

Crustacea Cirripedia Thoracica : MUSORSTOM 3 Philippines collection

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ABSTRACT

Sixty species of thoracican cirripedes representing 8 families and 27 genera are contained in this report. Seven species are new to science : *Calantica graphica*, *Pachylasma arwetergum*, *Acasta alcyonica*, *A. apertura*, *A. coriolis*, *A. perforata* and *Conopea squamosus*.

Twenty one species are new records for the Philippines.

RÉSUMÉ

Crustacea Cirripedia Thoracica : Récoltes faites aux Philippines lors de MUSORSTOM 3.

Soixante espèces appartenant à huit familles et 27 genres sont mentionnées dans ce rapport. Sept sont nouvelles pour la Science : *Calantica graphica*, *Pachylasma arwetergum*, *Acasta alcyonica*, *A. apertura*, *A. coriolis*, *A. perforata* et *Conopea squamosus*. Vingt et une espèces sont signalées, pour la première fois, des Philippines.

INTRODUCTION

Prior to MUSORSTOM Cruises to Philippine waters, about 77 species in 56 genera of Cirripedes were reported from this area (DARWIN, 1851, 1854 ; HOEK, 1883, 1907, 1913 ; PILSBRY, 1907, 1912, 1916 and BROCH, 1922, 1931). Deep sea forms from Philippine and adjacent waters were mainly obtained from the following expeditions : Challenger (1873-1876), Albatross (1893-1906), Siboga (1899-1900) and Dr Th. Mortensen's Pacific Expedition (1914-1916).

The last of these expeditions took place about 60 years ago. Since that time, no major attempts to collect deep sea samples took place, not until 1976.

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Three MUSORSTOM Cruises have been undertaken within Philippine territorial waters, MUSORSTOM 1 (1976), 2 (1980) and 3 (1985). Cirripedes collected by MUSORSTOM 1 numbered 29 species, 13 of which were new records (ROSELL, 1981). MUSORSTOM 2 reported 24 species, 9 of which were new records (ROSELL, 1989). Now MUSORSTOM 3 reports 60 species, 21 of which are new records. Only 6 species are common to all cruises; 6, 7, and 22 species are exclusive for MUSORSTOM 1, 2, and 3 respectively. All in all, MUSORSTOM campaigns have collected 78 species, 43 of which are new records and 12 species are new to science. Of the three expeditions, the third cruise is by far the richest in cirripedes.

The expeditions have greatly enriched our meagre knowledge of the Philippines bathyal barnacles. They have provided significant data concerning the biogeography and bathymetric distributions of the group. One species, *Trianguloscapellum rubrum* (Hoek, 1883), has the Philippines as type locality, and is collected again, 111 years after it was first collected in 1874.

MATERIALS AND METHODS

Materials used in the investigation are of the MUSORSTOM 3 Philippines 1985 collections. Drawings were made using a Camera lucida. Measurements were made using Vernier calipers, a microscope mounted micrometer and a plastic rule.

Internal body parts were dissected under a Stereozoom microscope. Mouth parts, thoracic appendages and dwarf or complemental males, when present were mounted in gum arabic on glass slides. Cover slips were sealed with canada balsam.

Specimens including type specimens, are deposited in the Muséum national d'Histoire Naturelle, Paris, France. Duplicates and some paratypes, wherever available, are deposited in the Invertebrate Museum of the Institute of Biology, College of Science, University of the Philippines, Diliman, Quezon City, Philippines.

LIST OF SPECIES PER STATION

- Station 86. — 31.05.85, 14°00.4'N - 120°17.8'E, southwest of Nasugbu, Batangas, 187-192 m : *Solidobalanus maldivensis*.
- Station 87. — 31.05.85, 14°00.6'N - 120°19.6'E, southwest of Nasugbu, Batangas, 197-191 m : *Chirona tenuis*.
- Station 88. — 31.05.85, 14°00.5'N - 120°17.4'E, southwest of Nasugbu, Batangas, 187 m : *Solidobalanus echinoplaxis*.
- Station 90. — 31.05.85, 14°00.1'N - 120°18.6'E, southwest of Nasugbu, Batangas, 195 m : *Solidobalanus maldivensis*.
- Station 92. — 31.05.85, 14°03.0'N - 120°11.5'E, southwest of Nasugbu, Batangas, 224 m : *Octolasmis hawaiiense*, *Megalasma striatum*, *Poecilasma kaempferi dubium*, *Verruca cookei*, *Chirona tenuis*, *Solidobalanus maldivensis*.
- Station 95. — 01.06.85, 13°55.8'N - 119°59.3'E, north northwest of Lubang Island, 865 m : *Verruca cookei*, *V. sulcata*.
- Station 96. — 01.06.85, 14°00.3'N - 120°17.3'E, southwest of Nasugbu, Batangas, 190-194 m : *Trilasmis eburnea*, *Paralepas nodulosa*, *Verruca cookei*, *Chirona amaryllis*, *Solidobalanus maldivensis*.
- Station 97. — 01.06.85, 14°00.7'N - 120°18.8'E, southwest of Nasugbu, Batangas, 194-189 m : *Megalasma striatum*, *Chirona amaryllis*, *Solidobalanus hawaiiensis*, *S. maldivensis*.
- Station 98. — 01.06.85, 14°00.2'N - 120°17.9'E, southwest of Nasugbu, Batangas, 194-205 m : *Temnaspis excavatum*, *Chirona tenuis*, *Solidobalanus maldivensis*.
- Station 99. — 01.06.85, 14°01.0'N - 120°19.5'E, southwest of Nasugbu, Batangas, 204-196 m : *Trianguloscapellum rubrum*, *Temnaspis excavatum*.

- Station 100. — 01.06.85, 14°00.0'N - 120°17.6'E, southwest of Nasugbu, Batangas, 189-199 m : *Temnaspis excavatum*, *Megalasma striatum*, *Chirona amaryllis*, *Solidobalanus maldivensis*, *Balanus amphitrite amphitrite*.
- Station 101. — 01.06.85, 14°00.15'N - 120°19.25'E, southwest of Nasugbu, Batangas, 196-194 m : *Temnaspis excavatum*, *Megalasma striatum*, *Solidobalanus maldivensis*.
- Station 105. — 01.06.85, 13°52.6'N - 120°29.6'E, west of Calatagan Point, Calatagan, Batangas, 417-398 m : *Chirona amaryllis*.
- Station 106. — 02.06.85, 13°47.0'N - 120°30.3'E, southwest of Calatagan Point, Batangas, 668-640 m : *Annandaleum laccadivicum laccadivicum*, *A. lambda*, *Amigoscalpellum vitreum*, *Trianguloscalpellum balanoides*, *T. regium latidorsum*, *Arcoscalpellum michelottianum*, *Megalasma minus*, *Verruca intexta*, *Balanus amphitrite amphitrite*.
- Station 107. — 02.06.85, 14°01.9'N - 120°27.9'E, west of Nasugbu, Batangas, 115-111 m : *Trilasmis eburnea*, *Solidobalanus maldivensis*.
- Station 108. — 02.06.85, 14°01.1'N - 120°17.9'E, southwest of Nasugbu, Batangas, 195-188 m : *Paracalantica newmani*, *P. rossi*, *Octolasmis orthogonia*, *Heteralepas japonica*, *Solidobalanus hawaiiensis*.
- Station 110. — 02.06.85, 13°59.5'N - 120°18.2'E, southwest of Nasugbu, Batangas, 187-193 m : *Paracalantica newmani*, *Megalasma striatum*, *Solidobalanus auricoma*, *S. maldivensis*, *Conopea squamosa* sp. nov.
- Station 111. — 02.06.85, 14°00.1'N - 120°17.5'E, southwest of Nasugbu, Batangas, 193-205 m : *Paracalantica newmani*, *P. rossi*, *Calantica graphica* sp. nov., *Megalasma striatum*, *Solidobalanus hawaiiensis*, *S. maldivensis*.
- Station 117. — 03.06.85, 12°31.2'N - 120°39.3'E, Mindoro Strait, 92-97 m : *Oxynaspis celata*, *O. indica*, *Acasta coriolis* sp. nov., *A. echinata*, *A. perforata* sp. nov., *A. sculpturata*, *Conopea squamosa* sp. nov., *C. cymbiformis*, *C. calceola*.
- Station 118. — 03.06.85, 11°58.6'N - 121°05.5'E, off southwestern tip of Mindoro Island, 466-448 m : *Catherinum perlongum*.
- Station 120. — 03.06.85, 12°05.6'N - 121°15.6'E, off southern tip of Mindoro Island, 220-219 m : *Abathescapellum fissum*, *Megalasma striatum*, *Verruca intexta*, *Chirona tenuis*.
- Station 121. — 03.06.85, 12°08.3'N - 121°17.3'E, off southeastern tip of Mindoro Island, 84-73 m : *Octolasmis weberi*, *Heteralepas cornuta*.
- Station 122. — 04.06.85, 12°20.0'N - 121°41.6'E, Tablas strait, off southeast of Mindoro Island, 673-675 m : *Smilium acutum*, *Scapellum stearnsii*, *Verum novaezelandiae*, *Octolasmis nierstraszi*, *Megalasma minus*, *Verruca cristallina*.
- Station 124. — 04.06.85, 12°02.6'N - 121°35.3'E, east of Semirara Islet, 123-120 m, *Heteralepas cornuta*, *Pachylasma arwetergum* sp. nov.
- Station 126. — 04.06.85, 11°49.2'N - 121°22.1'E, west northwest of Panay Island, 266 m : *Verum candidum*, *Oxynaspis indica*, *Hexelasma velutinum*, *Conopea dentifer*.
- Station 128. — 05.06.85, 11°49.7'N - 121°41.2'E, northwest of Pucio Point, northwestern Panay Island, 821-815 m : *Megalasma gracile*, *Verruca intexta*, *Balanus amphitrite amphitrite*.
- Station 131. — 05.06.85, 11°36.6'N - 121°43.0'E, 120-122 m : *Chirona tenuis*, *Acasta apertura* sp. nov.
- Station 132. — 05.06.85, 11°35.6'N - 121°45.5'E, northwest of Culasi, Antique, Panay Island, 430 m : *Megalasma minus*, *Balanus amphitrite amphitrite*.
- Station 133. — 05.06.85, 11°57.8'N - 121°52.2'E, west of Boracay Islet, northwestern Panay Island, 390-334 m : *Trianguloscalpellum balanoides*, *Megalasma minus*, *Verruca intexta*, *Solidobalanus maldivensis*.
- Station 134. — 05.06.85, 12°01.1'N - 121°57.3'E, off southeastern tip of Carabao Islet, northwestern Panay Island, 92-95 m : *Calantica trispinosa*, *Oxynaspis celata*, *O. connectens*, *Acasta alcyonica* sp. nov., *Conopea calceola*, *C. cymbiformis*, *C. dentifer*, *C. granulata*, *Balanus minutus*.
- Station 135. — 05.06.85, 11°58.6'N - 122°01.8'E, east of Boracay Islet, Panay Island, 551-486 m : *Trianguloscalpellum rubrum*, *Arcoscalpellum foresti*, *Megalasma minus*, *Verruca intexta*, *Chirona tenuis*.
- Station 138. — 06.06.85, 11°53.8'N - 122°15'E, north of Makato, Capiz, Panay Island, 252-370 m : *Trianguloscalpellum rubrum*, *Trilasmis eburnea*, *Megalasma striatum*, *Verruca intexta*.

- Station 139. — 06.06.85, 11°52.9'N - 122°14.7'E, north of Makato, Capiz, Panay Island, 240-267 m : *Trianguloscalpellum balanoides*, *T. rubrum*, *Trilasmis eburnea*, *Megalasma striatum*, *Paralepas scutiger*, *Verruca intexta*.
- Station 141. — 06.06.85, 11°44.6'N - 122°44.1'E, north of Roxas City, Capiz, Panay Island, 44-40 m : *Megalasma striatum*, *Verruca intexta*, *Balanus amphitrite amphitrite*.
- Station 142. — 06.06.85, 11°47'N - 123°01.5'E, southwest of Jintotolo Islet, Palanduta, southwest Masbate Island, 27-26 m : *Conopea dentifer*, *Balanus minutus*.
- Station 143. — 07.06.85, 11°28.3'N - 124°11.6'E, northwest of San Isidro, Leyte, 214-205 m : *Megalasma striatum*, *Solidobalanus maldivensis*.
- Station 145. — 07.06.85, 11°01.6'N - 124°04.2'E, off Borbon, Cebu, 214-246 m : *Octolasmis orthogonia*, *Trilasmis eburnea*, *Megalasma striatum*, *Solidobalanus maldivensis*, *Balanus amphitrite amphitrite*.

SYSTEMATIC ACCOUNT

Order THORACICA Darwin, 1854

Suborder LEPADOMORPHA Pilsbry, 1916

Family SCALPELLIDAE Pilsbry, 1916

Subfamily CALANTICINAE Zevina, 1978

Genus *PARACALANTICA* (Utinomi, 1949)

DIAGNOSIS. — Capitulum of hermaphrodite with 11 valves arranged in two rows. Upper row composed of paired scuta and terga and a carina ; tergum occupying space between scutum and carina. Lower row consisting of 2 pairs of latera, a rostrum, and a subcarina. Scutum with subcentral umbone, remaining plates with apical umbones. Peduncle small, with imbricating scales. Caudal appendage uniarticulate. Complemental male with 6 plates and short stalk.

Type species : *P. ikedai* (Utinomi 1949).

Paracalantica newmani (Rosell, 1981)

Calantica (*Paracalantica*) *newmani* Rosell, 1981 : 281, pl. 2, figs a-b, pl. 3, figs c-e.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn 108, 195-188 m : 6 specimens attached to antipatharian (MNHN-Ci 1951). — Stn 110, 187-193 m : 1 specimen on antipatharian (MNHN-Ci 1952). — Stn 111, 193-205 m : 2 specimens on antipatharian (MNHN-Ci 1954).

The present material is similar to that described in the MUSORSTOM I report (ROSELL, 1981) and nothing can be added to the previous description.

DISTRIBUTION. — Philippines, 184-205 m.

Paracalantica rossi (Rosell, 1981)

Calantica (*Paracalantica*) *rossi* Rosell, 1981 : 284, pl. 2, figs p-v.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn 108, 195-188 m : 2 specimens on antipatharian (MNHN-Ci 1956). — Stn 111, 193-205 m : 2 specimens on antipatharian (MNHN-Ci 1955).

The present material closely resembles the type material and nothing can be added to the previous description.

DISTRIBUTION. — Philippines, 184-205 m.

Genus *CALANTICA* Gray, 1825

DIAGNOSIS. — Capitulum with 2 rows of plates, all with apical umbones. Plates in the lower row small, 3 pairs of laterals, a rostrum and a subcarina. Peduncle scales small. Caudal appendage uniarticulate. Males usually with 6 plates.

Type species : *C. homii* Gray, 1825 (= *Pollicipes villosa* Leach).

Calantica graphica sp. nov.

Figs 3 b-d, 8 a-e

MATERIAL EXAMINED. — Philippines. MUSORSTOM 3 : stn 111, 193-205 m : 2 specimens attached to antipatharian together with *Solidobalanus hawaiiensis*.

TYPES. — Holotype : MNHN-Ci 2011; Paratype : MNHN-Ci 2011a.

DIAGNOSIS. — Scuta, terga and carina approximate; scutum more or less transparent, adductor muscle attachment discernible externally; tergum with irregularly shaped chalky-white markings; carina thick and robust, long, almost reaching apex of tergum; maxilla I notched on its frontal margin; mandible with 3 teeth, margins between teeth pectinated; caudal appendage uniarticulate; complemental male with capitulum and peduncle.

DESCRIPTION. — Total length of hermaphrodite (holotype) 10.5 mm, capitulum 7.5 mm; paratype, 11.6 mm, capitulum 7.2 mm, with developping nauplii in mantle cavity.

Capitulum ovate (fig. 3 b) with 13 approximate valves consisting of 2 whorls. Valves of upper whorl larger, consisting of scuta, terga and a carina; terga occupying space between scuta and carina; valves of lower whorl much smaller, consisting of paired median latera, rostral latera and carinal latera, unpaired rostrum and subcarina (fig. 3 c-d).

Scutum triangular, apex light crimson red, rest faintly tinted with similar color, umbo apical; tergum subtriangular, umbo apical; carina evenly bent, thick, tapering, umbo apical; carinal latera sickle-shaped, apex overlapping subcarina; subcarina small, apex slightly upwardly curving; rostrum small, more or less perpendicular to main axis, partly concealed by inwardly curving apex of rostral latera (fig. 3 d).

Peduncle shorter than capitulum, armed with small digitiform scales.

Labrum not bullate, tongue-shaped, margin with fine hairs; crest with a broad saddle-shaped notch supporting numerous triangular denticles (fig. 8 d). Palpus transversely pointed, upper margin and outer surface setose. Mandible (fig. 8 a) with 3 sharp teeth, margins between teeth serrulate; inferior angle rounded and pectinated. Maxilla I (fig. 8 b) notched, upper margin supporting a single large seta and 2 smaller ones, inferior margin straight or faintly convex, supporting numerous moderate sized setae with a single large seta about 1/3 of margin from inferior angle.

Cirri I-VI with pinnate setae; chaetotaxy of cirri II-VI ctenopod, intermediate segments bearing 4-5 pairs of subequal setae with spinules between bases; few short setae present on postero-distal angle of each segment.

Number of segments in their rami (upper numeral anterior ramus and upper row right appendages). Paratype :

	I	II	III	IV	V	VI
R. ant./post.	9/11	13/15	13/15	16/15	15/16	16/14
L. ant./post.	8/10	10/13	14/12	16/15	15/16	15/13

Caudal appendage uniarticulate, apical and inner margins hirsute. Penis short, gradually tapering, annulated, moderately setose. No basidorsal point (fig. 8 c).

Complemental male (fig. 8 e) more or less differentiated into capitulum and peduncle. Capitulum with paired terga and scuta, and unpaired rostrum and carina.

ETYMOLOGY. — The specific name is derived from the chalky-white irregularly shaped figures on the terga.

REMARKS. — This species is distinguished by the approximated valves and ovate shaped capitulum. Of the 13 *Calantica* species (ZEVINA, 1981) the present form comes closest to *C. eos* (Pilsbry, 1907) with regard to the shape of the capitulum (in ZEVINA, 1981 : 66, textfig. 39), while maxilla 1 is closest to *C. affinis* Broch, 1922, and its pinnate setae as in *C. pusilla* Utinomi, 1970. The mandible is not comparable to any of the known *Calantica* species.

Calantica trispinosa (Hoek, 1883)

Scalpellum trispinosum Hoek, 1883 : 72, pl. 6, figs 15, 16; 1907 : 54.

Scalpellum (Smilium) trispinosum - CALMAN, 1918 : 98.

Scalpellum (Calantica) trispinosa - WELTNER, 1922 : 102, pl. 3, fig. 4.

Calantica trispinosa - PILSBRY, 1908 : 106. — BROCH, 1931 : 2. — ROSELL, 1989 : 260, pl. 4, fig. g, pl. 10, fig. f.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 134, 92-95 m : 1 specimen attached to a small piece of terrestrial plant matter (MNHN-Ci 1901).

DISTRIBUTION. — West Pacific, from Java Sea (CALMAN, 1918) to the Philippines, the type locality (HOEK, 1883; PILSBRY, 1908), northward to Sagami Bay, Japan (WELTNER, 1922), 56-220 m.

Genus *SMILIUM* Gray, 1825

DIAGNOSIS. — Capitulum with 13 or 9 valves by loss of rostrolaterals and carinolaterals or 15 valves by addition of a submedian latus; upper latus apparently interposed between scuta and carina.

Type species : *S. peronii* Gray, 1825.

Smilium acutum (Hoek, 1883)

Scalpellum acutum Hoek, 1883 : 80, pl. 3, fig. 19, pl. 18, fig. 12; 1907 : 64, pl. 7, fig. 1. — NILSSON-CANTELL, 1921 : 170, textfig. 23.

Scalpellum (Smilium) acutum - ANNANDALE, 1910b : 154. — CALMAN, 1918 : 101.

Smilium acutum - BROCH, 1922 : 234, textfig. 5. — UTINOMI, 1958 : 283. — NEWMAN & ROSS, 1971 : 38, pl. 5 F, textfig. 12. — FOSTER, 1978 : 51, pl. 6 F, fig. 30; 1980 : 524. — ROSELL, 1989 : 19, pl. 4, figs h-j, pl. 5, figs d-e.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 122, 673-675 m : 1 specimen attached to a hydroid together with *Octolasmis nierstraszi* (MNHN-Ci 1973).

DISTRIBUTION. — Atlantic Ocean, off Azores (HOEK, 1883) and Cape Verde (CALMAN, 1918), Indian Ocean, off Kermadec Islands (NILSSON-CANTELL, 1921) and northward to the Philippines (ROSELL, 1989) then to Sagami Bay, Japan (NILSSON-CANTELL, 1921), 225-2194 m.

Subfamily SCALPELLINAE Pilsbry, 1907

Genus *SCALPELLUM* Leach, 1817

DIAGNOSIS. — Capitulum of female armed with 14 fully or partially calcified plates; carina angularly flexed at umbo, or rarely simply bowed with umbo subapical to apical; tergum normal or forked, with umbo apical; scutum with umbo apical, or removed from apex along occludent margin; caudal appendages commonly uniarticulate; dwarf males sack-like, not divided into capitulum and peduncle, with or without 4 rudimentary calcareous plates.

Type species : *Lepas scalpellum* Linné, 1767.

Scalpellum stearnsi Pilsbry, 1890

References. See ROSELL, 1981 : 279.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn 122, 673-675 m : 2 specimens attached to a crab; each with a *Megalasma minus*, attached to the scutum in one and to the rostral latus in the other (MNHN-Ci 1974).

The present form is similar to var. *genina* (Hoek, 1907).

