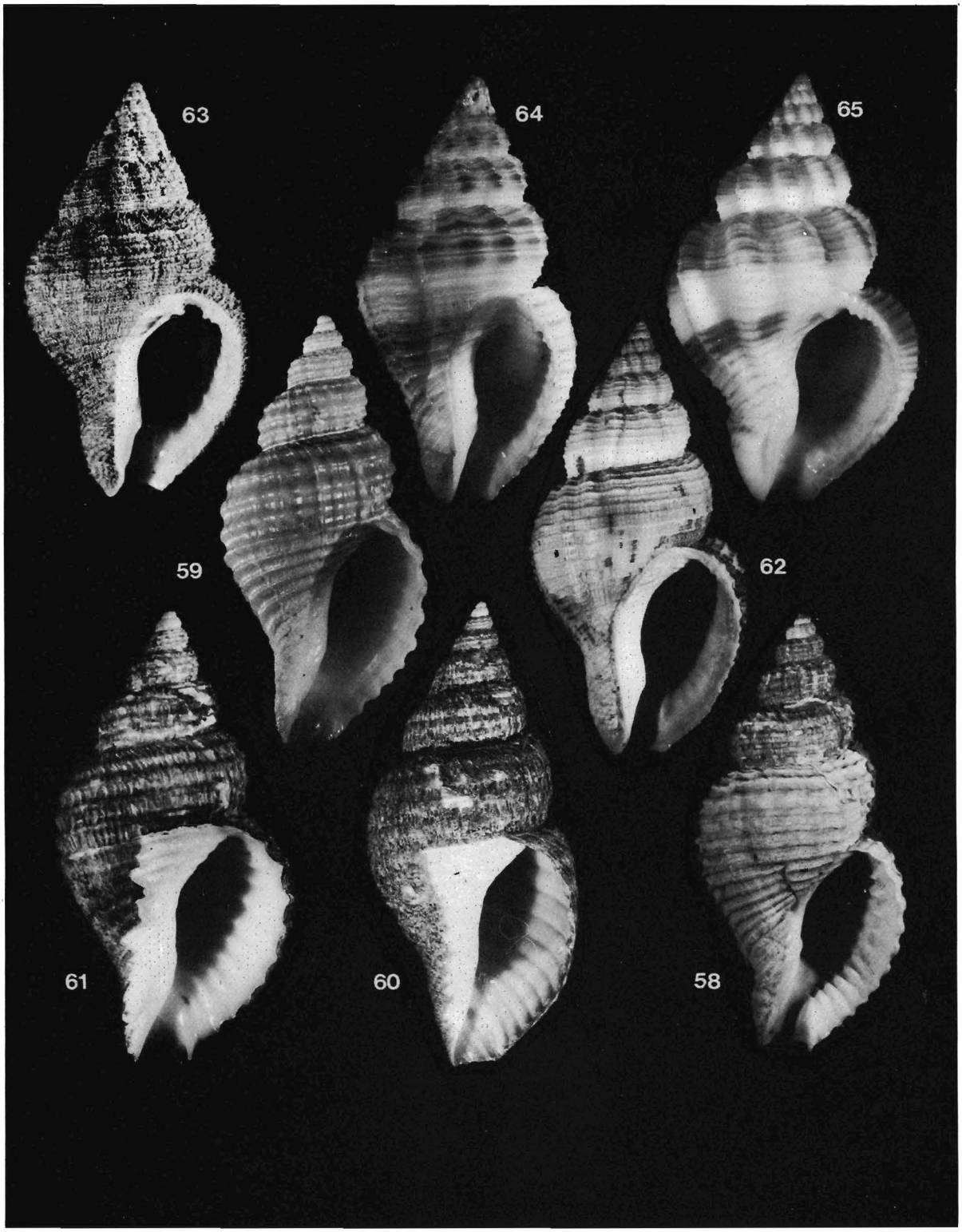



PLANCHE X

FIGS. 58-65. — Genera *Eosipho* and *Cantharus*. 58, *Eosipho dentatus*, holotype, ZMA 3.11.032, 26 mm ; 59, *E. dentatus*, holotype of *Axymene philippinensis*, DMNH 126394, 15.9 mm ; 60, *E. dentatus*, MUSORSTOM I, st. 25, 27.7 mm ; 61, *E. dentatus*, MUSORSTOM II, st. 15, 27.6 mm ; 62, *Cantharus delicatus*, holotype, ZSI M925, 33.8 mm ; 63, *C. delicatus*, MUSORSTOM II, st. 53, 30.0 mm ; 64, *C. delicatus, Vauban*, st. 65, 25.6 mm ; 65, *C. sowerbyanus*, syntype, BMNH 1903.11.20.40-1, 30.3 mm.

