

NEW GENUS AND SPECIES OF CRANGONIDAE (DECAPODA: CARIDEA) WITH A LARGE PLATE-LIKE EYE FROM THE ABYSSAL ZONE OFF TAIWAN, NORTHWESTERN PACIFIC

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ABSTRACT

A new crangonid genus, *Placopsicrangan*, is established for an unusual new species, *P. formosa*, which is described on the basis of material from off Taiwan in the northwestern Pacific, at the abyssal depths of 4412–4824 m. This new genus has a large and reflective plate-like eye that is unknown in decapod crustaceans before but similar to the eyes of the deep-sea grideye fish of the genus *Ipnops* Günther, 1878. The new genus is also unique within Crangonidae by having a laterally compressed rostrum with dentate dorsal margin, and the presence of a transverse row of sharp teeth adjacent to the posteroventral margin of the sixth pleonal sternite. *Placopsicrangan* appears closest to *Sabinea* in the general pattern of the carination on the carapace and pleon, and the substantially reduced non-chelate second pereopod. This new taxon is the sixth representative of Crangonidae inhabiting the abyssal zone.

KEY WORDS: Abyssal fauna, Caridea, Crangonidae, *Placopsicrangan*, Taiwan.

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INTRODUCTION

Because of the technical difficulty of samplings, our knowledge on the abyssal benthic fauna in the western Pacific is rather limited, though various recent expeditions, e.g., the French MUSORSTOM and other expeditions to the southwestern and northwestern Pacific, have made collections mainly in the bathyal zone down to 2000 m. With regard to the carideans, the following species are known from the abyssal zone (3000–6000 m deep) in the northwestern Pacific: two nematocarinid *Nematocarcinus batei* Burukovsky, 2000, and *N. longirostris* Bate, 1888 (Burukovsky, 2003); one stylodactylid *Bathystylodactylus inflatus* Hanamura and Takeda, 1996 (Hanamura and Takeda, 1996); one glyphocrangonid *Glyphocrangon caecescens* Wood-Mason, 1891, in Wood-Mason and Alcock (1891) (Komai, 2004); and two crangonids, *Neocrangon abyssorum* (Rathbun, 1902) and *Sclerocrangon zenkevitchii* Birshtein and Vinogradov, 1953 (Kim et al., 2000).

The ongoing TAIWAN deep sea-cruises since the year 2000 have yielded many interesting decapod crustaceans from Taiwan (Komai and Chan, 2002, 2003, 2006; Chuang et al., 2003; Cleva, 2004; Ho et al., 2004; Ahyong and Chan, 2004; Lin and Chan, 2005; Kim and Chan, 2005; Mitsuhashi and Chan, 2006; Osawa et al., 2006a, b, 2008; Lin, Osawa and Chan, 2007; Lin, Komai and Chan, 2007; Osawa and Chan, 2008). In a recent cruise off eastern Taiwan, some hauls down to 5011 m deep were made. In three stations between 4412–4824 m deep, many specimens of an extraordinary crangonid were obtained. This crangonid has the eyes greatly modified into a large yellowish-white plate which is unknown in any other decapod crustaceans. Such a shining plate-like eye, however, is superficially similar to the eyes of the deep-sea grideye fish of the genus *Ipnops* Günther, 1878 (Auropiformes: Ipnopi-

dae). Careful examination revealed that this unusual crangonid cannot be assigned to any known genus, though its morphological characters suggest that it has a close relationship to *Sabinea* Ross, 1835 and *Lissosabinea* Christoffersen, 1988. The present work describes and illustrates this interesting new genus and species.

MATERIAL AND METHODS

The material examined is deposited in the National Taiwan Ocean University, Keelung (NTOU) and the Natural History Museum and Institute, Chiba (CBM). The abbreviation cl refers to postorbital carapace length. The station (stn) designation CP refers to the collecting gears, a 4 m French beam trawl.

For comparative purpose, the following material was examined.

Sabinea hystrix (A. Milne-Edwards, 1881): CBM-ZC 724, 1 female cl 22.5 mm, RV. Shinkai-maru, Baffin Bay, Greenland, 69°19.2'N, 55°11.2'W, 1040 m, June 1990, otter trawl, coll. T. Goto.

Sabinea sarsi Smith, 1879: CBM-ZC 354, 2 ovigerous females cl 14.8, 16.0 mm, RV. Shinkai-maru, Davis Strait, Greenland, 68°25.8'N, 57°21.0'W, 361–362 m, otter trawl, coll. H. Endo.

SYSTEMATICS

Placopsicrangan n. gen.

Type species.—*Placopsicrangan formosa* n. sp.

Diagnosis.—Body relatively slender. Rostrum compressed laterally, sharply pointed apically, with dentate dorsal margin; no paired lateral teeth. Carapace distinctly longer than broad, with 3 pairs of sharp, serrate or denticulate lateral carinae; dorsal midline sharply carinate, also serrate; first lateral carina not continuous with antennal tooth; second lateral carina continuous with hepatic tooth; third lateral carina continuous with branchiostegal tooth, running over entire length of carapace; hepatic groove present; branchiostegal tooth small; pterygostomial angle rounded;

orbital margin evenly concave, without cleft; postorbital suture present. Thoracic sternum not interlocked with ventral margin of carapace; no paired ventral teeth posterior to coxae of fifth pereopods. Branchial formula summarized in Table 1; two greatly unequal arthrobranch gills present above base of third maxilliped (dorsal gill much smaller than ventral gill); pleurobranch gills large, dorsal apices directed forward. Pleonal sculpture rather simple, mainly composed of straight longitudinal carinae. Telson without dorsolateral spines. Pleonal sternites without median teeth on first to fifth somites; sixth sternite with transverse row of several slender teeth adjacent to posterior margin. Eyes contiguous, strongly modified into large, dorsoventrally flattened plates with shining dorsal surfaces, incompletely fused with cephalothorax; division of cornea and eyestalk not evident; no corneal facets recognized elsewhere. Antennal scale with distal lamella obliquely truncate, exceeded by terminally positioned distolateral tooth. First pereopod subchelate. Second pereopod not chelate, reduced in some degrees, only slightly overreaching distal margin of ischium of first pereopod. Carpi of fourth and fifth pereopods distinctly longer than propodi.