DISTRIBUTION. — Indo-Pacific from off Nicobar Islands east to off Celebes and northward to the Philippines, then to Sagami Bay, Japan, 146-2048 m.

Subfamily MEROSCALPELLINAE Zevina, 1978

Genus *ABATHESCALPELLUM* Newman & Ross, 1971

DIAGNOSIS. — Capitulum of adult female with 14 modified or reduced calcified plates; tergum not forked basally; scutum with short apicolateral arm, about 1/3 length of tergal margin, and with broad, shallow notch in basal margin; upper latus bifid, with long and broad depending arm; carinal latus higher than wide and umbo at basicarinal angle; inframedian latus wider than high, slightly hollowed out apically, and umbo basal; rostral latus about as high as wide; caudal appendage short, with less than 3 fused segments.

Type species : *Scalpellum koreanum* Hiro, 1933.

Abathescalpellum fissum (Hoek, 1907)

Fig. 1 j

Scalpellum fissum Hoek, 1907 : 116, pl. 9, figs 1, 2.

Abathescalpellum fissum - ZEVINA, 1981 : 142, fig. 100.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn 120, 219-220 m : 1 specimen on a tubularian stem (MNHN-Ci 1891).

Capitulum with 14 valves; rostrum very small but distinctive between umbones of rostral latera, though HOEK (1907) reported there are only 13 valves.

Inframedian wineglass-shaped; upper latera with fissure or bifid. There is no doubt the present material is of the same species as that of HOEK (*loc. cit.*). The size approximates HOEK's species whose total length is 9.5 mm, capitulum 6.5 mm, whereas total length of present specimen is 9 mm. Capitulum 6 mm.

DISTRIBUTION. — Off Celebes and northward to the Philippines, 219-472 m.

This is a new record for the Philippines.

Genus *ANNANDALEUM* Newman & Ross, 1971

DIAGNOSIS. — Capitulum of female with 14 partially calcified plates; tergum in shape of inverted V, scutum with moderately long apicolateral arm about 1/4 to 1/2 length of tergal margin; basal margin of scutum entire; upper latus pentagonal to triangular or subrectangular, with or without short depending arm; carinal latus as high as or slightly higher than wide, umbo at basicarinal angle; inframedian latus higher than wide, vase-shaped, umbo submedial to basal; rostral latus wider than high and commonly less than twice the height of inframedian latus; caudal appendage relatively long, with 5-11 segments.

Type species : *Scalpellum subflavum* Annandale, 1906.

Annandaleum laccadivicum laccadivicum (Annandale, 1906)

Fig. 1 a

Scalpellum laccadivicum Annandale, 1906a : 393.

Scalpellum subflavum Annandale, 1906b : 143.

Scalpellum polymorphum Hoek, 1907 : 80, pl. 7, figs 9-12. — WELTNER, 1922 : 72.

Scalpellum molliculum Pilsbry, 1911 : 68, pl. 11, fig. 4.

Scalpellum japonicum biramosum Pilsbry, 1911 : 73, pl. 11, figs 4, 5.

Annandaleum laccadivicum laccadivicum - ZEVINA, 1981 : 170, textfig. 121.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 106, 640-668 m : 1 specimen attached to a small *Arca*-like bivalve together with *Amigdoscalpellum vitreum* and *Trianguloscalpellum regium latidorsum* (MNHN-Ci 1964).

External morphology of the present material is similar to *Scalpellum molliculum* Pilsbry (1911, pl. 11, fig. 4) and probably belongs to the same species. As in *S. molliculum* rostrum is apparently absent. All valves, excepting the terga, are instead similar in shape to *S. curiosum* Hoek (1907, pl. 7, fig. 8) and also to *S. polymorphum* Hoek (1907, pl. 7, fig. 11). Carina has a well defined ridge on both sides. Nothing more can be added to HOEK's and PILSBRY's comments on this species. Total length 28 mm, capitulum 17 mm, breadth 10.5 mm.

DISTRIBUTION. — Southwest Pacific from off Sumbawa, Indonesia, southwest off Calatagan Point, Batangas, Philippines and northward to south off Honda Island, Japan, 397-804 m.

This is a new record for the Philippines.

Annandaleum lambda (Annandale, 1910)

Fig. 3 a

Scalpellum lambda Annandale, 1910a : 115. — STUBBINGS, 1936 : 26.

S. longis - STUBBINGS, 1936 : 27, textfig. 11.

Annandaleum lambda - NEWMAN & ROSS, 1971 : 122. — ZEVINA, 1981 : 169, textfig. 120.

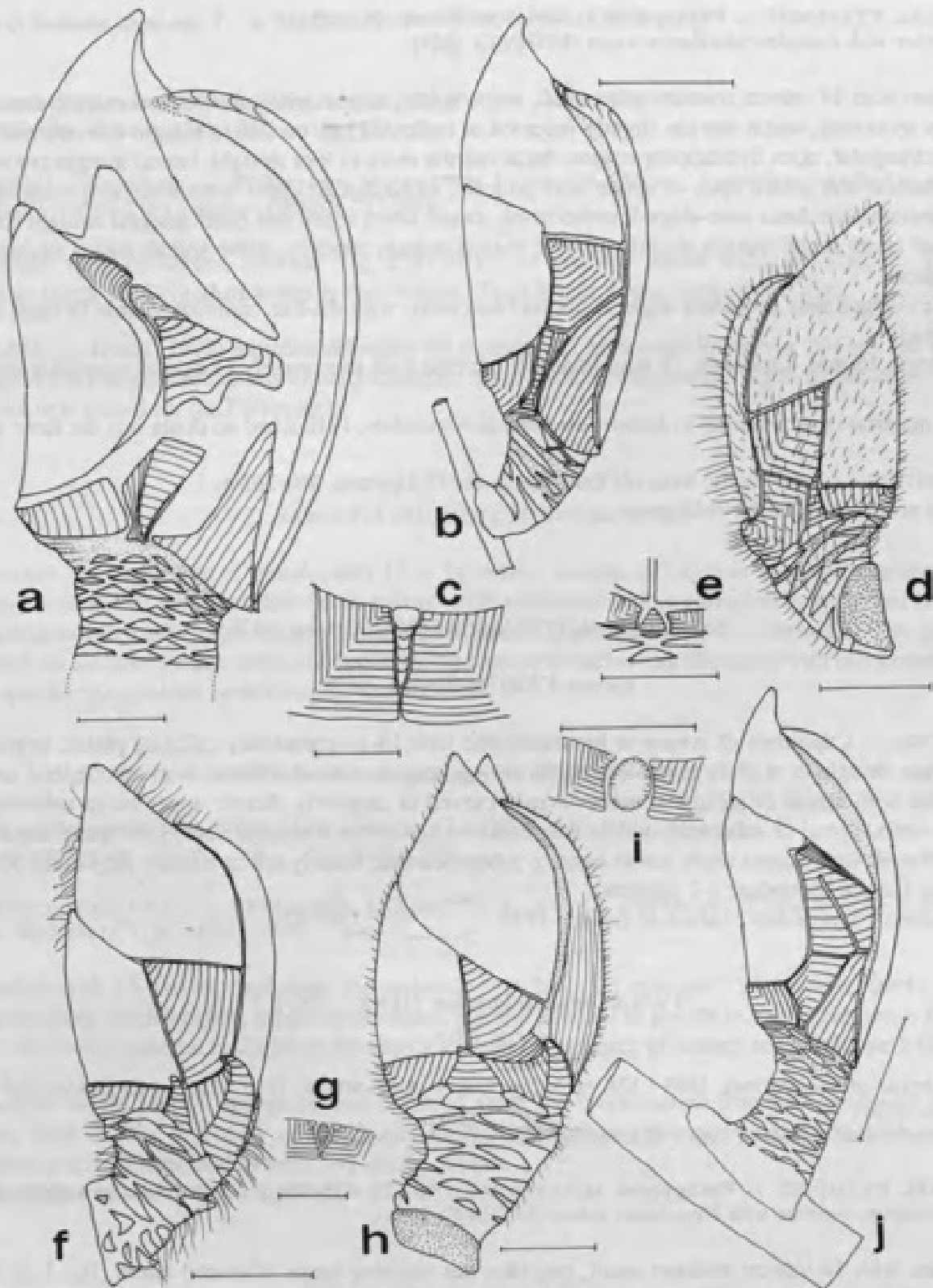


FIG. 1. — a, *Annandaleum laccadivicum laccadivicum* (Annandale); b, *Verum novaezelandiae* (Hoek); c, *idem*, rostrum; d, *Arcoscalpellum foresti* Rosell; e, *idem*, rostrum; f, *Trianguloscalpellum rubrum* (Hoek); g, *idem*, rostrum; h, *Trianguloscalpellum regium latidorsum* (Pilsbry); i, *idem*, rostrum; j, *Abathescalpellum fissum* (Hoek).

Scale : c, g = 0.5 mm; f, i = 1.0 mm; b, d, e, j = 2.0 mm; a, h = 3.0 mm.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 106, 640-668 m : 1 specimen attached to *Arca*-like bivalve together with *Amigdoscalpellum vitreum* (MNHN-Ci 1878).

Capitulum with 14 valves; rostrum quite small, umbo apical; tergum triangular, carinal margin concave apically slightly recurving, scutal margin slightly indented or hollowed out, occludent margin convex, umbo apical, scutum quadrangular, apex overlapping tergum, basal margin more or less straight, lateral margin convex with a short apicolateral arm where apex of upper latus projects, umbo apical; upper latus triangulopentagonal, umbo subapical; inframedian latus vase-shaped, umbo basal; rostral latera scutal and basal margins straight longer than wide; carinal latera scutal margin slightly convex, carinal margin concave, umbo apical; carina slightly arched, umbo subapical.

Males (2) lodged near occludent angle in pocket-like cavity, with slit-like openings visible through the inner-sides of scuta.

Total length 15 mm, capitulum 11 mm. Peduncle covered with transversely elongated triangular imbricating scales.

Present material is very similar to *Scalpellum lambda* Annandale, 1910 a and no doubt it is the same species.

DISTRIBUTION. — Indo-Pacific from off Zanzibar to the Philippines, 640-762 m.

This is a new record for the Philippines.

Subfamily ARCOSCALPELLINAE Zevina, 1978

Genus *VERUM* Zevina, 1958

DIAGNOSIS. — Capitulum of female or hermaphrodite with 13-14 completely calcified plates; tergum entire, carinal margin straight or slightly to moderately recurving; scutum with or without short apicolateral arm, umbo apical; carina with apical or subapical umbo, evenly curved or angularly flexed; upper latera subtriangular or pentagonal, umbo apical or subapical; middle latera narrow, somewhat triangular sometimes quadrangular, umbo basal or subbasal; carinolatera short, umbo basal to subbasocarinal, usually not or slightly projecting beyond rim of capitulum. Caudal appendage 1-7 segments.

Type species : *Scalpellum zenkevichi* Zevina, 1972.

Verum novaezelandiae (Hock, 1883)

Fig. 1 b-c

Scalpellum novae-zelandiae Hock, 1883 : 124, pl. 5, figs 7, 8. — ANNANDALE, 1913 : 231. — CALMAN, 1918 : 123. — WELTNER, 1922 : 71.

Verum novaezelandiae - ZEVINA, 1981 : 228, textfig. 165.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 122, 673-675 m : 1 specimen on a glassy spicule of hexactinellid sponge together with *Megalasma minus* (MNHN-Ci 1986).

Capitulum with 14 valves; rostrum small, peg-like, not reaching bases of rostral latera (fig. 1 c). External morphological features are similar to HOEK's illustrations (1883, pl. 5, fig. 8). Total length of present material 8 mm, capitulum 6.5 mm.

DISTRIBUTION. — Indo-Pacific. Previously reported from off New Zealand westward off East African coast and Gulf of Aden, 896-1644 m. Present material was taken from shallower areas, 673-675 m. Current bathymetric range, 673-1644 m.

This is a new record for the Philippines.

Verum candidum (Hoek, 1907)

Fig. 2 a-b

Scalpellum candidum Hoek, 1907 : 119, pl. 9, figs 3, 3a.*Verum candidum* - ZEVINA, 1981 : 233, textfig. 170.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 126, 266 m : 1 specimen attached to antipatharian growing on a sea urchin test fragment (MNHN-Ci 1889).

Capitulum with 14 valves; rostrum (fig. 2 b) small; inframedian latera wineglass-shaped. Morphology compared to HOEK's (1907) illustrations is very similar. Total length 9 mm, capitulum 6 mm.

REMARKS. — HOEK (1907) reported obtaining his material off Moluccas, Indonesia, 204 m. The presence of the species in the Philippines extends its zoogeographic range to the Northwest and depth to 266 m.

This is a new record for the Philippines.

Genus *CATHERINUM* Zevina, 1958

DIAGNOSIS. — Capitulum of female with 13 or 14 valves; scutum and tergum with apical umbones; carina bent evenly with apical umbo; middle latera narrow with subcentral umbo; carinolatera wide, not horny, umbo subbasicarinal not extending beyond rim of capitulum; caudal appendage long, 6-9 segments. The genus is distinguished from all other genera of the subfamily by the somewhat narrow middle latera with subcentral umbo.

Type species : *Scalpellum recurvitergum* Gruvel, 1902.

Catherinum perlongum (Pilsbry, 1907)*Scalpellum perlongum* Pilsbry, 1907b : 198, pl. 6, fig. 12 ; 1907d : 53.*Catherinum perlongum* - ZEVINA, 1981 : 256, textfig. 191.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 118, 448-466 m : 1 specimen on a hollow glassy material, a tubularian (?) (MNHN-Ci 1890).

Capitulum with 13 valves; capitulum and peduncle very long, 25 mm and 15 mm respectively. PILSBRY's (1907b) form very much smaller, length of capitulum 8.8 mm and that of peduncle 2 mm. However, the shape of the valves of present material is similar to PILSBRY's species, except apex of scutum not overlapping the tergum.

REMARKS. — PILSBRY's specimen was obtained from the Northeastern Pacific Ocean, off San Diego, California, 1168 m. The discovery of the species in Philippine waters extends its zoogeographic range to the Southwestern Pacific Ocean and to shallower depths, 448 m.

This is a new record for the Philippines.

Genus *AMIGDOSCALPELLUM* Zevina, 1978

DIAGNOSIS. — Capitulum of female or hermaphrodite with 13 or 14 completely calcified plates. Scutum and tergum with apical umbones. Carina bent evenly with apical or subapical umbo. Middle latera narrowly triangular or baton-like, small, umbo apical, not reaching upper latera. Carinolatera typically with umbo oriented with middle part of carinal area and not extending beyond rim of capitulum. Caudal appendage usually uniarticulate, but possibly absent or extended to 7 segments. Basically females with dwarf males.

Type species : *Scalpellum manum* Zevina, 1973.

***Amigoscalpellum vitreum* (Hoek, 1883)**

Fig. 2 e

Scalpellum vitreum Hoek, 1883 : 115, pl. 5, fig. 14. — WELTNER, 1922 : 63.

Scalpellum formosum Hoek, 1907 : 110, pl. 8, figs 11, 11 a.

Arcoscalpellum vitreum - NEWMAN & ROSS, 1971 : 87, pl. 8, figs E, F, textfigs 44-47. — FOSTER, 1978 : 58, pl. 7, fig. D, textfig. 34.

Amigoscalpellum vitreum - ZEVINA, 1981 : 277, textfig. 208.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 106, 640-668 m : 6 (2 juveniles) attached to a small *Arca*-like bivalve together with *Trianguloscalpellum regium latidorsum* and *Annandaleum laccadivicum laccadivicum* (MNHN-Ci 1876) and on a black neretid-like gastropod.

Capitulum with 13 completely calcified valves, dirty-white; umbones of all valves apical and, excepting carina, with distinct radiating lines; rostrum absent; inframedian latera very small, triangular not reaching upper latera. External morphology very similar to HOEK's (1907) *Scalpellum vitreum* and *S. formosum* and no doubt present material is of the same species.

DISTRIBUTION. — Indo-Pacific and Northeast Atlantic Ocean. Indo-Pacific distribution from East coast of Africa, Zanzibar Strait (WELTNER, 1922), 463 m, to Torres Strait (HOEK, 1883), 3429 m. Atlantic Ocean distribution : Northeast Atlantic Ocean (NEWMAN & ROSS, 1971) off South Carolina to off southern tip of Greenland, 2280-4531 m. The species has a wide bathymetric range, 463-4531 m.

This is a new record for the Philippines.

Genus ***TRIANGULOSCALPELLUM*** Zevina, 1978

DIAGNOSIS. — Capitulum of female or hermaphrodite with 14 completely calcified plates. Scutum and tergum with apical umbones. Middle latera triangular, sometimes quadrangular, with apical umbo reaching upper latera. Carinolatera triangular or subtriangular with apical umbo. Caudal appendage distinctly long.

Type species : *Scalpellum balanoides* Hoek, 1883.

***Trianguloscalpellum balanoides* (Hoek, 1883)**

Fig. 2 c-d

Scalpellum balanoides Hoek, 1883 : 129, pl. 5, fig. 15, pl. 10, fig. 11, pl. 11, figs 1-3. — GRUVEL, 1905 : 92, textfig. 104. — WELTNER, 1922 : 63, pl. 2, fig. 7, pl. 3, figs 8, 8a-c. — BROCH, 1922 : 242, textfig. 10; 1931 : 21, textfig. 8.

Scalpellum gonionotum Pilsbry, 1907c : 360 ; 1911 : 65, pl. 9, figs 2, 3, 4.

Trianguloscalpellum balanoides - ZEVINA, 1978 : 294, textfig. 221.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 106, 640-668 m : 1 specimen attached to cirri of crinoid (MNHN-Ci 1877). — Stn 133, 334-390 m : 1 specimen attached to cirri of crinoid (MNHN-Ci 1880). — Stn 139, 240-267 m : 3 specimens on cirri of crinoids (MNHN-Ci 1881).

There is definitely a rostrum in this species. GRUVEL (1905) and WELTNER (1922) also observed the presence of this valve in their specimens. PILSBRY (1911) likewise observed the same in *Scalpellum gonionotum* "separating rostral latera in the upper half of the length" as in the present material (fig. 2 d).

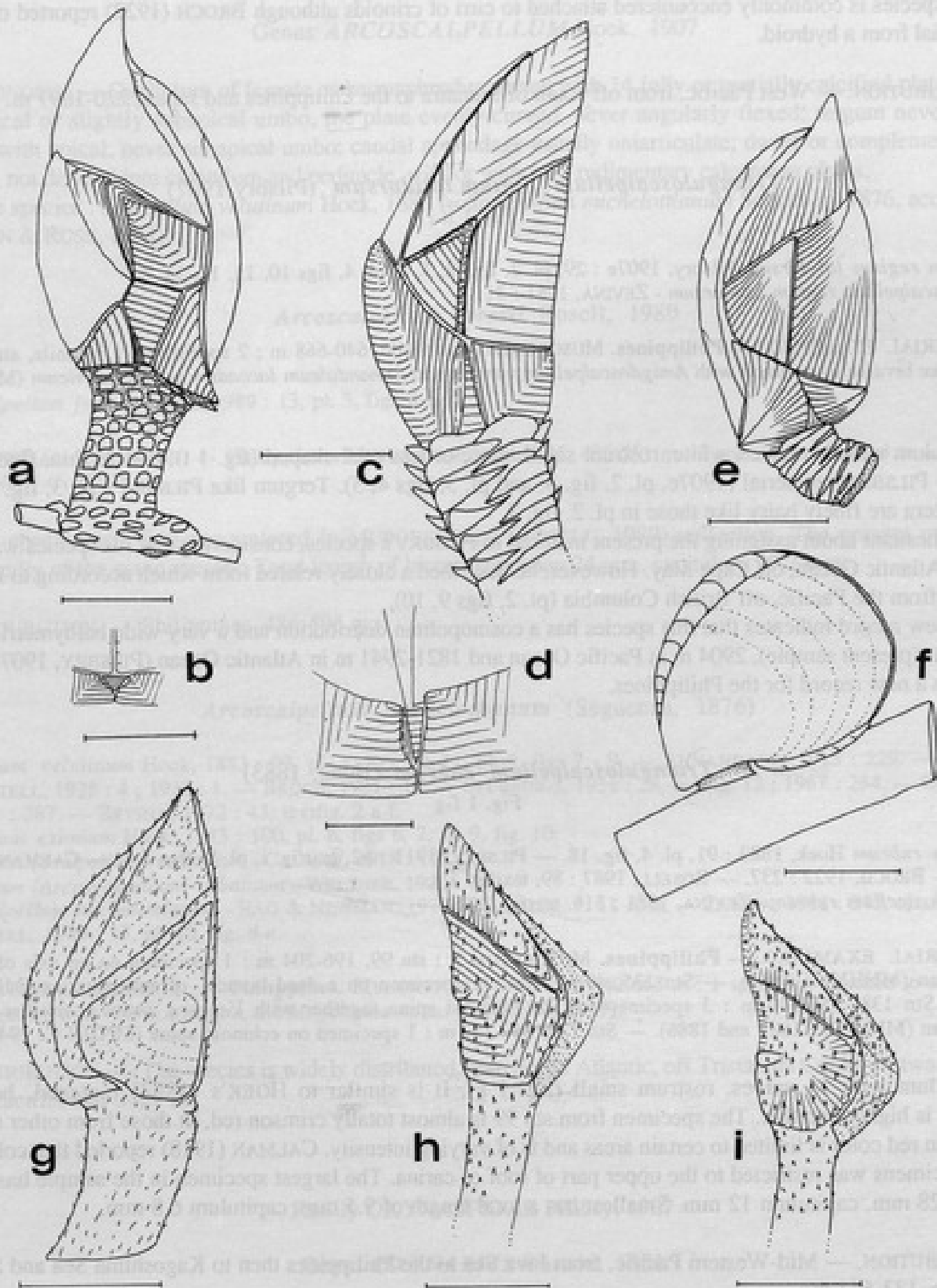


FIG. 2. — a, *Verum candidum* (Hoek); b, *idem*, rostrum; c, *Trianguloscalpellum balanoides* (Hoek); d, *idem*, rostrum; e, *Amigoscalpellum vitreum* (Hoek); f, *Trilasmis eburnea* Hinds; g, *Oxynaspis connectens* Broch; h, *Oxynaspis celata* Darwin; i, *Oxynaspis indica* Annandale.