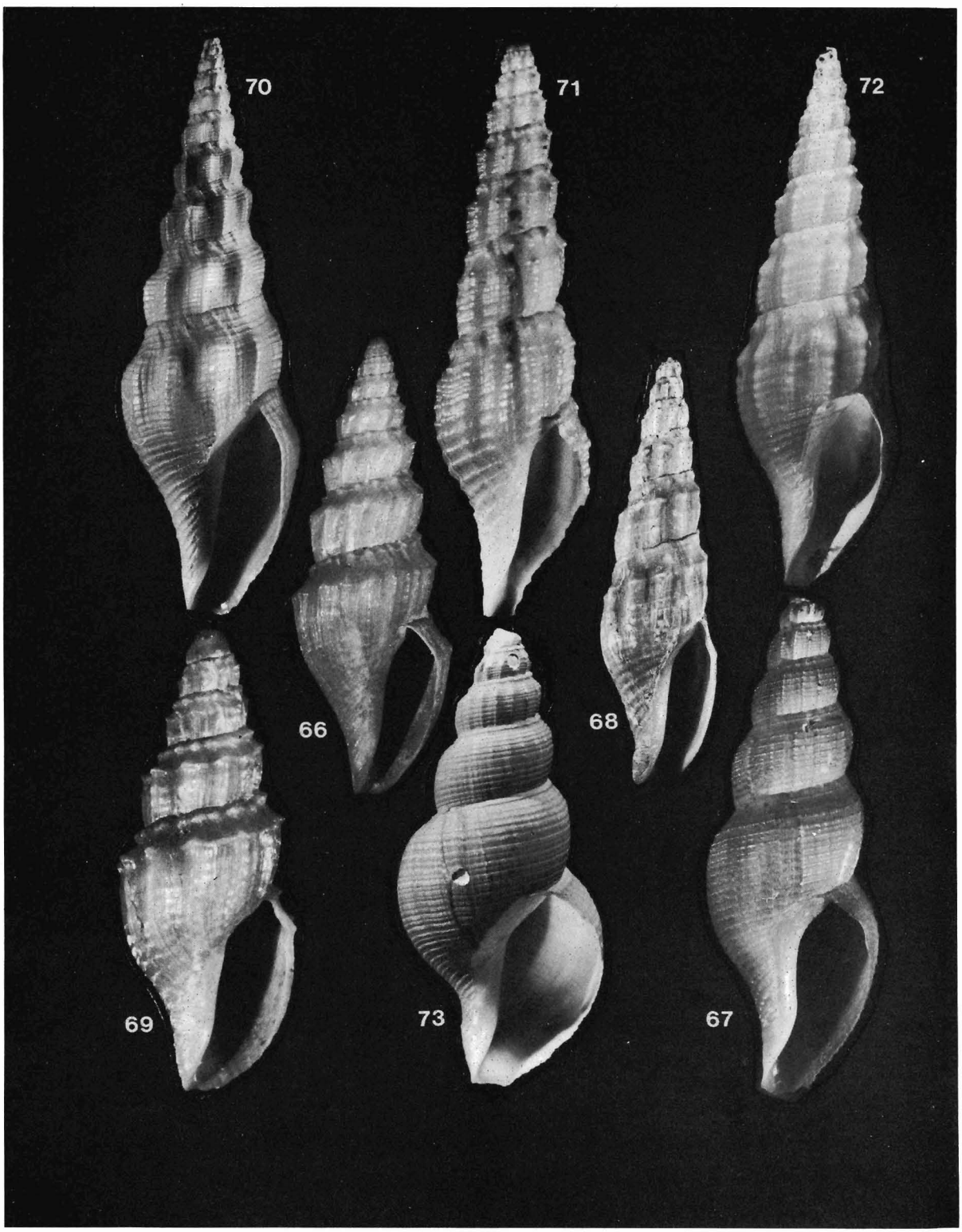



PLANCHE XI

FIGS. 66-73. — Genus *Belomitra*. 66, *B. exsculpta*, holotype, BMNH 1887.2.9.1128, 16.6 mm ; 67, *B. pacifica*, holotype, USNM 122590, 23.1 mm ; 68, *B. pacifica*, syntype, of *Surcula brachytoma, Siboga*, st. 284, 45.8 mm ; 69, *B. pacifica*, holotype of *Mangelia paschalis*, 9.0 mm ; 70, *B. pacifica, Vauban*, st. 135, 45.3 mm ; 71, *B. pacifica*, off New Caledonia, 15.6 mm ; 72, *B. pacifica*, MUSORSTOM II, st. 55, 38.4 mm ; 73, *B. pacifica, Galathea*, st. 176, 38.0 mm.