Remarks.—This monotypic new genus appears closest to *Sabinea* Ross, 1835, which is represented only by three Atlantic species (Komai, 2006), viz., *S. hystrix* (A. Milne-Edwards, 1881), *S. sarsii* Smith, 1879, and *S. septemcarinata* (Sabine, 1824). Shared characters include the presence of sharply defined, serrate middorsal and three pairs of lateral carinae on the carapace, dorsally carinate pleon, and the substantially reduced, non-chelate second pereopod. However, the new genus is very distinctive among the crangonids, as well as among all decapod crustaceans, in the eye as a large shining plate. The eye of this new taxon is strongly flattened dorsoventrally and plate-like, incompletely fused with the cephalothorax; there is no trace of a division between cornea and eyestalk, and the entire dorsal surface is reflective. Furthermore, the new genus is unique within the family in the shape of the rostrum and the armature of the sixth pleonal somite. In the new genus, the rostrum is laterally compressed with a sharply carinate, dentate dorsal margin. In other crangonid taxa, the structure of the rostrum is rather variable, but the dorsal margin is not dentate like the new genus. The ventral surface of the sixth abdominal somite of the new taxon is armed with 1-3 pairs of small teeth at about the anterior 0.30 and with a transverse row of sharp teeth adjacent to the posterior margin. Such an armature is not yet known in other crangonid taxa. There are some more differentiating characters between *Placopsicrangan* and *Sabinea*, including those of possible generic significance: the body integument is only scattered with long setae in *Placopsicrangan*, but is entirely covered with short pubescence in *Sabinea*; the third and fourth abdominal pleura bear marginal denticles in *Placopsicrangan*, whereas these margins are smooth in *S. sarsii* and *S. septemcarinata* or is each armed with a single acute ventral tooth in *S. hystrix*; the maxilla, first maxilliped and second maxilliped are longitudinally elongate in *Placopsicrangan*, but they are normal shaped in *Sabinea*; the carpi of the fourth and fifth pereopods are longer than the propodi in *Placopsicrangan*, and visa versa in *Sabinea*. Similar degree of reduction of the

Table 1. Branchial formula of *Placopsicrangan* n. gen. r = rudimentary.

Thoracic somites	1	2	3	4	5	6	7	8
	maxillipeds			pereopods				
Appendages	1	2	3	1	2	3	4	5
pleurobranches	—	—	—	+	+	+	+	+
arthrobranches	—	—	2	—	—	—	—	—
podobranchs	—	+	—	—	—	—	—	—
epipods	+	+	r	—	—	—	—	—
exopods	+	+	+	—	—	—	—	—

second pereopod is also present in *Lissosabinea* Christoffersen, 1988. Komai (2006) suspected that the sister group of *Lissosabinea* was *Sabinea*, because the reduced, non-chelate second pereopod could be synapomorphic between the two genera.

Other than the characters mentioned above, *Placopsicrangan* is readily separated from *Lissosabinea* by many features: the rostrum is devoid of lateral teeth in *Placopsicrangan*, which are present in *Lissosabinea*; the middorsal line of the carapace is sharply carinate with several tiny teeth in *Placopsicrangan*, rather than armed with one to three relatively large teeth in *Lissosabinea*; the carapace has three pairs of distinct lateral carinae in *Placopsicrangan*, but all these carinae are absent in *Lissosabinea*; the sculpture of the pleon is more complicated in *Placopsicrangan* than in *Lissosabinea*, which only has a middorsal carina on the third pleonal somite; the telson is devoid of dorsolateral spines in *Placopsicrangan*, whereas there are two pairs of dorsolateral spines in *Lissosabinea*; the carpi of the fourth and fifth pereopods are longer than the propodi in *Placopsicrangan*, visa versa in *Lissosabinea* (Komai, 2006).

With respect to the general pattern of the carination and sculpture on the carapace and pleon, the new genus is quite similar to *Aegaeon* Agassiz, 1846, *Pontocaris* Bate, 1888, and *Parapontocaris* Alcock, 1901, particularly the latter genus in which the shape and positions of the carinae on the body are nearly the same as *Placopsicrangan*. The general body size and shape, i.e., body rather long and slender, of *Placopsicrangan* also resemble *Parapontocaris* (cf. Chace, 1984; Han et al., 2007). Nevertheless, the laterally compressed rostrum and the reduced, non-chelate second pereopod immediately distinguish *Placopsicrangan* from *Aegaeon*, *Pontocaris* and *Parapontocaris*. In the latter three genera, the rostrum is dorsoventrally flattened and usually armed with lateral teeth; and the second pereopod is chelate and normal in the size (Chace, 1984; Chan, 1996). The non-chelate second pereopod is considered as apomorphic in crangonids (Christoffersen, 1988), although a possible homoplasy is indicated (Komai, 1995). Phylogenetic analysis amongst the crangonid genera will provide more insights on the relationships of this abyssal new genus with other crangonids.

Etymology.—From the Greek *plakos* (plate-like), *ops* (eye), and the generic name *Crangan* Fabricius, 1798, referring to the unique plate-like eyes in this new crangonid. Gender: feminine.

Placopsicrangan formosa n. sp.

(Figs. 1-6)

Material Examined.—Holotype: TAIWAN 2008, stn CP 416, 22°26.44'N, 122°21.18'E, 4824-4807 m, 15 June 2008, female cl 24.5 mm, NTOUM 00743.

Paratypes: TAIWAN 2008, stn CP 413, 22°15.07'N, 121°54.99'E, 4412-4446 m, 12 June 2008, 1 male cl 19.0 mm, NTOUM 00744; stn CP 415, 22°26.17'N, 122°21.11'E, 4813-4807 m, 15 June 2008, 2 females cl 16.2, ca. 21.3 mm, NTOUM 00745; same data as holotype, 2 males cl 17.3, 18.2 mm, 4 females cl 17.4-21.6 mm, NTOUM 00746, 1 male cl 19.6 mm, 1 female cl 19.3 mm, CBM-ZC 9510.