Scale : d = 0.5 mm; e = 1.0 mm; a, b, c, f, g, h, i = 2.0 mm.

This species is commonly encountered attached to cirri of crinoids although BROCH (1922) reported obtaining his material from a hydroid.

DISTRIBUTION. — West Pacific, from off south of Sumatra to the Philippines and Japan, 220-1097 m.

Trianguloscalpellum regium latidorsum (Pilsbry, 1907)

Fig. 1 h-i

Scalpellum regium latidorsum Pilsbry, 1907e : 29, pl. 2, figs 2, 3, 7, pl. 4, figs 10, 11, 12, 14.
Trianguloscalpellum regium latidorsum - ZEVINA, 1981 : 311.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 106, 640-668 m : 2 specimens, 1 juvenile, attached to an *Arca*-like bivalve in common with *Amigdoscalpellum vitreum* and *Annandaleum laccadivicum laccadivicum* (MNHN-Ci 1892).

Capitulum with 14 valves, white; rostrum small, more or less oval-shaped (fig. 1 i); cuticle thin, finely hairy similar to PILSBRY's material (1907e, pl. 2, fig. 3, and pl. 3, figs 4, 5). Tergum like PILSBRY's pl. 3, fig. 5 while carinal latera are finely hairy like those in pl. 2, fig. 3.

I was hesitant about assigning the present material to PILSBRY's species, considering that his species was taken from the Atlantic Ocean, off Cape May. However, he described a closely related form which according to him was collected from the Pacific, off British Columbia (pl. 2, figs 9, 10).

This new record indicates that this species has a cosmopolitan distribution and a very wide bathymetric range, 640-668 m (present sample), 2904 m in Pacific Ocean and 1821-2941 m in Atlantic Ocean (PILSBRY, 1907e).

This is a new record for the Philippines.

Trianguloscalpellum rubrum (Hoek, 1883)

Fig. 1 f-g

Scalpellum rubrum Hoek, 1883 : 91, pl. 4, fig. 18. — PILSBRY, 1911 : 62, textfig. i, pl. 8, figs 1-4. — CALMAN, 1918 : 122. — BROCH, 1922 : 237. — ROSELL, 1987 : 89, textfig. 1 a.
Trianguloscalpellum rubrum - ZEVINA, 1981 : 316, textfig. 240.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 99, 196-204 m : 1 specimen on an axis of a dead antipatharian (MNHN-Ci 1884). — Stn 135, 486-551 m : 1 specimen on a dead branch of antipatharian (MNHN-Ci 1885). — Stn 138, 252-370 m : 3 specimens on an echinoid spine together with *Verruca intexta*, another one on antipatharian (MNHN-Ci 1882 and 1886). — Stn 139, 240-267 m : 1 specimen on echinoid spine (MNHN-Ci 1940).

Capitulum with 14 valves, rostrum small (fig. 1 g). It is similar to HOEK's (1883) material, however coloration is highly variable. The specimen from stn 99 is almost totally crimson red, in those from other stations the crimson red color is limited to certain areas and is of varying intensity. CALMAN (1918) reported that coloration of his specimens was restricted to the upper part of roof of carina. The largest specimen in the sample has a total length of 28 mm, capitulum 12 mm. Smallest has a total length of 9.5 mm, capitulum 6.8 mm.

DISTRIBUTION. — Mid-Western Pacific, from Java Sea to the Philippines then to Kagoshima Sea and Sagami Bay, Japan, 133-551 m.

Type locality is the Philippines (HOEK, 1883) and this is the first time the species has been recollected in the type locality for 111 years.

Genus *ARCOSCALPELLUM* Hoek, 1907

DIAGNOSIS. — Capitulum of female or hermaphrodite armed with 14 fully or partially calcified plates; carina with apical or slightly subapical umbo, the plate evenly curved, never angularly flexed; tergum never forked; scutum with apical, never subapical umbo; caudal appendage usually uniaarticulate; dwarf or complemental male sac-like, not divided into capitulum and peduncle, with or without 4 rudimentary calcareous plates.

Type species : *Scalpellum velutinum* Hoek, 1883 (= *Scalpellum michelottianum* Seguenza, 1876, according to NEWMAN & ROSS, 1971).

Arcoscalpellum foresti Rosell, 1989

Fig. 1 d-e

Arcoscalpellum foresti Rosell, 1989 : 13, pl. 3, figs d-n.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 135, 486-551 m : 2 specimens attached to a gorgonian axis (MNHN-Ci 1893).

This species was first encountered in MUSORSTOM 2 (ROSELL, 1989) collection. The present material is undoubtedly of the same species. Total length of largest specimen 24 mm, capitulum 20.2 mm.

DISTRIBUTION. — Philippines, 486-595 m.

Arcoscalpellum michelottianum (Seguenza, 1876)

Scalpellum velutinum Hoek, 1883 : 93, pl. 4, figs 10, 11, pl. 9, figs 7 - 9. — ANNANDALE, 1913 : 229. — NILSSON-CANTELL, 1928 : 4 ; 1931 : 1. — BROCH, 1931 : 18. — STUBBINGS, 1936 : 28, textfig. 12 ; 1967 : 234. — O'RIORDAN, 1967 : 287. — ZEVINA, 1972 : 43, textfig. 2 a-f.

Scalpellum eximium Hoek, 1883 : 100, pl. 6, figs 6, 7, pl. 9, fig. 10.

Scalpellum (Scalpellum) velutinum - CALMAN, 1918 : 108.

Scalpellum (Arcoscalpellum) velutinum - WELTNER, 1922 : 75.

Arcoscalpellum michelottianum - RAO & NEWMAN, 1972 : 76, textfig. 5, 11 A-B. — ZEVINA, 1981 : 343, textfig. 263. — ROSELL, 1989 : 17, pl. 10, fig. d-e.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 106, 640-668 m : 1 specimen attached to an echinoid spine together with *Verruca intexta* and *Megalasma minus* (MNHN-Ci 1887).

DISTRIBUTION. — The species is widely distributed from South Atlantic, off Tristan da Cunha eastward to Mid-North Pacific, 640-3422 m.

Family OXYNASPIDAE Pilsbry, 1907

Genus *OXYNASPIS* Darwin, 1851

DIAGNOSIS. — Capitulum with 5 approximate or variously reduced plates; terga with apical umbones; scuta with subcentral umbones; carinal umbo varies from subapical to subbasal; caudal appendages uniaarticulate.

Type species : *O. celata* Darwin, 1851.

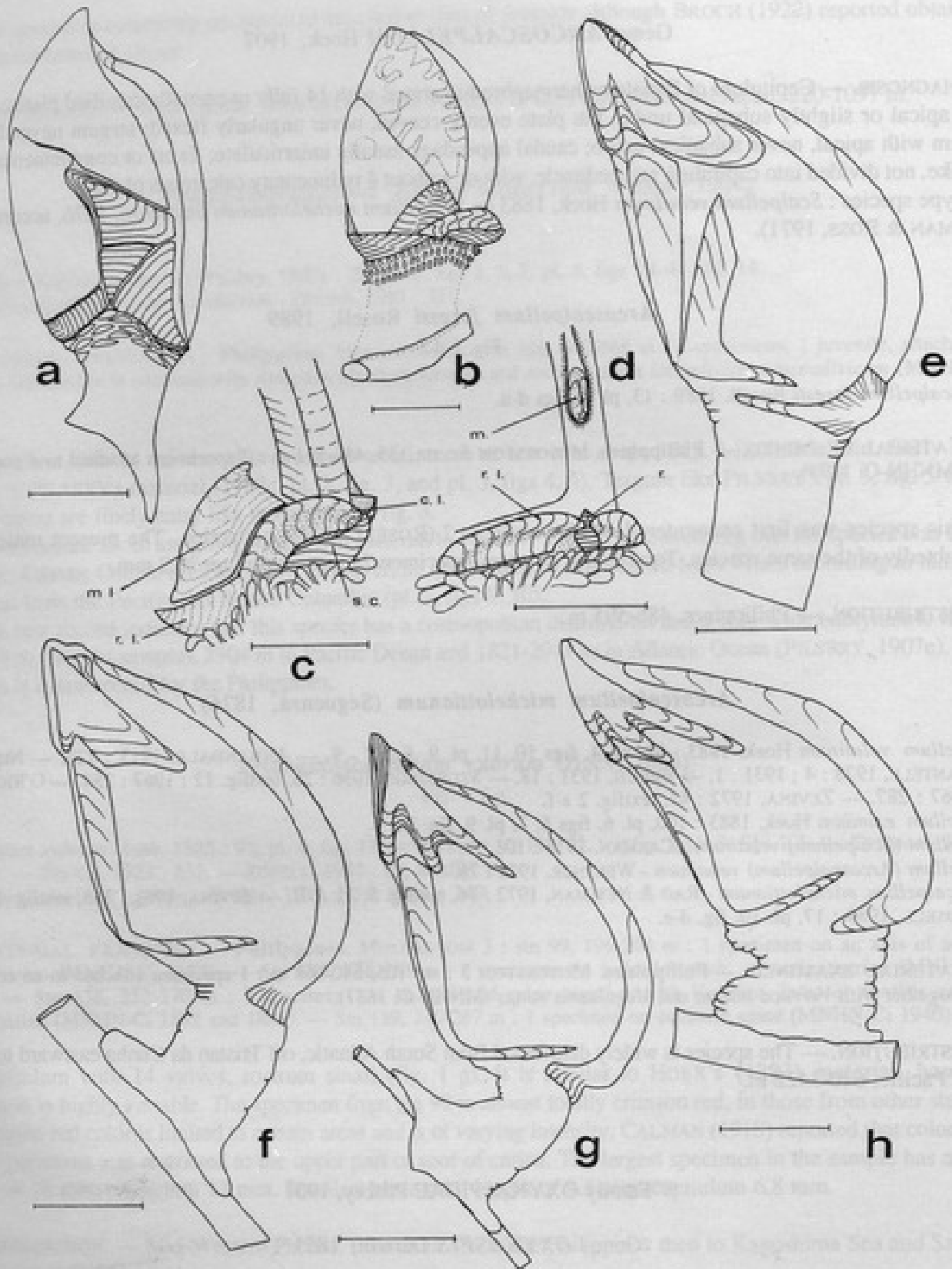


FIG. 3. — a, *Annandaleum lambda* (Annandale); b-d, *Calantica graphica* sp. nov., holotype : b, animal, lateral view; c, carinal side; d, rostral side; e, *Octolasmis nierstraszi* (Hoek); f, *Octolasmis hawaiiense* (Pilsbry); g, *Octolasmis orthogonia* (Darwin); h, *Octolasmis weberi* (Hoek).

c. l. = carinal latus; s. c. = subcarina; m. l. = median latus; r. l. = rostral latus; r. = rostrum; m. = dwarf male.

Scale : e, f = 1.0 mm; c, d, g, f, h = 2.0 mm; a, b = 3.0 mm.

Oxynaspis celata Darwin, 1851

Fig. 2 h

Oxynaspis celata Darwin, 1851 : 134, pl. 3, fig. 1. — GRUVEL, 1905 : 103, textfig. 114. — BROCH, 1922 : 275, textfigs 32, 33 (as *forma japonica*). — TOTTON, 1940 : 473, textfig. 9, 474, textfigs 10, 11 (as *var. hirtae*).

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 117, 92-97 m : 7 specimens on antipatharian (MNHN-Ci 1936). — Stn 134, 92-95 m : 1 specimen on antipatharian together with *Conopea granulata* (MNHN-Ci 1935).

DISTRIBUTION. — Cosmopolitan, reported from West Indies, Madeira and Nagasaki, Japan, 92-292 m. This is a new record for the Philippines.

Oxynaspis connectens Broch, 1931

Fig. 2 g.

Oxynaspis connectens Broch, 1931 : 34, textfig. 13. — ROSELL, 1981 : 289, pl. 5, figs c-h. — ZEVINA, 1982 : 33, fig. 21.

Oxynaspis cancellatae Totton, 1940 : 419, textfig. 1.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 134, 92-95 m : several attached to antipatharian (MNHN-Ci 1933).

Crimson red band present along occludent margin of scuta and terga, also along tergal and scutal margins of carina.

DISTRIBUTION. — Southwest Pacific, Indonesia and the Philippines, 92-245 m.

Oxynaspis indica Annandale, 1909

Fig. 2 i.

Oxynaspis indica Annandale, 1909 : 69, fig. 1. — TOTTON, 1940 : 476, figs 13, 14. — FOSTER, 1978 : 22, textfig. 9.

MATERIAL EXAMINED. — **Philippines.** MUSORSTORM 3 : stn 117, 92-97 m : several specimens on antipatharian (MNHN-Ci 1936). — Stn 126, 266 m : several specimens on antipatharian together with several *Conopea squamosus* (MNHN-Ci 1931).

ANNANDALE's species is distinct from DARWIN's (1851) *O. celata*. Valves in *O. indica* with pinkish tint ; tergal and carinal margins of scutum and scutal margin of tergum serrulate; *O. celata* is yellowish-white and only upper half of scutal margin is serrulate. Also in *O. indica* there is a clear V-shaped area across elbow of carina with the apex of V directed posteriorly.

DISTRIBUTION. — Indo-Pacific, off Mauritius, Bay of Bengal, Philippines then to southwest Pacific, off New Zealand, 31-266 m.

This is a new record for the Philippines.

Family POECILASMATIDAE Annandale, 1909

Genus *OCTOLASMIS* Gray, 1825

DIAGNOSIS. — Capitulum with 5, 3, or 2 incompletely calcified plates; carina short or extending up between terga when present.

Type species : *O. warwicki* Gray, 1825.

Octolasmis hawaiiense (Pilsbry, 1907)

Fig. 3 f

Dichelaspis hawaiiense Pilsbry, 1907a : 184, pl. 4, fig. 5.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 92, 224 m : 5 specimens on gorgonian (MNHN-Ci 1920).

Morphology of present material, as shown in fig. 3 f, is undoubtedly the same as that of PILSBRY (1907). His material was taken from depths of 369-462 m, while the present material was shallower, 224 m. Presence of the species in the Philippines extends its known zoogeographic range southwards.

DISTRIBUTION. — Mid-North and West Pacific, from off Hawaii, Japan and Philippines, 224-462 m. This is a new record for the Philippines.

Octolasmis nierstraszi (Hoek, 1907)

Fig. 3 e.

Dichelaspis nierstraszi Hoek, 1907 : 21, pl. 2, figs 1-7.

Dichelaspis (Octolasmis) nierstraszi - STUBBINGS, 1936 : 8.

Octolasmis nierstraszi - NILSSON-CANTELL, 1921 : 268 ; 1927 : 762 ; 1934a : 42, fig. 4 ; 1934b : 60. — BROCH, 1931 : 40, fig. 15. — HIRO, 1937b : 414. — ZEVINA, 1982 : 66, textfig. 58.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 122, 673-675 m : 3 specimens on a hydroid together with *Smilium acutum* (MNHN-Ci 1932).

DISTRIBUTION. — Indo-West Pacific from East coast of Africa (off Mombasa), Gulf of Aden, off Maldiv Islands, Indonesia (Bay of Bima), Philippines, China Sea to southern Japan, 22-675 m.

This is a new record for the Philippines.

Octolasmis orthogonia (Darwin, 1851)

Fig. 3 g

Dichelaspis orthogonia Darwin, 1851 : 130, pl. 2, fig. 10. — GRUVEL, 1905 : 138, textfig. 163. — HOEK, 1907 : 25, pl. 2, figs 14-18, pl. 3, figs 1, 1a, 1b, 10b.

Dichelaspis (Octolasmis) orthogonia - WELTNER, 1922, 81.

Octolasmis (Dichelaspis) orthogonia - ROSELL, 1981 : 294, pl. 8, figs h, i, k, l, m, o.

Octolasmis orthogonia - BROCH, 1922 : 279 ; 1931 : 38, textfig. 14. — NILSSON-CANTELL, 1925 : 21, textfig. 8 a-f. — HIRO, 1937b : 415. — STUBBINGS, 1963 : 327, textfig. 1. — UINOMI, 1970 : 342. — ZEVINA, 1982 : 61, textfig. 53.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 108, 193-205 m : 1 specimen on antipatharian together with *Paracalanica newmani* and *P. rossi* (MNHN-Ci 1921). — Stn 145, 214-246 m : several specimens attached to a nylon cord (MNHN-Ci 1918).

DISTRIBUTION. — Indo-West Pacific, East coast of Africa to Indonesia, Philippines, off Vietnam to southern Japan, 12-818 m.

Octolasmis weberi (Hoek, 1907)

Fig. 3 h

Dichelaspis weberi Hoek, 1907 : 20, pl. 3, figs 2-7.*Octolasmis (Dichelaspis) weberi* - ROSELL, 1981 : 297, pl. 8, figs p-s; 1989 : 23.*Octolasmis weberi* - UINOMI, 1970 : 343.*Octolasmis weberi weberi* - ZEVINA, 1982 : 62, textfig. 54.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 121, 84-73 m : 1 specimen on a hydroid (MNHN).

This species was also collected in MUSORSTOM 2. Its previously known bathymetric range is 569-595 m. Present sample is shallower, 73-84 m.

DISTRIBUTION. — West Pacific from Banda Sea, Indonesia, Philippines to southern Japan, 73-595 m.

Genus *TRILASMIS* Hinds, 1844

DIAGNOSIS. — Capitulum with 3 well-calcified plates; terga absent; scuta broad; carina minute, apex tapering not exceeding length of scuta; peduncle extremely short.

Type species : *T. eburnea* Hinds, 1844.

Trilasmis eburnea Hinds, 1844

Fig. 2 f

Trilasmis eburnea Hinds, 1844 : 71, pl. 21, fig. 5. — NILSSON-CANTELL, 1934a : 40. — ZEVINA, 1982 : 68, textfig. 60.*Poecilasma eburnea* - DARWIN, 1851 : 112, pl. 2, fig. 5.*Poecilasma eburneum* - HOEK, 1907 : 15, pl. 10, fig. 7.*Trilasmis eburneum* - PILSBRY, 1907a : 183, fig. 1. — FOSTER, 1981 : 351, fig. 2 c.*Trilasmis eburnea* - BROCH, 1931 : 32.*Trilasmis (Temnaspis) eburnea* - UINOMI, 1949 : 96.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 96, 190-194 m : 1 specimen on echinoid spine together with *Paralepas nodulosa*, *Megalasma striatum* and *Solidobalanus maldivensis* (MNHN-Ci 2015). — Stn 107, 111-115 m : 11 specimens on echinoid spine (MNHN-Ci 2014). — Stn 138, 252-370 m : 7 specimens on echinoid spine of the oral surface (MNHN-Ci 2017). — Stn 139, 240-267 m : 13 specimens on echinoid spine of the oral surface (MNHN-Ci 2018). — Stn 145, 214-246 m : 2 specimens on echinoid spine (MNHN-Ci 2016).

DISTRIBUTION. — West-Southwest Pacific, from New Zealand, New Guinea, Indonesia, Philippines, Gulf of Thailand to southern Japan, 2-914 m.

This is a new record for the Philippines.

Genus *TEMNASPIS* Fisher, 1884

DIAGNOSIS. — Capitulum with 5 approximate or variously reduced plates; scutum divided into 2 parts; apex of carina extending to or slightly overlapping basal end of terga, basally terminating in a disc.

Type species : *T. fissum* (Darwin, 1851).

Temnaspis excavatum (Hoek, 1907).

Poecilasma excavatum Hoek, 1907 : 10, pl. figs 5-10.

Poecilasma (Temnaspis) excavatum - NILSSON-CANTELL, 1925 : 16, textfig. 5, pl. 1, fig. 1. — STUBBINGS, 1936 : 6.

Temnaspis excavatum - BROCH, 1931 : 31, textfig. 10. — ZEVINA, 1982 : 73, textfig. 65.

Trilasmis (Temnaspis) excavatum - HIRO, 1937b : 412. — ROSELL, 1981 : 292, pl. 6, figs m-r.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 98, 194-205 m : 6 specimens, 5 juveniles, attached to a large crab (MNHN-Ci 2008). — Stn 99, 204-196 m : 1 specimen unattached (MNHN-Ci 2007). — Stn 100, 189-199 m : several specimens of various sizes attached to a rhizocephalan parasite on a crab under the flexed abdomen (MNHN-Ci 2019). — Stn 101, 196-194 m : 1 specimen attached to the carapace of a small crab (MNHN-Ci 2005 and 2006).

DISTRIBUTION. — Indo-Pacific, East coast of Africa (Zanzibar), Gulf of Aden, Indonesia, Philippines to southern Japan, 189-600 m.

Genus *MEGALASMA* Hoek, 1883

DIAGNOSIS. — Capitulum with 5 approximate, strongly calcified plates; scutal umbones subcentral; apex of carina sometimes slightly overlapping basal end of terga, progressively becoming broader towards the base; peduncle short.

Type species : *M. striatum* Hoek, 1883.

Subgenus *MEGALASMA* Hoek, 1883*Megalasma minus* Annandale, 1906

Megalasma striatum minus Annandale, 1906a : 399.

Megalasma minus - PILSBRY, 1907d : 408, figs 1 a-b, 3 a, 4 a-b, 6, pl. 31, figs 6, 7, 8. — BROCH, 1922 : 273, fig. 31; 1931 : 33. — STUBBINGS, 1936 : 8.

Megalasma bellum Pilsbry, 1907e : 93; 1907d : 408, figs 2, 3 b, 5, 7, pl. 31, figs 1-5.