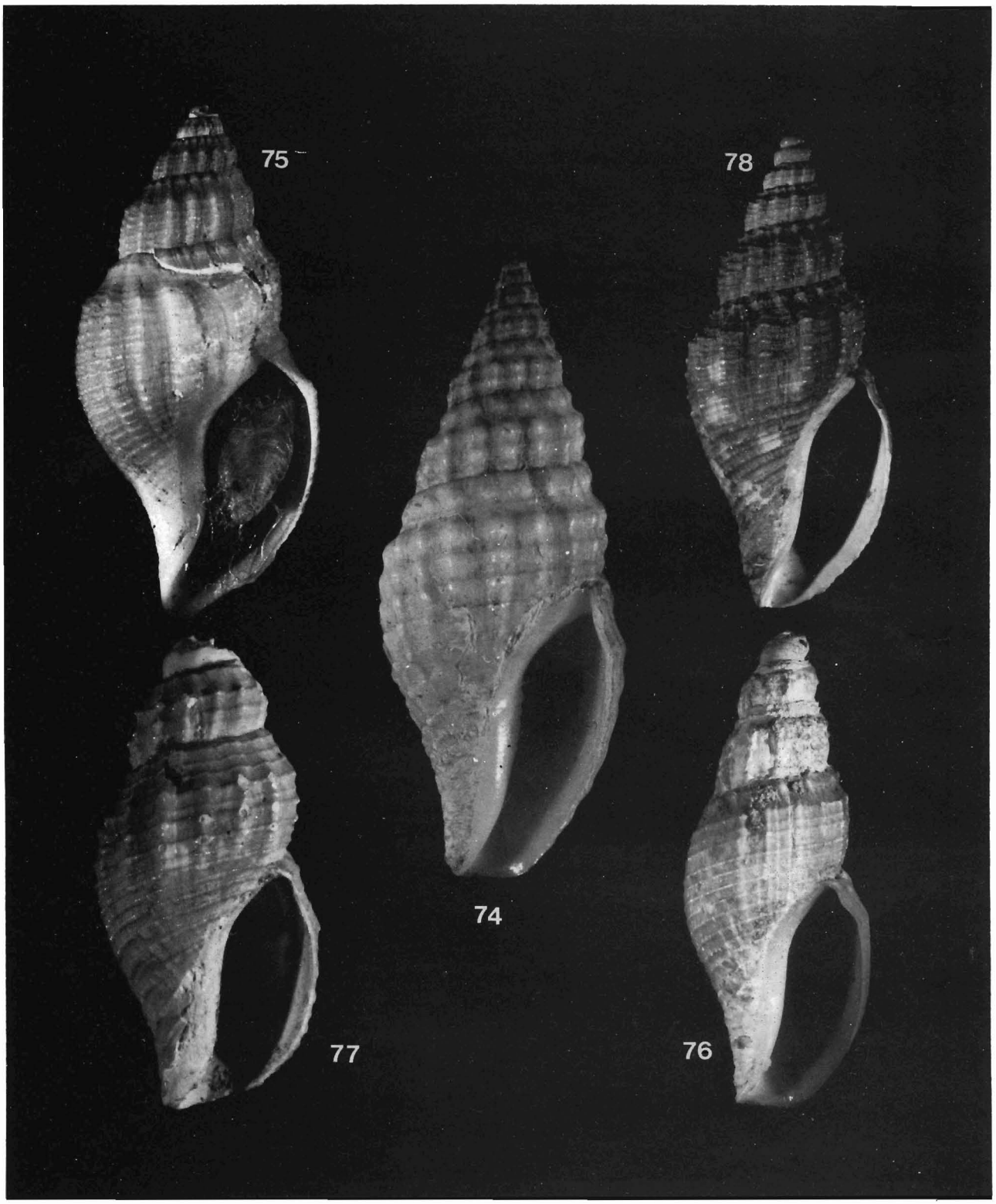



PLANCHE XII

FIGS. 74-78. — Genus *Belomitra*. 74, *B. richardi*, holotype, 27.6 mm ; 75, *B. torquata*, holotype, SAM A9884, 14.6 mm ; 76, *B. climacella*, holotype, USNM 127123, 19.4 mm ; 77, *B. climacella*, holotype of *Antizafra aoteana*, NMNZ M9215, 10.2 mm ; 78, *B. climacella*, holotype of *Waipaoa munida*, NMNZ M21554, 14.4 mm.