Description.—Body (Figs. 1, 2A, C, 3A, B) slender; integument thin, but rather firm.

Rostrum (Figs. 2A, 3A) slender, nearly straight, directed forward, compressed laterally, reaching distal margin of first segment of antennular peduncle to slightly overreaching third segment of antennular peduncle, terminating in acute tip; dorsal margin sharply carinate, with 2-5 (rarely 1) tiny teeth; ventrolateral margin sharply carinate, smooth, merging to orbital margin; ventral surface narrowly flat, unarmed. Carapace (Figs. 2A, 3A) 1.7-2.0 times longer than wide, provided with sharp middorsal and 3 pairs of lateral carinae, all denticulate or serrate; lateral margins sub-parallel in dorsal view; surface scattered with thin long setae, densest on anterodorsal part; middorsal carina extending over entire length of carapace, continuous with rostral carina, with 9-16 (9 in holotype) evenly distributed tiny teeth; dorsal profile in lateral view faintly sinuous or nearly straight; first lateral carina extending from slightly behind orbital margin to near posterior margin of carapace, straight, terminating in small tooth anteriorly, armed with 7-12 (10 or 11 in holotype) teeth which becoming smaller posteriorly; second lateral carina continuous with small hepatic tooth, extending nearly to posterior margin of carapace, armed with 7-13 (9 in holotype) teeth which becoming smaller posteriorly; third lateral carina slightly sinuous in lateral view, continuous with branchiostegal tooth, extending to near posterolateral margin of carapace, armed with 12-21 (12 or 13 in holotype) teeth which becoming smaller posteriorly; hepatic groove shallow; shallow depression also present posterior to hepatic groove; orbital margin evenly concave, without cleft; antennal tooth small; anterolateral margin weakly terraced; branchiostegal tooth small, directed anteriorly or anterolaterally, not reaching distal margin of antennal basicerite; pterygostomial angle rounded.

Thoracic sternum progressively slightly widened posteriorly. In females (Fig. 2B), median carina somewhat reduced, but that on fifth sternite distinct, that on sixth sternite discernible only at anterior half, unarmed anteriorly; eighth sternite with transverse row of moderately long setae; no conspicuous depressions at boundary between last thoracic and first pleonal sternites; no plate-like expansion on posterolateral extensions of eighth sternite. In males (Fig. 6B), distinct but low median carinae present on fifth to eighth sternites, that of fifth somite terminating in small, acute tooth, those on other somites each terminating in tiny tooth; divisions between somites indicated by shallow

transverse grooves; eighth sternite with pair of submedian patches of short setae; boundary between eighth sternite and first pleonal sternite with pair of deep depressions; posterolateral extensions of eighth sternite each with thin, plate-like expansion directed mesially.

Pleon (Figs. 2C, 3B, C) not markedly wider than carapace, surface nearly naked. First somite with 3 pairs of low, but clearly defined longitudinal carinae, each terminating anteriorly in small acute tooth projecting beyond anterior margin; sub-median and dorsolateral carinae not reaching posterodorsal margin, lateral carina sinuous, nearly extending to posterior margin; posterodorsal margin concave; pleuron generally rounded, marginally smooth, lateral surface slightly concave posteriorly to accommodate anterior portion of second pleuron. Second somite with tergum divided into 2 sections by distinct transverse ridge accompanied with deep groove; clearly defined middorsal and dorsolateral carinae present, these carina not extending to posterodorsal margin; middorsal carina terminating anteriorly in small subacute tooth; anterior end of dorsolateral carina forming rounded angle and merged with transverse ridge, occasionally with minute denticle slightly below angle; posterodorsal margin concave; pleuron with 2 shallow, vertical depressions, margins broadly rounded, smooth. Third somite with tergum divided into 2 sections by distinct transverse carina accompanied anteriorly with deep groove; middorsal carina distinct, extending over entire length of exposed tergite, anterior and posterior ends both slightly produced, dorsal margin in lateral view gently convex; dorsolateral carinae weak, far falling short of posterodorsal margin; lateral carina very short, restricted to anterior part, not reaching midlength of somite; posterodorsal margin weakly convex, with row of long, thin setae; pleural margin generally rounded, minutely denticulate; lateral surface of pleuron with shallow vertical depression with weakly delimited posterior margin. Fourth somite with low but distinct middorsal carina extending over entire length of exposed tergite, terminating posteriorly in small acute tooth; tergite with weak dorsolateral carinae not extending to anterior or posterodorsal margins; lateral carina distinct, distinctly convex; pleural margin generally rounded, but minutely denticulated; lateral surface of pleuron with shallow vertical depression posteriorly. Fifth somite with sharply defined, posteriorly diverging submedian carinae each terminating in small tooth, shallow transverse groove present across anterior 0.25 of somite; posterodorsal margin between terminal teeth of submedian carinae deeply concave, joint membrane between fifth and sixth somites clearly visible in dorsal view; lateral carina also sharply defined, extending from anterior 0.25 of somite to posterior margin, continuous with pleural margin; pleuron with ventral margin bearing row of minute denticles at least in posterior half (posteriormost one situated at posteroventral angle and largest), posterolateral margin sinuous; lateral surface of pleuron with shallow depression posteriorly. Sixth somite elongate, 3.1-3.3 times longer than wide, 2.5-2.6 times longer than high, slightly constricted at middle in dorsal view, becoming slightly narrower in lateral view; sub-median carinae distinct, sub-parallel, connected with proximal transverse carina, not extending beyond



Fig. 1. *Placopsicranganon formosa*. A, B, holotype, female cl 24.5 mm, NTOUM 00743; C, stn CP 415, paratype female cl 18.3 mm, NTOUM 00746. A, C, habitus, lateral view; B, habitus, dorsal view; D, stn CP416, paratype female cl 18.3 mm, NTOUM 00746.