Megalasma lineatum Hoek, 1907 : 31, pl. 4, figs 1-8.

Megalasma (Megalasma) minus - NILSSON-CANTELL, 1928 : 20; 1934a : 49. — ROSELL, 1981 : 294, pl. 7, figs m-q. — ZEVINA, 1982 : 81, textfig. 72.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 106, 668-640 m : 11 specimens on echinoid spine together with *Verruca intexta* and *Arcoscalpellum michelottianum* (MNHN). — Stn 122, 673-675 m : 3 specimens, 2 attached to *Scalpellum stearnsii* and one on glassy spicule of hexactinellid sponge (MNHN-Ci 1948). — Stn 132, 430 m : several unattached (MNHN-Ci 1946). — Stn 133, 390-334 m : 2 specimens attached to echinoid spine (MNHN-Ci 1947). — Stn 135, 551-486 m : 2 specimens on echinoid spine and on gorgonia together with *Verruca intexta* (MNHN-Ci 1941).

DISTRIBUTION. — Indo-West Pacific from East coast of Africa (Zanzibar), Indonesia, Philippines to southern Japan, 92-2050 m.

Megalasma striatum Hoek, 1883

Megalasma striatum Hoek, 1883 : 51, pl. 2, figs 5-9, pl. 7, figs 8-9; 1907 : 31. — BROCH, 1922 : 270.

Megalasma (Megalasma) striatum - UTINOMI, 1958 : 292, textfig. 4. — FOSTER, 1978 : 27, textfig. 13. — ROSELL, 1981 : 294, pl. 7, figs g-l; 1989 : 266. — ZEVINA, 1982 : 80, textfig. 71.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 92, 224 m : few specimens on echinoid spine together with shells of *Solidobalanus maldivensis* (MNHN-Ci 1937). — Stn 100, 189-199 m : few specimens on echinoid spine together with shells of *S. maldivensis* (MNHN-Ci 1944). — Stn 101, 196-194 m : few specimens on echinoid spine

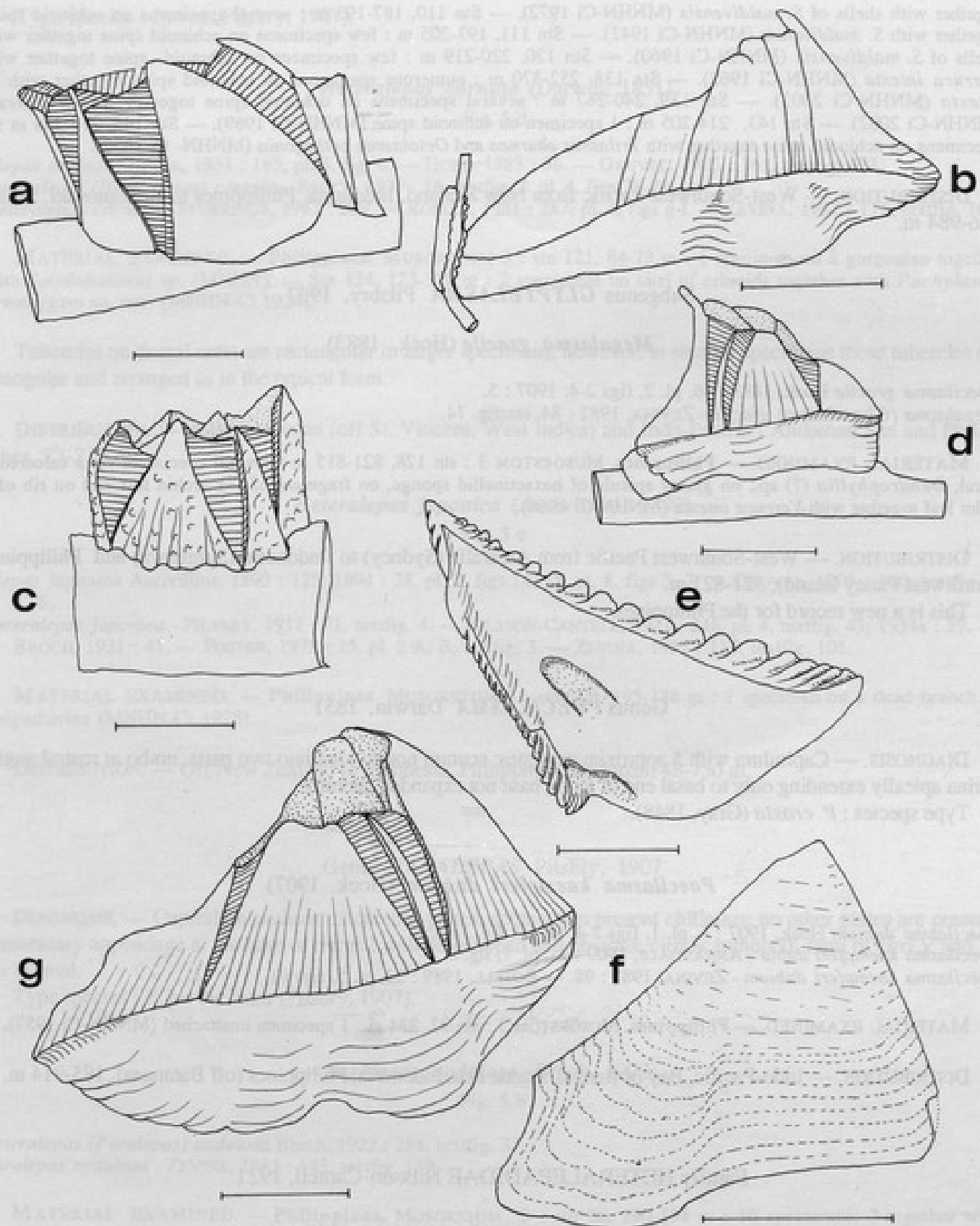


FIG. 4. — a, *Solidobalanus echinoplacis* (Stubbings); b, *Conopea cymbiformis* (Darwin); c, *Solidobalanus maldivensis* (Borradaile); d, *Conopea dentifer* (Broch); e-f, *Conopea cymbiformis* (Darwin): e, scutum, inner sideview; f, tergum, outside view; g, *Conopea calceola* (Ellis).

Scale: e, f = 1.0 mm; a, c, d, g = 2.0 mm; b = 5.0 mm.

together with shells of *S. maldivensis* (MNHN-Ci 1972). — Stn 110, 187-193 m : several specimens on echinoid spine together with *S. maldivensis* (MNHN-Ci 1942). — Stn 111, 193-205 m : few specimens on echinoid spine together with shells of *S. maldivensis* (MNHN-Ci 1960). — Stn 120, 220-219 m : few specimens on echinoid spine together with *Verruca intexta* (MNHN-Ci 1962). — Stn 138, 252-370 m : numerous specimens on echinoid spine together with *V. intexta* (MNHN-Ci 2003). — Stn 139, 240-267 m : several specimens on echinoid spine together with *V. intexta* (MNHN-Ci 2002). — Stn 143, 214-205 m : 1 specimen on echinoid spine (MNHN-Ci 1969). — Stn 145, 214-246 m : 8 specimens on echinoid spine together with *Trilasmis eburnea* and *Octolasmis orthogonia* (MNHN-Ci 1939).

DISTRIBUTION. — West-Southwest Pacific from New Zealand, Indonesia, Philippines to Bonomosaki, Japan, 146-984 m.

Subgenus *GLYPTELASMA* Pilsbry, 1907

Megalasma gracile (Hoek, 1883)

Poecilasma gracile Hoek, 1883 : 46, pl. 2, figs 2-4; 1907 : 5.
Megalasma (Glyptelasma) gracile - ZEVINA, 1982 : 84, textfig. 74.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn 128, 821-815 m : several specimens on a calcareous coral, *Dendrophyllia* (?) sp., on glassy spicule of hexactinellid sponge, on fragment of sea urchin test and on rib of a palm leaf together with *Verruca intexta* (MNHN-Ci 1966).

DISTRIBUTION. — West-Southwest Pacific from Australia (Sydney) to Indonesia (Sumbawa) and Philippines (northwest Panay Island), 521-821 m.

This is a new record for the Philippines.

Genus *POECILASMA* Darwin, 1851

DIAGNOSIS. — Capitulum with 5 approximate plates; scutum not divided into two parts, umbo at rostral angle; carina apically extending only to basal end of terga, base not expanded laterally.

Type species : *P. crassa* (Gray, 1848).

Poecilasma kaempferi dubium (Hoek, 1907)

Poecilasma dubium Hoek, 1907 : 6, pl. 1, figs 2-4, pl. 10, fig. 1a-d.
Poecilasma kaempferi dubia - ANNANDALE, 1909 : 91, pl. 7, fig. 8.
Poecilasma kaempferi dubium - ZEVINA, 1982 : 98. — ROSELL, 1989 : 22, pl. 5, figs j-l.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn 92, 224 m : 1 specimen unattached (MNHN-Ci 1957).

DISTRIBUTION. — Indo-Pacific, Bay of Bengal, Banda Sea, Indonesia, Philippines (off Batangas), 185-914 m.

Family HETERALEPADIDAE Nilsson-Cantell, 1921

Genus *HETERALEPAS* Pilsbry, 1907

DIAGNOSIS. — Capitulum without calcareous plates; scuta absent or minute and primarily chitinous; no other plates are present; filamentary appendage, at the base of cirrus I, small; cirri ctenopod or lasiopod; inner rami of cirri V and VI are shorter and slenderer than outer rami.

Type species : *H. rex* (Pilsbry, 1907).

***Heteralepas cornuta* (Darwin, 1851)**

Fig. 5 d

Alepas cornuta Darwin, 1851 : 165, pl. 3, fig. 6. — HOEK, 1883 : 56. — GRUVEL, 1905 : 161, textfig. 178.

Heteralepas (Heteralepas) cornuta - BROCH, 1927 : 16, textfig. 3, pl. 4, figs 26-29.

Heteralepas cornuta - STUBBINGS, 1967 : 239. — ROSELL, 1981 : 287, pl. 4, figs g-l. — ZEVINA, 1982 : 116, textfig. 102.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 121, 84-73 m : 1 specimen on a gorgonian together with *Solidobalanus* sp. (MNHN). — Stn 124, 123-120 m : 2 specimens on cirri of crinoids together with *Pachylasma arwetergum* sp. nov. (MNHN-Ci 1924).

Tubercles on dorsal crest are rectangular in larger specimens, however, in smaller specimens these tubercles are triangular and arranged as in the typical form.

DISTRIBUTION. — Atlantic Ocean (off St. Vincent, West Indies) and Indo-Pacific : Andaman Sea and Philippines, 73-210 m.

***Heteralepas japonica* (Aurivillius, 1892)**

Fig. 5 c

Alepas japonica Aurivillius, 1892 : 125; 1894 : 28, pl. 2, figs 14, 15, pl. 8, figs 3, 7. — GRUVEL, 1905 : 160, textfig. 176.

Heteralepas japonica - PILSBRY, 1911 : 71, textfig. 4. — NILSSON-CANTELL, 1921 : 246, pl. 4, textfig. 43; 1934a : 39. — BROCH, 1931 : 41. — FOSTER, 1978 : 15, pl. 2 A, B, textfig. 3. — ZEVINA, 1982 : 115, textfig. 101.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 108, 195-188 m : 1 specimen on a dead branch of antipatharian (MNHN-Ci 1925).

DISTRIBUTION. — Off New Zealand to Indonesia, Philippines and Japan, 48-750 m.

Genus *PARALEPAS* Pilsbry, 1907

DIAGNOSIS. — Capitulum without calcareous plates; scuta when present chitinous; no other plates are present; filamentary appendage at the base of cirrus I well developed and obvious; cirri acanthopod; rami of cirri V and VI are normal.

Type species : *P. percarinata* (Pilsbry, 1907).

***Paralepas nodulosa* (Broch, 1922)**

Fig. 5 b

Heteralepas (Paralepas) nodulosa Broch, 1922 : 286, textfig. 37.

Paralepas nodulosa - ZEVINA, 1982 : 143, textfig. 130.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 96, 190-194 m : 10 specimens, 2 together with *Megalasma striatum* and *Solidobalanus maldivensis* and 8 together with *Trilasmis eburnea* and *Megalasma striatum* on an echinoid spine (MNHN-Ci 1959).

The Philippines is the type locality of the species and this is the first record of this species since BROCH (1922) described it. The present sample is from shallower waters compared to BROCH's material, from 548 m.

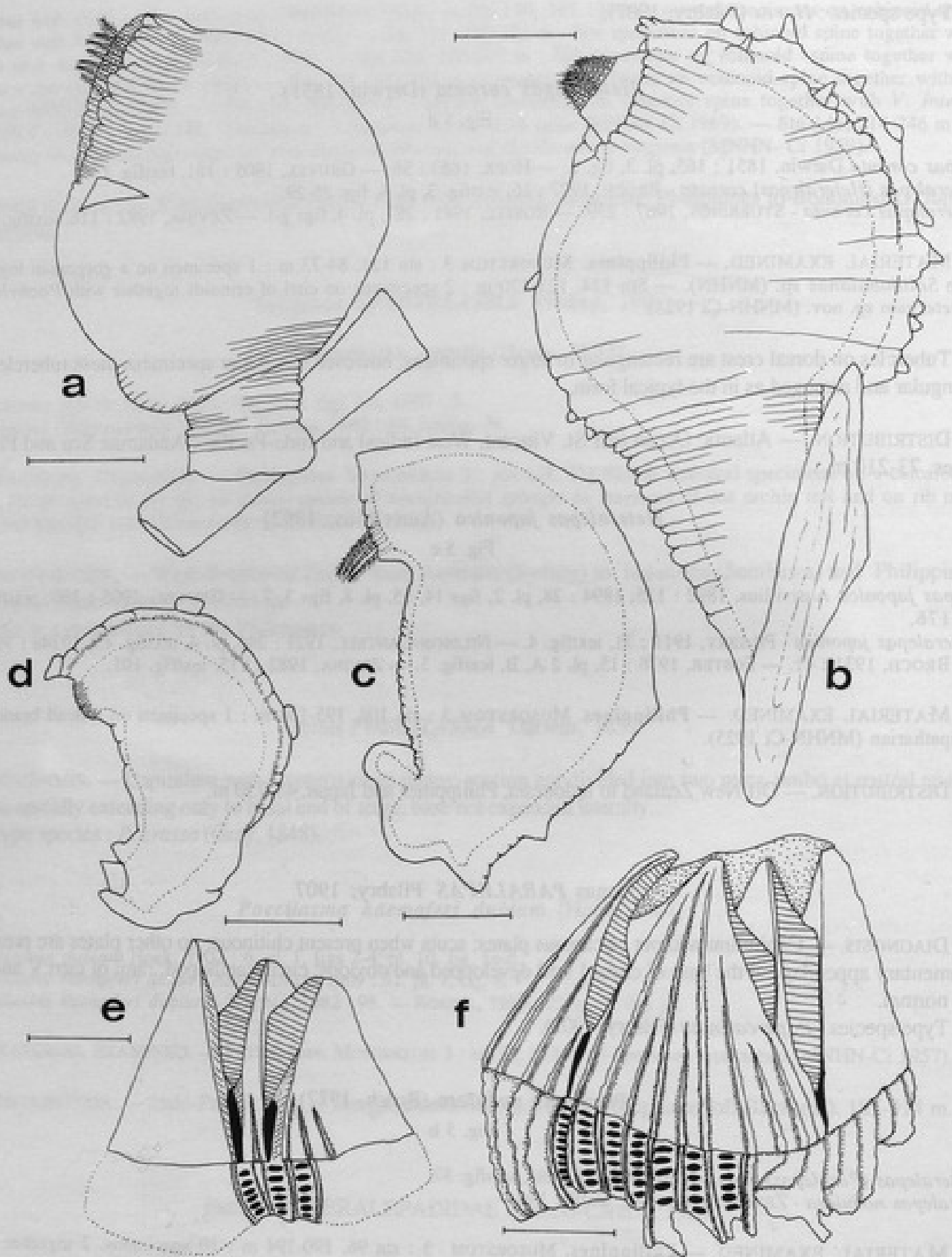


FIG. 5. — a, *Paralepas scutiger* (Broch); b, *Paralepas nodulosa* (Broch); c, *Heteralepas japonica* (Aurivillius); d, *Heteralepas cornuta* (Darwin); e-f, *Acasta perforata* sp. nov., holotype : e, part showing membrane covered apertures; f, whole animal, lateral view.

Scale : a, b, e, f = 1.0 mm; c, d = 2.0 mm.

DISTRIBUTION. — Philippines, 190-548 m.

Paralepas scutiger (Broch, 1922)

Fig. 5 a

Heteralepas (Paralepas) scutiger Broch, 1922 : 284, textfig. 36.

Paralepas scutiger - ZEVINA, 1982 : 142, textfig. 129.

MATERIAL EXAMINED. — Philippines. MUSORSTOM 3 : stn 139, 240-267 m : 1 specimen on spine from oral surface of an echinoid together with *Trilasmis eburnea* (MNHN-Ci 1958).

Surface smooth with neither wrinkles nor tubercles, as in BROCH's material (1922) from Sagami Bay, Japan. Capitulum sharply defined from peduncle, without a dorsal crest but with a horny or chitinous scuta. Orifice slightly protuberant with lappet-like border.

DISTRIBUTION. — West Pacific, from Sagami Bay, Japan to the Philippines, 240-731 m.

This is a new record for the Philippines.

Suborder VERRUCOMORPHA Pilsbry, 1916

Family VERRUCIDAE Darwin, 1854

Genus *VERRUCA* Schumacher, 1817

DIAGNOSIS. — Wall composed of 4 compartmental plates, consisting of a rostrum, carina and fixed scutum and tergum; opercular lid made up of a movable scutum and tergum.

Type species : *V. stroemia* (Muller, 1776).

Subgenus *METAVERRUCA* Pilsbry, 1916

Verruca cookei Pilsbry, 1927

Verruca cookei Pilsbry, 1927 : 308, figs 1-2, pl. 25, fig. 9. — HENRY, 1957 : 28, figs a-j. — ROSELL, 1981 : 299, pl. 11, figs r, s, u, v.

MATERIAL EXAMINED. — Philippines. MUSORSTOM 3 : stn 92, Batangas, 224 m : 2 empty shells without scuta and terga on a fragment of sea urchin test and on a coral fragment (MNHN-Ci 1994). — Stn 95, 865 m : 1 empty shell without scutum and tergum on a small stone (MNHN-Ci 2049). — Stn 96, 190-194 m : 1 specimen on a bivalve shell (MNHN-Ci 1995).

DISTRIBUTION. — Mid-Pacific to West Pacific, from Hawaii, Tuamotu and the Philippines, 167-865 m.

Subgenus *ROSTRATOVERRUCA* Broch, 1922

Verruca intexta Pilsbry, 1912

Verruca intexta Pilsbry, 1912 : 292; 1916 : 47.

Verruca conchula Hoek, 1913 : 146, pl. 11, figs 14-15.

Verruca (Rostratoverruca) intexta - NILSSON-CANTELL, 1929 : 468, textfig. 3; 1934a : 50. — ROSELL, 1989 : 26, pl. 7, F, G.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 106, 668-640 m : 4 specimens on echinoid spine (MNHN-Ci 1888). — Stn 120, 220-219 m : several specimens on echinoid spine, some encrusted with bryozoans, together with *Megalasma striatum* (MNHN-Ci 1963). — Stn 128, 821-815 m : few specimens on fragment of sea urchin test and glassy spicules of hexactinellid sponge together with *Megalasma gracile* (MNHN-Ci 1965). — Stn 133, 390-334 m : 2 specimens, one on echinoid spine, another on a hard siliceous sponge (MNHN-Ci 1997). — Stn 135, 551-486 m : few specimens attached to the coenosarc of gorgonians and on compartment of a balanid (MNHN-Ci 1996). — Stn 138, 252-370 m : numerous specimens on echinoid spine together with numerous *Megalasma striatum* (MNHN-Ci 2004). — Stn 139, 240-267 m : numerous specimens on echinoid spine together with numerous *M. striatum* (MNHN-Ci 2001). — Stn 141, 44-40 m : 4 specimens on echinoid spine (MNHN-Ci 1998).

The Philippines is the type locality, off northwestern Panay Island, "Albatross" Stn 5259, USNM Cat. N°43468.

DISTRIBUTION. — Mid-West Pacific from Timor Sea, Indonesia to the Philippines, 40-821 m.

Subgenus *ALTIVERRUCA* Pilsbry, 1916

Verruca cristallina Gruvel, 1907

Verruca cristallina Gruvel, 1907 : 2, pl. 1, figs 3, 4, 9, 10. — PILSBRY, 1916 : 41. — BROCH, 1922 : 292, fig. 41 (as forma *laevis*); 1931 : 46. — NILSSON-CANTELL, 1929 : 477, fig. 7. — ROSELL, 1989 : 24, pl. 6, figs d-i. *Verruca cassis* Hoek, 1913 : 138, pl. 11, figs 1-6, pl. 12, figs 1-8, pl. 13, figs 8-10.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 122, 673-675 m : 4 specimens attached to a glassy spicule of hexactinellid sponge (MNHN-Ci 2000).

DISTRIBUTION. — Indo-Pacific, from Andaman and Nicobar Islands to Banda Sea, Indonesia and the Philippines, 233-1600 m.

Verruca sulcata Hoek, 1883

Verruca sulcata Hoek, 1883 : 139, pl. 6, figs 19-20. — GRUVEL, 1905 : 179, textfig. 196. — ROSELL, 1981 : 299, pl. 9, figs w-z.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 95, 865 m : 2 specimens on a small stone (MNHN-Ci 1999).

DISTRIBUTION. — West-Southwest Pacific, from Kermadec Island, New Zealand to the Philippines, 750-1125 m.

