

Deep-sea Bodotriidae (Crustacea: Cumacea) from New Caledonia, Fiji and Indonesia

JORDI CORBERA*

Carrer Gran, 90, 08310 Argentona, Catalonia, Spain

Received 6 March 2007; accepted for publication 4 June 2007

Cumaceans (Crustacea: Peracarida) belonging to the family Bodotriidae collected between 206 and 3680 m depth, during the French campaigns BIOCAL and BIOGEOCAL in waters of New Caledonia, KARUBAR in Indonesia and BORDAU 1 around Fiji were studied. The 93 specimens belonging to this family were assigned to 11 species, ten of them new to science, namely *Cyclaspis variosculpta* sp. nov., *Cyclaspis richeri* sp. nov., *Cyclaspis dictyota* sp. nov., *Cyclaspis decora* sp. nov., *Cyclaspis magna* sp. nov., *Cyclaspoides erugatus* sp. nov., *Alticuma? ectyphum* sp. nov., *Apocuma pacificum* sp. nov., *Hypocuma fragosum* sp. nov. and *Bathycuma coremium* sp. nov. The genera *Cyclaspoides* and *Hypocuma* are recorded for the first time from the Pacific Ocean. © 2008 The Linnean Society of London, *Zoological Journal of the Linnean Society*, 2008, 152, 227–254.

ADDITIONAL KEYWORDS: Bodotriidae – Indo West Pacific – new species.

INTRODUCTION

Bodotriidae, with more than 370 species, is after Nannastacidae the most diverse family within the order Cumacea. The high regional diversity of this family in the Indo-West Pacific induced Day (1978) to propose this region as the centre of origin for the Bodotriidae. However, based on a filogenetic analysis, Haye (2002) suggested as a centre of origin the newly forming Atlantic during the Jurassic, supporting the view pointed of Corbera (2002) for the subfamily Mancocumatinae.

Although this second hypothesis may be true, there is no doubt that Bodotriidae reaches high diversity in the South West Pacific. This is particularly so for the genus *Cyclaspis*, for which Australian waters have been suggested to be its centre of origin (Bacescu, 1990). Most of our knowledge on this genus in the region comes from the work of Hale (1944, 1948). More recently, Tafe & Greenwood (1996) studying the cumacean fauna of a relatively small area, Moreton Bay (Queensland, Western Australia), recorded 13 species of the genus, describing nine of them as new. In the same work the authors also described four

other species belonging to the genus *Bodotria*, *Leptocuma* and *Picrocuma*. This again highlights the high diversity of Bodotriidae in waters in this region. However, most of the species were described from shallow waters.

French cruises carried out in deep waters of the Indo-West Pacific have supplied a very diverse cumacean collection and a first report dealing with the family Lampropidae was recently published (Corbera, 2006a). The present article deals with material belonging to the family Bodotriidae, of which a new genus has already been described (Corbera, 2006b).

MATERIAL AND METHODS

Material identified was collected during the French campaigns BIOCAL, BIOGEOCAL (Richer de Forges, 1990), KARUBAR (Crosnier, Richer de Forges & Bouchet, 1997) and BORDAU 1 (Richer de Forges *et al.*, 2000) between 206 and 3680 m depth. Samples were collected using three different gears, identified by upper-case letters in the name of the station as follows: beam trawl (CP), Sanders epibenthic sledge (DS) and Waren dredge (DW).

For morphological observations, the cumaceans were dissected in lactic acid and stained with chlorazol black. Material preserved in permanent glass

*E-mail: corbera@sct.ictnet.es

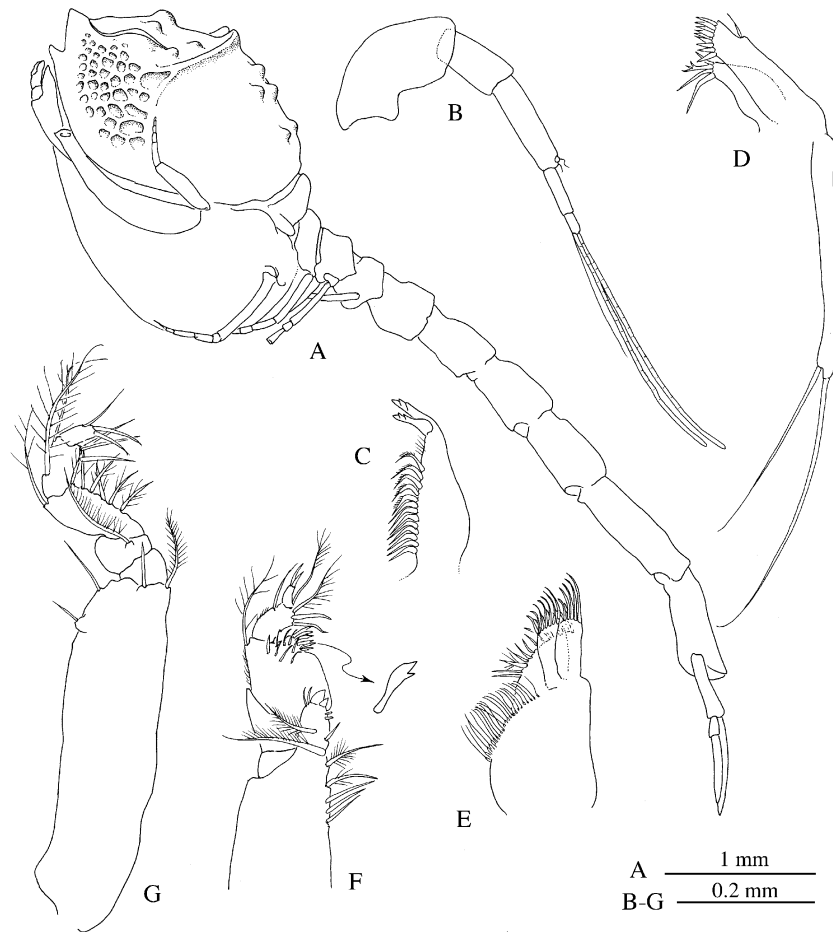


Figure 1. *Cyclaspis variosculpta* sp. nov. adult female paratype: A, whole animal in lateral view. Preadult male holotype: B, antenna 1; C, left mandible; D, maxilla 1; E, maxilla 2; F, maxilliped 1; G, maxilliped 2.

slides was mounted in Fauré medium sealed with nail varnish. Drawings were prepared using a camera lucida on an Olympus microscope. Few specimens were examined with a Hitachi H-2300 scanning electron microscope; they were prepared by dehydration through a graded ethanol series, critical point dried, mounted on stubs and sputter-coated with gold. Setae terminology follows Watling (1989) and Garm (2004), and other morphological terms follow Bacescu & Petrescu (1999). The specimens from the French campaigns remain deposited in the Muséum national d'Histoire naturelle, Paris (MNHN).

TAXONOMY

FAMILY BODOTRIIDAE SCOTT, 1901
SUBFAMILY BODOTRIINAE SCOTT, 1901
GENUS *CYCLASPIS* SARS, 1865

Diagnosis: Pereonite 1 visible sometimes in female but never in male. Pereopod 2 7-articulate. Male with five pairs of pleopods. Uropod endopod 1-articulate.

CYCLASPIS VARIOSCULPTA SP. NOV. (FIGS 1, 2)

Type material: Holotype: preadult male dissected in two slides, New Caledonia, BIOCAL, stn CP75, 22°18.65'S, 163°23.30'E, 825 m, 4.ix.1985 (MNHN-Cu1072). **Paratypes:** same station than holotype, 1 adult female, 1 preadult female, 1 juvenile (MNHN-Cu1073).

Diagnosis: Carapace globose with a transversal ridge, some tubercles on the dorsal half, and reticulate below the frontal lobe. Uropod peduncle half length of pleonite 6, with very small simple setae on outer margin. Endopod nearly twice as long as peduncle, with very small simple setae on inner margin; exopod as long as endopod with five simple setae on inner margin.

Description: Preadult male 6.4 mm total length. Carapace (Fig. 1A) slightly shorter than one-third of total length, globose, with a transversal ridge on the dorsal half; this ridge crosses the dorsal line in the

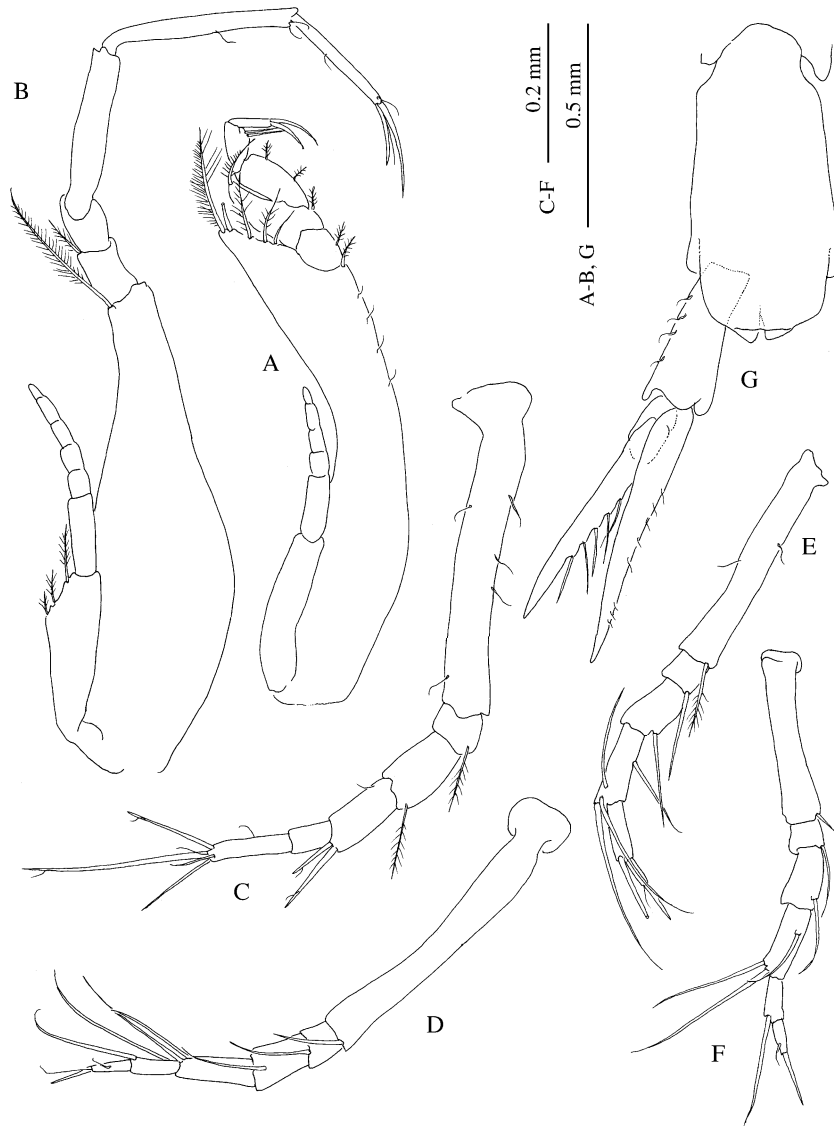


Figure 2. *Cyclaspis variosculpta* sp. nov. preadult male holotype: A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, uropod and last abdominal sommite.

middle of carapace and slopes slightly forward on each side; with tubercles dorsally in front of and behind the ridge; hardly reticulate below the frontal lobe. Eyelobe small and triangular, not reaching the tip of pseudorostrum.

Antennule (Fig. 1B), peduncle article 1 shorter than articles 2 and 3 combined length; article 3 longer than article 2; main flagellum 2-articulate, with two aesthetascs and a long, simple seta, accessory flagellum rudimentary. Left mandible (Fig. 1C) with three teeth on the pars incisiva, 13 setae between pars incisiva and pars molaris. Maxillule (Fig. 1D) palp with two unequal filaments, inner endite with four setae, three simple and one trifid.

Maxilla (Fig. 1E), endites exceeding the protopod, with simple setae.

Maxilliped 1 (Fig. 1F), basis with six setae on inner margin, distally produced reaching carpus, with a long plumose seta on the prejection; carpus with six bi-dentate flattened setae on the inner margin and a long plumose seta on distal outer corner. Maxilliped 2 (Fig. 1G) basis longer than rest of appendage, with a plumose seta on inner distal corner; carpus longer than merus, with five plumose setae on inner margin and a long plumose seta on distal outer corner; propodus with two long plumose setae on outer margin and three simple setae on the inner. Maxilliped 3 (Fig. 2A), basis expanded distally over mero-carpal

articulation, with plumose setae on inner margin of projection; ischium with a plumose seta on inner margin; merus produced distally reaching the carpo-propodial articulation with a plumose seta on its tip. Pereopod 1 (Fig. 2B), basis shorter than rest of appendage; ischium and merus of similar length; carpus shorter than propodus; dactylus shorter than carpus. Pereopod 2 (Fig. 2C), basis slightly longer than rest of appendage; ischium short, with a plumose seta; merus twice as long as ischium, with a plumose seta distally; carpus of similar length as merus, with two setae on distal corner; dactylus twice as long as propodus. Pereopod 3 (Fig. 2D), basis slightly longer than rest of appendage, with simple seta on distal margin; ischium half length of merus; merus shorter than carpus; carpus and propodus with three and one long setae on distal corner, respectively. Pereopods 4 and 5 (Fig. 2E, F), basis shorter than rest of appendage; merus shorter than carpus; carpus and propodus with two and one long simple seta on distal corner, respectively.

Uropod peduncle half length of pleonite 6 (Fig. 2G), with four small simple setae on outer margin. Endopod twice as long as peduncle, sharply pointed. Exopod slightly shorter than endopod, with five simple setae on inner margin.

Etymology: From the Latin *varius* meaning diverse, referring to the different kinds of carapace ornamentation including ridges, tubercles and reticulation.

Remarks: Other two *Cyclaspis* species have a transverse ridge crossing the carapace at least dorsally, *C. cingulata* Calman, 1907 and *C. adistolos* Corbera, Tirado & Martin, 2005; however, neither has the reticulated area below of the frontal lobe.

CYCLASPIS RICHERI SP. NOV. (FIGS 3–5)

Type material: Holotype: adult female dissected in two slides, New Caledonia, BIOCAL, stn DW44, 22°47.3'S, 167°14.3'E, 440–450 m, 30.viii.1985 (MNHN-Cu1074). *Paratypes:* same station as holotype, 1 adult female, 15 preadult females, 13 preadult males, 2 juveniles (MNHN-Cu1075); stn DW46, 22°53.05'S, 167°17.08'E, 570–610 m, 30.viii.1985, 3 preadult males (MNHN-Cu1076); stn DW51, 23°05.27'S, 167°44.95'E, 700–680 m, 31.viii.1985, 1 preadult male, 5 preadult females (MNHN-Cu1077), stn CP75, 22°18.65'S, 167°23.30'E, 825–860 m, 5.ix.1985, 2 manca (MNHN-Cu1078); stn DW77, 22°15.32'S, 167°15.40'E, 440 m, 5.ix.1985, 3 preadult males, 4 preadult females (MNHN-Cu1079).

Diagnosis: Carapace globose and smooth, finely reticulate at high magnification. Pseudorostral lobes

not meeting in front of the eyelobe. Uropod peduncle shorter than half length of pleonite 6; endopod nearly twice as long as peduncle; exopod of similar length as endopod, inner margin smooth without setae.

Description: Adult female 8.73 mm total length. Carapace (Fig. 3) slightly shorter than one-third total length, globose, finely reticulate at high magnification (Fig. 4B); produced backwards dorsally hiding pereonite 2 in dorsal view (in preadult specimens it is more produced hiding part of pereonite 3; see Fig. 4A). Pseudorostral lobes not meeting in front of eyelobe. Eyelobe without lenses. Antennal notch deep, anterolateral angle acute.

Antennule (Fig. 3B), peduncle article 1 longer than combined length of articles 2 and 3; article 3 as long as article 2; main flagellum 2-articulate, with two aesthetascs, accessory flagellum rudimentary. Left mandible (Fig. 3C) with four teeth on the pars incisiva, 17 setae between pars incisiva and pars molaris (18 setae on right mandible). Maxillule (Fig. 3D) palp with two unequal filaments, inner endite with four setae, three simple and one trifid. Maxilla (Fig. 3E), endites with simple and serrulate setae.