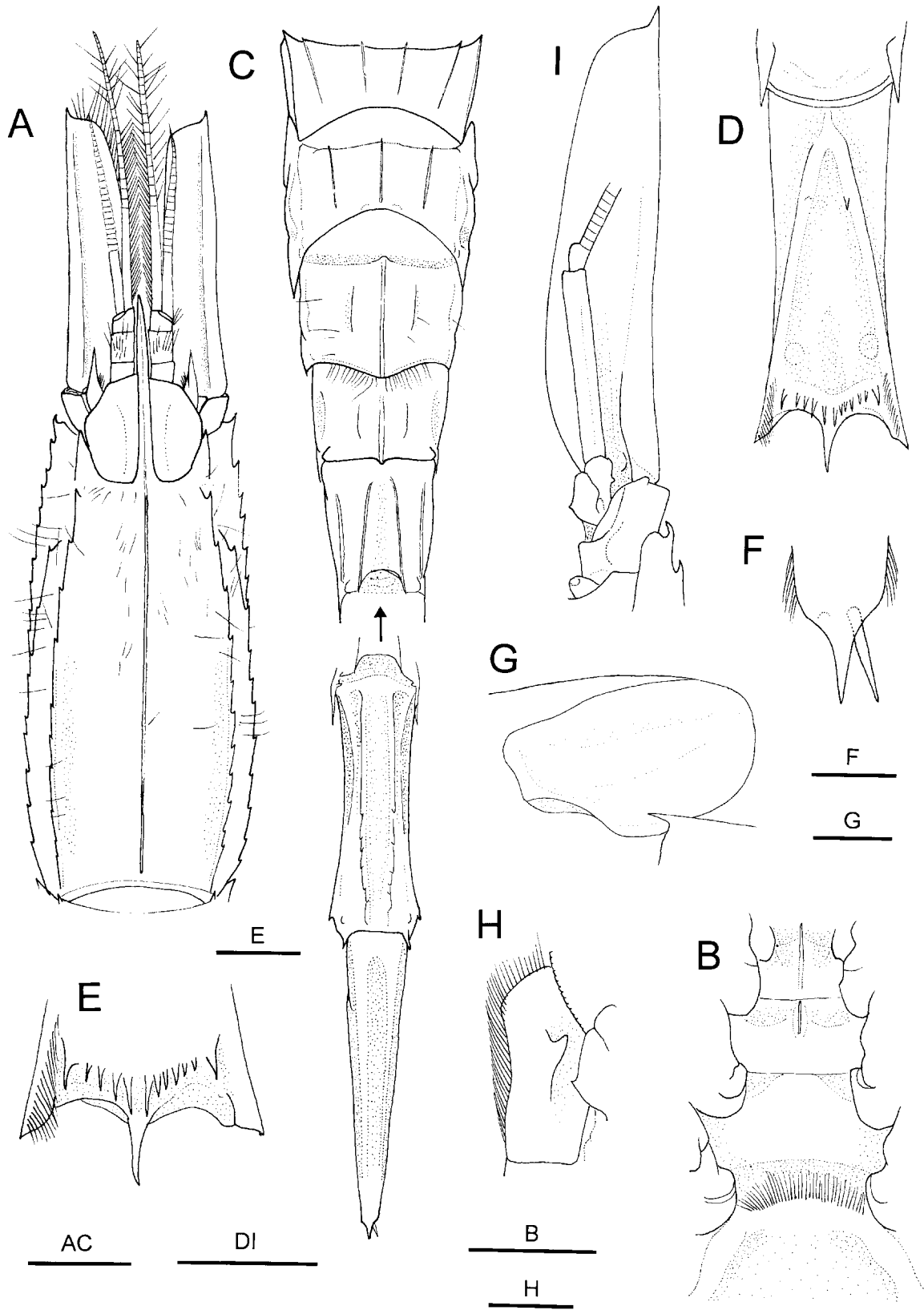


Fig. 2. *Placopsicrangan formosa*, holotype, female cl 24.5 mm, NTOUM 00743. A, carapace and cephalic appendages, dorsal view; B, fifth to eighth thoracic sternites, ventral view; C, pleon and telson, dorsal view; D, sixth pleonal somite, ventral view; E, posterior part of sternite of sixth pleonal somite, ventral view; F, terminal part of telson, dorsal view; G, left eye, dorsolateral view; H, first segment of left antennular peduncle, ventral view; I, left antenna, ventral view. Scales bars: 5 mm for A-D, I; 2 mm for E-H.