Suborder BALANOMORPHA Pilsbry, 1916

Superfamily CHTHAMALOIDEA Darwin, 1854

Family CHTHAMALIDAE Darwin, 1854

Subfamily PACHYLASMINAE Utinomi, 1968

Genus *PACHYLASMA* Darwin, 1854

DIAGNOSIS. — Compartmental plates consisting of a carina, paired carinolaterals and latera and a rostral plate formed by partial or complete fusion of rostrum with adjoining rostrolaterals; parietes solid; radii rudimentary or absent; basis calcareous; caudal appendages present.

Type species : *P. giganteus* (Philippi, 1836).

Pachylasma arwetergum sp. nov.

Figs 6 j-k, 8 f-h, 9 a-f

DIAGNOSIS. — Shell conical more or less elongated along rostrocarinal axis; carinolatera small, sharply tapering, apex very narrow so that apex lateral compartment almost touching carina; carina deeply concave, almost V-shaped; rostrum with distinct sutures delimiting rostral latera; scuta transversely elongated towards basioccludent angle; terga, viewed externally, arrow-shaped; basis membranous; mandible with 3 teeth, upper margin of 3rd and/or 2nd teeth serrate, inferior angle pointed; maxilla notched; caudal appendage 7-9 segments.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 124, 123-120 m : 7 specimens on cirri of crinoids together with *Heteralepas cornuta*.

TYPES. — Holotype : MNHN-Ci 2103. Paratype : MNHN-Ci 2104. Paratype : UPIBM Crust. Coll. N° 372.

DESCRIPTION. — Rostrocarinal basal diameter (holotype), 5 mm; paratype (1), 4.2 mm; other paratype 3.4 mm. Paratype (1) ovigerous with developing eggs in mantle cavity.

Shell conical, light pinkish-brown, a similar but darker color forms a transverse band across scuta up to tergal angle and spur of tergum, more or less coinciding with mid-section of lateral compartment; lateral bears a brownish spot on its upper rostral corner in some specimens; orifice rhomboidal not toothed; rostrum triangular, united with rostralaterals by linear sutures, radii narrow, summits highly oblique, sheath not free or projecting, paries below smooth; carina V-shaped, alae broader than parietes, summits highly oblique, sheath free with distinct horizontal growth lines, paries smooth; carinolatera very small, apex tapering, basal width about 1/3 of basal width of latera; latera largest of all compartmental plates, radii narrow, alae broad, a little more than 1/2 of width of parietes, sheath narrow, fine horizontal growth lines distinct, paries smooth.

Scutum (figs 9 b, d) triangular, transversely elongated towards its basioccludent angle, ocludent margin longer than basal and tergal margins, horizontal growth lines distinctive, basitergal angle rounded; articular ridge narrow occupying about 3/4's length of tergal margin; apically, smooth articulating facet with tergum distinctive; adductor ridge, pits for adductor and lateral depressor muscles indistinct.

Tergum (fig. 9 c, e) small, when viewed externally arrow-shaped, spur medially situated without fasciole; articular ridge broad and prominent as wide as the outer portion; crests for depressor muscles developed, distal ends exceeding basal margin of valve.

Labrum not bullate, without notch, crest with fine short hairs, innerside with numerous minute blunt denticles; palpus club-shaped, upper margin setose (fig. 9 a). Mandible (fig. 8 f) with 3 teeth, superior margin of 3rd and/or 2nd tooth serrulate, inferior angle pointed, margin serrulate. Maxilla 1 (fig. 8 h) notched, uppermost seta largest, rest of frontal margin bears moderate sized setae, inferior angle protuberant bearing 3 small setae. Maxilla 2 (fig. 8 g) posterior and apical margins supporting dense long setae and a smaller lower lobule bearing shorter setae.

Segments of anterior ramus of cirrus 1 broader than posterior ramus; chaetotaxy of cirri III-VI ctenopod, setae finely pinnate; intermediate segments bear 4 pairs of subequal setae, proximal pair minute.

Number of segments of their rami (upper numeral anterior ramus and upper row right appendages) :

Holotype

	I	II	III	IV	V	VI	c. a.
R. ant./post.	8/7	5*/10	10/12	16/16	16/16	cut/cut	-
L. ant./post.	7/5	12/13	2*/10	16/16	12*/17	cut/cut	7

Paratype

	I	II	III	IV	V	VI	c. a.
R. ant./post.	8/6	9/9*	12/13	15/15	17/16	16/17	9
L. ant./post.	7/7	8/9	12/12	10*/15	7*/15	17/16	8

* cut/mutilated

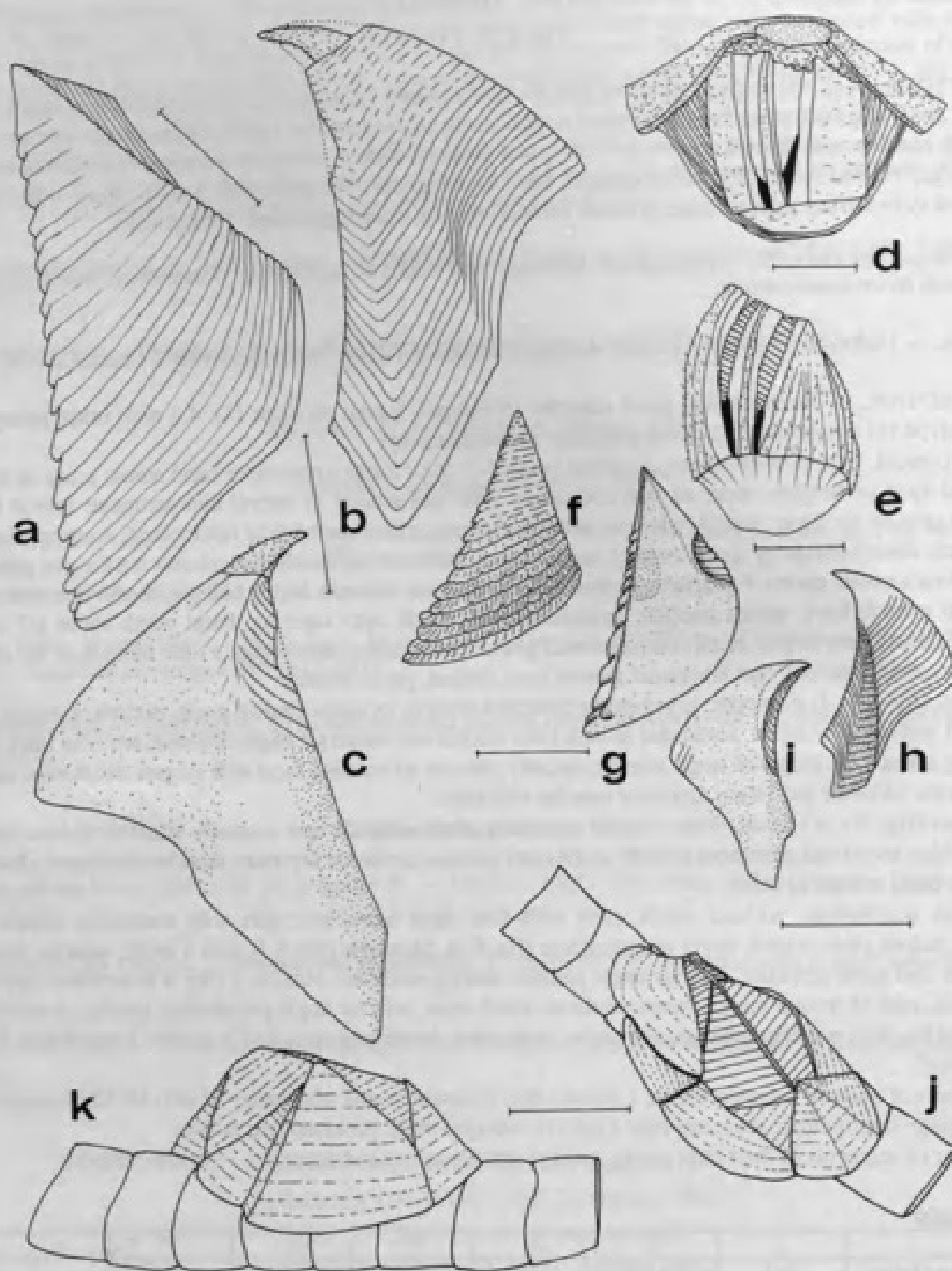


FIG. 6. — a-c, *Acasta perforata* sp. nov., holotype : a, scutum, outside view; b, tergum, outside view; c, tergum, inside view; d-l, *Acasta alcyonica* sp. nov., holotype : d, animal partly exposed; e, whole isolated animal; f, scutum, outside view; g, scutum, inside view; h, tergum, outside view; i, tergum, inside view; j-k, *Pachylasma arwetergum* sp. nov., holotype : j, animal, lateral side; k, animal, upperside view.

Scale : a, b, c = 0.5 mm; d, e = 3.0 mm; f, g, h, i, j, k = 2.0 mm.

Penis moderately long, gradually tapering, finely annulated, clothed with long setae particularly at and near apex. No basidorsal point.

Caudal appendage multiarticulate, 7-9 segments, longer than protopodite of cirrus VI, distal margin of each segment bearing long slender setae (fig. 9 f).

ETYMOLOGY. — The specific name refers to the arrow-shaped terga. Arwe (= arrow) is a Middle English word

REMARKS. — There are four species of *Pachylasma* with a membranous basis, viz : *P. crinoidophilum* Pilsbry, 1911; *P. darwinianum* Pilsbry, 1912; *P. japonicum* Hiro, 1933 (in UTINOMI, 1968a) and *P. ochriderma* Foster, 1981. In the new species, the broad alae and the projecting crests for depressor muscles beyond basal margin of terga are similar to *P. darwinianum*, however it differs from *P. darwinianum* in its orifice not being toothed and in the presence of a well developed spur on the tergum. The triangular rostrum and rostral latera united by linear sutures, the mandibles and the maxillae are similar to *P. crinoidophilum*, however the terga differ from those of *P. crinoidophilum* (cf. PILSBRY, 1911, pl. 17, fig. 10, 11) and *P. japonicum* (cf. UTINOMI, 1968a, text-fig. 3). Moreover the orifice of *P. crinoidophilum* is toothed, with the apex of the carinolatera standing out (cf. PILSBRY, 1911, pl. 17, fig. 2) while in the present species the orifice is not toothed and the apex of the carinolatera does not exceed the apex of the lateral compartment. The opercular valves of the present form are different from those of *P. japonicum* (cf. UTINOMI, 1968a, text-fig. 2) and of *P. ochriderma* (cf. FOSTER, 1981, text-fig. 5 C, C', D, D').

Superfamily CORONULOIDEA Leach, 1817

Family BATHYLASMATIDAE Newman & Ross, 1971

Subfamily HEXELASMINAE Newman & Ross, 1976

Genus *HEXELASMA* Hoek, 1913

DIAGNOSIS. — Compartmental plates consisting of a carina, paired carinolaterals and latera, and a rostrum without any sign of fusion; parietes solid; radii absent; caudal appendages absent.

Type species : *H. velutinum* Hoek, 1913.

Hexelasma velutinum Hoek, 1913

Hexelasma velutinum Hoek, 1913 : 246, pl. 26, figs 1-16. — BROCH, 1931 : 53. — UTINOMI, 1968a : 30. — FOSTER, 1981 : 356, figs 6 A-E, 7.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn 126, 266 m : 1 specimen with a missing rostrum, unattached (MNHN-Ci 1922).

Compartments and opercular valves are similar to those of HOEK's (1913) material and undoubtedly the MUSORSTOM specimen is of the same species.

DISTRIBUTION. — West-Southwest Pacific, from off New Zealand, off Kei Islands, Indonesia, Philippines to southern Japan, 204-390 m.

Superfamily BALANOIDEA Leach, 1817
 Family ARCHAEOBALANIDAE Newman & Ross, 1976
 Subfamily ARCHAEOBALANINAE Newman & Ross, 1976

Genus *CHIRONA* Gray, 1835

DIAGNOSIS. — Shell wall or compartment thin, parietes and radii solid; sutural edge of radii smooth or weakly crenulate; tergal spur narrow, moderately long; basis calcareous.

Type species : *C. hameri* (Ascanius, 1767).

Subgenus *STRIATOBALANUS* Hoek, 1913

Chirona amaryllis (Darwin, 1854)

References. See ROSELL, 1989 : 31.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 96, 190-194 m : 1 specimen on a gastropod, *Distorsio anus* (?) (MNHN-Ci 1903). — Stn 97, 194-189 m : 1 specimen on an empty gastropod shell (MNHN-Ci 1905). — Stn 100, 189-199 m : 1 specimen on a gastropod shell, *Gemmula* sp. (MNHN-Ci 1905). — Stn 105, 417-398 m : numerous specimens attached to rusting steel/iron panels (MNHN-Ci 1851).

DISTRIBUTION. — Indo-Pacific, off Madagascar, Indian Ocean, northern Australia, Malay Archipelago, Philippines, China Sea to southern Japan, 10-484 m.

Chirona tenuis (Hoek, 1883)

References. See ROSELL, 1989 : 33.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 87, 197-191 m : 1 specimen on a gastropod shell (MNHN-Ci 1910). — Stn 92, 224 m : 1 specimen unattached (MNHN-Ci 1912). — Stn 98, 194-205 m : 4 specimens on a gastropod shell with sea anemone (MNHN-Ci 1907). — Stn 120, 220-219 m : 1 specimen on bark of coconut, *Cocos nucifera* (MNHN-Ci 1911). — Stn 131, 120-122 m : 2 specimens on a solitary coral, *Flabellum* sp. (MNHN-Ci 1909). — Stn 135, 551-486 m : several specimens on coenosarc of gorgonian (MNHN-Ci 1907).

DISTRIBUTION. — West Pacific, Arafura Sea, Malay Archipelago, Philippines to southern Japan, 40-551 m.

Genus *SOLIDOBALANUS* Hoek, 1913

DIAGNOSIS. — Shell wall of 6 plates; parietes and radii solid; radii well developed, with denticulate sutural edges; basis calcareous, solid; complementary male, when present, may be found in pit of rostral plate of hermaphrodite.

Type species : *S. auricoma* (Hoek, 1913).

Subgenus *SOLIDOBALANUS* Hoek, 1913

Solidobalanus auricoma (Hoek, 1913)

Balanus (*Solidobalanus*) *auricoma* Hoek, 1913 : 198, pl. 18, figs 20-22, pl. 19, figs 1-7. — BROCH, 1922 : 323, textfig. 62; 1931 : 71. — FOSTER, 1978 : 100, textfig. 60. — ROSELL, 1981 : 303.

Solidobalanus auricoma - FOSTER, 1981 : 364.

Solidobalanus (Solidobalanus) auricoma - NEWMAN & ROSS, 1976 : 50.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 110, 187-193 m : several specimens unattached to a substratum but attached to each other in a clump (MNHN-Ci 1985).

Compartments feebly ribbed longitudinally; parietes of carinal latera very narrow, ridge-like; opercular valves bearing golden hairs along occludent margins.

DISTRIBUTION. — West-Southwest Pacific, from New Zealand, Banda Sea, Indonesia, Philippines to southern Japan, 50-292 m.

Solidobalanus echinoplacis (Stubbings, 1936)

Fig. 4 a

Balanus echinoplacis Stubbings, 1936 : 45, textfig. 20.

Balanus (Solidobalanus) echinoplacis - ROSELL, 1981 : 304.

Solidobalanus (Solidobalanus) echinoplacis - NEWMAN & ROSS, 1976 : 51.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 88, 187 m : several specimens attached to an echinoid spine together with *Megalasma striatum* (MNHN-Ci 1968).

Parietes smooth, summits of radii more or less parallel to bases.

DISTRIBUTION. — Indo-Pacific, from East coast of Africa (Zanzibar) to Philippines, 150-550 m.

Solidobalanus hawaiiensis (Pilsbry, 1916)

References. See ROSELL, 1981 : 304.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 97, 194-189 m : few specimens on antipatharian together with *Paracalanica newmani* (MNHN-Ci 1989). — Stn 108, 195-188 m : numerous specimens on antipatharian (MNHN-Ci 1988 and 1989). — Stn 111, 193-205 m : numerous specimens on antipatharian together with *Calantica graphica* sp. nov. (MNHN-Ci 1990).

Compartments white, some tinted pinkish ; parietes longitudinally ribbed.

DISTRIBUTION. — Mid-Pacific and West Pacific : Hawaii, Japan and Philippines, 38-406 m.

Solidobalanus maldivensis (Borradaile, 1903)

Fig. 4 c.

Balanus maldivensis Borradaile, 1903 : 442, fig. 118. — HOEK, 1913 : 195, pl. 18, figs 13-19. — ANNANDALE, 1906 : 148.

Balanus (Solidobalanus) maldivensis - ROSELL, 1981 : 303; 1989 : 33, pl. 9, fig. c.

Solidobalanus (Solidobalanus) maldivensis - NEWMAN & ROSS, 1976 : 51.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 86, 187-192 m : several shells on echinoid spine (MNHN-Ci 1976). — Stn 90, 195 m : 6 shells on echinoid spine (MNHN-Ci 1978). — Stn 92, 224 m : several specimens on echinoid spine together with *Megalasma striatum* (MNHN-Ci 1928). — Stn 96, 190-194 m : several shells on echinoid spine (MNHN-Ci 1980). — Stn 97, 194-189 m : several shells on echinoid spine together with *M. striatum* (MNHN-Ci 1982). — Stn 98, 194-205 m : several shells on echinoid spine (MNHN-Ci 1981). — Stn 100, 189-199 m : several shells on echinoid spine together with *M. striatum* (MNHN-Ci 1945). — Stn 101, 196-194 m : several specimens

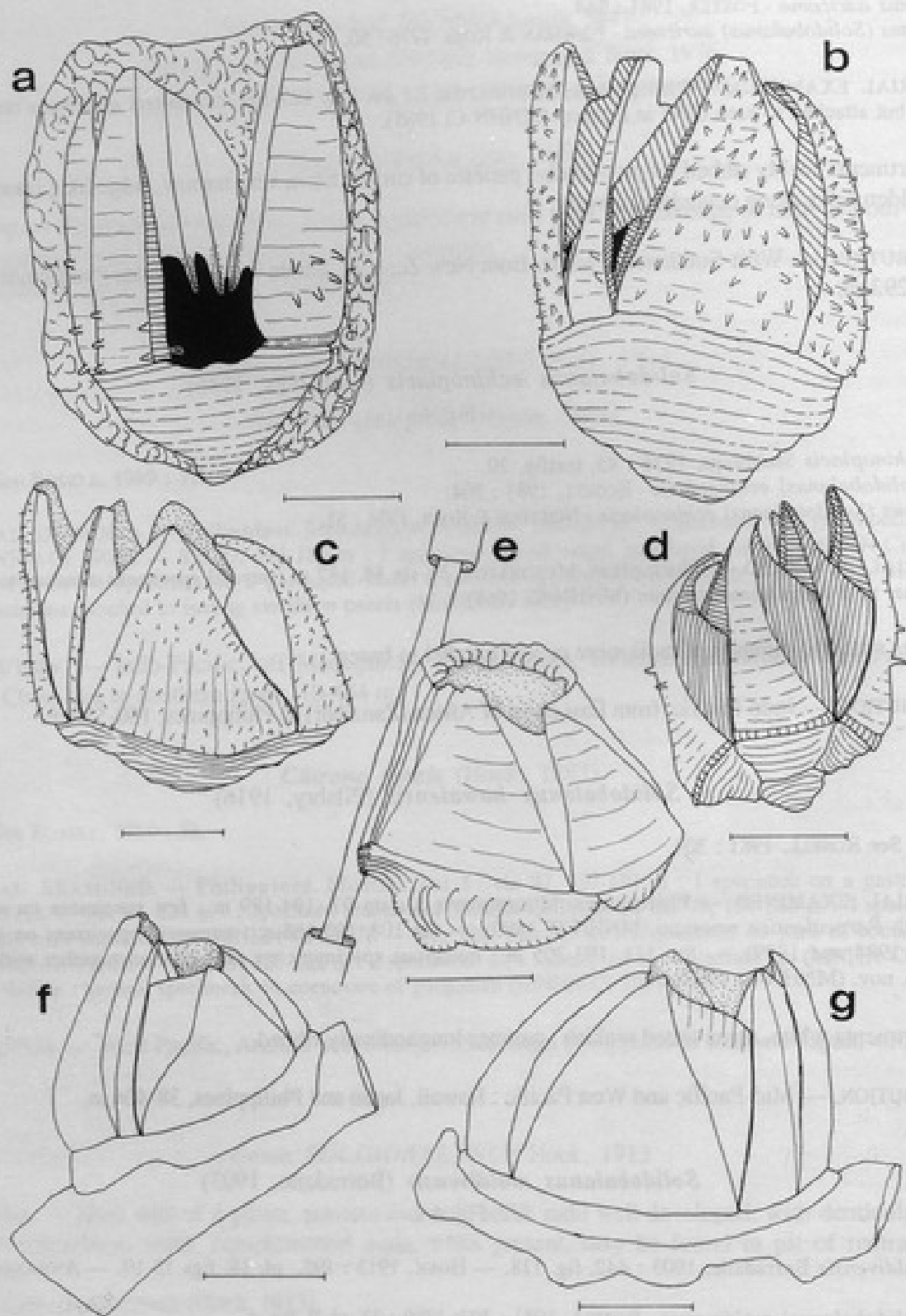


FIG. 7. — a, *Acasta sculpturata* Broch, animal partly exposed from embedding sponge; b, *Acasta apertura* sp. nov., holotype, whole animal freed from embedding sponge; c, *Acasta echinata* Hiro, whole animal freed from embedding sponge; d, *Acasta coriolis* sp. nov., holotype, whole animal freed from embedding coenosarc of gorgonia; e, *Conopea granulata* (Hiro), whole animal freed from embedding coenosarc of gorgonia; f, *Conopea squamosa* sp. nov., holotype, whole animal freed from embedding coenosarc of gorgonia; g, *Conopea squamosa* sp. nov., paratype, whole animal freed from embedding coenosarc of gorgonia.