Maxilliped 1 (Fig. 3F), basis with six setae on inner margin, distally produced reaching carpus; carpus with six bi-dentate flattened setae on the inner margin and a long pappose seta on distal outer corner. Maxilliped 2 (Fig. 3G) basis longer than rest of appendage, with two plumose setae on inner distal corner; carpus longer than merus, with seven plumose setae on inner margin; propodus with a long pappose seta on proximal half, a simple seta on distal outer corner and three simple setae on distal inner corner. Maxilliped 3 (Fig. 5A), basis expanded distally over mero-carpal articulation, with a row of plumose setae on inner margin of projection; merus produced distally not reaching the carpo-propodial articulation with a plumose seta on its tip. Pereopod 1 (Fig. 5B), basis shorter than rest of appendage; ischium and merus short; carpus shorter than propodus; dactylus shorter than carpus and half length of propodus. Pereopod 2 (Fig. 5C), basis longer than rest of appendage; ischium short; merus three times as long as ischium, with a plumose seta distally; carpus shorter than merus, with two cuspidate setae on distal corner; dactylus nearly twice as long as propodus, with three cuspidate setae terminally. Pereopod 3 (Fig. 5D), basis longer than rest of appendage, with simple seta on distal margin; merus three times as long as ischium and as long as carpus; propodus with a long simple seta on distal corner. Pereopod 4 (Fig. 5E), basis as long as rest of appendage; merus nearly as long as carpus; carpus and propodus with two and one long simple setae on distal corner, respectively. Pereopod 5 (Fig. 5E), basis shorter than rest of

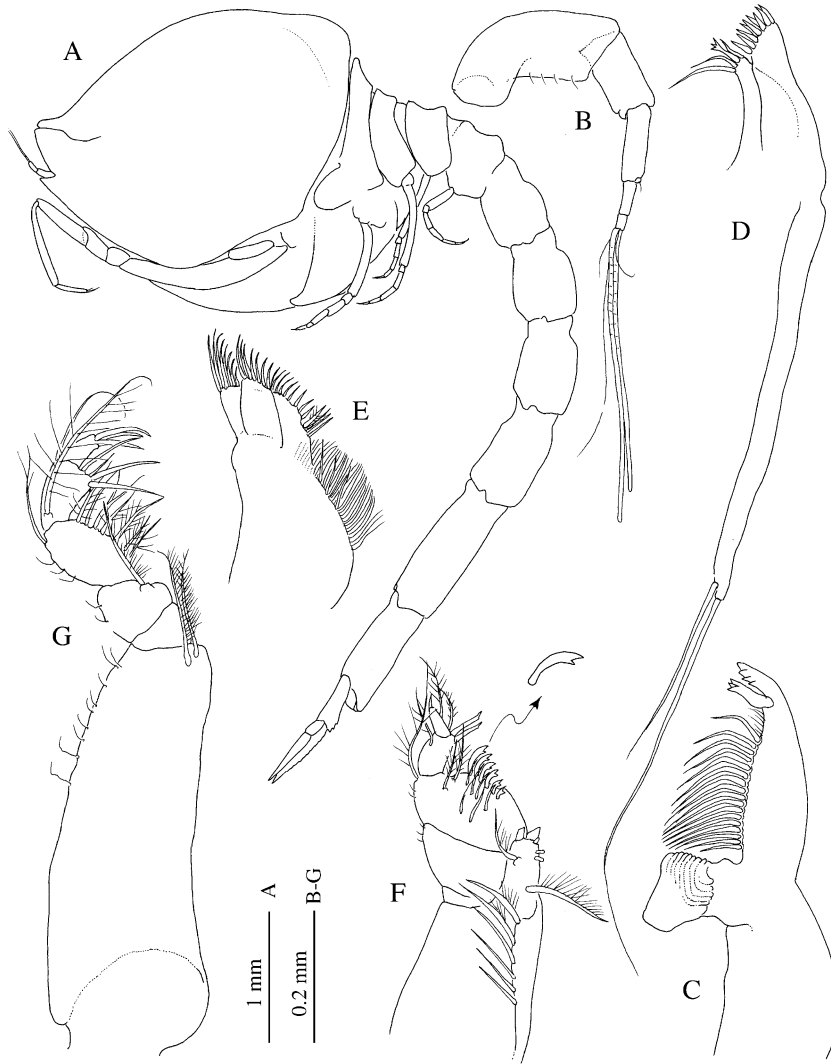


Figure 3. *Cyclaspis richeri* sp. nov. adult female holotype: A, whole animal in lateral view; B, antenna 1; C, left mandible; D, maxilla 1; E, maxilla 2; F, maxilliped 1; G, maxilliped 2.

appendage; merus nearly as long as carpus; carpus and propodus with two and one long simple setae on distal corner, respectively.

Uropod peduncle (Figs 4C, 5G) shorter than half length of pleonite 6; endopod nearly twice as long as peduncle, inner margin crenulate; exopod of similar length than endopod, inner margin without setae.

Etymology: This species is named after Bertrand Richer de Forges (IRD, New Caledonia) in recognition of his efforts in collecting deep-sea fauna in the Indo-West Pacific.

Remarks: Resembles *C. globosa* Hale, 1944 but differs from it by the lack of lenses in the eyelobe, the lack of plumose setae on the basis of pereopods, the shortness of uropod peduncle and the rami that lack

plumose setae. *C. pinguis* Hale, 1944 also has affinities with *C. richeri*, but the peduncle of the uropod is nearly as long as the telsonic somite and the carapace does not hide the second pereonite in dorsal view.

CYCLASPIS DICTYOTA SP. NOV. (FIGS 6, 7)

Type material: Holotype: preadult female partially dissected in one slide, New Caledonia, BIOCAL, stn DS59, 23°56.21'S, 166°41.10'E, 2650 m, 2.ix.1985 (MNHN-Cu1080).

Diagnosis: Carapace globose covered by small granules, which show a reticulate pattern that disappear near the margins; pseudorostral lobes meeting just in front of the eyelobe. Uropods shorter than pleonite 6; rami slightly longer than peduncle.

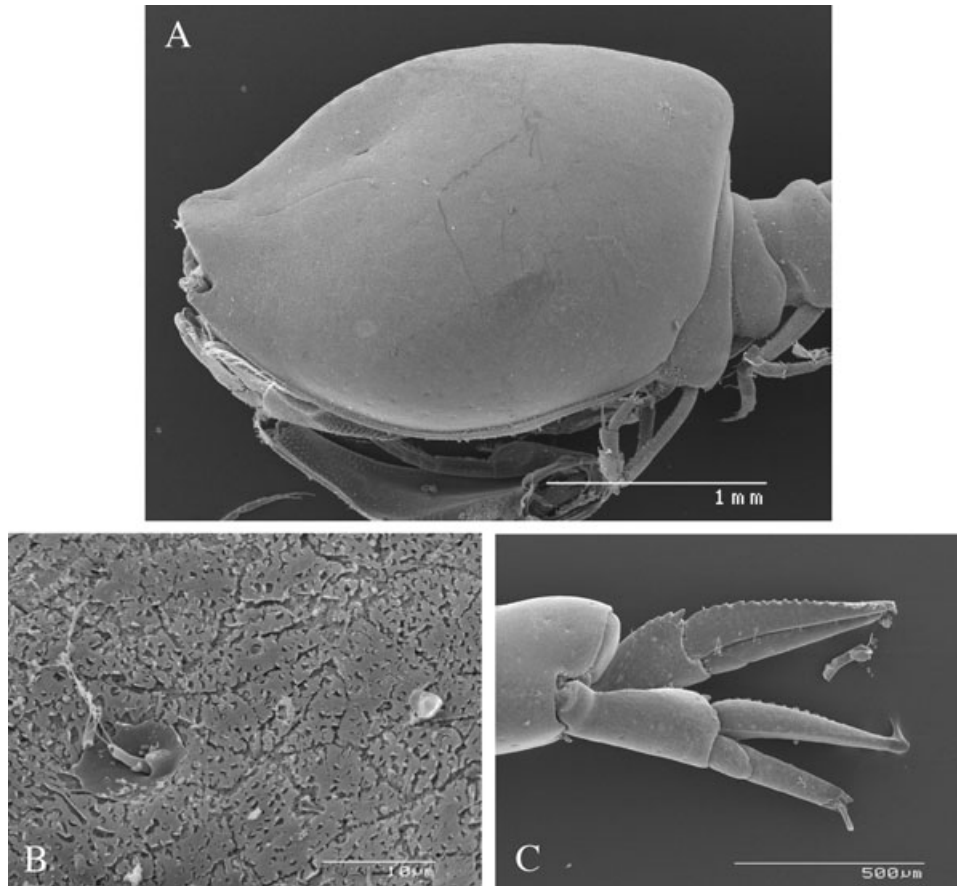


Figure 4. *Cycloaspis richeri* sp. nov. preadult female, SEM photograph: A, carapace in lateral view; B, microstructure of the carapace integument at the frontal lobe, showing a small sensory seta; C, uropods in lateral view.

Description: Preadult female 10.2 mm total length. Carapace (Fig. 6A) slightly shorter than one-third total length, globose, covered by small granules that draw a reticulate pattern that disappears near the margins. Eyelobe small and triangular, not reaching the tip of pseudorostrum. Reticulations are also slightly visible dorsally on thoracic segments.

Antennule (Fig. 6B), peduncle article 1 wider than article 2 and shorter than combined length of articles 2 and 3; article 3 longer than article 2; main flagellum 2-articulate, with two aesthetascs and a long simple seta terminally, accessory flagellum rudimentary. Mouth appendages not dissected in order to preserve holotype.

Maxilliped 1 basis (Fig. 6C), distally produced reaching carpus, with a plumose seta on the projection; carpus with six bi-dentate flattened setae on distal half of inner margin and a long pappose seta on distal outer corner. Maxilliped 2 (Fig. 6D) basis longer than rest of appendage, with three pappose setae on distal inner corner and a row of ten pappose setae on distal third of outer margin; carpus longer than merus, with five plumose and one simple setae on

inner margin and a long plumose seta on distal outer corner; propodus with two long pappose setae on outer margin. Maxilliped 3 (Fig. 7A), basis more than twice as long as rest of appendage, expanded distally over mero-carpal articulation, with seven plumose setae on inner margin of projection and two longer on the tip; ischium as wide as long, with a small plumose seta on inner margin; merus produced distally nearly reaching the carpo-propodial articulation with a plumose seta on its tip. Pereopod 1 (Fig. 7B), basis twice as long as the following three segments combined; ischium and merus of similar length; carpus longer than combined length of ischium and merus; propodus and dactylus lost. Pereopod 2 (Fig. 7C), basis slightly longer than rest of appendage; ischium short; merus twice as long as ischium, with a simple seta distally; carpus of similar length to merus, with two cuspidate setae on distal corner; propodus shorter than carpus; dactylus nearly twice as long as propodus. Pereopod 3 (Fig. 7D), basis longer than rest of appendage, with a plumose seta on distal margin; ischium half length of merus; carpus as long as merus with two simple setae distally; propodus with a long

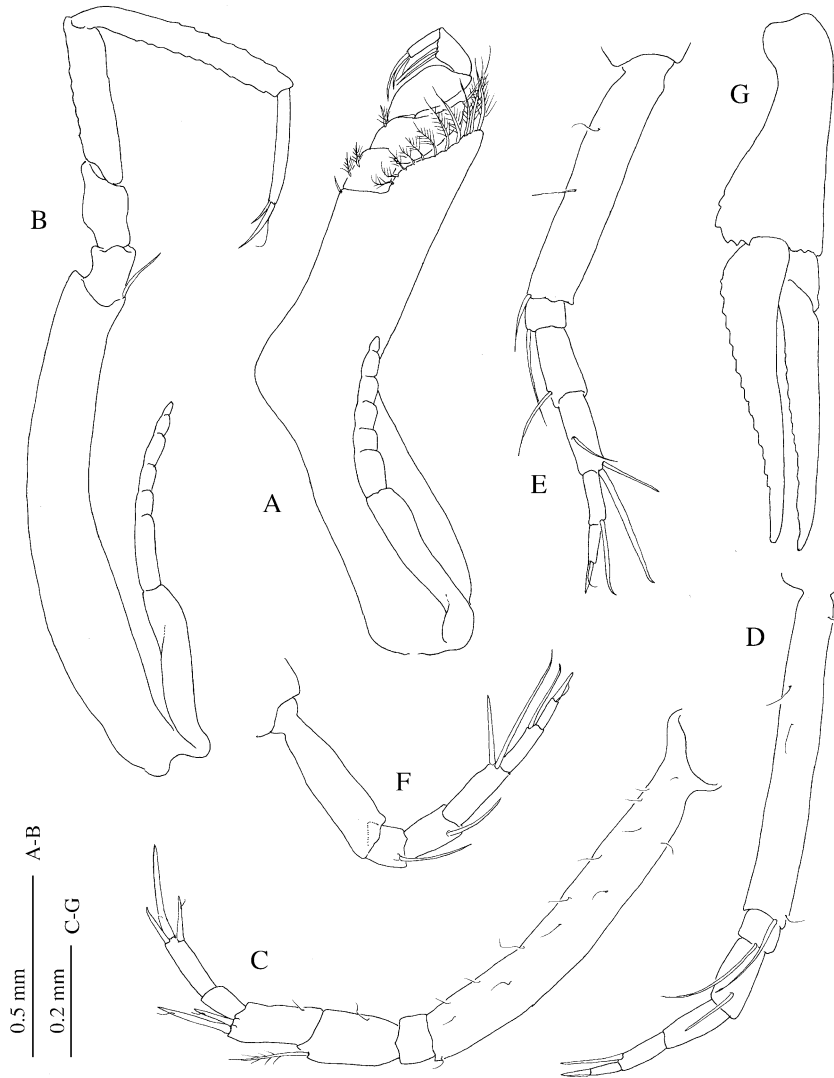


Figure 5. *Cyclaspis richeri* sp. nov. adult female holotype: A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, uropod.

seta on distal corner. Pereopod 4 (Fig. 7E), basis longer than rest of appendage; merus and carpus of same length; carpus and propodus with two and one long simple setae on distal corner, respectively. Pereopod 5 (Fig. 7F), basis shorter than rest of appendage; ischium with a simple seta; merus and carpus of same length; carpus and propodus both with one long simple seta on distal corner.

Uropod (Fig. 6E) shorter than pleonite 6, with few denticulations on distal inner corner. Rami (both broken at tip) slightly longer than peduncle. Endopod 1-articulate, inner margin crenulate.

Etymology: From the Greek *diktyotos*, meaning reticulate, referring to the sculpture of the carapace.

Remarks: By the sculpture of the carapace *C. dictyota* resembles *C. reticulata* Roccatagliata, 1985. However, *C. dictyota* is larger (10.2 vs. 2.1–2.5 mm) and has the uropods shorter than pleonite 6.