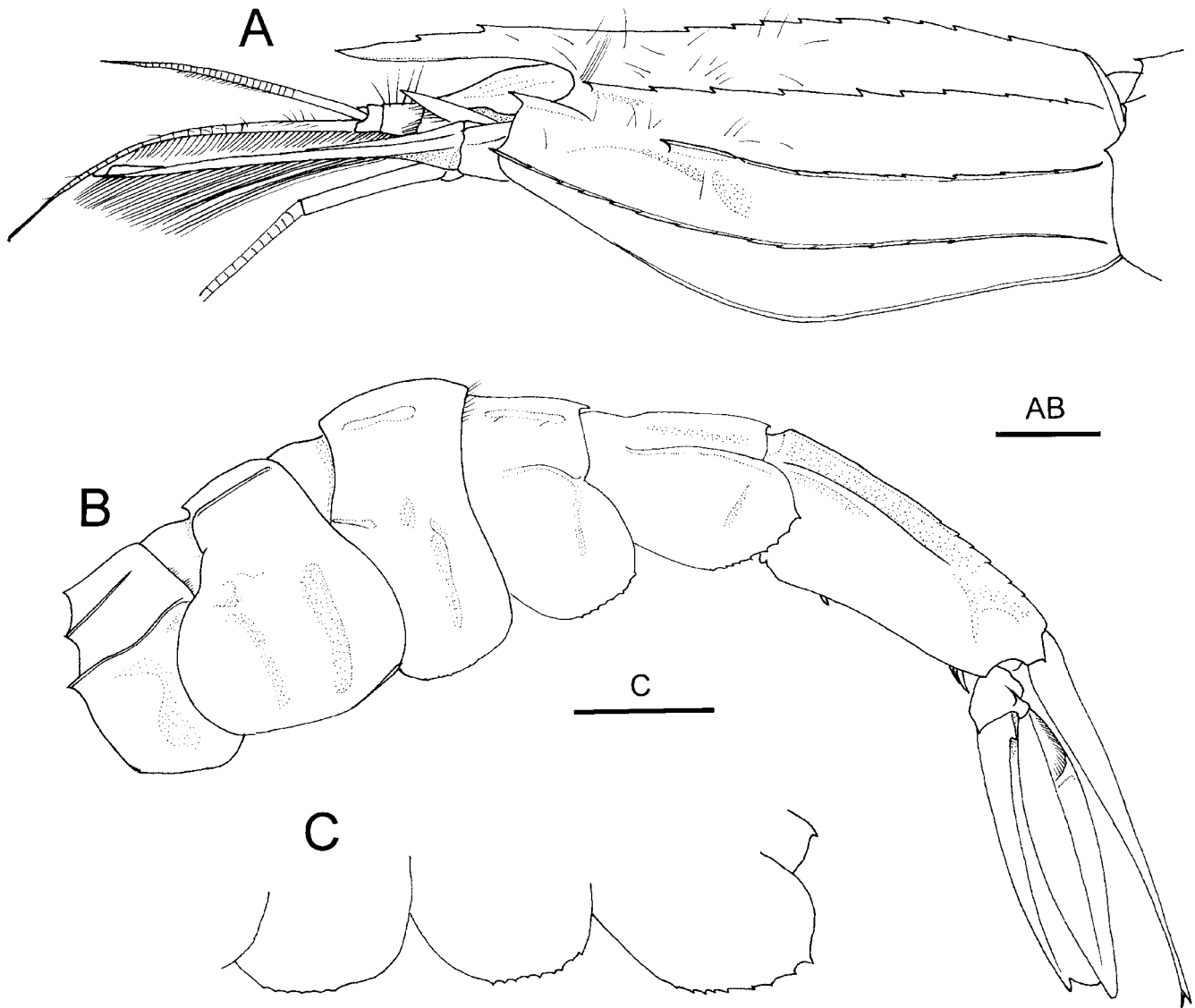


Fig. 3. *Placopsicrango formosa*, holotype, female cl 24.5 mm, NTOUM 00743. A, carapace and cephalic appendages, lateral view; B, pleon, lateral view; C, pleura of third to fifth pleonal somites, lateral view. Scale bars: 5 mm.

posterodorsal margin, margins smooth or denticulate in posterior half; lateral carina also distinct, extending to posterior 0.3 of somite; posterolateral process broad, terminating in tiny acute or sub-acute tooth directed slightly laterally; pleuron poorly sculptured, with sub-acute postero-ventral angle; ventral surface flanked by V-shaped carina diverging posteriorly, each carina with 1-3 small spines arising at about anterior 0.25 of somite (Fig. 2D); posterior margin adjoining with an obliquely transverse row of 5-7 slender, sharp, posteriorly curved teeth on either side of midline; preanal tooth prominent, curved dorsally (Fig. 2D, E). Telson (Figs. 2C, 3B) 1.15-1.20 times longer than sixth somite, gradually tapering distally, terminating in slender posteromedian tooth flanked by 1-4 pairs of small spines (Fig. 2F); dorsolateral carinae blunt but distinct, extending to posterior 0.8 of telson length; dorsolateral spine absent.

Eyes (Figs. 1B, D, 2A, G, 6A) contiguous, strongly modified into dorsoventrally flattened plates and with entire

dorsal surface reflective; about 0.25 times as long as carapace, general outline of each eye longitudinally oval, about 2 times as long as wide, anterior margin transversely or obliquely truncate, lateral margin weakly angular and with anterolateral part sometimes slightly notched; dorso-mesial margin weakly crested, dorsal surface sloping laterally and anteriorly.

Antennular peduncle (Figs. 2A, 3A, 6A) subcylindrical, reaching proximal 0.30 of antennal scale. First segment longer than distal two segments combined, armed with sub-acute tooth on midline of ventral surface, arising slightly distal to midlength; stylocerite slender, tapering distally, sharply pointed, reaching midlength of second segment, directed somewhat dorsally in lateral view, lateral margin sinuous. Outer flagellum sexually dimorphic; in females (Fig. 2A) about half length of carapace, consisting of about 20 articles (proximalmost article occupying about 0.30 of total length), slightly overreaching lamella of antennal scale;