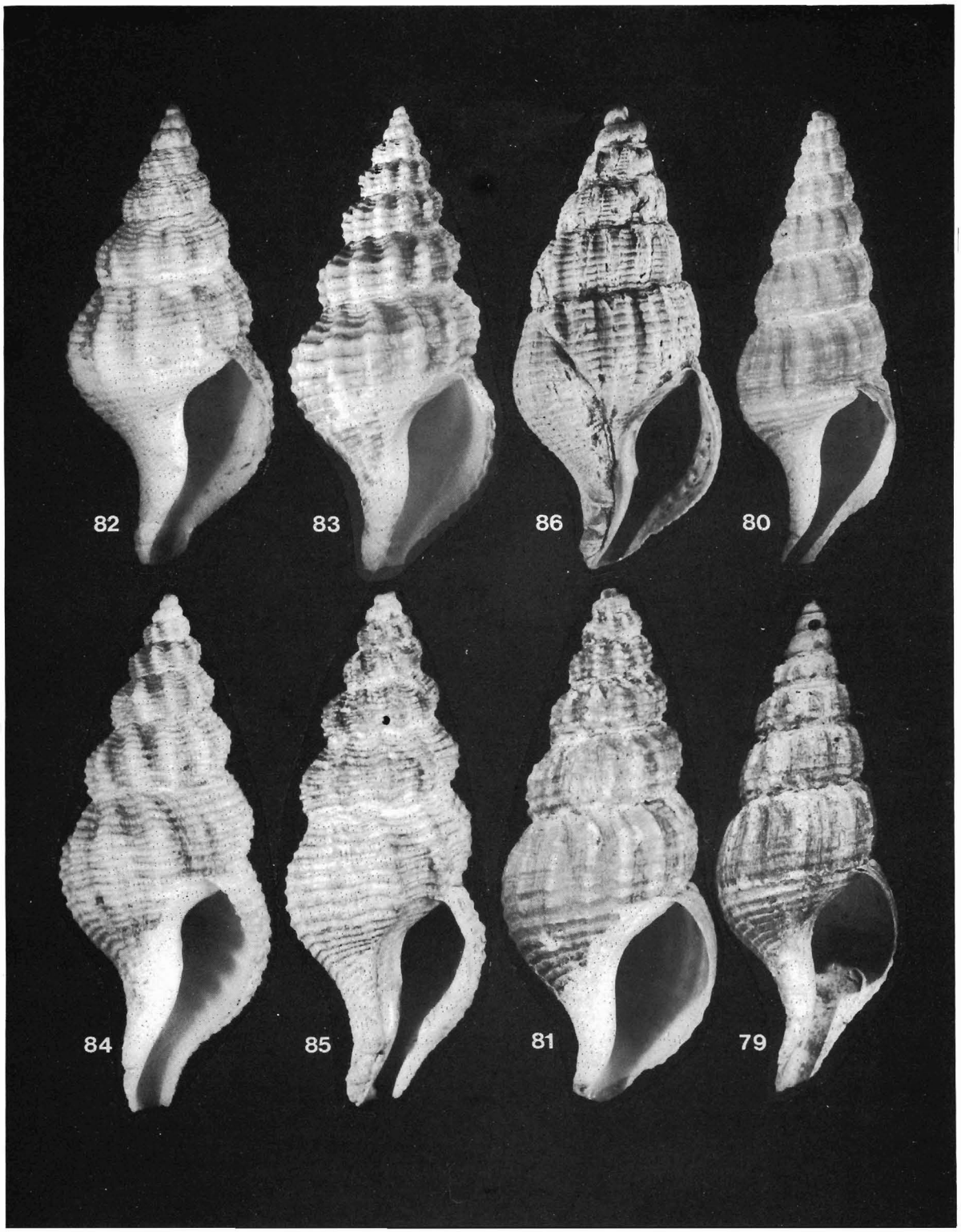



PLANCHE XIII

FIGS. 79-86. — Genus *Manaria*. 79, *M. brevicaudata*, syntype, ZMA 3.11.018, 40.7 mm ; 80, *M. brevicaudata*, syntype, 35.4 mm ; 81, *M. brevicaudata*, MUSORSTOM II, st. 56, 30.8 mm ; 82, *M. lirata*, holotype, NSMT 53362, 22.1 mm ; 83, *M. lirata, Albatross*, st. 5590, 23.1 mm ; 84, *M. lirata*, MUSORSTOM II, st. 75, 20.5 mm ; 85, *M. lirata*, MUSORSTOM II, st. 78, 22.2 mm ; 86, *M. thurstoni*, holotype, Zoological Survey of India, 30.1 mm.