CYCLASPIS DECORA SP. NOV. (FIGS 8–10)

Type material: Holotype: preadult male dissected in two slides, New Caledonia, BIOCAL, stn DW77, 22°15.32'S, 167°15.40'E, 440 m, 5.ix.1985 (MNHN-Cu1081). **Paratypes:** same station than holotype, 1 adult female, 1 adult male, 1 preadult male (MNHN-Cu1082); Stn DW43, 22°46.21'S, 167°14.50'E, 400 m, 30.viii.1985, 1 preadult female (MNHN-Cu1083). Fiji, BORDAU 1, stn DW1485, 19°02.69'S, 178°29.80'W,

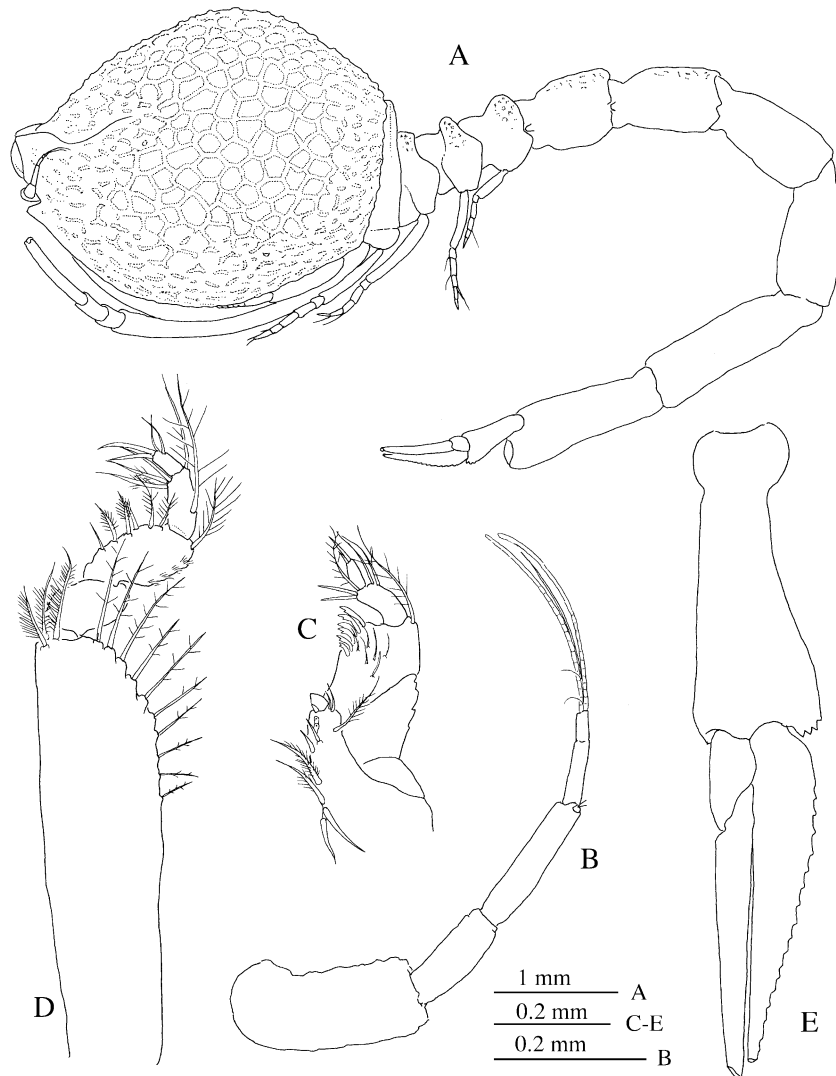


Figure 6. *Cyclaspis dictyota* sp. nov. preadult female holotype: A, whole animal in lateral view; B, antenna 1; C, maxilliped 1; D, maxilliped 2; E, uropod.

700–707 m, 10.iii.1999, 1 preadult male (MNHN-Cu1084).

Diagnosis: Carapace nearly twice as long as high, with transverse and oblique carinae. Without a postocular tubercle. Eyelobe elongate reaching the tip of pseudorostrum. Pereopod 1 dactylus longer than carpus. Uropod longer than pleonite 6; exopod slightly longer than endopod, with three small setae terminally.

Description: Preadult male 9.25 mm total length. Carapace (Fig. 8A, B) shorter than one-quarter total length, nearly twice as long as high, with transverse and oblique carinae, third dorsal transverse carina runs forward on the side of carapace and reaches the

first. Eyelobe long, narrow and without lenses, reaching the tip of pseudorostrum. Antennal notch deep, anterolateral angle acute.

Antennule (Fig. 8C), peduncle article 1 shorter than combined length of articles 2 and 3; article 3 longer than article 2; main flagellum 2-articulate, with two aesthetascs, accessory flagellum rudimentary. Right mandible (Fig. 8D) with three teeth on pars incisiva, 21 setae between pars incisiva and pars molaris. Maxillule (Fig. 8E) palp with two unequal filaments, inner endite with five setae, one of them trifold. Maxilla (Fig. 8F), endites with simple and serrulate setae.

Maxilliped 1 (Fig. 1G) basis with six simple setae on inner margin, distally produced reaching carpus; carpus with six bi-dentate flattened setae on the

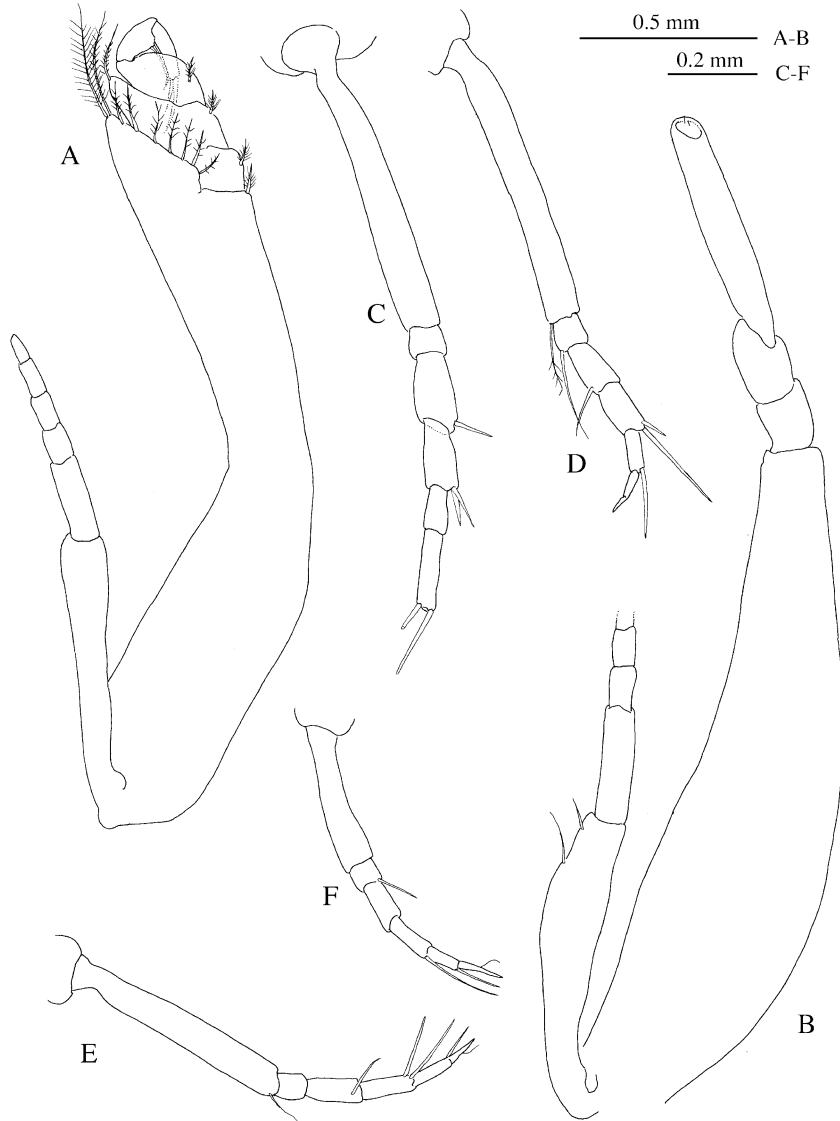


Figure 7. *Cyclaspis dictyota* sp. nov. preadult female holotype: A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5.

inner margin and a long pappose seta on distal outer corner. Maxilliped 2 (Fig. 1H) basis longer than rest of appendage, with two plumose setae on distal inner corner and four simple setae on outer margin; carpus longer than merus, with simple and plumose setae on inner margin and a long pappose seta on distal outer corner. Maxilliped 3 (Fig. 9A), basis twice as long as rest of appendage, expanded distally reaching half length of merus, with a row of plumose setae on both margins of projection being longer those of inner margin; merus produced distally not reaching the carpo-propodial articulation. Pereopod 1 (Fig. 9B), basis shorter than combined length of propodus and dactylus, with a cuspidate seta on inner margin and two plumose setae distally; merus twice as long as

ischium; carpus shorter than propodus; dactylus as long as propodus. Pereopod 2 (Fig. 9C), basis shorter than rest of appendage; ischium short; merus longer than carpus, with a simple seta on each margin; carpus longer than propodus, with two cuspidate setae on distal corner; dactylus twice as long as propodus, with two long cuspidate setae terminally. Pereopod 3 (Fig. 9D), basis longer than rest of appendage, with three pappose setae on margin; ischium with two simple setae on distal margin; merus more than twice as long as ischium and shorter than carpus; carpus with two long simple setae on distal corner; propodus with a long seta on distal corner. Pereopod 4 (Fig. 9E), basis as long as rest of appendage, with long pappose setae; merus nearly as

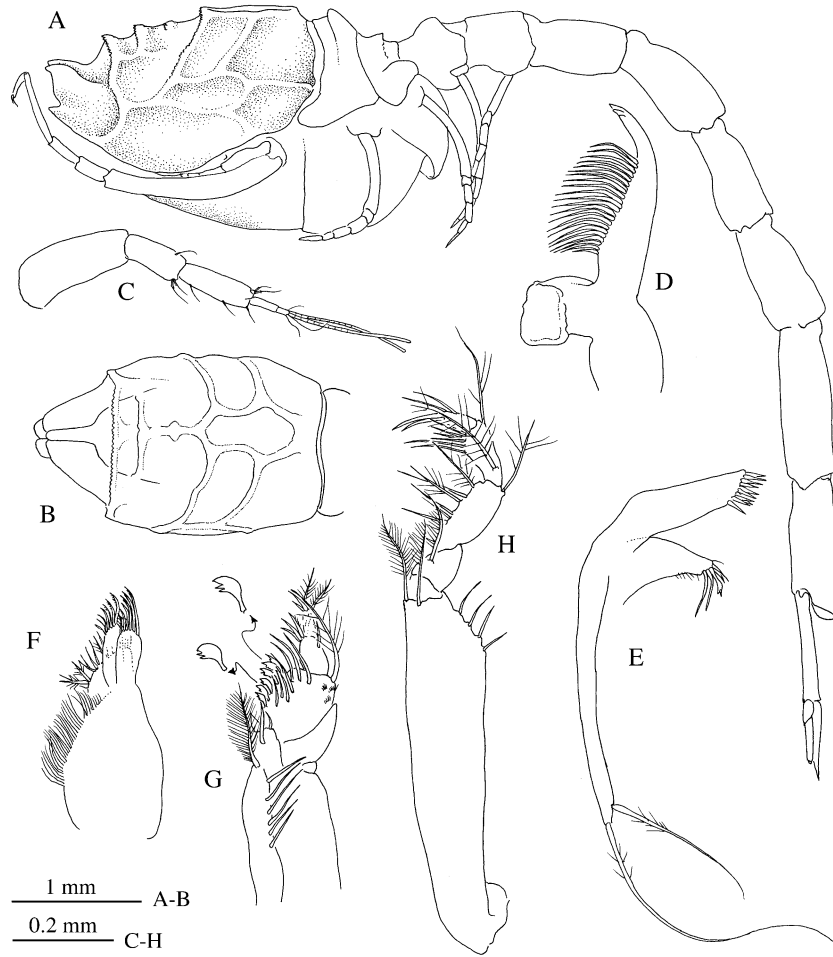


Figure 8. *Cyclaspis decora* sp. nov. adult female paratype: A, whole animal in lateral view. Preadult male holotype: B, carapace in dorsal view; C, antenna 1; D, right mandible; E, maxilla 1; F, maxilla 2; G, maxilliped 1; H, maxilliped 2.

long as carpus; carpus and propodus with two and one long simple setae on distal corner, respectively. Pereopod 5 (Fig. 9F), basis shorter than rest of appendage, with long pappose setae; merus shorter than carpus; carpus and propodus with three and one long simple setae on distal corner, respectively.

Uropod peduncle (Fig. 10C) shorter than pleonite 6, with a pair of plumose setae and five cuspidate setae on inner margin; endopod shorter than peduncle, with five cuspidate setae on proximal half of inner margin; exopod slightly longer than endopod, with three simple setae terminally.

Variability: Main differences between males and females were observed in the uropod armature. In the adult female (Fig. 10B) the uropod is very similar to that described for the preadult male and differs only by having six cuspidate setae but no plumose setae on the inner margin of the peduncle. However, in adult

male differences are greater. In the peduncle there are long plumose setae but no cuspidate setae (Fig. 10D). Similarly, the proximal third of the uropod endopod has long plumose setae in the inner margin followed by five cuspidate setae on the second third.

The preadult male collected in Fiji has a greater number of carinae on the posterior sides of the carapace (Fig. 10A) than in females. The other two males assigned to this species and collected at the same station as the holotype are poorly calcified and is not possible to determine if they also have the same ornamentation on the carapace. However, other features such as the structure of pereopod 1 with the long dactylus suggest including this specimen in the same species given the variability of carapace ornamentation as a sexual difference.

Etymology: From Latin *decorus*, meaning ornament, referring the beautiful sculpture of the carapace.

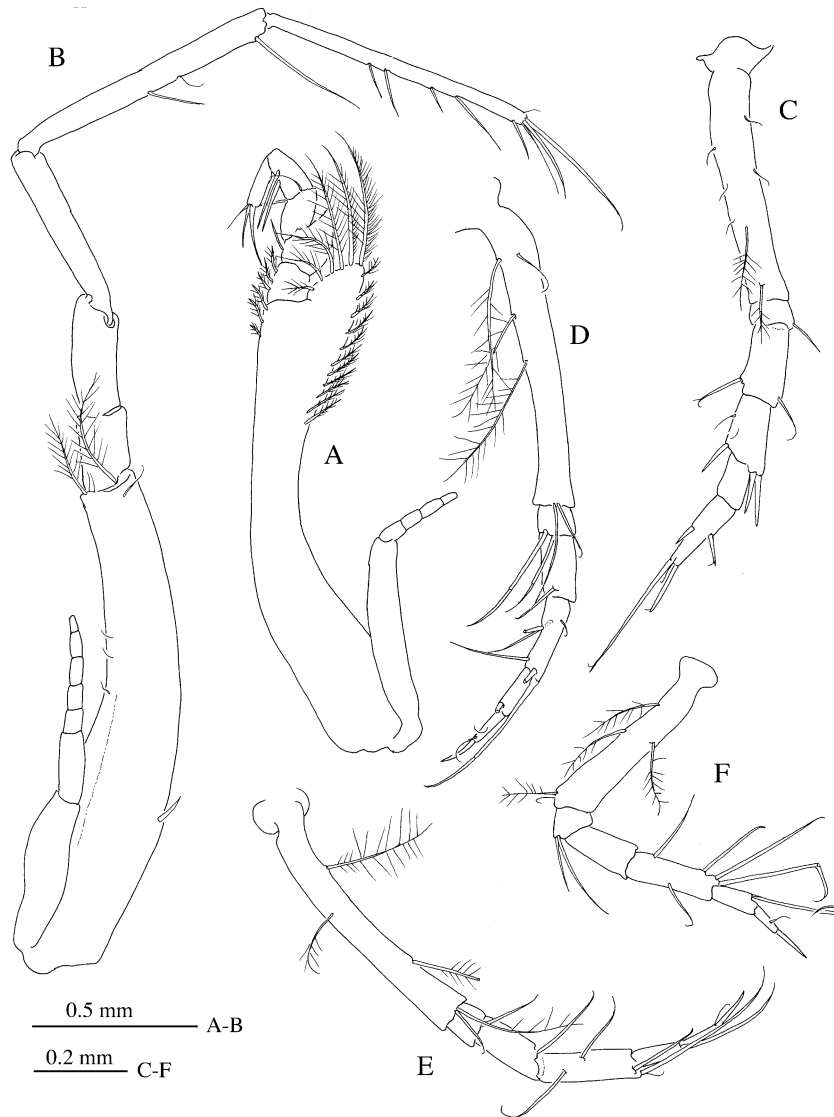


Figure 9. *Cyclaspis decora* sp. nov. preadult male holotype: A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5.