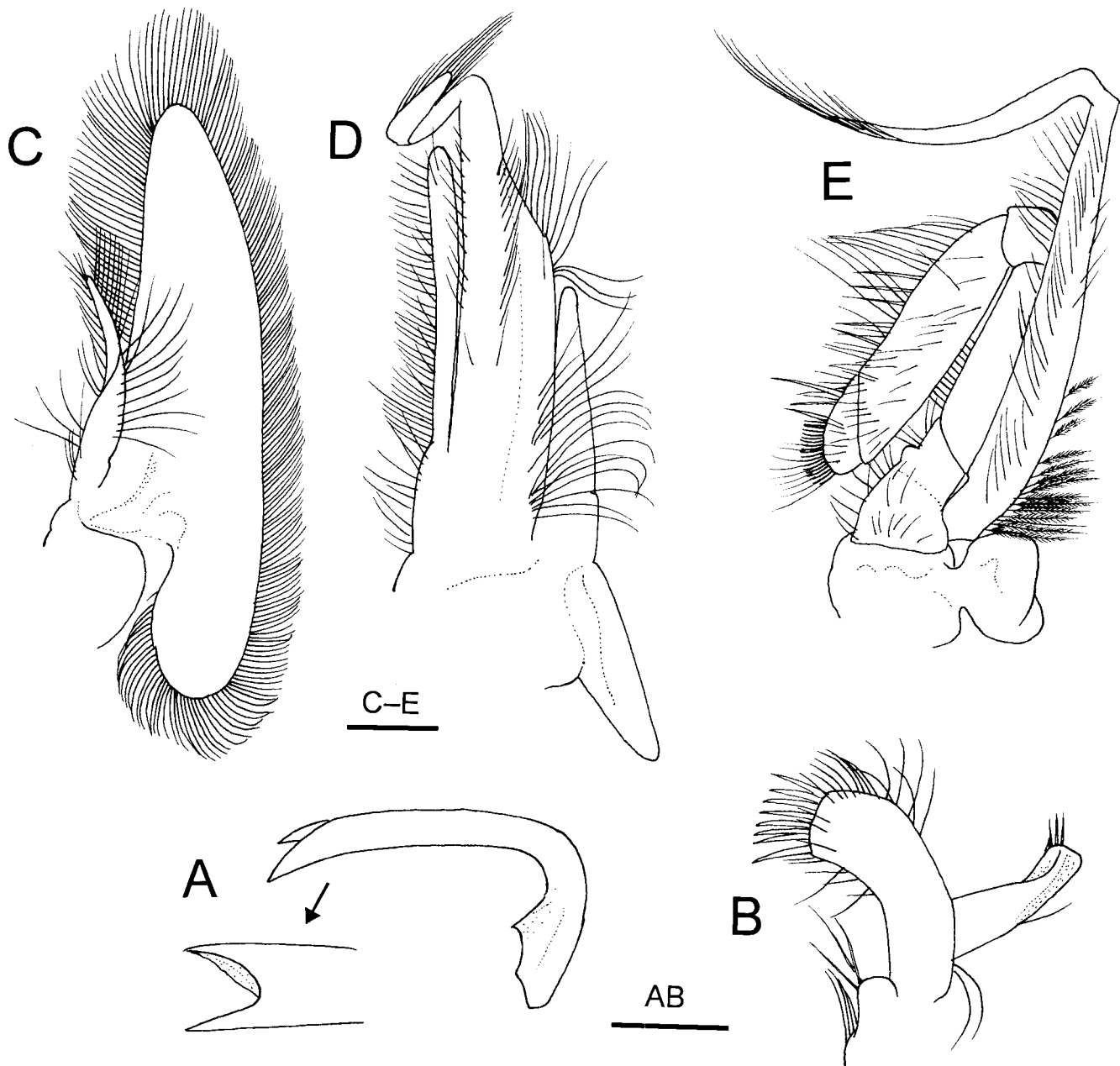


Fig. 4. *Placopsicranton formosa*, paratype, stn CP 413, male cl 19.0 mm, NTOUM 00744. Left mouthparts. A, mandible, posterior view; inset, distal part, inner view; B, maxillule, outer view; C, maxilla, outer view; D, first maxilliped, outer view; E, second maxilliped, outer view. Scale bars: 1 mm.

in males (Fig. 6A), about 0.70-0.80 length of carapace, consisting of much more articles, aesthetasc-bearing portion broadened, flattened dorsoventrally, overreaching distal lamella of antennal scale by about half length. Inner flagellum overreaching antennal scale by 0.30-0.40 length in females (Fig. 2A), about 0.50 length in males (Fig. 6A), lateral margin with row of sparse setae, mesial margin with dense setae in basal 0.60 and sparse setae in distal 0.40.

Antennal scale (Fig. 2A, I) 0.70-0.75 times as long as carapace and 4.0-4.2 times longer than wide; lateral margin nearly straight or slightly sinuous, distolateral tooth terminal in position; distal lamella obliquely truncate. Antennal basicerite unarmed on ventrolateral distal angle; dorsolateral

distal angle not produced. Third segment with minute tooth on mesial surface. Fifth segment (carpocerite) slender, reaching midlength of antennal scale. Antennal flagellum slightly longer than carapace; each article with a few short setae on distal margin.

Mandible (Fig. 4A) somewhat compressed, strongly curved at base, terminally divided into 2 subequal, acute teeth. Maxillule (Fig. 4B) with very small, sub-quadrate coxal endite bearing sparse setae; basal endite curved mesially, armed with double row of long spines on roundly truncate distal margin; endopod weakly curved, terminal lobe simple, bearing 4 spiniform setae distally. Maxilla (Fig. 4C) with strongly reduced endites; endopod slender,