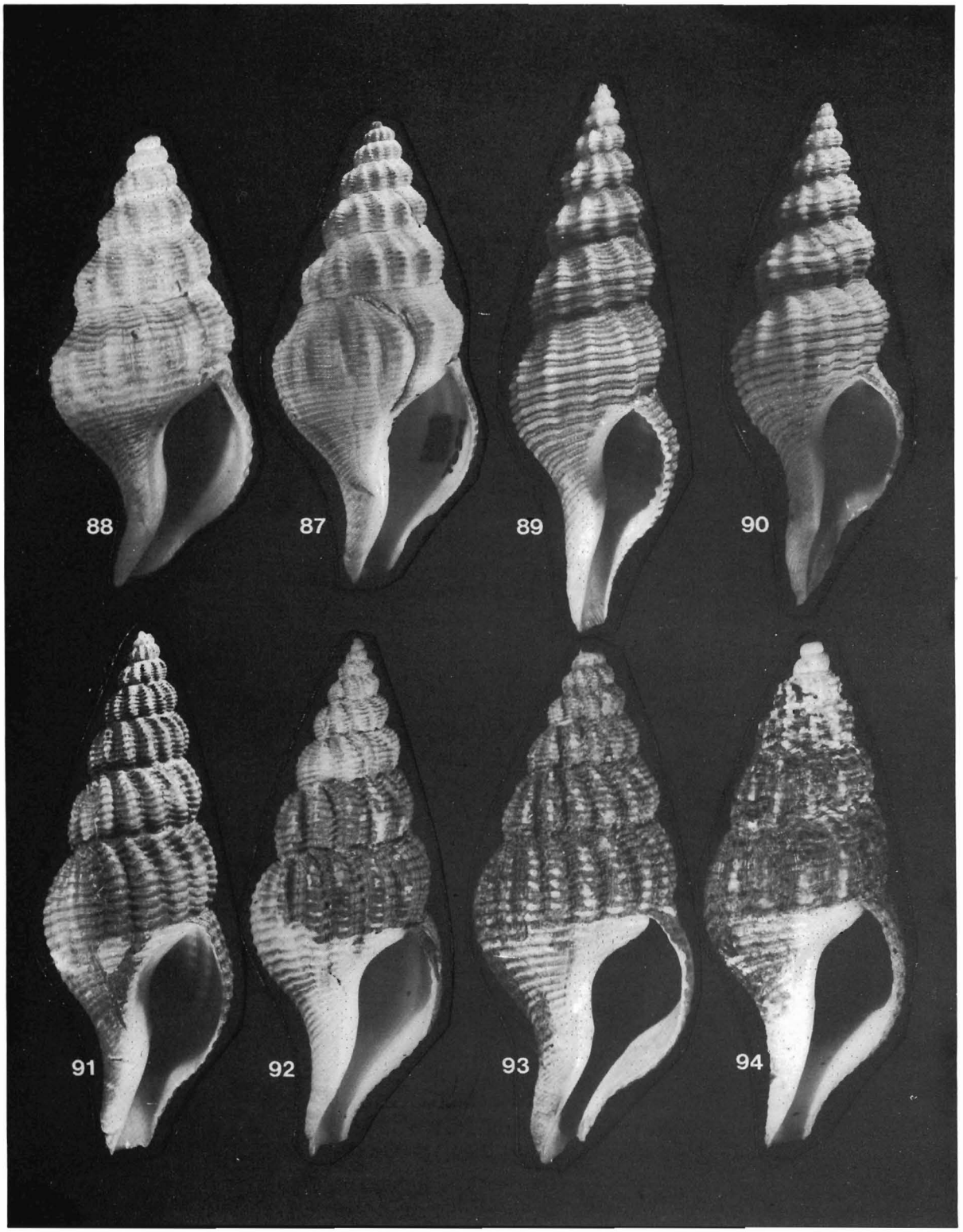



PLANCHE XIV

FIGS. 87-94. — Genus *Manaria*. 87, *M. kuroharai*, paratype, 44.3 mm ; 88, *M. kuroharai*, Tosa bay, 24.7 mm ; 89, *M. formosa*, holotype, 51.0 mm ; 90, *M. formosa, Vauban*, st. 28, 39.8 mm ; 91, *M. clandestina*, holotype, 42.7 mm ; 92, *M. clandestina*, MUSORSTOM II, st. 39, 30.5 mm ; 93, *M. clandestina*, MUSORSTOM II, st. 78, 30.3 mm ; 94, *M. makassarensis*, holotype, 33.0 mm.