Remarks: By the dorsal transverse carinae, *Cyclaspis decora* slightly resembles *C. sibogae* Calman, 1905 and *C. triplicata* Calman, 1907. However, *C. decora* has a greater number of carinae on the sides of the carapace. Moreover, the uropod peduncle is shorter than pleonite 6 in *C. decora* while it is longer in *C. sibogae* and the first lacks the mid-dorsal projection at the hind margin of the carapace, which is present in *C. triplicata*.

CYCLASPIS MAGNA SP. NOV. (FIGS 11, 12)

Type material: Holotype: adult male partially dissected in one slide, Arafura Sea, east of Tanimbar Island, Indonesia, KARUBAR, stn DW49, 08°00'S, 132°59'E, 206–210 m, 29.x.1991 (MNHN-Cu1085).

Diagnosis: Carapace nearly twice as long as high, with mid-dorsal carina paired on hind half and a transverse carina behind frontal lobe running down near lateral margin and ending in an acute tubercle. Eyelobe elongate reaching the tip of pseudorostrum; without a postocular tubercle. Uropod peduncle nearly twice as long as pleonite 6; rami half uropod length.

Description: Adult male 16.5 mm total length. Carapace (Fig. 11A, B) one-third total length, twice as long as high, with mid-dorsal carina paired on hind half and a transverse carina behind frontal lobe running down to near lateral margin and ending in an acute tubercle. Eyelobe long and narrow reaching the tip of

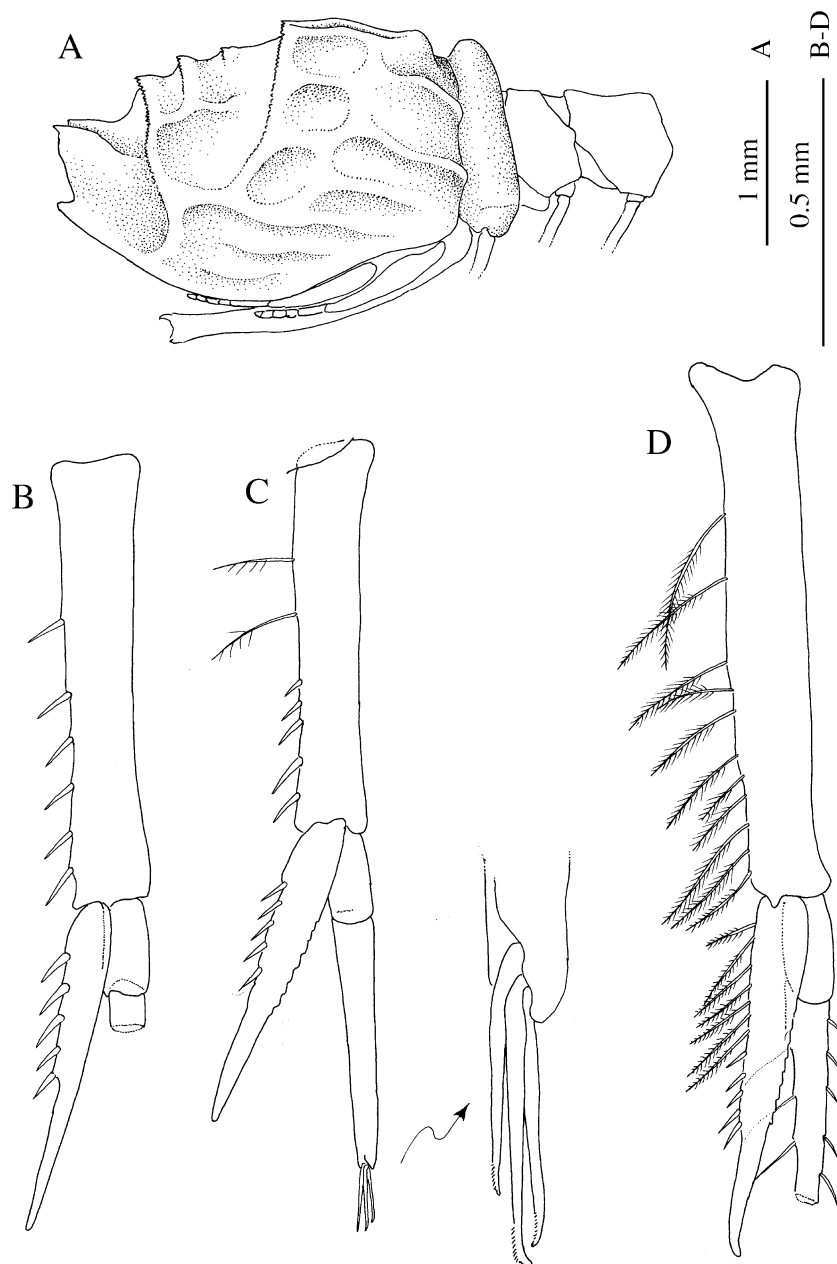


Figure 10. *Cyclaspis decora* sp. nov.: A, carapace of a preadult male paratype in lateral view. Variability in the uropod armature: B, adult female paratype; C, preadult male holotype; D, adult male paratype.

pseudorostrum. Antennal notch deep. Pereonite 4 with a mid-dorsal carina, pereonite 5 with a pair of dorsolateral carinae that end in an acute tooth. Pleonites 1–4 with a pair of dorsolateral carinae ending in acute tooth; pleonite 5 with a pair of dorsolateral carina on anterior half.

Antennule (Fig. 11C), peduncle article 1 longer than combined length of articles 2 and 3; article 3 shorter than article 2; main flagellum 2-articulate, with four aesthetascs (three on article 1 and a larger

one terminally), accessory flagellum rudimentary. Flagellum of antenna 2 longer than body. Mouth appendages not dissected in order to preserve the holotype.

Maxilliped 1 (Fig. 11D) basis with nine plumoserate setae on inner margin, distally produced reaching carpus; carpus with seven hand-like flattened setae on the inner margin and a long plumose seta on distal outer corner. Maxilliped 2 (Fig. 11E) basis longer than rest of appendage, with three plumose

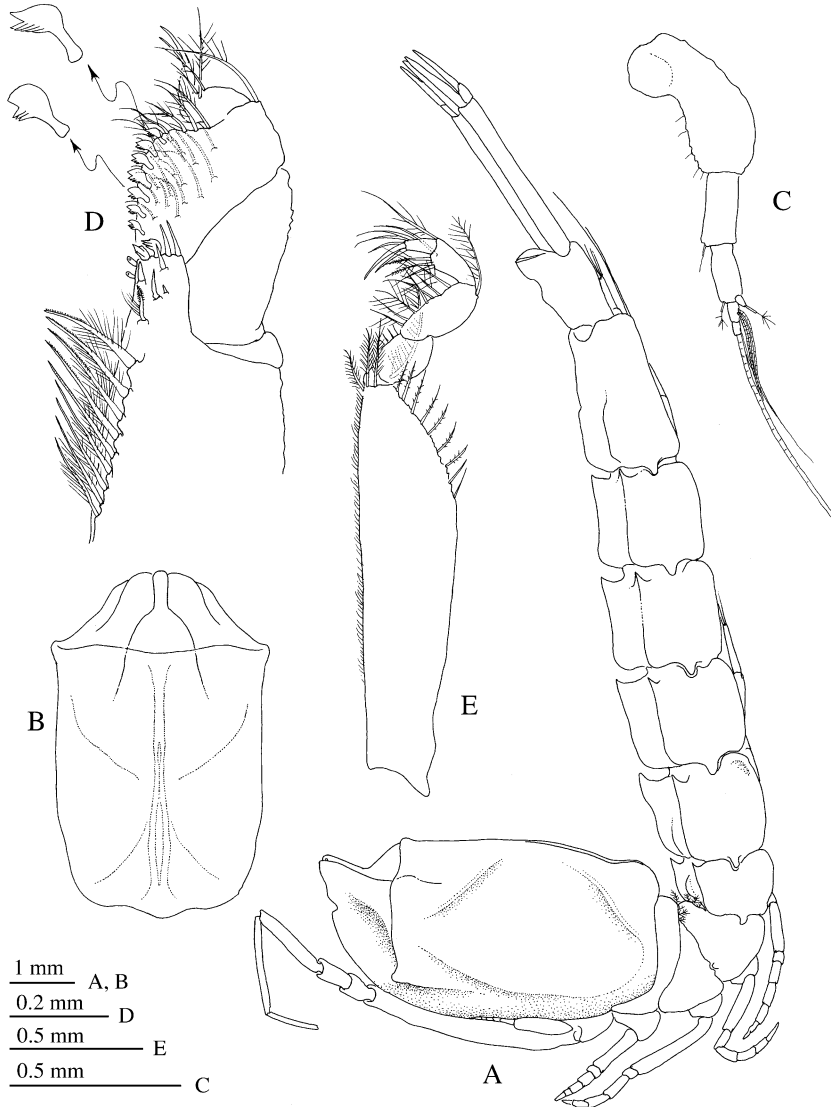


Figure 11. *Cyclaspis magna* sp. nov. adult male holotype. A, whole animal in lateral view; B, carapace in dorsal view; C, antenna 1; D, maxilliped 1; E, maxilliped 2.

setae on distal margin and nine simple setae on outer margin; carpus longer than merus, with pappose setae on inner margin and a long pappose seta on distal outer corner. Maxilliped 3 (Fig. 12A), basis more than twice as long as rest of appendage, expanded distally over mero-carpal articulation, with a row of plumose setae on outer margin and on inner margin of projection, with a depression on the central part, where basis of pereopod 1 is lodged; merus produced distally reaching the carpo-propodial articulation; carpus as long as broad. Pereopod 1 (Fig. 12B), basis shorter than rest of appendage, with a plumose seta on distal corner; merus twice as long as ischium; carpus shorter than propodus; dactylus half length of propodus with simple setae on the margin and termi-

nally. Pereopod 2 (Fig. 12C), basis shorter than rest of appendage, with a row of long pappose setae on margin; ischium short with a long pappose seta; merus longer than carpus, with three long pappose setae on distal margin; carpus longer than propodus, with a long, simple seta on distal corner; dactylus twice as long as propodus, with three cuspidate setae terminally and one on margin. Pereopod 3 (Fig. 12D), basis slightly longer than rest of appendage, with five long pappose setae on anterior margin, a row of small ones on posterior margin and two setae distally; ischium with two simple setae on distal margin; merus more than twice as long as ischium; carpus shorter than merus with a long, simple seta on margin and other on distal corner; propodus with a

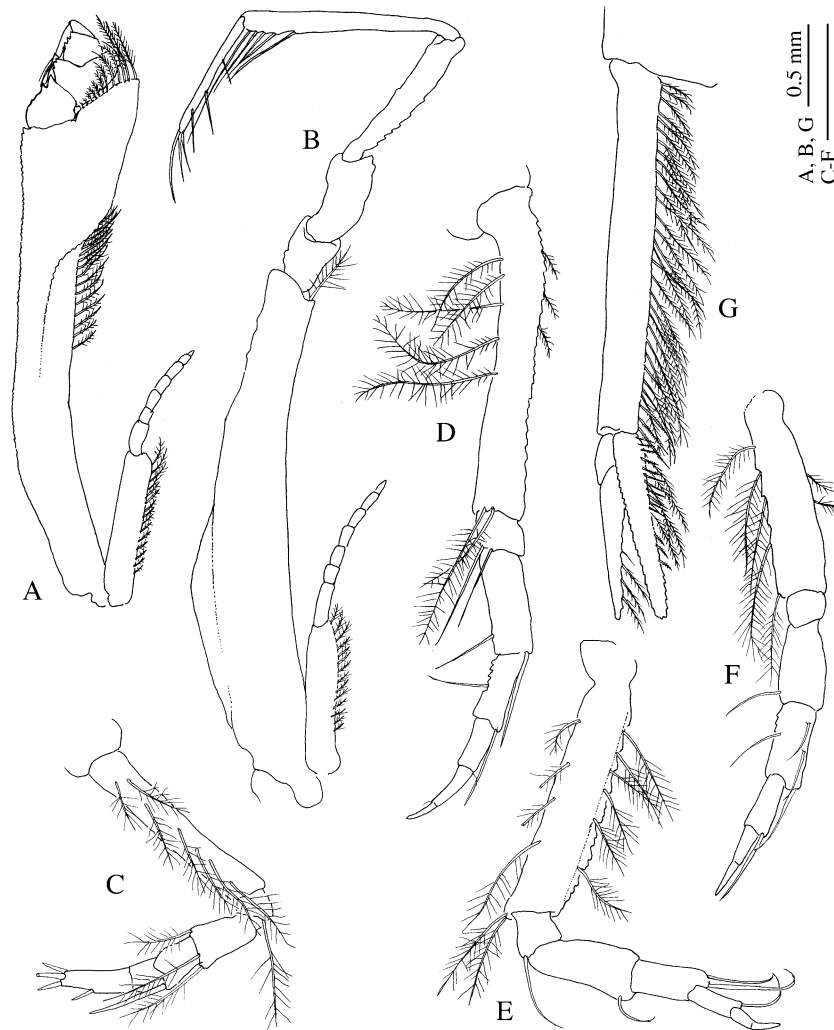


Figure 12. *Cyclaspis magna* sp. nov. adult male holotype. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, uropod.

seta on distal corner. Pereopod 4 (Fig. 12E), basis as long as rest of appendage, with long pappose setae on anterior and posterior margins; ischium short, with a simple seta on distal corner; merus longer than carpus; carpus and propodus with two and one long simple setae on distal corner, respectively. Pereopod 5 (Fig. 12F), basis shorter than rest of appendage, with long pappose setae on margin; merus and carpus of similar length; carpus with three simple setae on margins and a longer one on distal corner; propodus shorter than carpus, with a long simple seta on distal corner.

Uropod peduncle (Fig. 12G) nearly twice as long as pleonite 6, with a row of long setae (27 plumose and the last three serrate) on inner margin; endopod half peduncle length, with 16 serrate and six long plumose setae on inner margin; exopod as long as endopod with plumose setae on inner margin.

Etymology: From Latin *magnus*, meaning large, referring the size of the specimen.

Remarks: *Cyclaspis magna* seems to belong to the *sculpta* group, males of which are markedly dissimilar from the females, having a carapace that is more elongate with less developed tubercles and ridges (Hale, 1928, 1944). *C. magna* resembles *C. tribulis* Hale, 1928, *C. cana* Hale, 1944 and *C. mawsonae* Hale, 1944 but differs from them by the presence of a mid-dorsal paired carina, the lack of dorsolateral tubercles and the uropod length, which is twice as long as rami. *C. munda* Hale, 1944 and *C. pruinosa* Hale, 1944 also lack dorsolateral tubercles, but neither has the mid-dorsal paired carina. Finally, *C. indoaustralica* Bacescu, 1992, which closely resembles *C. magna*, has a greater number of oblique

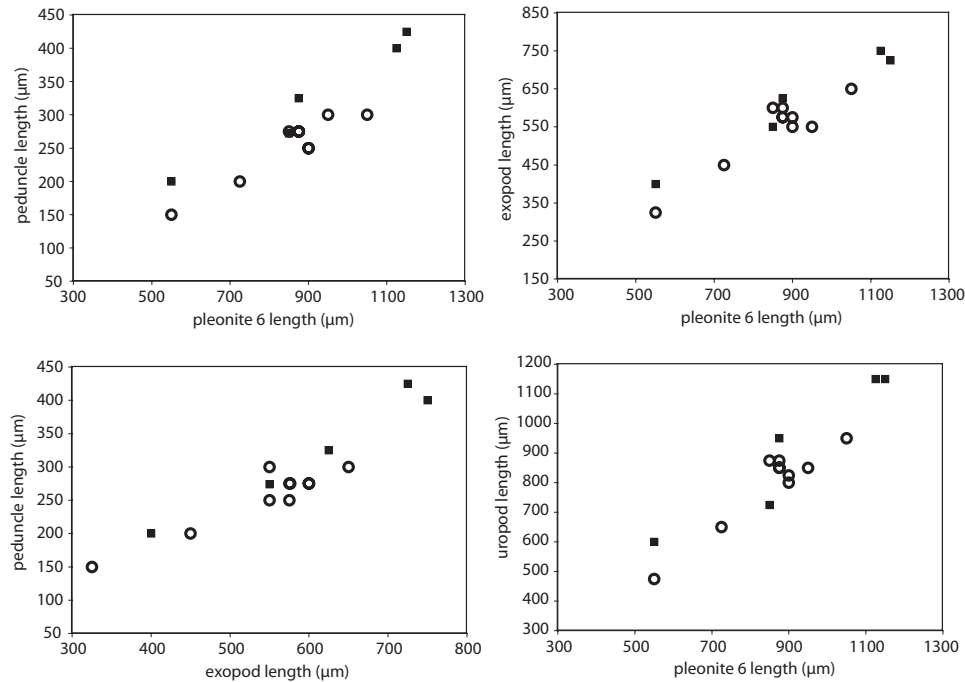


Figure 13. Relations between uropod measurements of *Cyclaspis longicaudata* specimens from New Caledonia (open circles) and Bay of Biscay (full squares).

carinae on carapace and the mid-dorsal one is not paired.