Scale : a-g = 2.0 mm.

on echinoid spine together with *M. striatum* (MNHN-Ci 1971). — Stn 107, 115-111 m : 2 specimens on echinoid spine (MNHN-Ci 1984). — Stn 110, 187-193 m : numerous specimens on echinoid spine together with *M. striatum* (MNHN-Ci 1942). — Stn 111, 193-205 m : several specimens on echinoid spine together with *M. striatum* (MNHN-Ci 1961). — Stn 133, 390-234 m : 1 specimen on echinoid spine (MNHN-Ci 1983). — Stn 143, 214-205 m : several shells on echinoid spine (MNHN-Ci 1977). — Stn 145, 214-246 m : several shells on echinoid spine (MNHN-Ci 1979).

DISTRIBUTION. — Indo-Pacific : Indian Ocean, Indonesia and Philippines, 54-390 m.

Genus *ACASTA* Leach, 1817

DIAGNOSIS. — Compartmental plates 6, weakly articulated; parietes solid; radii well developed; basis calcareous, solid, rounded or cup-shaped; shell not elongate along carinorostral axis; cirrus IV with or without recurved teeth or hooks; commonly embedded in sponges or coenenchyme of gorgonians.

Type species : *A. spongites* (Poli, 1795).

Acasta alcyonica sp. nov.

Figs 6 d-i, 9 g-h, 10 f-h

DIAGNOSIS. — Shell oval-shaped; carina higher than rostrum; orifice ovate, not toothed, apices of compartmental plates truncate; radii and alae not reaching bases, thus membrane covered slits are formed between compartmental plates; scuta transparent, triangular, elongated along basioccludent angle; terga transparent, transversely produced towards basiscutal angle; labrum notched with 2 or 3 small denticles on crest; mandibles with 4 teeth, 4th tooth small situated very close to the 3rd tooth; maxilla 1 without notch on its frontal margin.

MATERIAL EXAMINED. — Philippines. MUSORSTOM 3 : stn 134, 92-95 m : several specimens embedded in the stalk of a nephtheid alcyonarian.

TYPES. — Holotype : MNHN-Ci 2012. Paratype : MNHN-Ci 2013. Paratypes : MNHN-Ci 2014. Paratype : UPIBM Crust. Coll. N° 371.

DESCRIPTION. — Carinorostral basal diameter (holotype) 5 mm, orifice 3.6 mm, height from apex of carina to bottom of basal cup 6 mm; paratype, 6 mm, 2.4 mm, 7.8 mm respectively.

The barnacle is completely concealed underneath the "skin" of the alcyonarian, its presence is noticeable only through a small opening beneath which is the orifice of the barnacle (fig. 6 d). Inside the host body, the barnacle is contained within a sac-like, transparent membrane attached to the underside of "skin" by fibrous bundles embedded in the mesoglea. Parietes bears fine short tubercles protruding out of the thin membrane enclosing the animal and these tubercles together with the fibrous bundles, possibly aid in anchorage within the host.

Shell (fig. 6 e) oval-shaped, carina higher than rostrum orifice ovate, not toothed, apices of compartments truncate; basis calcareous, cup-shaped; radii and alae with oblique summits; radii not reaching basal cup, thus membrane covered slits are formed between compartmental plates; white longitudinal lines of varying length on compartments, most lines fading out before reaching apex; likewise, white horizontal lines on plates create rectangular features of different sizes; inner parietes longitudinally ribbed, sheath not free or projecting. Basal cup deep, with radiating lines, rim supporting small bifid tubercles.

Scutum (fig. 6 f) transparent, triangular, slightly recurving elongated along basioccludent angle : raised horizontal growth ridges prominent, margin discretely emarginate, radiating longitudinal lines faintly indicated but distinct; occludent margin longer than basal and tergal margins; adductor ridge low, medially situated; articular ridge small; pits for adductor muscles distinct; pits for lateral depressors not clearly indicated (fig. 6 g).

Tergum transparent, triangular; spur short, transversely produced towards basi-scutal angle; spur fasciole moderately deep, horizontal growth lines distinct; carinal margin convex, scutal margin concave; articular ridge about 1/2 of length of scutal margin; crests for depressors few, low but discernible.

Labrum notched, crests with 2 or 3 small denticles; palpus spatulate, upper, outer and apical margins densely setose, setae pinnate (fig. 10 f). Mandible (fig. 9 h) with 3 prominent teeth and a small 4th tooth close to the 3rd tooth, in another specimen 4th tooth not very distinctive; 2nd tooth may or may not be bifid, inferior angle blunt. Maxilla 1 (fig. 9 g) with straight cutting edge supporting 11-12 moderate sized setae, inferior angle rounded. Maxilla 2 (fig. 10 g) bilobed; posterior lobe larger, frontal margin setose to apex; anterior lobe small bearing few small short setae.

Rami of cirrus I very unequal, anterior ramus has almost twice or thrice as many segments as posterior ramus, larger setae pinnate. Protopodite of cirri I-III bears plumose setae on its anterior and posterior margins, setae on posterior margin longer. Chaetotaxy ctenopod; cirri IV-VI much longer than cirri III, intermediate segments bears 3 pairs of subequal setae, proximal pair minute. Some segments of anterior ramus of cirrus IV may or may not bear a small single and distinctive spine between the two uppermost pairs of setae on its frontal margin; protopodite devoid of any spine on its frontal margin.

Number of segments of their rami (upper numeral anterior ramus and upper row right appendages). Paratype :

	I	II	III	IV	V	VI
R. ant./post.	13/7	12/7	14/11	25/29	32/31	32/35
L. ant./post.	17/6	11/8	13/11	27/32	34/34	33/35

Penis long, finely annulated, gradually tapering, sparsely hairy proximally becoming denser distally. No basidorsal point.

ETYMOLOGY. — The specific name is derived from the name of the host organism which is a nephtheid alcyonarian.

REMARKS. — There are 4 known species of *Acasta* taken from alcyonacean hosts, these are : *A. unitosaka* Utinomi, 1962 ; *A. echinata* Hiro, 1937a ; *A. sculpturata* Broch, 1931, and *A. alcyonicola* Utinomi, 1953. The present species likewise taken from a nephtheid alcyonarian has membrane covered apertures on its compartments as *A. unitosaka* and *A. sculpturata*. *A. echinata* and *A. alcyonicola* do not exhibit any apertures on their compartments. The present species differs from both *A. unitosaka* and *A. sculpturata* in the form of the opercular valves. In addition, in *A. sculpturata* the penis has a basidorsal point which is lacking in the new species and the frontal margin of some segments of the anterior ramus of cirrus IV, have claw-like spines (BROCH, 1931, textfig. 35 k) which are absent in *A. alcyonica*.

Acasta apertura sp. nov.

Figs 7 b, 13 a-j

DIAGNOSIS. — Shell globular, white; orifice large, toothed; parietes with numerous calcareous tubercles; radii and alae moderately wide, summits oblique; radii of latera and carinolatera not reaching bases, leaving narrow membrane covered apertures; basis calcareous, cup-shaped, deep, bottom pointed curving to one side; scutum transversely elongated towards basioccludent angle; tergum triangular with prominent spur; mandible with 4 teeth, inferior angle bifid; maxilla 1 without notch; penis with basidorsal point.

MATERIAL EXAMINED. — Philippines. MUSORSTOM 3 : sta 131, 120-122 m : 1 specimen embedded in a dirty-white calcareous sponge.

TYPES. — Holotype : MNHN-Ci 2105.

DESCRIPTION. — Carinorostral basal diameter 5.3 mm; height of carina 5.4 mm; depth of cup 2.4 mm (holotype).

The barnacle was completely embedded in the sponge except the orifice. Shell (fig. 7 b) globular-ovate, white;

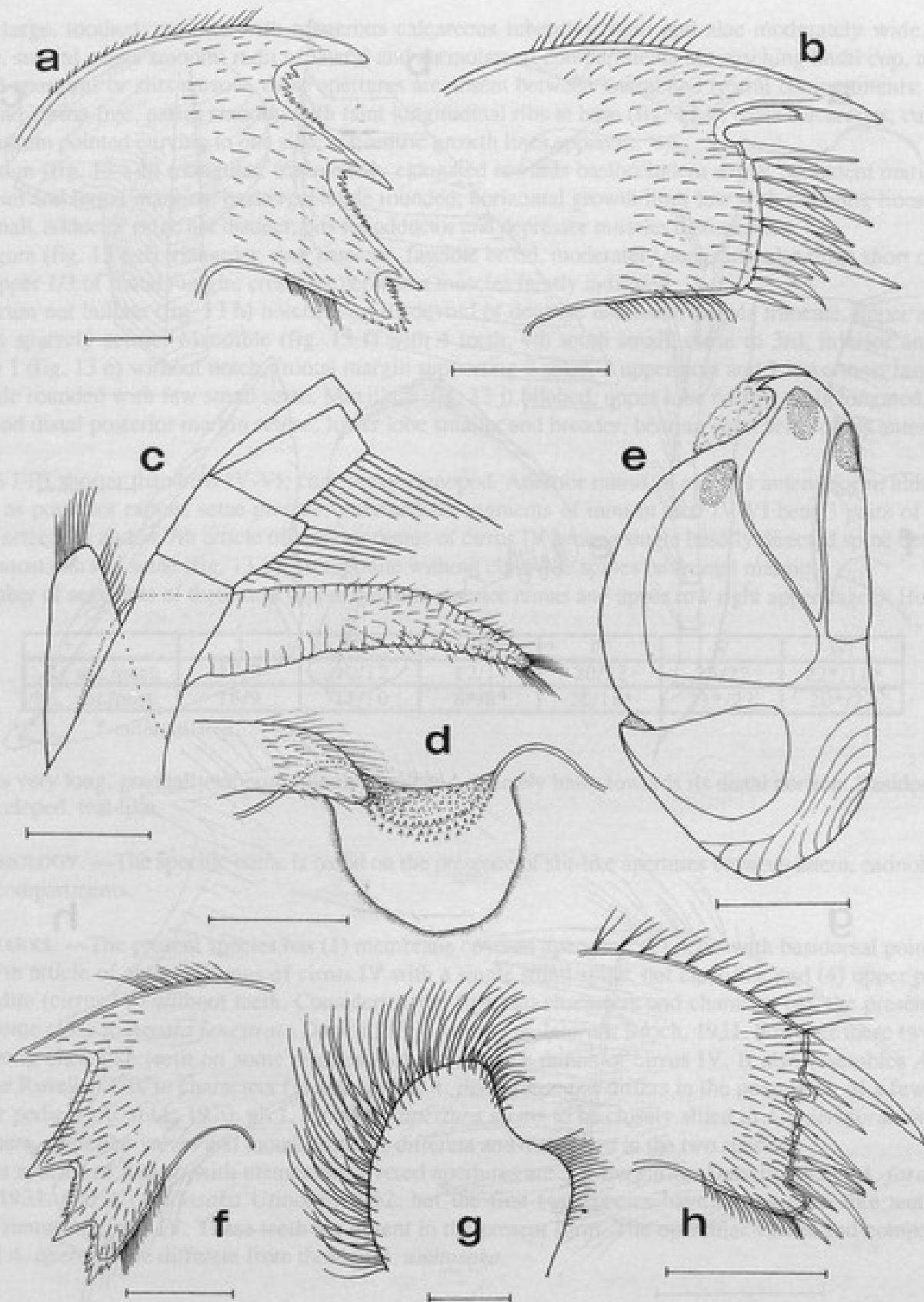


FIG. 8. — a-e, *Calantica graphica* sp. nov., paratype : a, mandible; b, maxilla I; c, cirrus VI (part only) with penis and caudal appendage; d, labrum and palpus; e, complemental male; f-h, *Pachylasma arwetergum* sp. nov., holotype : f, mandible; g, maxilla II; h, maxilla I.

Scale : a, b, f, g, h = 0.1 mm; d, e = 0.3 mm; c = 0.5 mm.

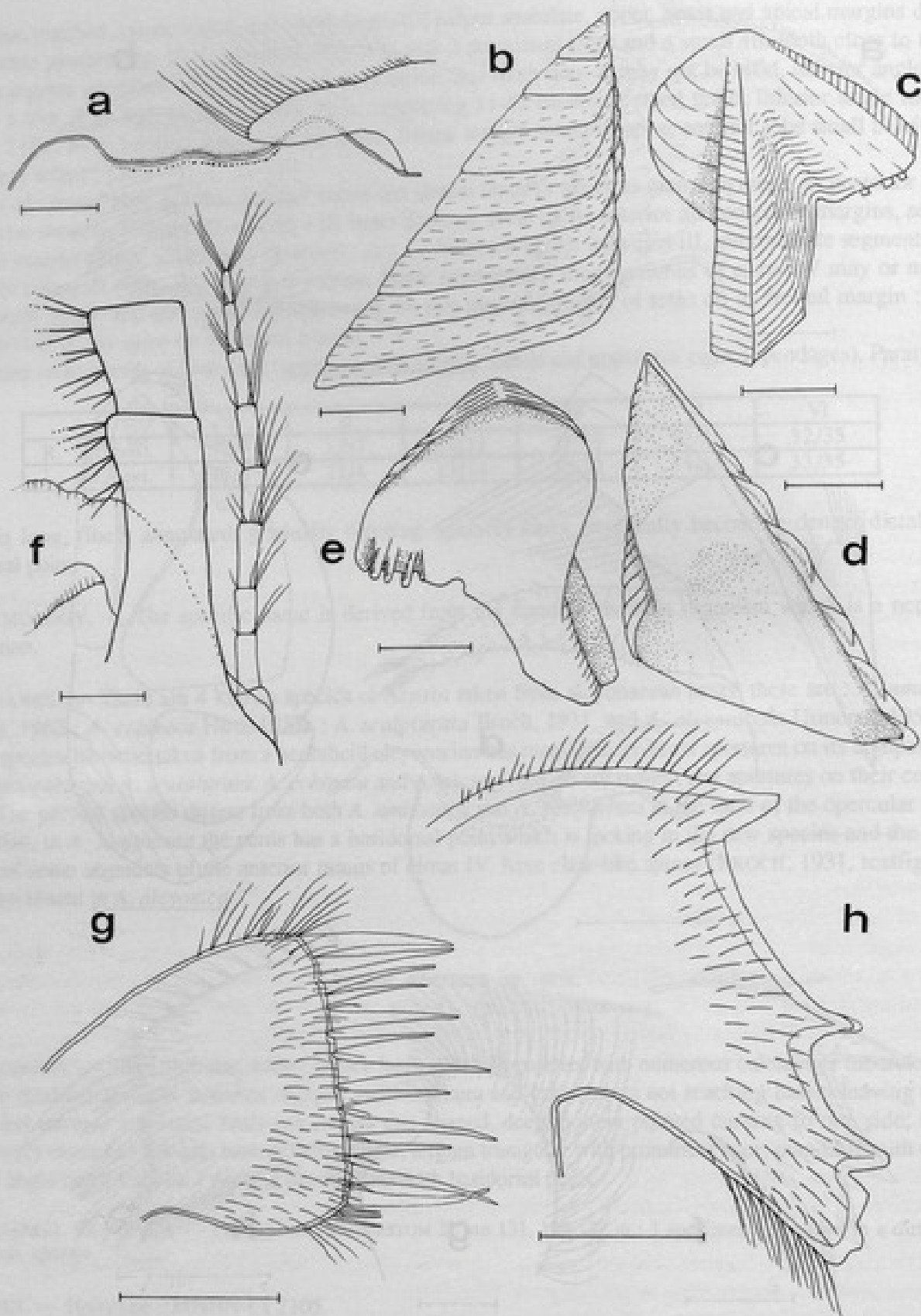


FIG. 9. — a-e, *Pachylasma arwetergum* sp. nov., holotype : a, labrum and palpus; b, scutum, outside view; c, tergum, outside view; d, scutum, inside view; e, tergum, inside view; f, *idem*, paratype, cirrus VI (part only) showing caudal appendage; g-h, *Acasta alcyonica* sp. nov., paratype : g, maxilla I; h, mandible.
Scale : a = 0.1 mm; b, c, d, e = 0.5 mm; f, g, h = 0.2 mm.

orifice large, toothed; parietes with numerous calcareous tubercles; radii and alae moderately wide, summits oblique, sutural edges smooth; radii of lateral and carinolateral compartments not reaching basal cup, membrane covered apertures or slits narrow, these apertures are absent between lateral and rostral compartments; sheath of latera and carina free, paries smooth, with faint longitudinal ribs at base (fig. 13 i); basis calcareous, cup-shaped, deep, bottom pointed curving to one side, concentric growth lines apparent.

Scutum (fig. 13 a-b) triangular, transversely elongated towards basioccludent angle; ocludent margin longer than basal and tergal margins, basitergal angle rounded; horizontal growth lines low with radiating lines; articular ridge small, adductor ridge not distinct; pits for adductor and depressor muscles distinctive.

Tergum (fig. 13 c-d) triangular, spur truncate, fasciole broad, moderately deep, articular ridge short occupying about upper 1/3 of scutal margin; crests for depressor muscles faintly indicated.

Labrum not bullate (fig. 13 h) notched, crests devoid of denticle and hairs; palpus truncate, upper and apical margins sparsely setose. Mandible (fig. 13 f) with 4 teeth, 4th tooth small, close to 3rd, inferior angle bifid. Maxilla 1 (fig. 13 e) without notch, frontal margin supporting 9 setae, 2 uppermost and 2 lowermost largest, inferior angle rounded with few small setae. Maxilla 2 (fig. 13 j) bilobed, upper lobe narrow and elongated, anterior, apical and distal posterior margin setose; lower lobe smaller and broader, bearing short setae on its anterior upper region.

Cirri I-III shorter than cirri IV-VI; chaetotaxy ctenopod. Anterior ramus of cirrus 1 antenniform, almost twice as long as posterior ramus, setae pinnate; intermediate segments of rami in cirri IV-VI bear 3 pairs of subequal pinnate setae; 6th and/or 7th article of anterior ramus of cirrus IV bears a single basally directed spine between the 2 uppermost pairs of setae (fig. 13 g), protopodite without claw-like spines on frontal margins.

Number of segments of their rami (upper numeral anterior ramus and upper row right appendages). Holotype :

	I	II	III	IV	V	VI
R. ant./post.	17/9	10/12	12/14	20/22	23/22	22*/16*
L. ant./post.	16/9	11/10	8*/8*	20/18*	21*/22	20*/23

* cut/mutilated.

Penis very long, gradually tapering, finely annulated, sparsely hairy towards its distal portion. Basidorsal point well developed, teat-like.

ETYMOLOGY. —The specific name is based on the presence of slit-like apertures between latera, carinolatera and carinal compartments.

REMARKS. —The present species has (1) membrane covered apertures, (2) penis with basidorsal point, (3) 6th and/or 7th article of anterior ramus of cirrus IV with a single small spine, not claw-like and (4) upper pedicel of protopodite (cirrus IV) without teeth. Considering the first two characters and character (4), the present species would come close to *Acasta fenestrata* Darwin, 1854, and *A. sculpturata* Broch, 1931, however these two species have strong claw-like teeth on some segments of the anterior ramus of cirrus IV. It also resembles *A. microforamina* Rosell, 1970, in characters (1) and (2) but *A. microforamina* differs in the possession of a few teeth on its upper pedicel (ROSELL, 1970, pl. 1, fig. 6). *A. apertura* seems to be closely allied to *A. microforamina* but the carinolatera, opercular valves and mouth parts are different and distinctive in the two species.

Other species of *Acasta* with membrane covered apertures are : *A. purpurata* Darwin, 1854 ; *A. foraminifera* Broch, 1931, and *A. umitosaka* Utinomi, 1962, but the first two species have strong claw-like teeth on the anterior ramus of cirrus IV. These teeth are absent in the present form. The opercular valves and compartmental plates of *A. apertura* are different from those of *A. umitosaka*.

Acasta echinata Hiro, 1937

Figs 7 c, 11 a-i

Acasta echinata Hiro, 1937a : 70, fig. 1. — BROCH, 1947 : 23, fig. 5. — UTINOMI, 1962 : 224.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 117, Mindoro strait, 92-97 m : few specimens embedded in alcyonarian (MNHN-Ci 2106).

DESCRIPTION. — Carinal height 4.5 mm; carinorostral basal diameter 5 mm, orifice 3 mm. Ovigerous, with developing nauplii in mantle cavity.

Shell white more or less elongated along rostro-carinal axis, orifice toothed, basis calcareous, cup-shaped; parietes with minute calcareous spines arranged in horizontal rows in some areas, irregularly in others, as noted by BROCH (1947); lateral compartment faintly longitudinally ribbed below sheath; summits of radii and alae highly oblique.

Scuta (fig. 11 a-b) triangular, occludent margin denticulate, longer than basal and tergal margins; adductor ridge not well defined, articular ridge short. Terga (fig. 11 c-d) triangular, spur short, broad, transversely pointed, very close to basiscutal angle; articular ridge short, about half the length of scutal margin; crests for depressor muscles faintly indicated.

Labrum (fig. 11 h) notched, crests with 2 or 3 minute denticles; palpus more or less apically truncate with long spines or setae. Mandible (fig. 11 e) with 4 teeth, 2nd to 4th bifid, inferior angle bearing 1 or 2 minute short stout spines. Maxilla 1 (fig. 11 f) : frontal edge without notch, supporting 11 spines, 2 uppermost and 2 lowermost largest. Maxilla 2 (fig. 11 g) bilobed, upper lobe large, as in oblong-shaped; lower lobe small; frontal margins setose, as in *A. cancellorum*, described by HIRO (1931).

Cirri I-III shorter than posterior cirri, setae finely pinnate. Intermediate articles of cirri IV-VI bear 3 or 4 pairs of subequal finely pinnate setae. Third segment of anterior ramus of right cirrus IV bears one single claw-like tooth (fig. 11 i) and none on the left cirrus.