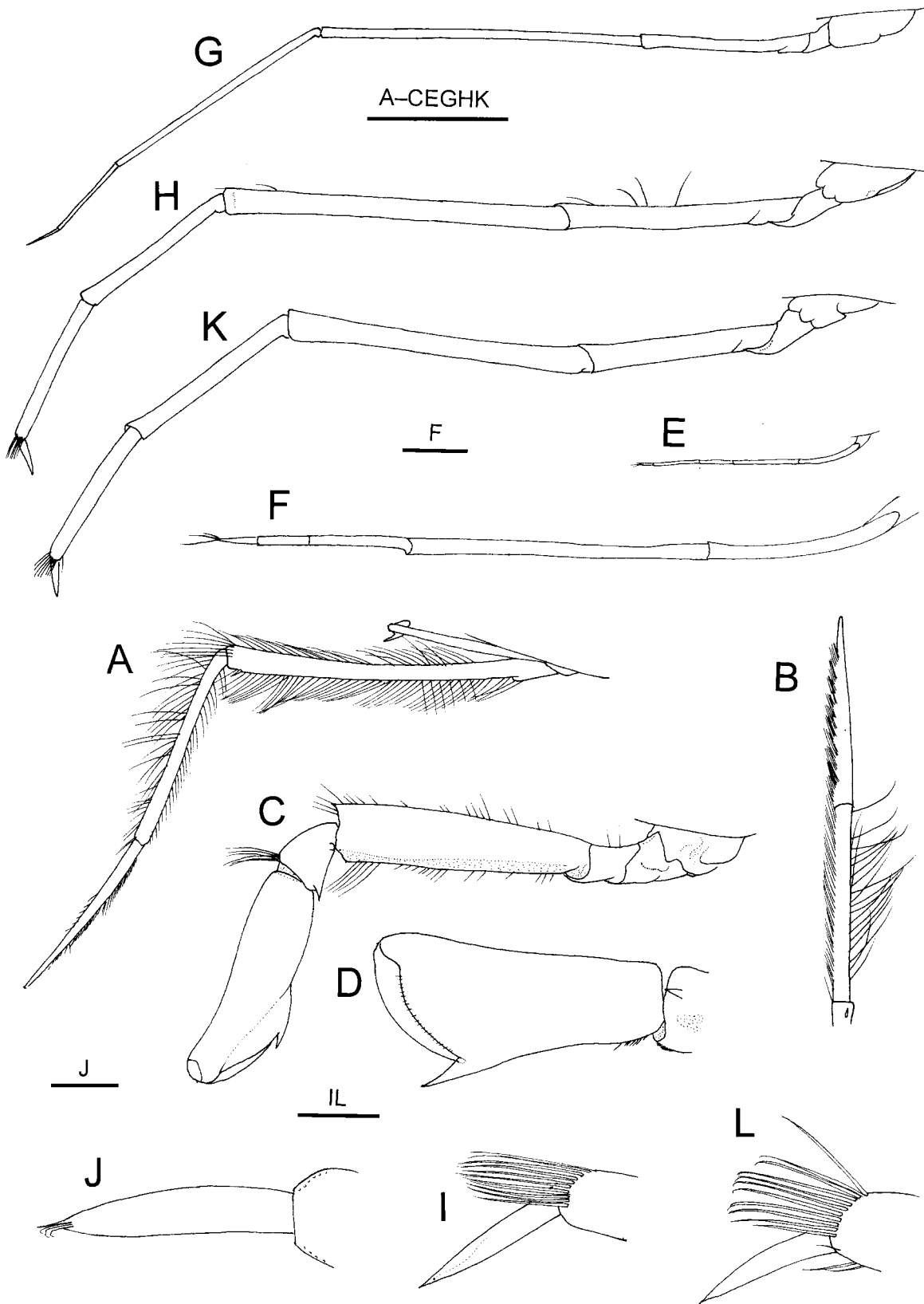


Fig. 5. *Placopsicranton formosa*, holotype, female cl 24.5 mm, NTOUM 00743. Left thoracic appendages. A, third maxilliped, lateral view; B, distal two segments of third maxilliped, ventral view; C, first pereiopod, lateral view; D, subchela of first pereiopod, flexor view; E, F, second pereiopod, lateral view; G, third pereiopod, lateral view; H, fourth pereiopod, lateral view; I, dactylus and distal part of propodus of fourth pereiopod, lateral view; J, dactylus of fourth pereiopod, flexor view; K, fifth pereiopod, lateral view; L, dactylus and distal part of propodus of fifth pereiopod, lateral view. Scale bars: 5 mm for A-C, E, G, H, K; 1 mm for F, I, L; 0.5 mm for J.