CYCLASPIS LONGICAUDATA SARS, 1865

Material examined: New Caledonia, BIOCAL, stn CP57, 23°43.26'S, 166°58.06'E, 1490–1620 m, 1.ix.1985, 1 preadult female, 1 juvenile, 1 manca (MNHN-Cu1086); stn DS59, 23°56.21'S, 166°41.10'E, 2650 m, 2.ix.1985, 1 preadult male, 1 preadult female, 1 juvenile (MNHN-Cu1087).

Diagnosis: Carapace globose and smooth without ridges or tubercles; pseudorostral lobes meeting just in front of the eyelobe. Uropods as long as pleonite 6, peduncle half length than unarmed rami.

Remarks: Specimens agree with the description of *Cyclaspis longicaudata* Sars, 1865a previously known from the North Atlantic, the Mediterranean and the south-west Atlantic. Comparison of the present material with specimens from the Bay of Biscay (north-eastern Atlantic) and eastern Mediterranean reveals no significant differences between them.

Day (1978) assigned the material collected off the South African coast between 460 and 1300 m depth to *Cyclaspis spectabilis* Zimmer, 1908. However, no specimen has the transverse suture across the carapace, diagnostic in *C. spectabilis* and neither has the

plumose setae on the inner margin of the uropod exopod. Without these features, the South African material is closely related to *C. longicaudata* but Day (1978) pointed out the greater length of the uropod peduncle as a main difference. However, in her description she mentioned that pleonite 6 is 'more than twice length of peduncle of uropods' and 'rami subequal in length, about twice length of peduncle'. Both statements allow this material to be included within the range of variation of *C. longicaudata* (Fig. 13).

Cyclaspis longicaudata may have a wider distribution than the south-eastern Atlantic, the Indian Ocean and the west Pacific or, conversely, comprises a group of sibling species that only a molecular analysis will be able to separate.

GENUS *CYCLASPOIDES* BONNIER, 1896

Diagnosis: First two or three pereonites fused with the carapace at least dorsally. Pseudorostral lobes long. Pereopod 2 6-articulate. Uropod endopod 1- or 2-articulate. Gut coiled. Male with five pairs of pleopods.

CYCLASPOIDES ERUGATUS SP. NOV. (FIGS 14, 15)

Type material: Holotype: preadult female dissected in two slides, New Caledonia, BIOCAL, stn CP72, 22°09.02'S, 167°33.18'E, 2100–2110 m, 4.ix.1985

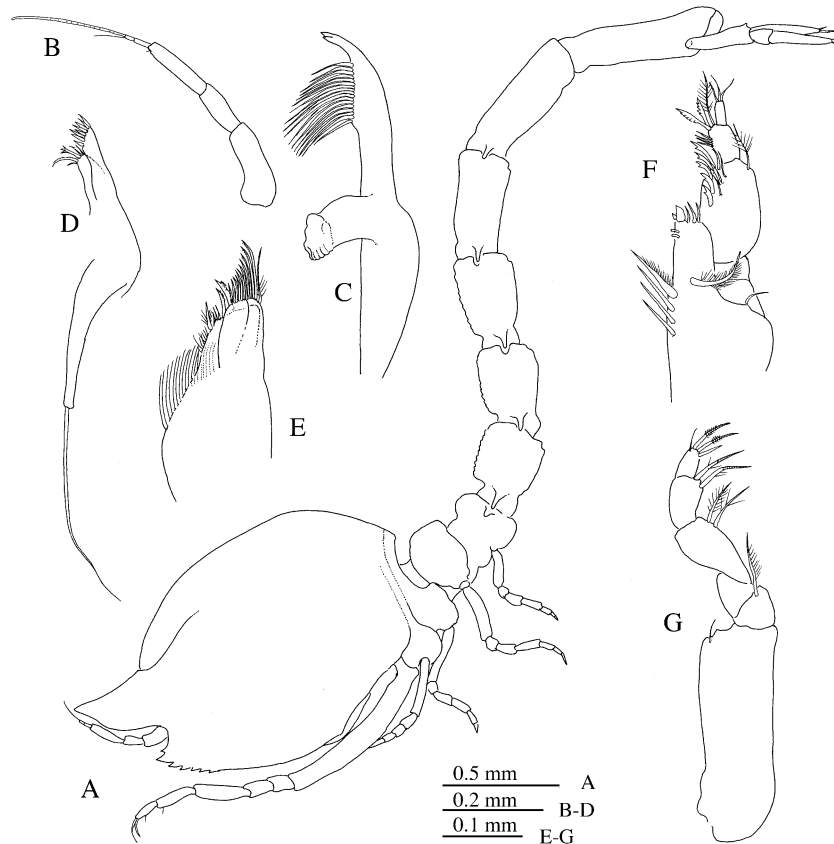


Figure 14. *Cyclaspoides erugatus* sp. nov. preadult female holotype: A, whole animal in lateral view; B, antenna 1; C, right mandible; D, maxilla 1; E, maxilla 2; F, maxilliped 1; G, maxilliped 2.

(MNHN-Cu1088). Paratypes: same station as holotype, 2 preadult females (MNHN-Cu1089); stn DS98, 21°24.60'S, 166°30.16'E, 2365–2470 m, 7.ix.1985, 1 preadult female (MNHN-Cu1090); stn DS04, 21°15.88'S, 166°39.38'E, 2340 m, 11.viii.1985, 1 preadult female (MNHN-Cu1091).

Diagnosis: Mandible with 17 setae between pars incisiva and pars molaris. Uropods slightly shorter than pleonite 6, peduncle with a small tooth on inner distal margin; endopod 1-articulated, slightly longer than peduncle, with 2–3 setae on inner margin.

Description: Preadult female 4.6 mm total length. Carapace (Fig. 14A) slightly shorter than one-third total length, globose. Pseudorostral lobes relatively long, with long siphons (broken in the holotype and in most specimens). Eyelobe without optical elements. Antennal notch deep, anterolateral angle acute; anterolateral margin serrate (six teeth on lower margin and one in antennal notch). Pereonite 1 not visible, pereonites 2 and 3 fused dorsally with carapace.

Antennule (Fig. 14B), peduncle article 1 longest; article 3 longer than article 2; main flagellum 2-articulate, with one aesthetasc, accessory flagellum rudimentary. Right mandible (Fig. 14C) with three teeth on the pars incisiva, 17 setae between pars incisiva and pars molaris (also 17 setae on left mandible). Maxillule (Fig. 14D) palp with a single filament, inner endite with five setae, three simple, one trifold and one serrulate. Maxilla (Fig. 14E), endites with simple and serrulate setae.

Maxilliped 1 (Fig. 14F) basis with four setae on inner margin, distally produced reaching carpus; carpus with five bi-dentate flattened setae on the inner margin and a pappose seta on distal outer corner; propodus with two flattened comb-like and a plumose setae on distal inner corner. Maxilliped 2 (Fig. 14G) basis slightly longer than rest of appendage; carpus longer than merus, with a plumose and a forked setae on inner margin. Maxilliped 3 (Fig. 15A), basis nearly twice long as rest of appendage, expanded distally reaching half merus length, with three plumose setae on inner margin of projection and two long plumose setae on the tip; merus produced distally over carpo-propodial articu-

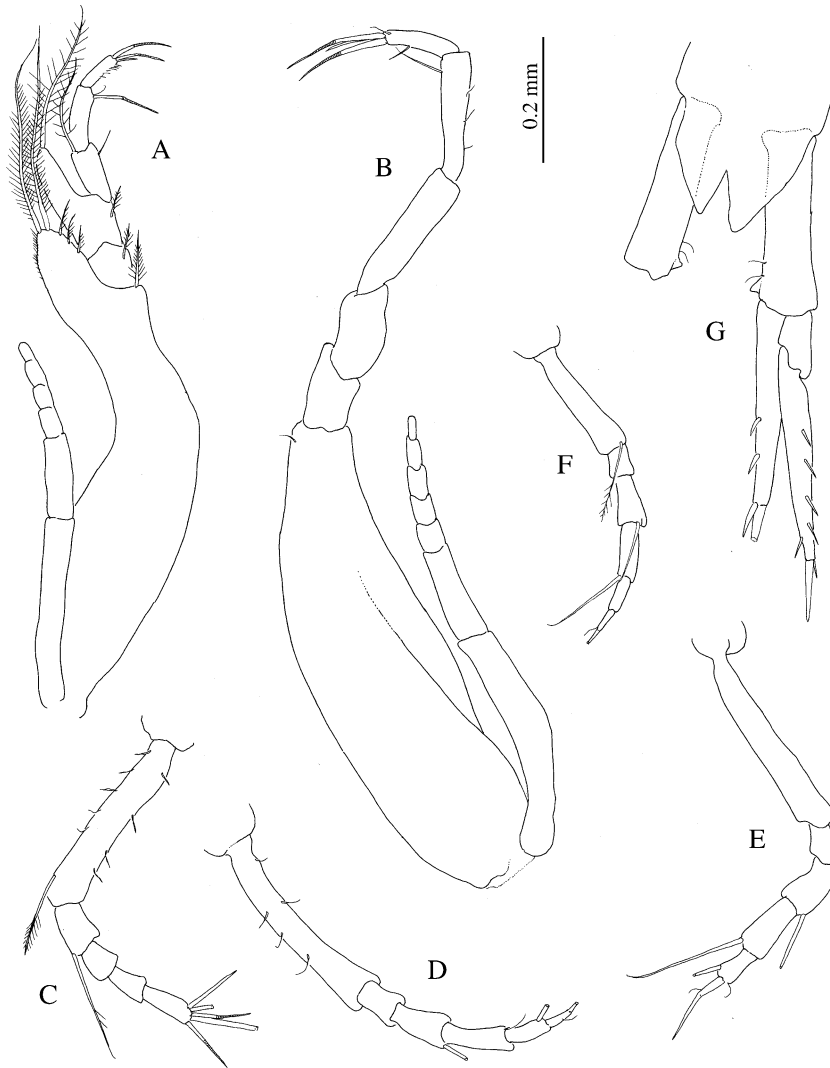


Figure 15. *Cyclaspoides erugatus* sp. nov. preadult female holotype: A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, uropod.

lation with a long plumose seta on its tip; carpus and propodus of similar length, the first with a plumose seta on distal outer corner. Pereopod 1 (Fig. 15B), basis as long as rest of appendage; ischium and merus short; carpus and propodus of the same length; dactylus half length of propodus. Pereopod 2 (Fig. 15C), basis longer than rest of appendage, with a plumose seta on the margin; ischium fused with basis; merus with a seta distally; carpus and propodus of similar length; dactylus as long as merus, with five long cuspidate setae terminally. Pereopods 3 and 4 (Fig. 15D, E), basis slightly shorter than rest of appendage; merus longer than ischium and shorter than carpus, with a simple distal seta; propodus with a long simple seta on distal corner. Pereopod 5 (Fig. 15F), basis rather shorter than rest of appendage; merus nearly as

long as carpus, both with a long simple seta on distal corner.

Uropods (Fig. 15G) slightly shorter than pleonite 6, peduncle with a small tooth on inner distal margin; endopod 1-articulated, slightly longer than peduncle, with 2–3 setae on inner margin; exopod longer than endopod, with four setae on the margin and a longer one distally.

Etymology: From the Latin *erugo*, meaning clear of wrinkles, referring to its smooth carapace.

Remarks: Three species of *Cyclaspoides* are known, *C. sarsi* Bonnier, 1896, *C. pellucidus* Day, 1978 and *C. bacescui* Petrescu, 1995. *C. pellucidus* has the uropod endopod 2-articulated and in *C. bacescui* the uropod is longer than pleonite 6, the uropod peduncle

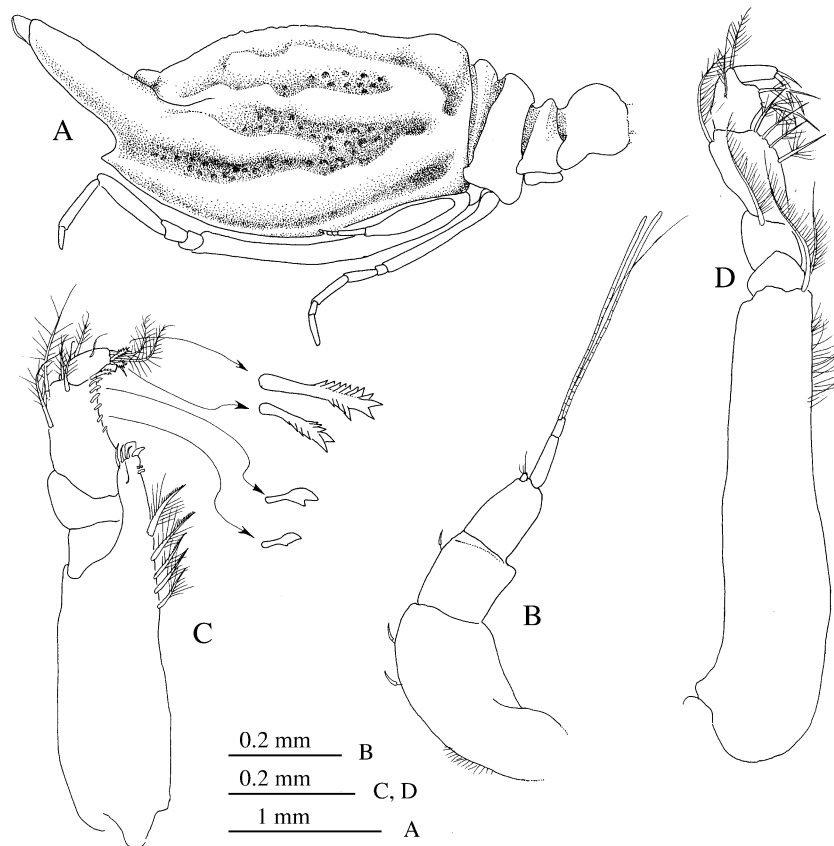


Figure 16. *Alticum? ectyphum* sp. nov. preadult male holotype: A, carapace and four toracic somites in lateral view; B, antenna 1; C, maxilliped 1; D, maxilliped 2.

being half length of endopod. *C. erugatus* is closely related to *C. sarsi* but differs mainly from it by a lower number of setae on the uropod endopod and the small tooth on inner distal margin of uropod peduncle.

ALTICUMA DAY, 1978

Diagnosis: Pereonite 1 visible in both sexes. Maxilliped 3 basis produced distally. Pereopod 2 7-articulate. Uropod endopod 2-articulate. Male with five pairs of pleopods.

ALTICUMA? ECTYPHUM SP. NOV. (FIGS 16, 17)

Type material: Holotype: preadult male without abdomen, partially dissected, New Caledonia, BIOGEOCAL, stn CP260 21°00.00'S, 167°58.34'E, 1820–1980 m, 17.iv.1987 (MNHN-Cu1092).

Diagnosis: Carapace ornamented with longitudinal ridges with small rounded pits on the depressions. Pseudorostrum long and upturned. Pereonite 1 visible dorsally and laterally. Pereopod 2 7-articulate.

Description: Preadult male 2.9 mm carapace length. Carapace (Fig. 16A) ornamented with longitudinal ridges and small pits on the depressions. Pseudorostrum longer than one-third carapace length, upturned. Eye-lobe rounded without lenses. Antennal notch well marked, anterolateral angle acute. Pereonite 1 visible dorsally and laterally. No exopods beyond pereopod 1.