Number of segments in their rami (upper numeral anterior ramus and upper-row right appendages) :

	I	II	III	IV	V	VI
R. ant./post.	13/8	10/7	12/11	23/24	29/32	30/29
L. ant./post.	13/7	9/7	10/12	25/18*	32/10*	*/*

* cut/mutilated

Penis very long, finely annulated, distally sparsely hairy. No basidorsal point.

DISTRIBUTION. — West Pacific : Japan (Nomosaki, Kyusyu), Vietnam (Condor Island) and Philippines (off southwestern Mindoro Island), 15-97 m.

Acasta coriolis sp. nov.

Figs 7 d, 12 a-i

DIAGNOSIS. — Shell white, globular; orifice small, toothed; basis calcareous, cup-shaped; parietes with few calcareous tubercles, horizontal growth lines faintly indicated; parietes of carinal latera very narrow just like a thin line, compartment almost made up of radii and alae; basal part of compartmental plates, excepting carinal latera, with a narrow bulge forming a distinctive ring just dorsal to rim of basal cup; sheath of rostrum and lateral compartments free, paries smooth with broad horizontal lines on latera, 2 immediately below sheath and 2 towards basal margin; apices of compartments inwardly curving. Radii quite broad, summits oblique, sutural edges smooth; alae moderately broad, summits oblique. Basis calcareous, cup-shaped, more or less divided into quadrants, circular growth lines distinct; bottom pointed.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 117, 92-97 m : 1 specimen embedded in a white, compact, tough calcareous sponge.

TYPE. — Holotype : MNHN-Ci 2107.

DESCRIPTION. — Carinal height 4.4 mm, carinorostral basal diameter 3.4 mm, orifice 2 mm ; depth of basal cup 0.7 mm.

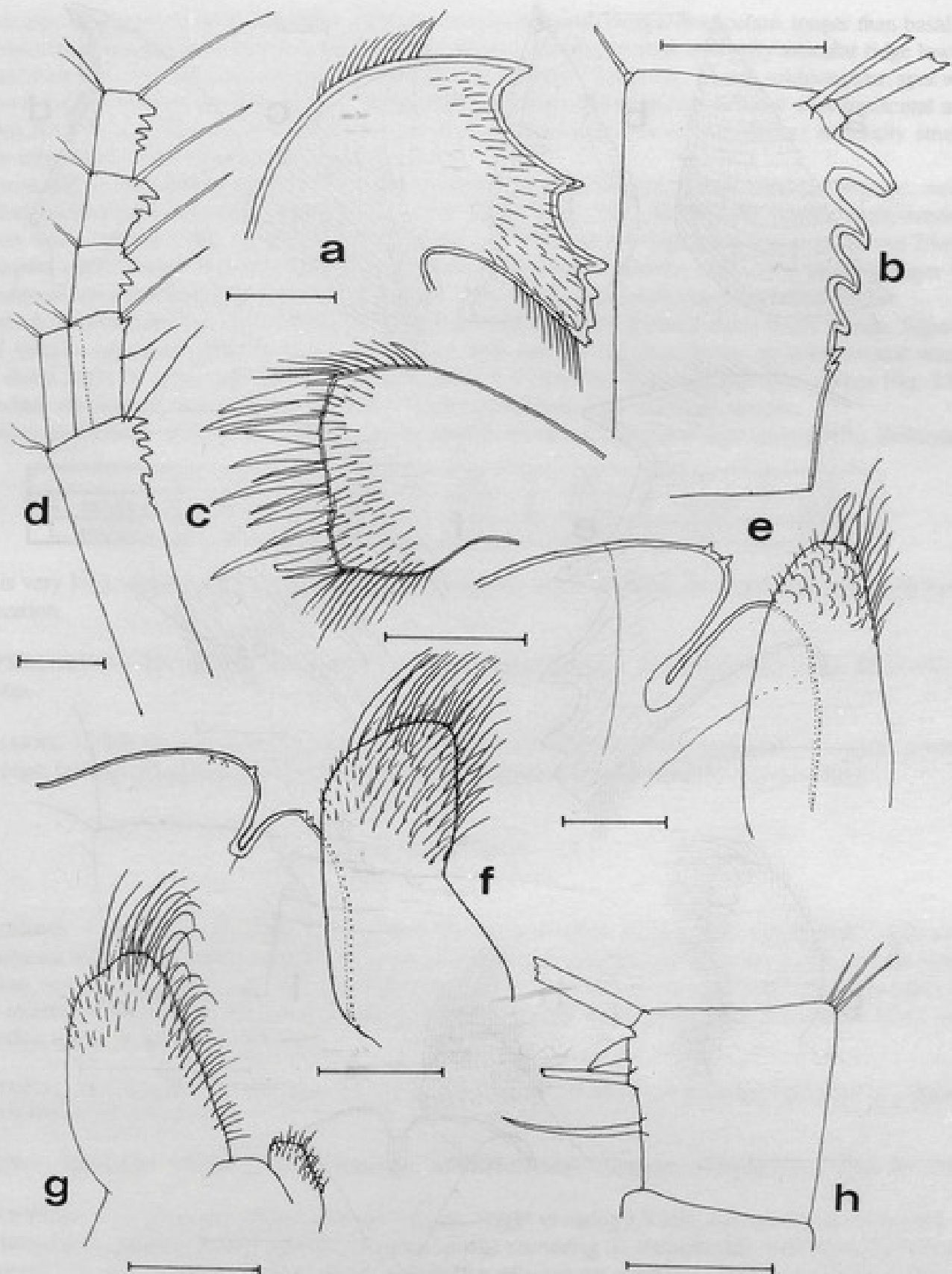


FIG. 10. — a-e, *Acasta perforata* sp. nov., holotype : a, mandible; b, 6th segment anterior ramus, cirrus IV; c, maxilla I; d, cirrus IV (right, part only); e, labrum and palpus; f-h, *Acasta alcyonica* sp. nov., paratype : f, labrum and palpus; g, maxilla II; h, 12th segment, cirrus IV (right anterior ramus).

Scale : a, c, e, h = 0.1 mm; b, 0.05 mm; d = 0.2 mm; f, g = 0.3 mm.

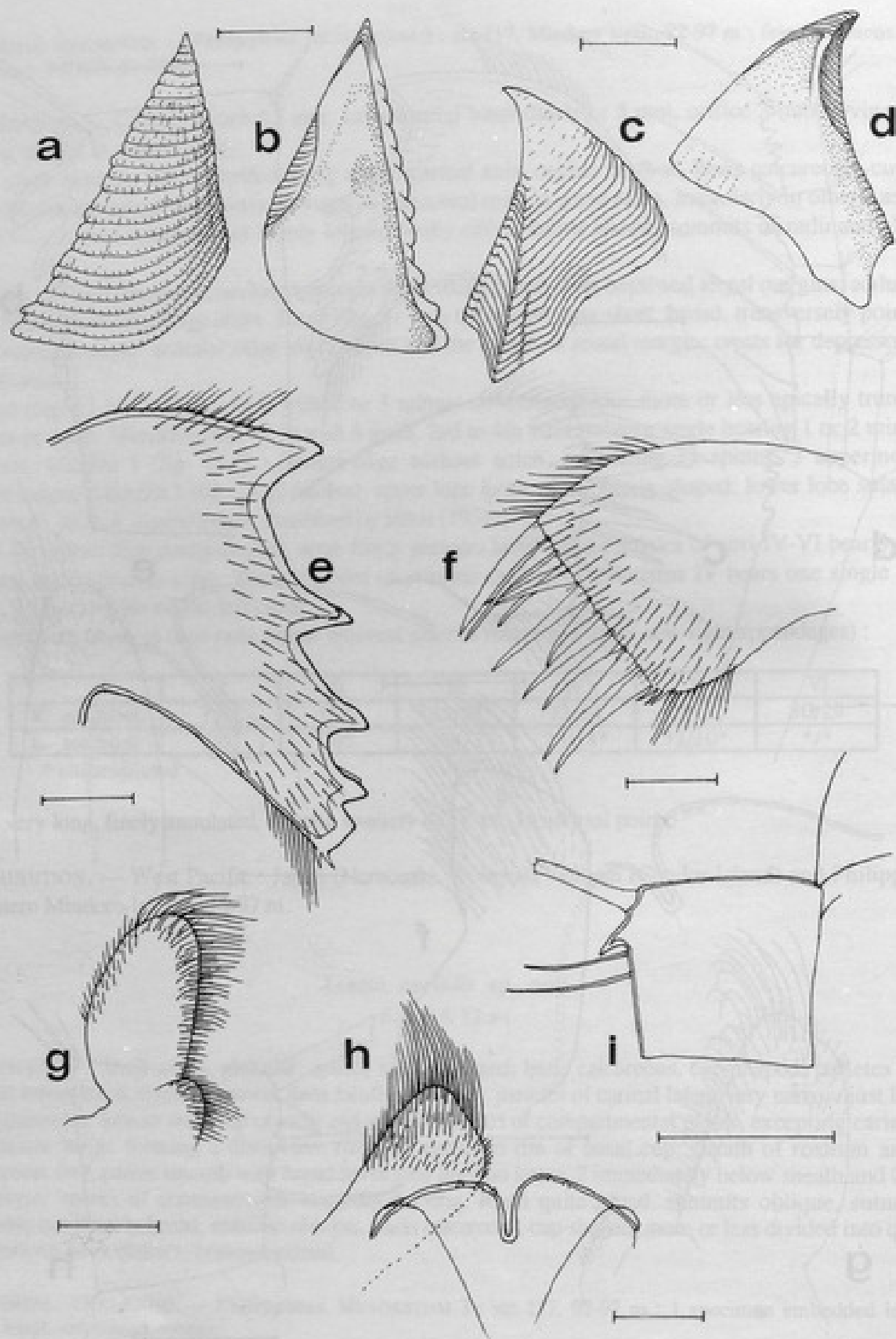


FIG. 11. — *Acasta echinata* Hiro : a, scutum, outside view; b, scutum, inside view; c, tergum, outside view; d, tergum, inside view; e, mandible; f, maxilla I; g, maxilla II; h, labrum and palpus; i, 3rd article anterior ramus cirrus IV.

Scale : a, b, c, d = 1.0 mm; e, f, i = 0.1 mm; g, h = 0.2 mm.

Scuta (fig. 12 a-b) triangular, externally slightly concave, occludent margin denticulate, longer than basal and tergal margins, basiscutal angle rounded, growth ridges distinct, radially striated; internally articular ridge low and short, adductor pit, ridge and crests for depressor muscles not apparent. Terga (fig. 12 c-d) subtriangular, spur without furrow, half as wide as the basal margin, transversely truncated and rounded, confluent with basiscutal angle such that there is no basal margin on this side of valve; growth lines low but distinctive; internally smooth, articular ridge short, crests for depressor muscles obsolete.

Labrum (fig. 12 g) notched, crests with fine hairs and 3 low denticles; palpus transversely elongated, median and apical margins with long setae. Mandible (fig. 12 e) with 4 teeth, 2nd and 3rd bifid, inferior angle bearing 1 or 2 short setae. Maxilla 1 (fig. 12 f) with straight frontal edge supporting 9 large setae, 2 uppermost and 2 lowermost largest, inferior angle rounded supporting few short smaller setae. Maxilla 2 (fig. 12 i) bilobed, upper lobe paddle-shaped, apex rounded, frontal and apical margins setose; lower lobe small, margin rounded, setose.

Cirri I-III shorter than cirri IV-VI. Setae on apex of terminal segments of cirri I and II finely serrate. Segments 1-11 of anterior ramus of cirrus IV bear 1-3 claw-like teeth and 2 small erect spines on distal frontal margin; frontal distal angle of upper pedicel of protopodite bears 4-5 claw-like teeth and few erect spines (fig. 12 h). Intermediate segments of rami of cirri V-VI bear 2-3 pairs of subequal setae on frontal margin.

Number of segments of their rami (upper numeral anterior ramus and upper row right appendages). Holotype :

	I	II	III	IV	V	VI
R. ant./post.	18/8	10/8	14/12	23/26	31/28	30/31
L. ant./post.	18/7	11/8	12/11	17/20	24/25	30/30

Penis very long, slender, tapering, finely annulated, distally sparsely setose. No basidorsal point with bump-like elevation.

ETYMOLOGY. — The specific name is based on the research vessel "*Coriolis*" used in the MUSORSTOM expedition.

REMARKS. — The present species is very similar to *Acasta zuiho* Hiro (1936, textfig. 9). However, armature of 4th cirrus, features of opercular valves and compartmental plates serve to distinguish between them.

***Acasta perforata* sp. nov.**

Figs 5 e-f, 6 a-c, 10 a-e

DIAGNOSIS. — Shell conical, white, transparent; orifice large, toothed; parietes with longitudinal ridges which are continuous with similar ridges on basal cup; radii and alae broad, summits oblique, sutural edge of radii weakly denticulate, not reaching basal cup; with numerous membrane covered apertures; basal cup with linear transverse slit-like membrane covered pores between radiating ridges; mandibles with 4 teeth; maxilla 1 without notch on its cutting edge; cirrus IV with claw-like teeth.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 117, 92-97 m : 4 specimens embedded in a siliceous sponge encrusting on antipatharian.

TYPES. — Holotype : MNHN-Ci 2009. Paratype : MNHN-Ci 2010. Paratype : UPIBM Crust. Coll. N° 373.

DESCRIPTION. — Carinorostral basal diameter 3.8 mm; height of carina 1.9 mm, rostrum 2 mm (holotype).

The barnacle is completely embedded in a siliceous sponge encrusting on antipatharian coral but not adherent to it; anchorage is by the encrusting sponge; linear nodule-like enlargement containing each barnacle is readily dislodged from axis of antipatharian indicating that basal cup is not cemented to it.

Shell conical, white, transparent, orifice large toothed; compartments with longitudinal ridges of varying height and length, these ridges are continuous with similar ridges on basal cup (fig. 5 f); inner parietes longitudinally ribbed, ribs extending beyond basis as tooth-like projections interlock with ridges of basal cup at

rim of cup; radii and alae quite broad, summits oblique, sutural edges of radii weakly denticulate, those of alae smooth; radii not reaching basal cup thereby leaving membrane covered apertures between compartmental plates (fig. 5 e).

Basal cup broad, shallow with radiating ridges, each coinciding with ridges from parietal wall, ridge rough, tuberculate giving summits gnarled and serrated appearance; between ridges are linear transverse slit-like membrane covered holes or pores.

Scutum (fig. 6 a) triangular, transversely elongated towards basioccludent angle; occludent margin denticulate, longer than basal and tergal margins, growth ridges very distinct; adductor ridge prominent, articular ridge moderate extending almost entire length of tergal margin; pits for adductor and lateral depressors deep.

Tergum (fig. 6 b-c) transparent, triangular, transversely elongated along basiscutal angle, beaked like those of *Balanus terebratus* figured by HOEK (1913, pl. 20, figs 18, 18 b, d); spur broad, short, transversely elongated without spur fasciole, medially forming an acute angle at basiscutal corner, so that basal margin on this side appears obsolete; growth lines distinct, articular ridge short, crests for depressors indistinct.

Labrum not bullate, notched, one side of crests with 2 tooth-like denticles, other side devoid of any visible denticles; palpus paddle-like, apical margin sparsely setose (fig. 10 e). Mandible (fig. 10 a) with 4 teeth, 4th tooth small, situated close to 3rd; 2nd tooth bifid, inferior angle indistinctly bifid. Maxilla 1 (fig. 10 c) without notch, supporting 7-9 spines, inferior angle bearing a small seta.

Rami of cirrus I unequal, anterior ramus has more than twice as many segments as posterior ramus. Cirrus IV, proximal segment of anterior ramus bears 1-4 claw-like teeth on its frontal margin and a single moderate seta; upper pedicel of protopodite also bears 4 claw-like teeth (fig. 10 d).

Intermediate segments of cirrus VI each bearing 4 pairs of subequal setae on frontal margin and few small ones at posterior distal angle.

Number of segments of their rami (upper numeral anterior ramus and upper row right appendages). Holotype :

	I	II	III	IV	V	VI
R. ant./post.	16/7	-/-	10/9	16/19	12*/24	26/17
L. ant./post.	14/6	7/6	11/8	-/-	26/23	26/27

Penis very long, slender, finely annulated, with few scattered short setae. Low conical basidorsal point present.

ETYMOLOGY. — The specific name is derived from the presence of perforations on its basal cup.

REMARKS. — I was reluctant to describe this form as new species after comparison with DARWIN's (1854) and HOEK's (1913) descriptions of *Balanus terebratus*. The present species is very similar to DARWIN's *B. terebratus* and the beaked tergum and holes on basal cup are like those of HOEK's illustrations (pl. 20, figs 17, 18, 18 b, d). DARWIN's species displays the characteristics more of an acastan rather than a balanid. This supports DARWIN's comment "Indeed, had *B. terebratus* inhabited a sponge, I should have been compelled to have ranked it in the subgenus *Acasta*". HOEK likewise, suspected or intimated on the true habit of *B. terebratus* stating "The shell is almost entirely covered by a thick yellowish coat which seems to be a sponge; the ribbed structure appears distinct only after this has been taken away". However, both DARWIN and HOEK did not mention membrane covered apertures on the compartments of their forms. Both were very keen observers and it is unlikely that they would have overlooked such an important character. Also, HOEK (1913), mentioned that the holes on basal cup are in double rows, but in present form these holes are in single rows. Hence the decision to describe the present form as a new species.

Acasta sculpturata Broch, 1931

Fig. 7 a

Acasta sculpturata Broch, 1931 : 101, textfig. 35. — NEWMAN & ROSS, 1976 : 54.

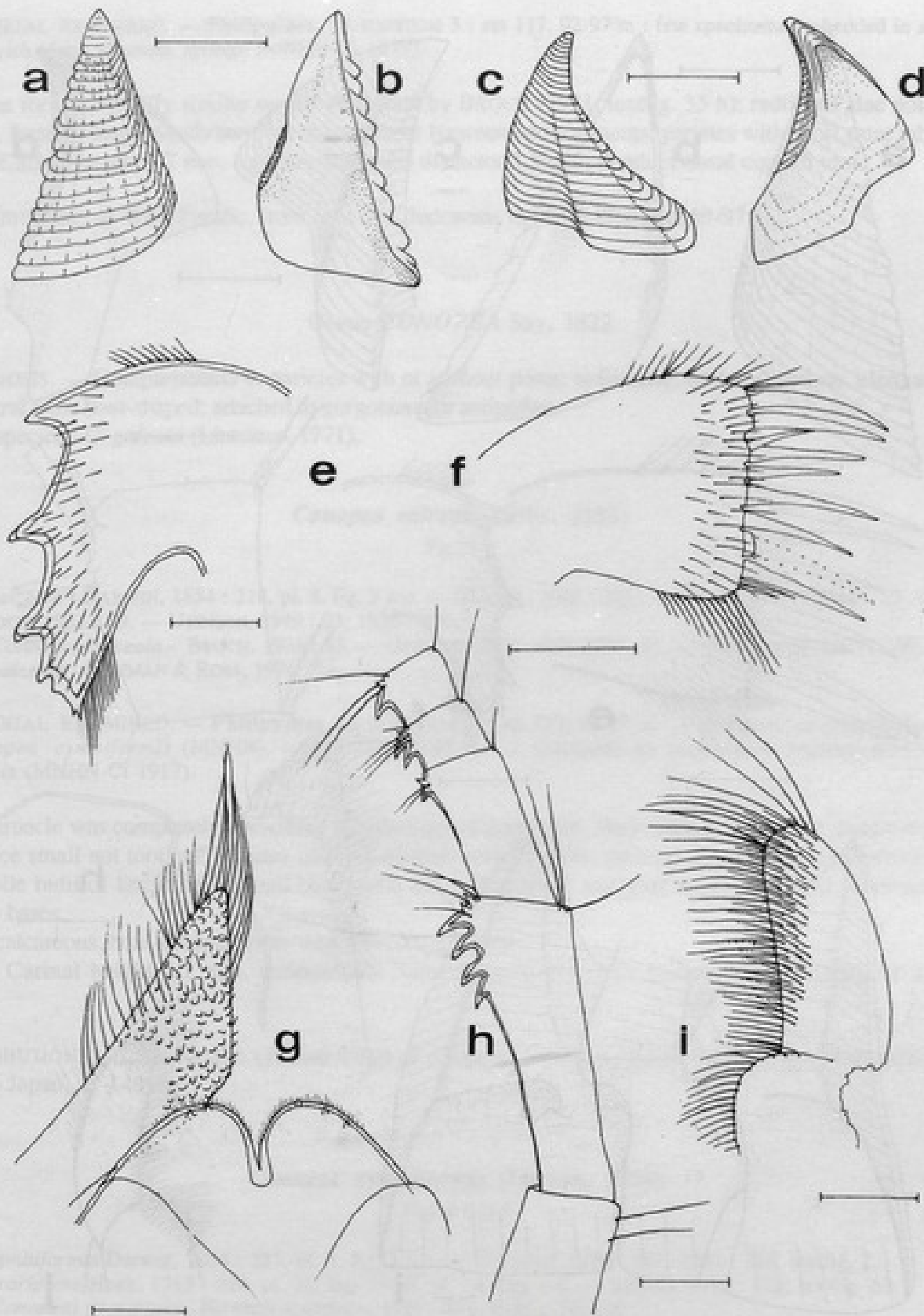


FIG. 12. — *Acasta coriolis* sp. nov., holotype : a, scutum, outside view; b, scutum, inside view; c, tergum, outside view; d, tergum, inside view; e, mandible; f, maxilla I; g, labrum and palpus; h, cirrus IV (part only); i, maxilla II.

Scale : a, b, c, d = 1.0 mm; e, f, g, h, i = 0.1 mm.