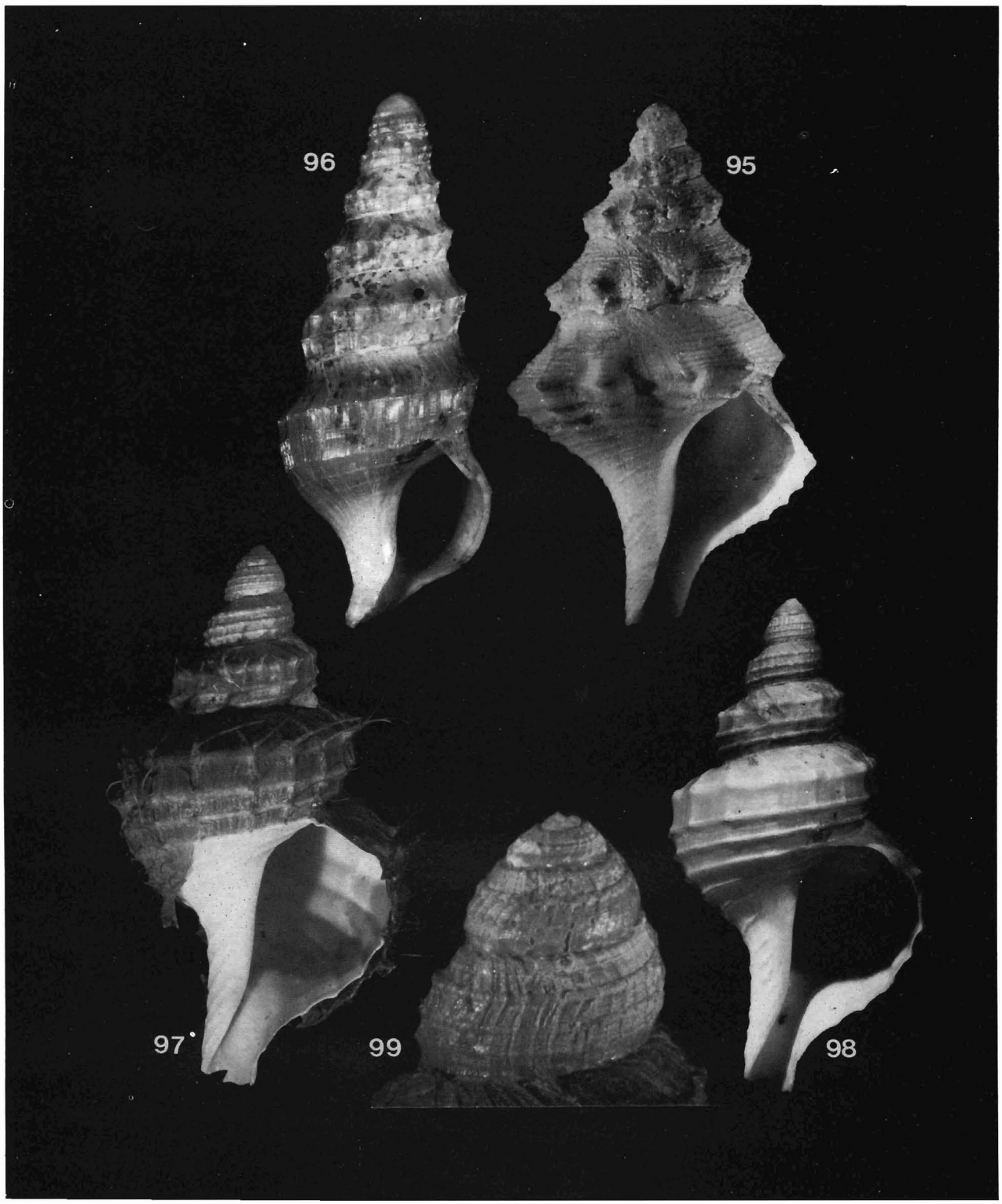



PLANCHE XV

FIGS. 95-99. — Genera *Kryptos, Americominella*. 95, *Kryptos koehleri*, bay of Biscay, 21.8 mm ; 96, *Kryptos tholoides*, holotype, BMNH 1887.2.9.1129, 16.1 mm ; 97, 98, 99, *Americominella duartei*, 41°09 S, 57°05 W, 340-355 m, 44.4 mm.