Antennule (Fig. 16B), peduncle article 1 longer than following two articles combined; articles 2 and 3 of same length; main flagellum 2-articulate, with two aesthetascs; accessory flagellum rudimentary. Mouth appendages were not dissected in order to preserve the holotype.

Maxilliped 1 (Fig. 16C), basis with five plumoserrate setae on inner margin, distally produced reaching carpus; carpus with five small flattened setae on the inner margin and pappose setae on outer margin; propodus with three serrate setae on distal inner corner; dactylus small and barely visible. Maxilliped 2 (Fig. 16D) basis longer than rest of appendage, with two pappose setae on inner distal corner; merus shorter than carpus, with a long pappose seta

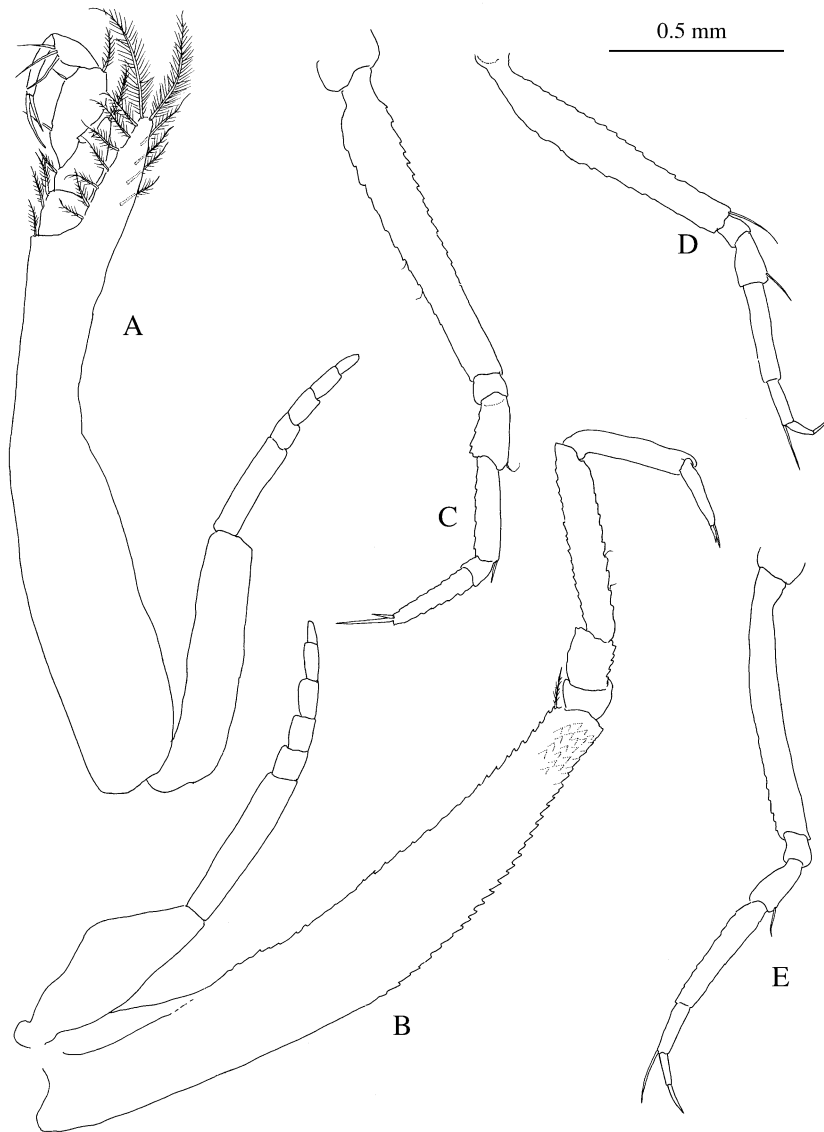


Figure 17. *Alticum? ectyphum* sp. nov. preadult male holotype: A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4.

on distal margin; carpus with a long plumose seta on distal outer corner and four plumose setae on inner margin; propodus shorter than carpus, with three setae on inner margin. Maxilliped 3 (Fig. 17A), basis twice as long as rest of appendage, produced distally reaching half length of carpus, with seven plumose setae on inner margin of production, four on outer margin and two on the tip of production; merus also produced with a long plumose seta on the tip; carpus longer than propodus; dactylus longer than propodus. Pereopod 1 (Fig. 17B) with well-developed exopod, basis longer than rest of appendage, with a small plumose seta distally; ischium and merus short;

carpus longer than propodus; dactylus half length of propodus. Pereopod 2 (Fig. 17C), basis longer than rest of appendage; ischium short; merus shorter than carpus; propodus as short as ischium; dactylus three times as long as propodus, with two setae terminally. Pereopod 3 (Fig. 17D), basis slightly longer than rest of appendage; merus twice as long as ischium; carpus twice as long as merus; propodus with a simple seta on distal corner. Pereopod 4 (Fig. 17E), basis slightly shorter than rest of appendage; merus twice long as ischium and half length of carpus; propodus with a simple seta on distal corner. Pereonite 5 and pleon missing.

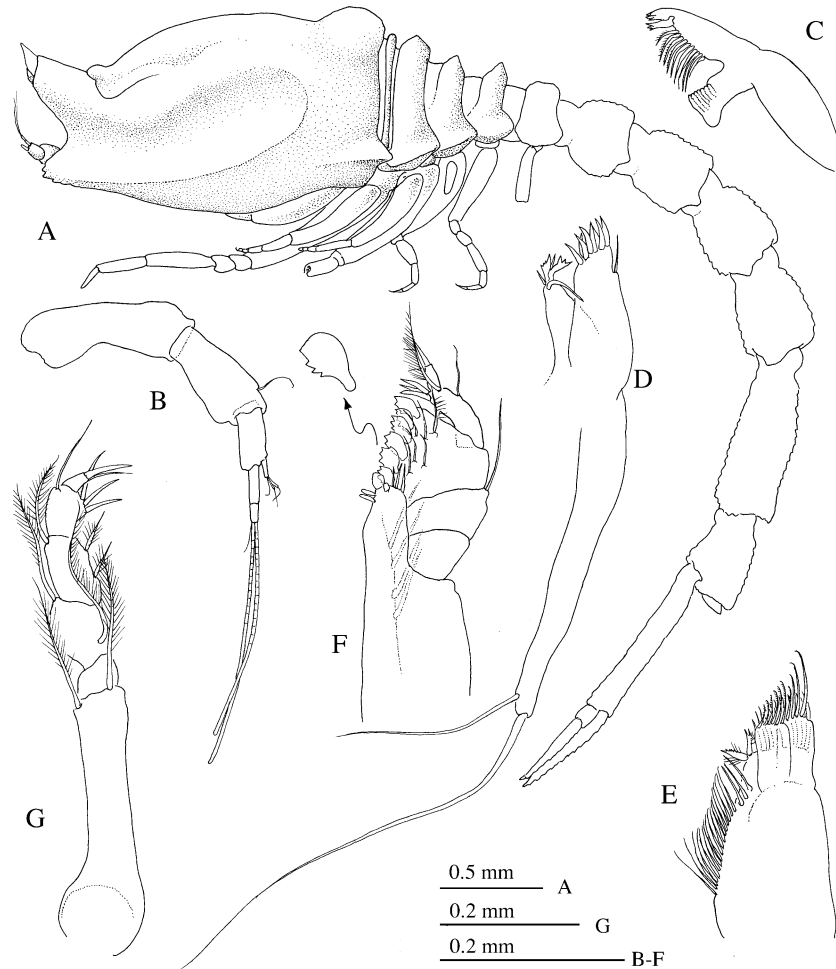


Figure 18. *Apocuma pacificum* sp. nov. preadult female holotype: A, whole animal in lateral view; B, antenna 1; C, left mandible; D, maxilla 1; E, maxilla 2; F, maxilliped 1; G, maxilliped 2.

Etymology: From the Greek *ektyphos*, meaning puffed up, referring to the carapace sculpture.

Remarks: The lack of exopods beyond pereopod 1 and the distal production of maxilliped 3 suggest including this specimen in the Bodotriidae. Moreover, it could be included provisionally in the genus *Alticum* Day, 1978 based on the first pedigerous somite being visible and pereopod 2 having a distinct ischium; however, the lack of a uropod makes this assignation uncertain. Thus far, only two species, *Alticum carinatum* (Zimmer, 1921) and *A. bellum* Day, 1978, belong to this genus. *Alticum? ectyphum* differs from both by its long pseudorostrum being longer than one-quarter carapace length and the peculiar ornamentation of the carapace. By this ornamentation *Alticum? ectyphum* also resembles *Mossambicum elongatum* Day, 1978. However, in the latter, the first pedigerous somite is not visible and pereopod 2 is 6-articulate.

SUBFAMILY VAUNTOMPSONIINAE SARS, 1878
GENUS *APOCUMA* JONES, 1973

Diagnosis: Pereonite 1 visible in both sexes. Pleonite 6 not produced between uropods. Basis of maxilliped 3 not produced distally. Female with well-developed exopods on pereopods 1 and 2 and rudimentary exopod on pereopod 3. Pereopod 2 of seven articles. Male with five pairs of pleopods. Uropod endopod 1-articulate.

***APOCUMA PACIFICUM* SP. NOV. (FIGS 18, 19)**

Type material: Holotype: preadult female dissected in two slides, New Caledonia, BIOCAL, stn DS59, 23°56.21'S, 166°41.10'E, 2650 m, 2.ix.1985 (MNHN-Cu1093). Paratypes: same station than holotype, 3 preadult females (MNHN-Cu1094); stn DS14, 20°18.09'S, 167°17.70'E, 3680–3700 m, 13.viii.1985, 2 adult females, both poorly calcified and rather damaged, one without pleon (MNHN-Cu1095); stn

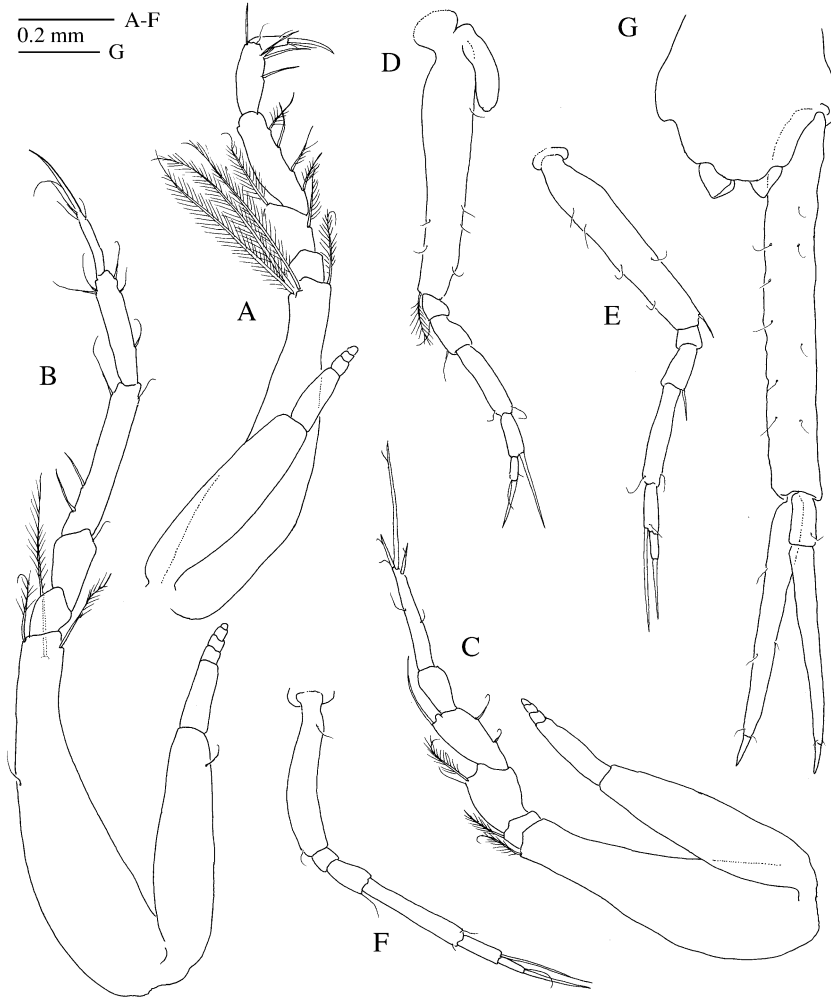


Figure 19. *Apocuma pacificum* sp. nov. preadult female holotype: A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, uropod.

CP72, 22°09.02'S, 167°33.18'E, 2100–2110 m, 4.ix.1985, 1 preadult female (MNHN-Cu1096). BIOGEOCAL, stn CP260 21°00.00'S, 167°58.34'E, 1820–1980 m, 17.iv.1987, 1 preadult female (MNHN-Cu1097); stn KG261 21°02.04'S, 167°02.32'E, 1508 m, 18.iv.1987, 1 preadult female (MNHN-Cu1098).

Diagnosis: Anterolateral angle rounded and with denticles, projected forward up to level of tip of pseudorostrum. Lower lateral carina running backwards from the anterolateral angle, turning up to meet the upper carina and not reaching the lower hind margin of the carapace. Uropod endopod 1-articulate with a single cuspidate seta terminally.

Description: Preadult female 5.5 mm total length. Carapace (Fig. 18A) about one-third total length, with a mid-dorsal and two pairs of lateral carinae; upper carina runs backwards sinuously from the pseudoro-

stral lobes; lower carina more sharper than the upper, running backwards from the anterolateral angle, interrupted near the end of carapace and turned up to meet the upper carina surrounding a large lateral sulcus; however, the distal end of this lower carina still persists at the postero-lateral angle and is produced backwards to form a subtriangular lobe; hind end raised into a middorsal hump. Integument rugose, covered by small rounded tubercles. Pseudorostral lobes slightly upturned, meeting in front of the eyelobe. Eyelobe rounded, without lenses. Antennal notch deep, anterolateral angle rounded and with denticles, produced forward up to the tip of pseudorostrum level.

Antennule (Fig. 18B), peduncle article 1 as long as the following two articles combined; article 3 shorter than article 2; main flagellum 2-articulate, with two aesthetascs; accessory flagellum rudimentary. Left mandible (Fig. 18C) with four teeth on pars incisiva,

ten setae between pars incisiva and pars molaris (11 setae on right mandible). Maxillule (Fig. 18D) palp with two unequal filaments, inner endite with five setae, three simple, one trifold and one serrulate. Maxilla (Fig. 18E), endites with simple and serrulate setae.

Maxilliped 1 (Fig. 18F) basis with four setae on inner margin, distally produced reaching carpus; carpus with six hand-like flattened setae on the inner margin; propodus with three cuspidate setae on distal inner corner. Maxilliped 2 (Fig. 18G) basis slightly longer than rest of appendage, with two plumose setae distally; merus and carpus of the same length, both with a plumose seta on distal outer corner; propodus shorter than carpus, with three simple setae on inner margin. Maxilliped 3 (Fig. 19A), basis longer than rest of appendage, not expanded distally, with three long plumose setae on distal outer corner; merus with a long plumose seta; carpus longer than propodus, the first with three plumose and a simple setae on inner margin. Pereopod 1 (Fig. 19B) with well-developed exopod, basis shorter than rest of appendage, with three plumose setae distally; ischium and merus short; carpus longer than propodus; dactylus shorter than propodus. Pereopod 2 (Fig. 19C) with well-developed exopod, basis as long as rest of appendage, with a plumose seta on distal lower corner; ischium short with distal plumose seta; merus and carpus of similar length; propodus half length of carpus; dactylus more than twice as long as propodus, with three cuspidate setae terminally. Pereopod 3 (Fig. 19D) with rudimentary exopod; basis longer than rest of appendage; merus longer than ischium and shorter than carpus; propodus with a long simple seta on distal corner. Pereopod 4 (Fig. 19E), basis as long as rest of appendage; merus twice as long as ischium and shorter than carpus; propodus with a long simple seta on distal corner. Pereopod 5 (Fig. 19F), basis rather shorter than rest of appendage; carpus more than twice as long as carpus; propodus with a long simple seta on distal corner.