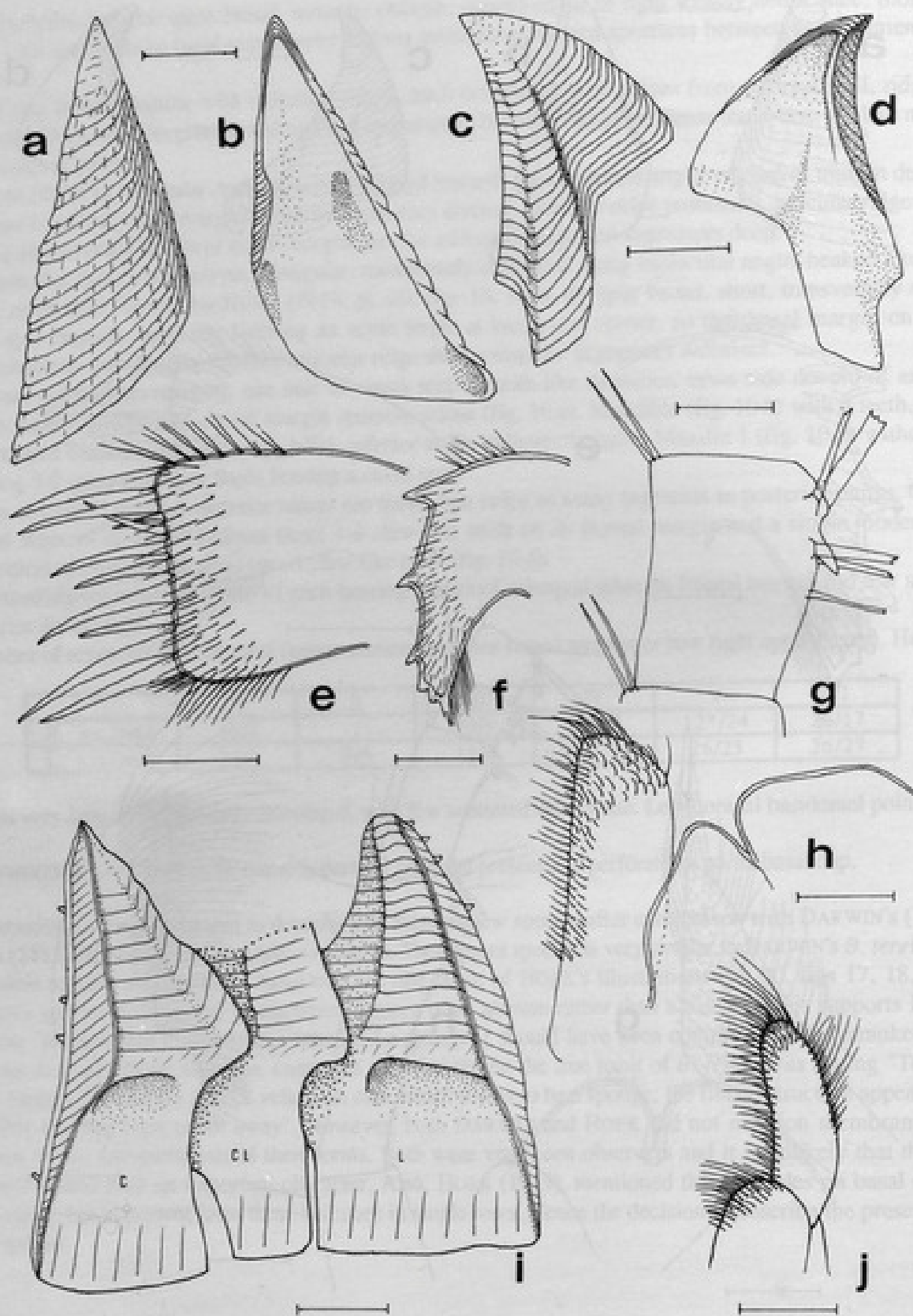


FIG. 13. — *Acasta apertura* sp. nov., holotype : a, scutum, outside view; b, scutum, inside view; c, tergum, outside view; d, tergum, inside view; e, maxilla I; f, mandible; g, 7th segment, anterior ramus cirrus IV (right); h, labrum and palpus; i, compartmental plates; j, maxilla II (CL, carinolateral; L, Latera).

Scale : a, b, c, d, i = 1.0 mm; e = 0.1 mm; f, h, j = 0.2 mm; g = 0.5 mm.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 117, 92-97 m : few specimens embedded in a compact, tough grayish-black siliceous sponge (MNHN-Ci 1879).

Present form externally similar to that described by BROCH (1931, textfig. 35 b); radii and alae not reaching basal cup, forming large membrane covered apertures between compartments; parietes with short stout tubercles.

Size : Carinal height 5.7 mm; carinorostral basal diameter 5.3 mm; depth of basal cup 4.5 mm.

DISTRIBUTION. — West Pacific, from Java Sea, Indonesia to the Philippines, 49-97 m.

Genus *CONOPEA* Say, 1822

DIAGNOSIS. — Compartments 6; parietes with or without pores; radii solid; basis calcareous, elongated along carinorostral axis, boat-shaped; attached to gorgonians or antipathes.

Type species : *C. galeata* (Linnaeus, 1771).

Conopea calceola (Ellis, 1758)

Fig. 4 g

Balanus calceola - DARWIN, 1854 : 218, pl. 3, fig. 3 a-e. — GRUVEL, 1905 : 221. — HOEK, 1913 : 221, pl. 22, figs 19-25. — BROCH, 1927 : 29. — UTINOMI, 1949 : 23; 1958 : 296.

Balanus (Conopea) calceola - BROCH, 1931 : 85. — UTINOMI, 1959 : 403; 1969 : 91. — STUBBINGS, 1967 : 290.

Conopea calceola - NEWMAN & ROSS, 1976 : 54.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 117, 92-97 m : 1 specimen on gorgonian together with *Conopea cymbiformis* (MNHN). — Stn 134, 92-95 m : 2 specimens on gorgonian together with *Conopea cymbiformis* (MNHN-Ci 1917).

The barnacle was completely embedded in coenosarc of gorgonian. Shell conical, elongated along carinorostral axis; orifice small not toothed; parietes colored, pinkish-white basally, rostrum lighter than other plates, its radii white, while radii of latera and carinal latera with alternating white and pink horizontal lines; summits of radii parallel to bases.

Basis calcareous, boat-shaped, white with protruding bottom.

Size : Carinal height 4.1 mm, carinorostral basal diameter 9.6 mm, orifice 3.2 mm, depth of basal cup 2.4 mm.

DISTRIBUTION. — Indo-Pacific, off East Coast of Africa to Australia, Malay Archipelago, Philippines, Amoy, China and Japan, 21-140 m.

Conopea cymbiformis (Darwin, 1854)

Fig. 4 b, e-f

Balanus cymbiformis Darwin, 1854 : 221, pl. 3, fig. 5 a-b. — UTINOMI, 1958 : 297; 1962 : 219, textfig. 2.

Balanus proripiens Hoek, 1913 : 228, pl. 33, figs 17-21, pl. 24, figs 1-3. — BROCH, 1922 : 326, textfig. 63.

Balanus (Conopea) proripiens - NILSSON-CANTELL, 1921 : 331, textfig. 70, c-d.

Balanus (Conopea) cymbiformis - BROCH, 1931 : 85, textfig. 29. — STUBBINGS, 1936 : 48. — UTINOMI, 1962 : 219, textfig. 2.

Conopea cymbiformis - NEWMAN & ROSS, 1976 : 55.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 117, 92-95 m : 2 specimens on gorgonian together with *Conopea calceola* (MNHN-Ci 1916). — Stn 134, 92-95 m : 1 specimen on a gorgonian together with *Conopea calceola* (MNHN-Ci 1915).

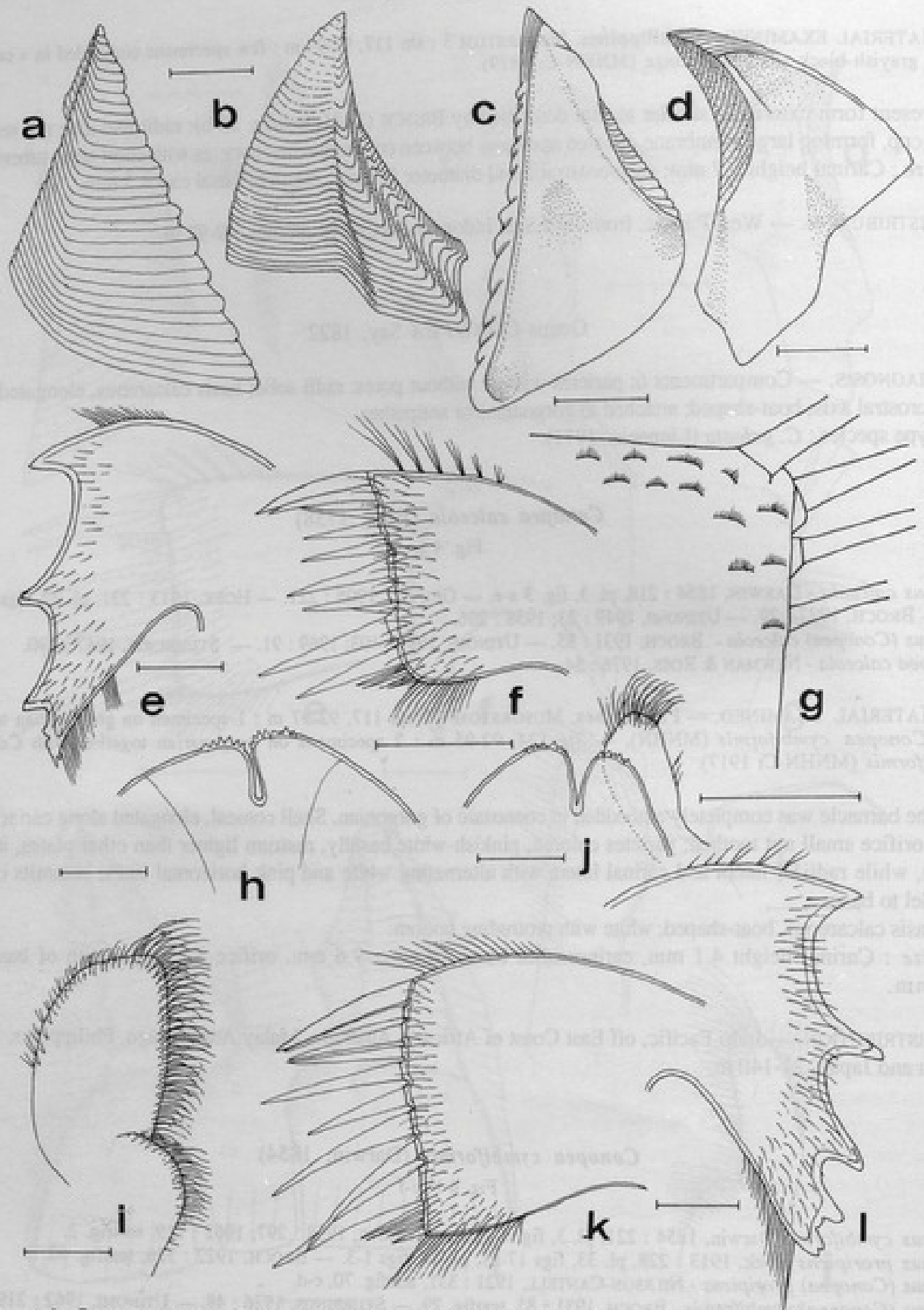


FIG. 14. — a-h, *Conopea squamosa* sp. nov., holotype : a, scutum, outside view; b, tergum, outside view; c, scutum, inside view; d, tergum, inside view; e, mandible; f, maxilla I; g, 7th segment anterior ramus, cirrus IV; h, labrum; i-l, *idem*, paratype : i, maxilla II; j, labrum and palpus; k, maxilla I; l, mandible.

Scale : a, b, c, d = 0.5 mm; j = 0.2 mm; e, f, h, i, k, l = 0.1 mm; g = 0.05 mm.

The present material is represented by an empty shell completely embedded in coenosarc of a bright orange octocoral. Paring off coenosarc revealed a snow-white shell. Basal cup boat-shaped, rostrum elongated; parietes with distinct longitudinal lines which are more apparent towards the base.

Tergum (fig. 4 f) is similar to HOEK's description (1913, pl. 23, fig. 18).

There is no doubt the present material is of the above species; commonly attached to gorgonians, rarely to antipatharians.

Size : carinal height 6 mm, carinorostral basal diameter 20 mm, orifice 2.5 mm; another individual with a carinorostral basal diameter of 24.7 mm.

DISTRIBUTION. — Indo-Pacific : Gulf of Aden east to Fiji and northwest to Indonesia, Philippines and southern Japan, littoral - 453 m.

Conopea dentifer (Broch, 1922)

Fig. 4 d

Balanus dentifer Broch, 1922 : 321, textfigs 64, 65, 66; 1931 : 88.

Conopea dentifer - NEWMAN & ROSS, 1976 : 55.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 126, 266 m : several specimens on antipatharian together with *Oxynaspis indica* (MNHN-Ci 1930). — Stn 134, 92-95 m : 4 specimens on gorgonian (MNHN-Ci 1914). — Stn 142, 27-26 m : 1 empty shell on axis of dead gorgonian (MNHN-Ci 1929).

Shell completely embedded in coenosarc of gorgonians or antipatharians. Once coenosarc is pared off the animal is revealed. Shell white, basal cup whitish. Those from stn 126 (fig. 4 d) are similar to BROCH's (1922) specimens, with tooth on carina.

Size : height of carina 2.2 mm, carinorostral basal diameter 4.3 mm, orifice 1.6 mm, depth of basal cup 0.7 mm.

DISTRIBUTION. — West-Southwest Pacific, off Tonga Islands to Kei Islands, Indonesia, Philippines and southern Japan, 26-266 m.

This is a new record for the Philippines.

Conopea granulata (Hiro, 1937)

Fig. 7 e

Balanus (Conopea) granulatus Hiro, 1937b : 444, textfigs 29, 30; 1939 : 266. — UTINOMI, 1958 : 309; 1962 : 220; 1970 : 359. — UTINOMI & KIKUCHI, 1966 : 7.

Conopea granulata - NEWMAN & ROSS, 1976 : 55.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 134, 92-95 m : 1 empty shell with opercular valves on axis of gorgonian (MNHN).

One empty shell completely embedded in coenosarc of host gorgonian. Shell pinkish, dirty-white on basal part of latera and rostrum; attachment to axis of gorgonian only at small point of basal cup on carinal side and on upper part of carina (fig. 7 e). Parietes smooth, growth lines faintly visible, radii with summits parallel to bases, pinkish in colour, like parietes, rostrum white. Scuta and terga similar to HIRO's specimens (1937, textfig. 29 b-f). Basis calcareous, dirty-white or pinkish-white, cup-shaped with irregularly shaped bottom, orifice not toothed.

Size : height of carina 3 mm, carinorostral basal diameter 6 mm, orifice 3.1 mm, depth of basal cup 1.3 mm.

DISTRIBUTION. — Western Pacific, Tanabe Bay, Japan to north-western Panay Island, Philippines, 10-95 m.

This is a new record for the Philippines.

Conopea squamosa sp. nov.

Figs 7 f-g, 14 a-l

DIAGNOSIS. — Shell dome-shaped to conical, snow-white, slightly elongated along carinorostral axis; parietes smooth; radii broad, summits slightly oblique; alae narrow, summits oblique; orifice small, more or less toothed; basis calcareous, solid, slightly boat-shaped, much shallower than in *C. cymbiformis* and *C. calceola*, margin finely denticulate, denticles bifid; scutum triangular, faintly radially striated, slightly externally concave; tergum triangular, spur transversely elongated towards basiscutal angle, fasciole distinct; mandible with 4 teeth, 2nd and 3rd bifid, 4th tooth small; maxilla 1 without notch, bearing 9-10 spines; intermediate articles of cirri III and IV with comb-like scales; penis without basidorsal point.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 117, 92-97 m : 1 specimen embedded in a white gorgonian (holotype) (MNHN-Ci 2108). — Stn 110, 187-193 m : 4 specimens embedded in a white gorgonian (paratype) (MNHN-Ci 2109).

TYPES. — Holotype : MNHN-Ci 2108. Paratypes : MNHN-Ci 2109. Paratype : UPIBIM Crust. Coll. N° 374.

DESCRIPTION. — Carinorostral basal diameter 4.7 mm, orifice 1.5 mm; height of carina 4.1 mm, rostrum 3 mm; depth of basal cup 0.3 mm (holotype). Carinorostral basal diameter 6.3 mm, orifice 2 mm; height of carina 4.5 mm; depth of basal cup 0.5 mm (paratype).

Shell snow-white, dome or cone-shaped (fig. 7 f-g); orifice small, more or less slightly toothed; parietes solid, smooth; radii broad, summits slightly oblique; inner paries longitudinally ribbed, basal part of ribs pronounced, fading out before reaching sheath; basis calcareous, solid, slightly boat-shaped, margin finely denticulate, denticles bifid.

Scutum (fig. 14 a, c) triangular, horizontal growth lines distinct, in some faintly radially striated, slightly transversely elongated towards basioccludent angle; basiscutal angle rounded; occludent margin longer than scutal and basal margins; articular ridge small, adductor ridge indistinct; pits for adductor and depressor muscles defined.

Tergum (fig. 14 b, d) triangular, spur distinct, transversely elongated towards basiscutal angle, fasciole conspicuous; articular ridge short; crests for depressor muscles obsolete.

Labrum (fig. 14 h, j) notched, crests armed with several sharp denticles; palpus club-shaped, outer and apical margins bearing short setae. Mandible (fig. 14 e, l) with 4 teeth, 2nd and 3rd bifid, 4th tooth small close to 3rd tooth; inferior angle produced, bifid. Maxilla 1 (fig. 14 f, k) without notch, bearing 9-10 setae, usually uppermost and 2 lowermost largest, inferior angle rounded supporting few small straight setae. Maxilla 2 (fig. 14 i) bilobed, upper lobe larger and paddle-like, apical and frontal margins densely setose; lower lobe small, frontally with rounded margin, setose.

Cirri I-III shorter than cirri IV-VI; anterior ramus of cirrus I longer than posterior ramus, larger setae on terminal segment finely serrate; posterior margin of protopodite with long plumose setae. Intermediate segments of cirri III and IV each with fine comb-like scales on distal lateral surface (fig. 14 g). Frontal margins of intermediate segments of cirri IV-VI bearing 3 pairs of subequal setae, proximal pair minute.

Number of segments in their rami (upper numeral anterior ramus and upper row right appendages) :

Holotype :

	I	II	III	IV	V	VI
R. ant./post.	12/6	8/6	7/8	12/16	20/20	24/25
L. ant./post.	12/6	8/7	8/8	14/12*	20/22	26/24

Paratype :

	I	II	III	IV	V	VI
R. ant./post.	11/7	8/8	8/*	*/*	*/19	19/21
L. ant./post.	10/7	9/8	9/8	12/16	18/13	19/17

*Cut/mutilated.

Penis very long, gradually tapering, finely annulated, sparsely setose. No basidorsal point.

ETYMOLOGY. — The specific name is based on the comb-like scales on some segments of rami in cirri III and IV.

REMARKS. — Of the fifteen presently known species of *Conopea* the present form is closely allied to *C. fragilis* Broch, 1931. The mandibles, maxillae and terga bear some resemblance to BROCH's species. The intermediate segments of the 3 posterior cirri each have 3 pairs of subequal setae on the frontal margin. But, in the present form, some segments of the rami of cirri III and IV have comb-like scales and whereas the margin of the basis is finely denticulate, with denticles bifid, in *C. fragilis* there are no hooks or spines on these cirri and the margin of the basis is even or smooth.

Family BALANIDAE Leach, 1817

Genus *BALANUS* Da Costa, 1778

DIAGNOSIS. — Compartments 6; parietes with parietal tubes; radii solid; basis calcareous.

Type species : *B. balanus* (Linnaeus, 1758) (= *B. porcatus* Da Costa, 1778).

Balanus amphitrite amphitrite Darwin, 1854

References. See ROSELL, 1989 : 31.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 100, 189-199 m : several empty shells on oyster shell (MNHN-Ci 1897). — Stn 106, 668-640 m : 4 empty shells on oyster shell (MNHN-Ci 1898). — Stn 128, 821-815 m : few empty shells on oyster shell (MNHN-Ci 1900). — Stn 145, 214-246 m : 6 empty shells unattached (MNHN-Ci 1896). — Stn 141, 40-44 m : several empty shells on bamboo, nipa or coconut leaf (MNHN-Ci 1895).

This is a shallow-water species; its presence in deeper water samples is mainly accidental. Hence only empty shells are encountered and mostly attached to oyster shells or unattached. Most likely these are detached from floating objects and sunk to the bottom where they become part of the rubble.

DISTRIBUTION. — Cosmopolitan in tropical and subtropical waters.

Balanus minutus Hoek, 1913

Balanus minutus Hoek, 1913 : 177, pl. 15, figs 9-16. — PILSBRY, 1916 : 78. — BROCH, 1922 : 317, textfigs 58, 59, 60. — NILSSON-CANTELL, 1925 : 31, textfig. 12, pl. 1, fig. 4. — UINOMI, 1968b : 173. — NEWMAN & ROSS, 1976 : 65.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 134, 92-95 m : 3 specimens on antipatharian together with *Conopea granulata* (MNHN). — Stn 142, 27-26 m : 5 specimens on small branch of antipatharian (MNHN-Ci 1894).

Present form quite small, attached to narrow branches of antipatharian. Shell coloration quite similar to that of *Balanus amphitrite amphitrite*. Color on rostral plate variable, in some it is all white, in others only radii are white and parietes similar to other plates though fainter. Opercular valves as described by BROCH (1922, fig. 58).

Size : largest individual, height of carina 2.4 mm, rostrum 3.3 mm, carinorostral basal diameter 6 mm, orifice 3.3 mm.

DISTRIBUTION. — West Pacific, from Kwandang Bay, Indonesia, Philippines to southern Japan, 26-146 m.

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