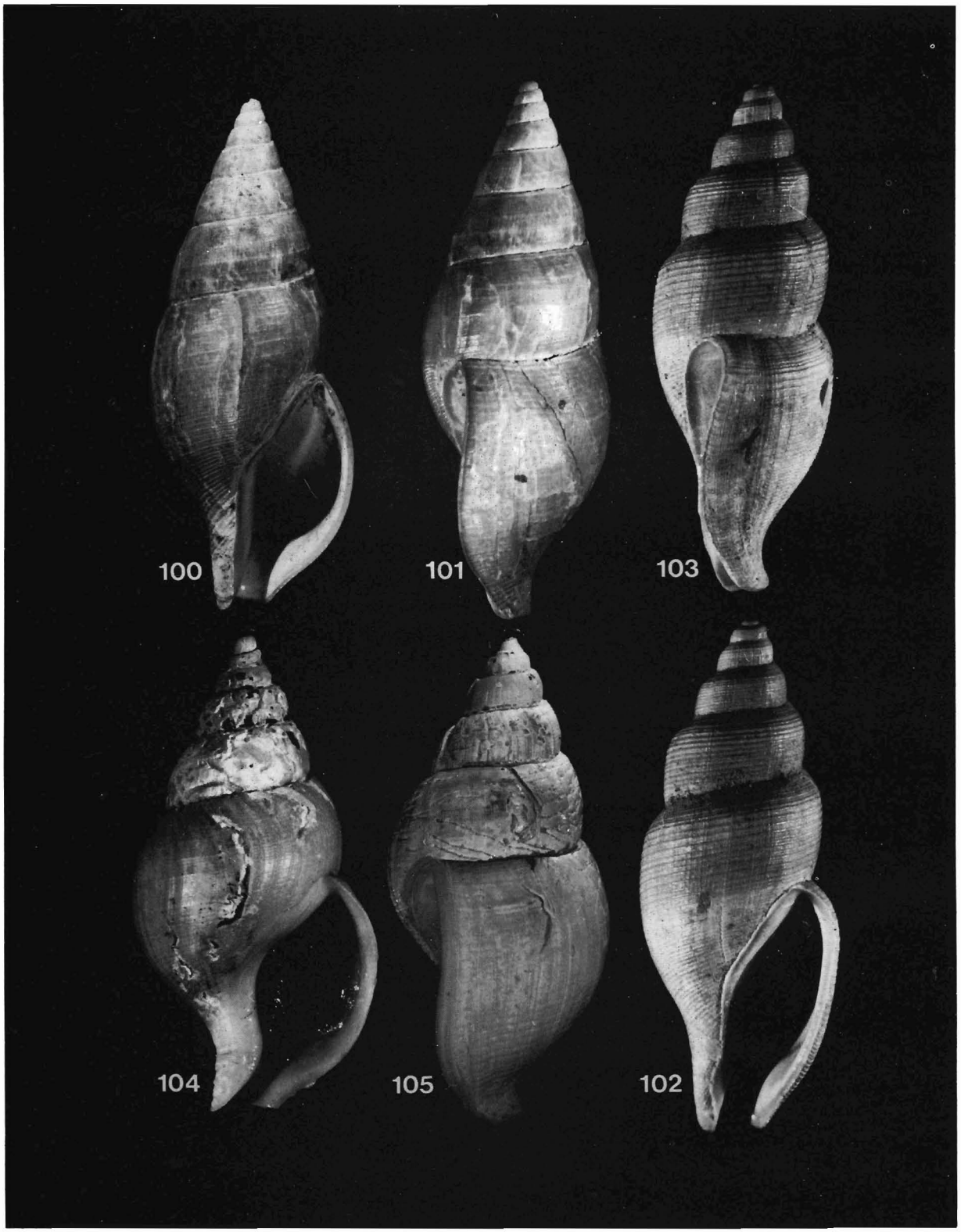



PLANCHE XVI

FIGS. 100-105. — Genera *Kanamarua, Iredalula, Colus*. 100, 101, *Kanamarua adonis*, MUSORSTOM II, st. 82, 32.0 mm ; 102, 103, *Iredalula striata*, 37°46 S, 177°01 E, 72-84 m, NMNZ M60609, 18.1 mm ; 104, 105, *Colus georgianus*, Straits of Georgia, 33.7 mm and 31 mm.

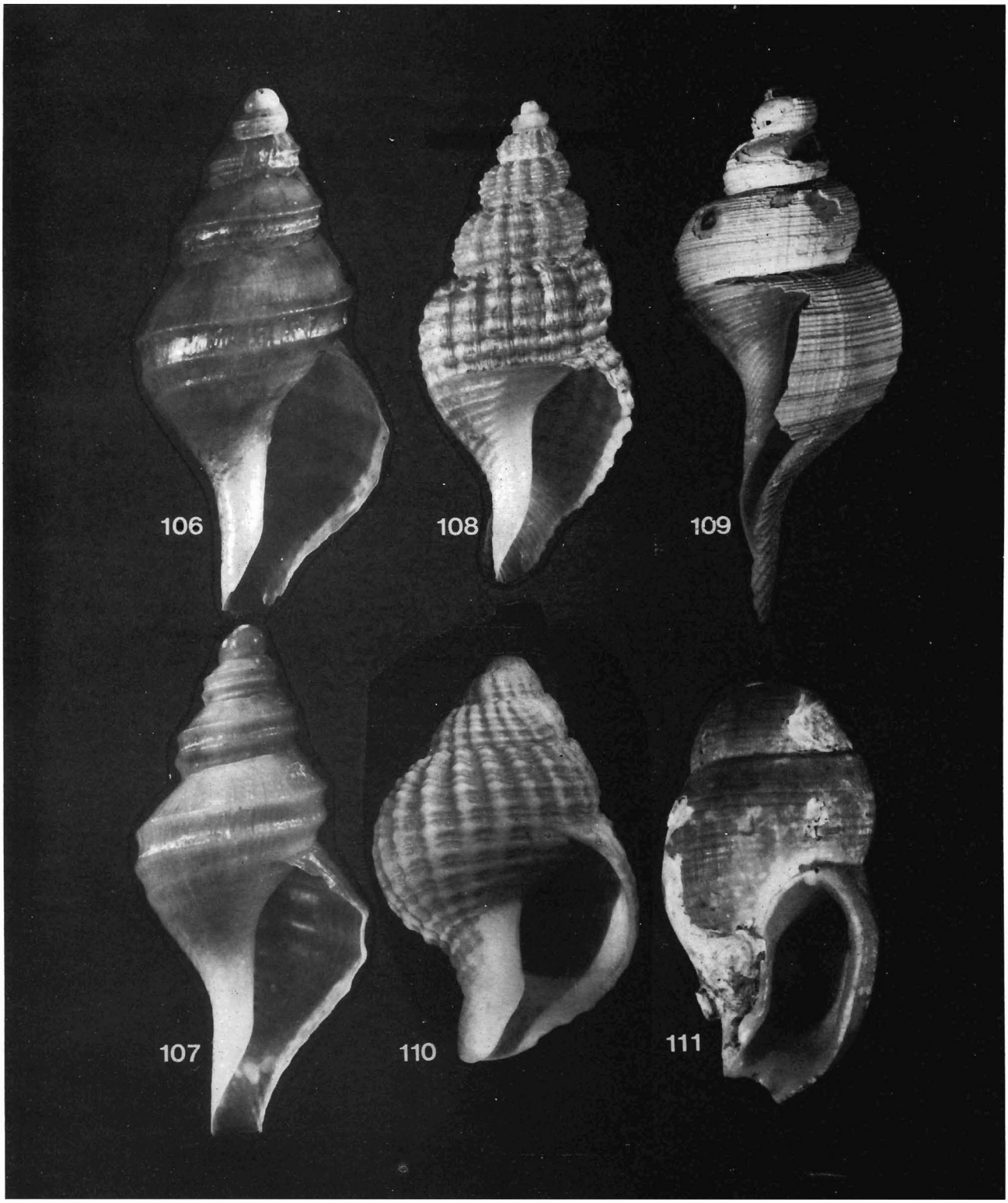



PLANCHE XVII

FIGS. 106-111. — Genera *Pararetifusus, Bayerius* and species of uncertain taxonomic position. 106, 107, *Pararetifusus tenuis*, paratypes, 14.8 mm and 13.9 mm ; 108, *Pararetifusus* sp., CORINDON II, st. 229, 11.6 mm ; 109, *Bayerius fragilissimus*, holotype, USNM 123007, 20.0 mm ; 110, *Liohindsia dimidiata*, holotype, HUJ 32420, 31.3 mm ; 111, *Volutopsius amabilis*, holotype, USNM 123008, 10.7 mm.