Uropods (Fig. 19G) longer than combined length of pleonites 5 and 6, peduncle 1.5 times as long as rami; endopod 1-articulated, with single cuspidate seta terminally. Exopod 2-articulate, as long as endopod, with single cuspidate seta terminally.

Etymology: Referring to the Pacific Ocean where the specimens were collected.

Remarks: The genus *Apocuma* was only known from a single species, *Apocuma brasiliensis* Jones, 1973, collected from the Atlantic Ocean. Petrescu (2004) described a novel species, *A. poorei*, from Australian water and he transferred *Cumellopsis australiense*

Hale, 1949 to this genus. *Apocuma poorei* is the only one of the three species with a large lateral sulcus. However, *A. pacificum* differs from it because the pereon and the pleon lack a double dorsal keel, the uropod peduncle does not have a strongly serrate margin, the terminal seta of the rami are not fused and the anterolateral angle is not acute but rounded.

GENUS *HYPOCUMA* JONES, 1973

Diagnosis: Pereonite 1 visible in both sexes. Pleonite 6 produced between uropods. Basis of maxilliped 3 not produced distally. Female with well-developed exopods on pereopods 1–3 and rudimentary exopod on pereopod 4. Pereopod 2 7-articulate. Male with five pairs of pleopods. Uropod endopod 2-articulate.

HYPOCUMA FRAGOSUM SP. NOV. (FIGS 20, 21)

Type material: Holotype: preadult male, New Caledonia, BIOCAL, stn CP72, 22°09.02'S, 167°33.18'E, 2100–2110 m, 4.ix.1985 (MNHN-Cu1099). Paratypes: same station as holotype, 1 preadult male, 1 preadult female, partially dissected in one slide (MNHN-Cu1100).

Diagnosis: Carapace uniformly covered by small denticles; pseudorostral lobes one-sixth carapace length. Antenna 1, main flagellum 2-articulated. Article 2 of uropod exopod three times as long as article 1.

Description: Preadult male 7.3 mm total length. Carapace (Fig. 20A) shorter than one-third total length, dorsal outline somewhat curved. Integument rough, covered by small triangular denticles. Pseudorostral lobes meeting in front of the eyelobe for one-sixth carapace length. Without eyes. Anterolateral margin with a row of spines, and without projection. Male with five pairs of pleopods. Pleonite 6 produced backwards between the uropods.

Antennule (Fig. 20B), peduncle article 1 as long as the following two articles combined; article 3 shorter than article 2; main flagellum 2-articulate, article 1 longer than twice length of article 2; with two aesthetascs; accessory flagellum rudimentary. Mouth appendages do not dissected in order to preserve the holotype.

Maxilliped 3 (Fig. 20C) with well-developed exopod, basis longer than rest of appendage, not expanded distally, with three long plumose setae on distal outer corner; merus slightly produced distally with a long plumose seta on the tip; carpus as long as propodus, the first with three plumose and a simple setae on inner margin and a plumose seta on distal outer corner. Pereopod 1 (Fig. 20D) with well-developed

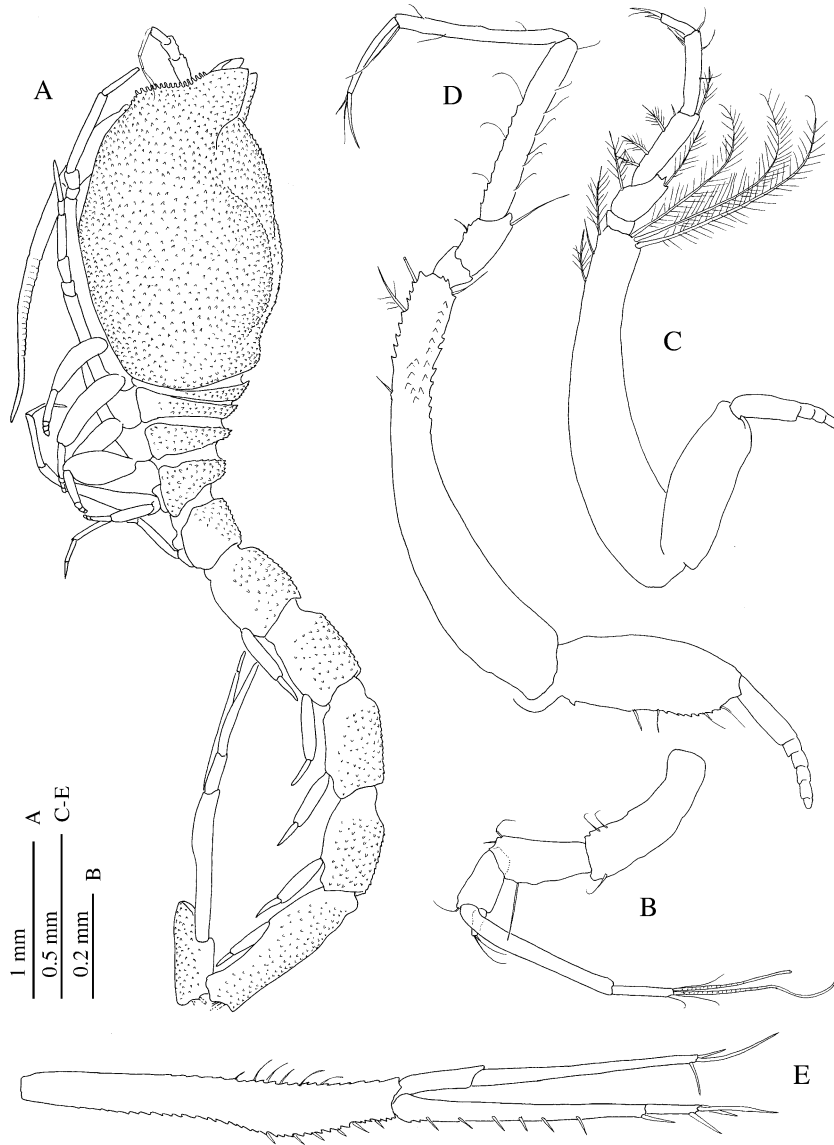


Figure 20. *Hypocuma fragosum* sp. nov. preadult male holotype: A, whole animal in lateral view; B, antenna 1; C, maxilliped 3; D, pereopod 1; E, uropod.

exopod, basis shorter than rest of appendage, with three small plumose setae distally; merus twice as long as ischium; carpus slightly longer than propodus with simple setae on both margins; dactylus half length than propodus.

Uropod peduncle (Fig. 20E) as long as pleonite 5, 1.2 times as long as rami. Endopod 2-articulated; article 1 more than four times as long as article 2, with seven setae on inner margin; article 2 with three setae terminally. Exopod as long as endopod; article 2 three times as long as article 1, with three setae terminally.

Preadult female. Antennule (Fig. 21A), peduncle article 1 as long as the following two articles combined; article 3 shorter than article 2; main flagellum

2-articulate, article 1 longer than twice length of article 2; with two aesthetascs; accessory flagellum rudimentary. Left mandible (Fig. 21B) with four teeth on the pars incisiva, 15 setae between pars incisiva and pars molaris. Maxillule (Fig. 21C) palp with two unequal filaments, inner endite with five setae, three simple, one trifold and one serrulate. Maxilla (Fig. 21D), endites with simple and serrate setae.

Maxilliped 1 (Fig. 21E) basis with four plumoserate and two simple setae on inner margin, distally produced reaching carpus; merus with a long pappose seta on distal outer corner; carpus with five flattened one-sided serrate setae on the inner margin; propodus with three cuspidate setae on distal inner corner.

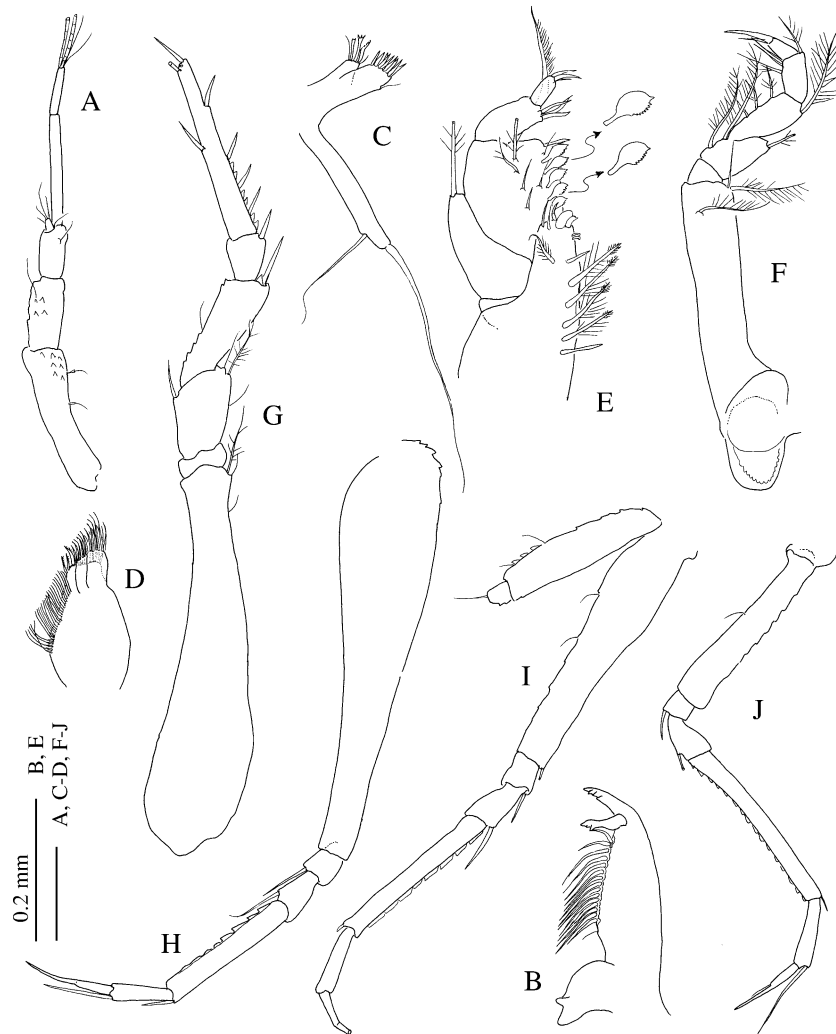


Figure 21. *Hypocuma fragosum* sp. nov. preadult female paratype: A, antenna 1; B, left mandible; C, maxilla 1; D, maxilla 2; E, maxilliped 1; F, maxilliped 2; G, pereopod 2; H, pereopod 3; I, pereopod 4; J, pereopod 5.

Maxilliped 2 (Fig. 21F) basis slightly longer than rest of appendage, with two pappose setae distally; merus with two long pappose setae on inner margin and one on distal outer corner; carpus longer than merus with three short forked setae on inner margin and a long plumose seta on distal outer corner; propodus shorter than carpus, with three simple setae on inner margin.

Pereopod 2 (Fig. 21G) with well-developed exopod (not figured), basis slightly shorter than rest of appendage, with a small pappose seta on distal lower corner; ischium short; merus shorter than carpus; carpus with a seta on distal corner; propodus shorter than merus with a cuspidate seta on distal corner; dactylus more than three times as long as propodus, with four cuspidate setae on lower margin, one on the upper margin and three terminally (the central one lost). Pereopod 3 (Fig. 21H) with well-developed exopod (not figured); basis longer than rest of append-

age; merus longer than ischium; carpus three times as long as merus, with a simple seta on distal corner; propodus shorter than half length of carpus, with a long simple seta on distal corner. Pereopod 4 (Fig. 21I) with rudimentary 2-articulate exopod, basis shorter than rest of appendage; merus longer than ischium, with a simple seta on distal corner; carpus three times as long as merus, with a simple seta on distal corner; propodus shorter than half length of carpus, with a long simple seta on distal corner. Pereopod 5 (Fig. 21J), basis rather shorter than rest of appendage; carpus more than three times as long as carpus; propodus with a long simple seta on distal corner.

Etymology: From the Latin *fragosus* meaning rough, referring to the denticulate microstructure of the integument.

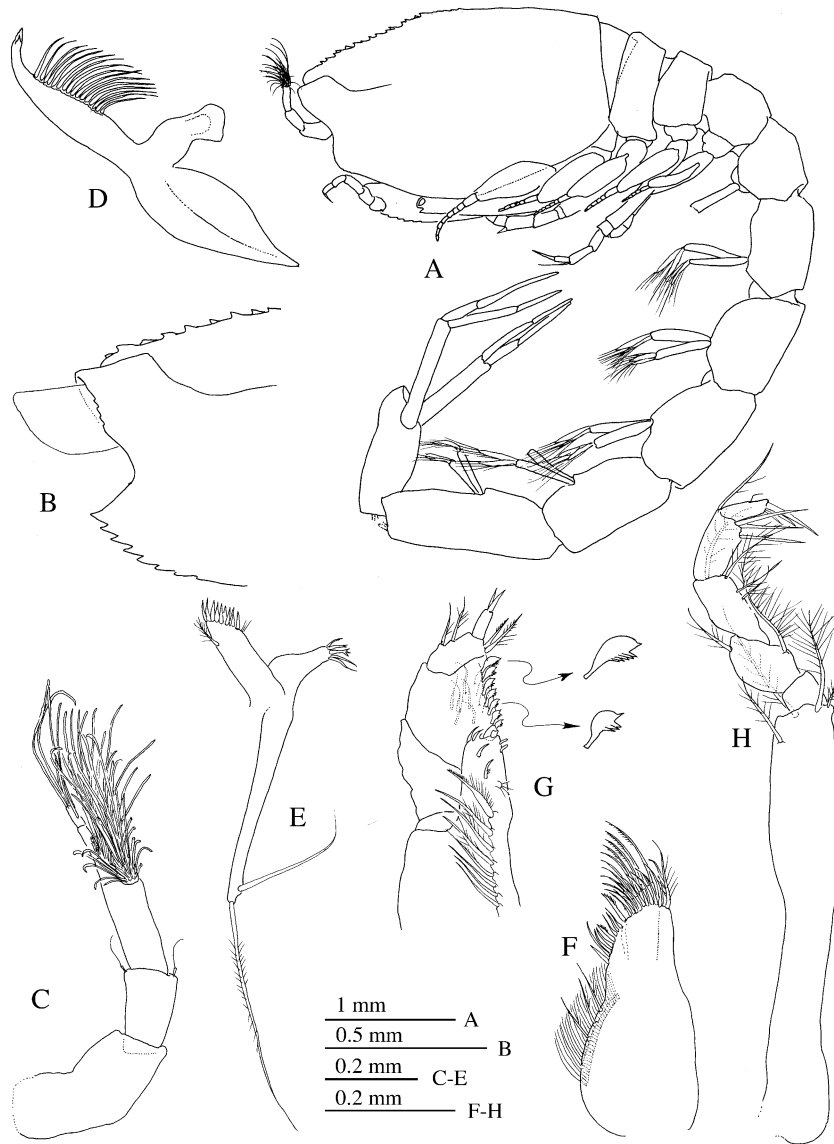


Figure 22. *Bathycuma coremium* sp. nov., adult male holotype (A, C) and preadult male paratype (B, D–H). A, whole animal in lateral view; B, anterior half of carapace showing the serrate anterolateral margin of a preadult male; C, antenna 1; D, right mandible; E, maxilla 1; F, maxilla 2; G, maxilliped 1; H, maxilliped 2.

Remarks: Only two species were previously known for the genus *Hypocuma*, *H. serratifrons* Jones, 1973 and *H. dentatum* Day, 1975. *H. fragosum* differs from the first by the relative length of their uropod exopod articles, the second article being three times as long as the first in the new species. Uropods are not known in *H. dentatum*, which differs by its longer pseudorostrum (about one-fifth carapace length) and the presence of a row of more developed denticles on the frontal lobe. Moreover, the main flagellum of antenna 1 is always 2-articulated in *H. fragosum* while it is apparently 1-articulated in the females and 3-articulated in the male of *H. dentatum*.

GENUS *BATHYCUMA* HANSEN, 1895

Diagnosis: Eyes absent. Last pleonite produced between the uropods. Basis of maxilliped 3 produced distally. Exopods on maxilliped 3 and pereopods 1–3 of female and in pereopods 1–4 of male. Male with five pairs of pleopods. Uropod endopod 2-articulate.

BATHYCUMA COREMIUM SP. NOV. (FIGS 22, 23)

Type material: Holotype: adult male, New Caledonia, BIOCAL, stn CP72, 22°09.02'S, 167°33.18'E, 2100–2110 m, 4.ix.1985 (MNHN-Cu1101); Paratype: stn CP75, 22°18.65'S, 167°23.30'E, 825–860 m, 5.ix.1985,

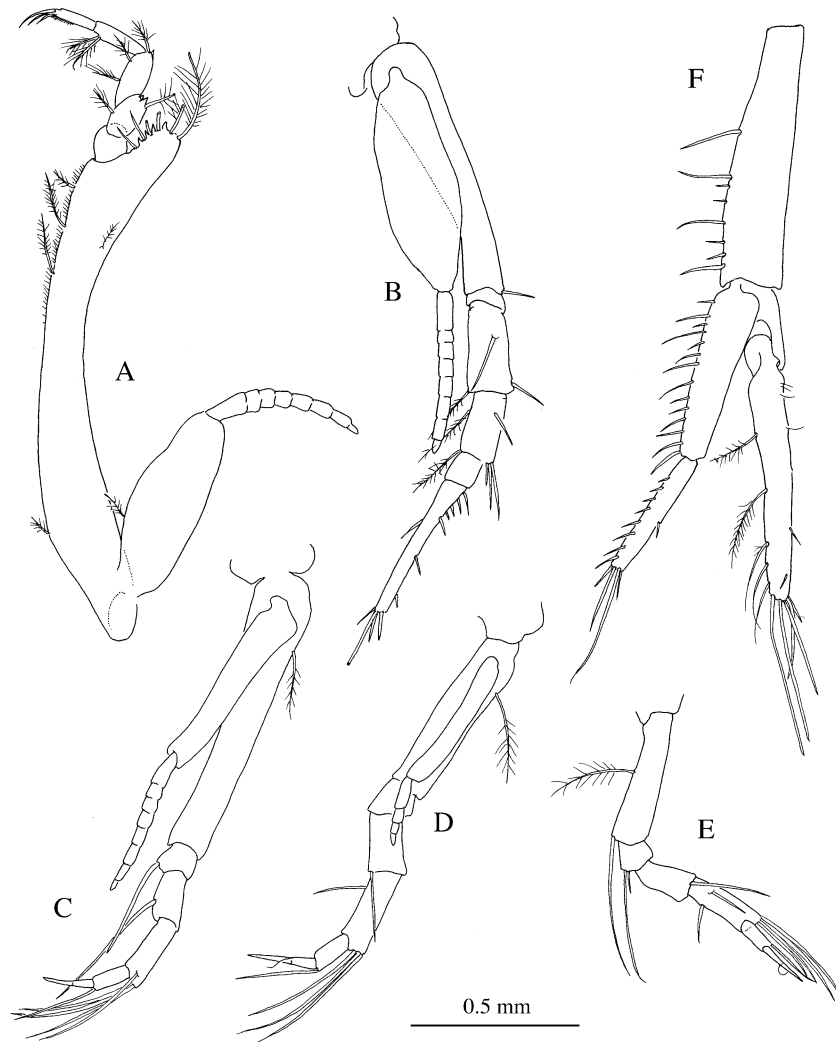


Figure 23. *Bathycuma coremium* sp. nov., adult male holotype: A, maxilliped 3; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, uropod.

1 preadult male without last 3 pleonites partially dissected in one slide (MNHN-Cu1102).

Diagnosis: Mid-dorsal line of carapace serrate on its anterior half, eyelobe reaching near the pseudorostral tip. Pleon without carinae. Distal process of maxilliped 3 not reaching the end of merus. Uropod rami of the same length and longer than peduncle; article 1 of endopod slightly longer than article 2.

Description: Adult male, 9.4 mm total length. Carapace (Fig. 22A) one-quarter total length, mid-dorsal carina with a paired row of teeth on its anterior half. Pseudorostral lobes meeting in front of the eyelobe, which is rounded and reach beyond half length of pseudorostrum lobes. Antennal notch shallow, anterolateral angle rounded (acute and with serration on

the lateral margin in the preadult male; Fig. 22B). Pleonite 6 produced between the uropods.

Antennule (Fig. 22C), peduncle article 1 the longest; article 3 longer than article 2; main flagellum 2-articulate, article 1 expanded at base and with a brush of sensory setae on the expansion; accessory flagellum rudimentary covered by sensory setae. Right mandible (Fig. 22D) with 16 setae between pars incisiva and pars molaris. Maxillule (Fig. 22E) palp with two unequal filaments, inner endite with five setae, three simple, one trifold and one serrulate. Maxilla (Fig. 22F), with simple and serrulate setae.

Maxilliped 1 (Fig. 22G) basis with seven plumose setae and one plumoserrate seta on inner margin, distally produced reaching carpus; carpus with seven hand-like flattened setae on the inner margin; propodus with two setae on distal inner corner. Maxilliped

2 (Fig. 22H) basis longer than rest of appendage, with three long pappose setae distally; merus with a long pappose seta on inner margin and a shorter one on distal outer corner; carpus longer than merus, with a long pappose seta on distal margin; propodus shorter than carpus, with three simple setae on distal inner corner and one pappose seta on outer corner. Maxilliped 3 (Fig. 23A), basis more than twice as long as rest of appendage, expanded distally reaching half length of merus, with three plumose setae on inner margin and six setae on inner margin of process, which has some teeth; merus with a plumose seta and a tooth on distal outer corner; carpus longer than merus, with two plumose setae on inner margin and one on distal outer corner. Pereopod 1 all articles lost except the basis in both specimens. Pereopod 2 (Fig. 23B), basis shorter than rest of appendage, with a simple seta on distal lower corner; ischium very short; merus longer than carpus, the last has three simple setae on distal lower corner; dactylus more than four times as long as propodus, with seven cuspidate setae on lower margin and four terminally. Pereopod 3 (Fig. 23C) basis longer than rest of appendage; ischium with a long simple seta; merus longer than ischium and shorter than carpus, with a long simple seta; carpus with four long simple setae on distal corner; propodus with a long simple seta on distal corner. Pereopod 4 (Fig. 23D), basis shorter than rest of appendage; merus longer than ischium and shorter than carpus; carpus with three long simple setae on distal corner; propodus with a long simple seta on distal corner. Pereopod 5 (Fig. 23E), basis rather shorter than rest of appendage; carpus more than twice as long as ischium; propodus with four long simple setae on distal corner.

Uropod peduncle (Fig. 23F) shorter than pleonite 6, with eight simple setae of two different lengths on inner margin. Rami subequal and longer than peduncle. Endopod 2-articulate, article 1 longer than article 2, with 14 and eight simple setae on inner margin, respectively, two long and two short simple setae distally. Exopod with plumose and simple setae on inner margin and four long and one short simple setae terminally.

Etymology: From the Greek *korema* meaning broom, referring to the brush of sensory setae that male has on the first antenna.

Remarks: From the 14 species of the genus *Bathycuma* up to now known, only six have the following combination of characters: article 1 of uropod endopod longer than article 2, no carinae on the pleon somites and dorsal carina of carapace at least partially serrate. In four of them, *B. capense* (Zimmer, 1921), *B. brevirostre* (Norman, 1879), *B. longirostre* Calman,

1905 and *B. declinatum* Gamô, 1989, the eye-lobe is obsolete, not reaching half length of pseudorostral lobes. *B. granulatum* Gamô, 1989 has the article 1 of uropod endopod more than twice as long as article 2 and *B. elongatum* Hansen, 1895 has no ischium in pereopod 2. These features are not shared by *B. coremium*, which moreover has the uropod endopod longer than the peduncle.

B. brevirostre is here included between the group of species having article 1 of uropod endopod longer than article 2, although this feature is not stated in this way in the keys of Day (1978) and Petrescu (1995). This is probably a mistake as Norman (1879), in the original description of *Leucon brevirostris*, pointed out: 'inner branch with first segment longer than second'. Similarly, Bonnier (1896) describing *Vaunthompsonia caeca* (a synonym of *Bathycuma brevirostris*) clearly figured article 1 as longer than 2.

ACKNOWLEDGEMENTS

I am very grateful to Bertrand Richer de Forges (IRD, New Caledonia) and Alain Crosnier (MNHN, Paris) for the opportunity to study a very interesting collection of cumaceans collected during the French Cruises in the South West Pacific. Thanks are also due to R. Fontarnau and collaborators for their assistance during SEM sessions in the Serveis Científicotècnics – University of Barcelona, and to L. Watling and an anonymous reviewer for their comments on the manuscript.

REFERENCES

- Bacescu M.** 1990. New Cumacea from northern Australian waters. *Beaufortia* **41**: 9–13.
- Bacescu M.** 1992. Sur quelques *Cyclaspis* (Crustacea, Cumacea) des eaux NW Australie. *Travaux du Muséum d'Histoire Naturelle 'Grigore Antipa'* **32**: 251–256.
- Bacescu M, Petrescu I.** 1999. Ordre des Cumacés (Cumacea Krøyer 1846). In: Forest J, ed. *Traité de Zoologie*, Tome VII Fascicule IIIA Crustacés Pécararides. *Memoires de l'Institut Océanographique, Monaco* 19: 391–428.
- Bonnier J.** 1896. Résultats scientifiques de la Campagne du 'Caudan' dans le Golf de Gascogne: Cumacea. *Annales de l'Université de Lyon* **24**: 528–562.
- Calman WT.** 1905. The Cumacea of the Siboga Expedition. *Siboga-Expeditie* **36**: 1–23.
- Calman WT.** 1907. On new or rare Crustacea of the order Cumacea from the collection of the Copenhagen Museum. Part I. *Transactions of the Zoological Society of London* **18**: 1–58.
- Corbera J.** 2002. Amphi-Atlantic distribution of the Mancocumatinae (Cumacea: Bodotriidae), with description of a new genus dwelling in marine lava caves of Tenerife (Canary Islands). *Zoological Journal of the Linnean Society* **134**: 453–461.

- Corbera J. 2006a.** Lampropidae (Crustacea, Peracarida, Cumacea) from deep waters of new Caledonia. In: *Richer de Forges B, Justine J-L, eds. Tropical Deep-Sea Benthos*, Vol. 24. *Mémoires du Muséum national d'Histoire naturelle* **193**: 143–162.
- Corbera J. 2006b.** A new operculate cumacean genus (Bodotriidae: Vaunthompsoniinae) from deep waters of New Caledonia. *Zoosystema* **28**: 325–330.
- Corbera J, Tirado P, Martin D. 2005.** Cumaceans (Crustacea: Peracarida) from the Persian Gulf. *Zootaxa* **1087**: 1–31.
- Crosnier A, Richer de Forges B, Bouchet P. 1997.** La campagne KARUBAR en Indonésie, au large des îles Kai et Tanimbar. In: Crosnier A, Bouchet P, eds. Résultats des campagnes MUSORSTOM, Vol. 16. *Mémoires du Muséum national d'Histoire naturelle* **172**: 9–26.
- Day J. 1975.** South African Cumacea. Part 1. Family Bodotriidae, Subfamily Vaunthompsoniinae. *Annals of the South African Museum* **66**: 177–220.
- Day J. 1978.** South African Cumacea. Part 2. Family Bodotriidae, Subfamily Bodotriinae. *Annals of the South African Museum* **75**: 159–290.
- Gamô S. 1989.** Four new species of deep-sea Cumacea (Crustacea) from the Japan Trench. *Science Reports of the Yokohama National University sec. 2* **36**: 11–33.
- Garm A. 2004.** Revising the definition of the crustacean seta and setal classification systems based on examinations of the mouthpart setae of seven species of decapods. *Zoological Journal of the Linnean Society* **142**: 233–252.
- Hale HM. 1928.** Australian Cumacea. *Transactions of the Royal Society of South Australia* **52**: 31–48.
- Hale HM. 1944.** Australian Cumacea. No. 7, The genus *Cyclaspis*. *Records of the South Australian Museum* **8**: 63–142.
- Hale HM. 1948.** Australian Cumacea. No. 14, Further notes on the genus *Cyclaspis*. *Records of the South Australian Museum* **9**: 1–42.
- Hale HM. 1949.** Australian Cumacea. No. 16, The family Nannastacidae. *Records of the South Australian Museum* **9**: 226–245.
- Hansen HJ. 1895.** Isopoden, Cumaceen und Stomatopoden der Plankton-Expedition. *Ergebnisse der Plankton Expedition der Humboldt-Stiftung*, B 2, G.c., 1–105.
- Haye P. 2002.** Systematics of the Cumacea (Crustacea). PhD Thesis, University of Maine.
- Jones NS. 1973.** Some new Cumacea from deep water in the Atlantic. *Crustaceana* **25**: 297–319.
- Norman AM. 1879.** Crustacea Cumacea of the 'Lightning', 'Porcupine', and 'Valorus' expeditions. *Annals and Magazine of Natural History ser. 5* **3**: 54–73.
- Petrescu I. 1995.** Cumaceans (Crustacea: Peracarida) from the South American coast collected by the R/V 'Vema'. *Travaux du Muséum d'Histoire Naturelle 'Grigore Antipa'* **35**: 49–86.
- Petrescu I. 2004.** The first mention of the genus *Apocuma* Jones, 1973 (Crustacea: Cumacea: Bodotriidae) from Autralian waters. *Travaux du Muséum National d'Histoire Naturelle 'Grigore Antipa'* **46**: 45–54.
- Richer de Forges B. 1990.** Les campagnes d'exploration de la faune bathyale dans la zone économique de la Nouvelle-Calédonie. Explorations for bathyal fauna in the New Caledonia economic zone. In: Crosnier A, ed. Résultats des Campagnes MUSORSTOM, Vol. 6. *Mémoires du Muséum national d'Histoire naturelle* **145**: 9–54.
- Richer de Forges B, Bouchet P, Dayrat B, Waren A, Philippe J-S, Crosnier A. 2000.** La campagne BORDAU 1 sur la ride de Lau (îles Fidji). Compte rendu et liste des stations. In: Crosnier A, ed. Résultats des Campagnes MUSORSTOM, Vol. 21. *Mémoires du Muséum national d'Histoire naturelle* **184**: 25–38.
- Roccatagliata D. 1985.** Three new species of the genus *Cyclaspis* (Cumacea) from the South-West Atlantic with a redescription of *Cyclaspis platymerus* Zimmer 1944. *Crustaceana* **49**: 177–192.
- Sars GO. 1865.** Om den aberrante Kerbsdyrgruppe Cumacea og dens nordiske arter. *Forhandlinger i Videnskabs-Selskabet i Christiania* **1864**: 128–208.
- Sars GO. 1878.** Middelhavets Cumaceer. Part 1. *Archiv for Matematik og Naturvidenskab* **3**: 461–512.
- Scott T. 1901.** Notes on some gatherings of Crustacea collected for the most part on board the Fishery Steamer 'Garland' and examined during the past years. *Annual Report of the Fishery Board for Scotland* **19**: 273.
- Tafe DJ, Greenwood JG. 1996.** The Bodotriidae (Crustacea: Cumacea) of Moreton Bay, Queensland. *Memoirs of the Queensland Museum* **39**: 391–482.
- Watling L. 1989.** A classification system for crustacean setae based on the homology concept. *Crustacean Issues* **6**: 15–26.
- Zimmer C. 1908.** Die Cumaceen der Duetschen Tiefsee-Expedition. *Wissenschaftliche Ergebnisse der Duetschen Tiefsee-Expedition auf dem Dampfer 'Valdivia' 1898–1899* **8**: 155–196.
- Zimmer C. 1921.** Mitteilung über Cumaceen des Berliner Zoologischen-Museums. *Mitteilungen aus dem Zoologischen Museum in Berlin* **10**: 117–149.