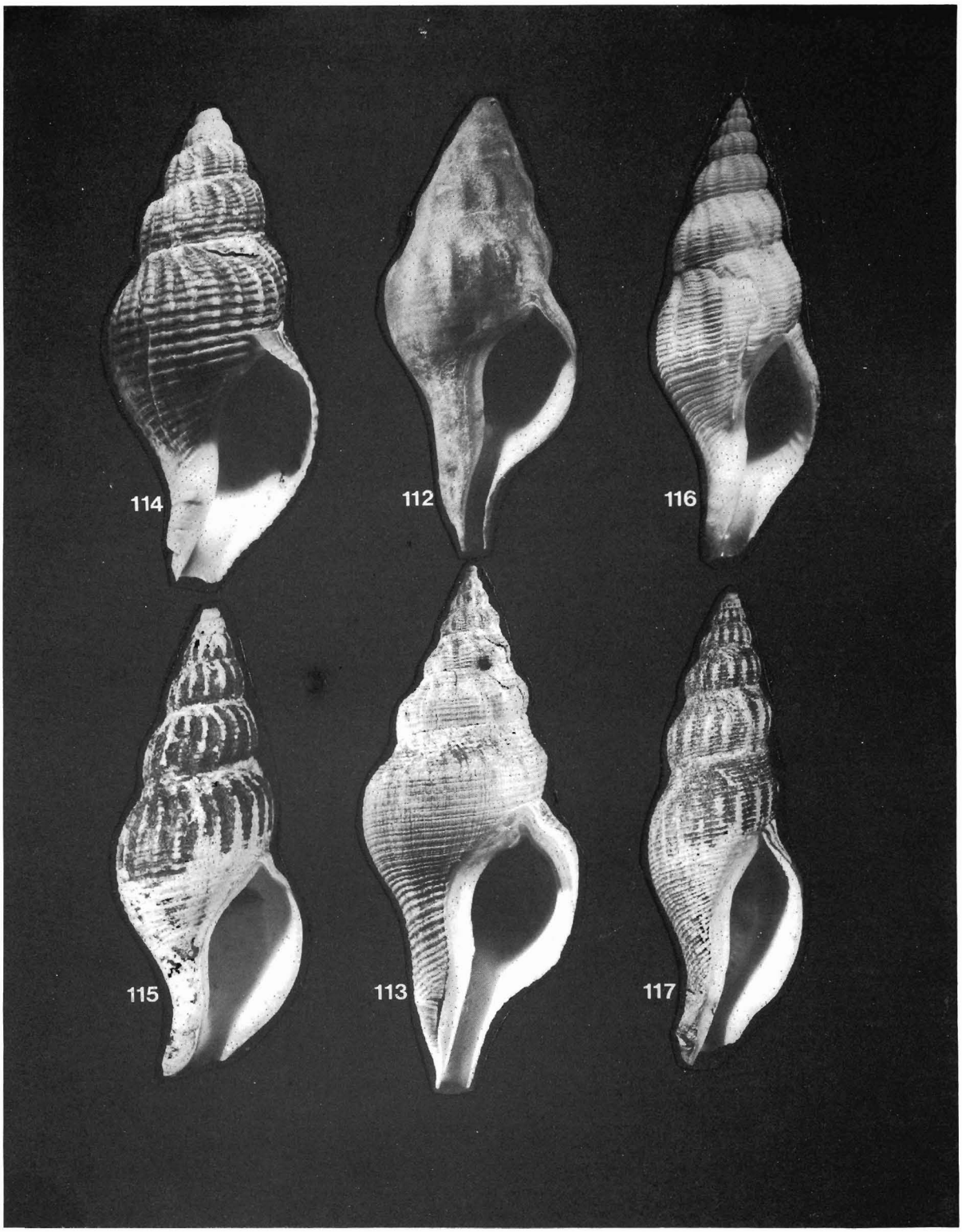



PLANCHE XVIII

FIGS. 112-117. — Genus *Euthriostoma* and species of uncertain taxonomic position. 112, *E. saharica*, syntype, 44.7 mm ; 113, *E. saharica*, 20°08 N, 17°15 W, 300 m, 71.4 mm ; 114, *Buccinum canetae*, holotype, MCZ 145740, 68.5 mm ; 115, *B. canetae*, holotype of *Plicifusus jamarci*, NSMT 60025, 82.2 mm ; 116, *Metula fusiformis*, holotype, MCZ 135290, 49.4 mm ; 117, *M. fusiformis*, holotype of *Buccinofusus surinamensis*, NSMT 60028, 86.4 mm.