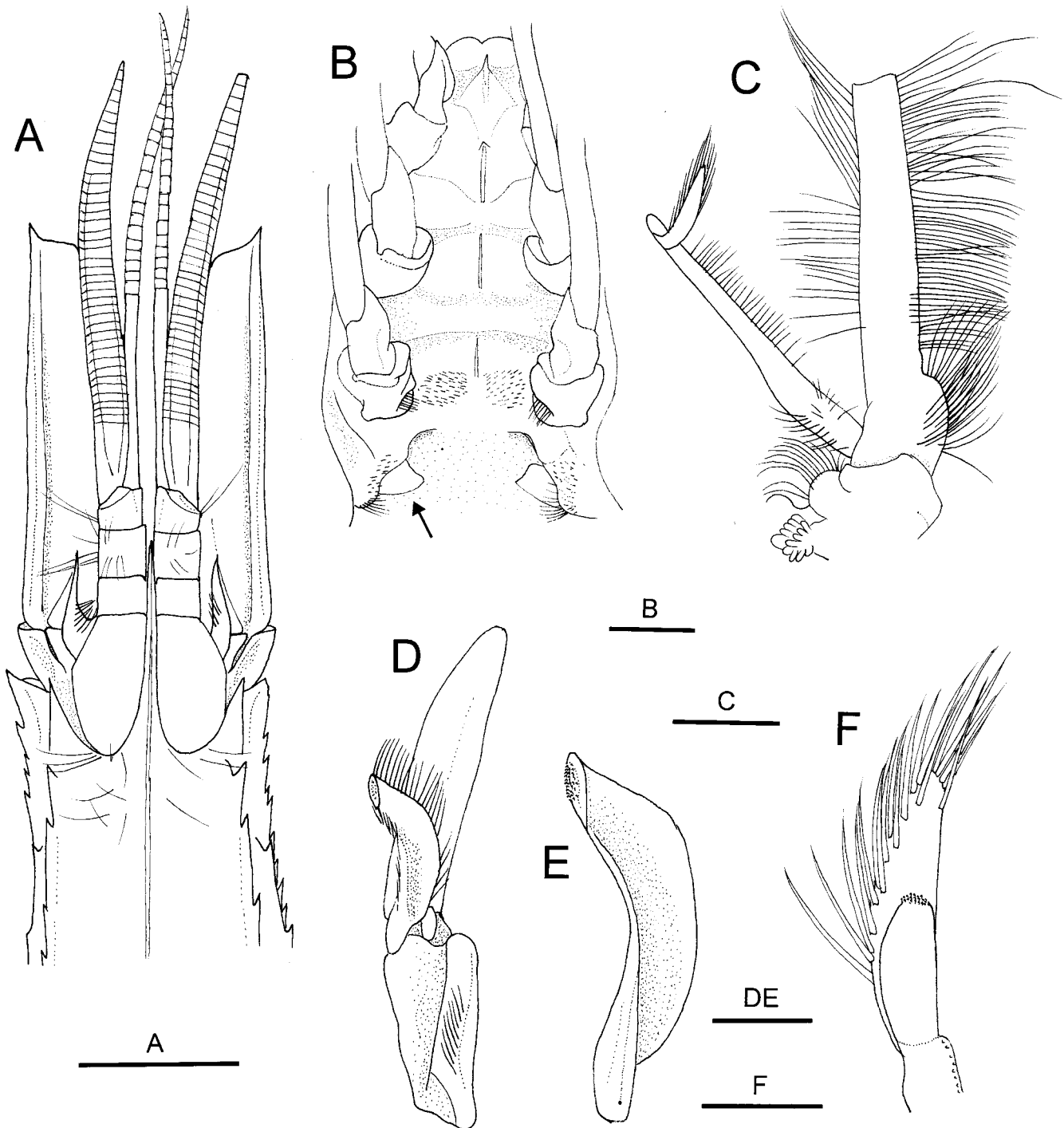


Fig. 6. *Placopsicrangan formosa*. A, B, D-F, paratype, stn CP 416, male cl 17.3 mm, NTOUM 00746; C, paratype, stn CP 413, male cl 19.0 mm, NTOUM 00744. A, anterior part of carapace and cephalic appendages, dorsal view (setae partially omitted); B, fourth to eighth thoracic sternites, ventral view (arrow indicating peculiar projection arising from posterior extension of eighth thoracic sternite); C, basal part of left third maxilliped, dorsal view; D, left first pleopod, ventral view (setae partially omitted); E, endopod of left first pleopod, ventral view; F, appendices interna and masculina of left second pleopod, mesial view. Scale bars: 5 mm for A; 2 mm for B, C; 1 mm for D, F; 0.5 mm for E.

somewhat twisted, with long setae on margins; scaphognathite somewhat elongate longitudinally, anterior lobe tapering distally into rounded apex, posterior lobe much shorter than anterior lobe, rounded, fringed with moderately short, subequal setae. First maxilliped (Fig. 4D) elongate longitudinally; endites greatly reduced into a faint convexity

and bearing sparse setae; endopod flattened, slightly broadened distally, falling short of base of exopodal flagellum, with row of moderately short setae on mesial margin; exopod with narrow caridean lobe, bearing well-developed flagellum; epipod bilobed, both anterior and posterior lobes tapering distally to rounded apices, posterior lobe shorter

than anterior lobe. Second maxilliped (Fig. 4E) slender; endopod consisting of 6 segments with basis and ischium incompletely fused; dactylus rounded terminally, bearing thick cluster of finely setulose setae mixed with longer setae on mesial margin distally and 2 long spines proximally, articulation with propodus strongly oblique; propodus noticeably elongate, with row of long spines and setae on mesial margin; ischium with small protuberance on mesial margin; exopod distinctly overreaching carpus, slightly broadened proximally, with row of setae on midline of ventral surface; flagellum long; epipod roundly rectangular, devoid of podobranch. Third maxilliped (Figs. 5A, B, 6C) rather slender for crangonids, weakly flattened dorsoventrally, overreaching antennal scale by 0.25 length of ultimate segment; margins of endopodal segments densely covered with long setae; ultimate segment gradually tapering distally to blunt tip, about 10.0 times longer than wide, with numerous transverse tracts of stiff setae on mesial surface; penultimate segment subequal in length to ultimate segment, with thick stiff setae on mesial surface; antepenultimate segment nearly straight in dorsal and lateral views, small distolateral spine present, proximally with distinct thickening that bearing cluster of long setae on mesial margin; coxa stout, with semi-circular lateral plate; exopod reaching far behind distal margin of antepenultimate segment, notably widened in proximal 0.30, with well-developed flagellum.

First pereopod (Fig. 5C, D) moderately stout, not reaching distal margin of antennal scale; palm depressed dorsoventrally, widened distally, lateral margin slightly concave, cutting edge oblique; distomesial projection (thumb) rather strong, directed distolaterally, acuminate, immovably attached to palm; dactylus weakly curved, not extending beyond base of thumb when retracted; carpus short, cup-shaped, with tuft of long setae on dorsodistal margin and small ventrolateral distal tooth; merus becoming wider distally, dorsal margin bluntly carinate, terminating in small tooth distally, with sparse setae; ventrolateral margin bluntly carinate; ventral surface unarmed, with sparse setae. Second pereopod (Fig. 5E, F) substantially reduced, non-chelate, overreaching distal margin of ischium of first pereopod by length of distal three segments; dactylus subequal in length to propodus, tapering distally to blunt apex that bearing tuft of short setae; carpus subequal in length to distal two segments combined; merus distinctly longer than distal three segments combined or ischium. Third pereopod (Fig. 5G) thin, overreaching antennal scale by length of dactylus and propodus; length ratio of propodus to ischium against dactylus 1.0: 1.4: 6.9: 9.1: 4.9. Fourth pereopod (Fig. 5H) moderately slender, overreaching antennal scale by length of dactylus and 0.80 of propodus; length ratio of propodus to ischium against dactylus 1.0: 3.7: 4.2: 8.5: 6.1; dactylus (Fig. 5I, J) weakly depressed dorsoventrally, nearly straight, tapering distally, terminating distolaterally in slender, acute unguis that bearing sub-terminal tuft of mesially curved setae, ventral surface slightly convex in horizontal plane; propodus with tuft of stiff setae partially encircling distal margin (Fig. 5I), covering proximal 0.60 of dorsal surface of extended dactylus; carpus slightly longer than propodus; merus about 16.0 times longer than high, dorsal and ventral surfaces

nearly naked; ischium with a few dorsal setae. Fifth pereopod (Fig. 5K, L) similar to fourth pereopod and failed to reach distal margin of antennal scale; length ratio of propodus to ischium against dactylus 1.0: 3.9: 4.8: 8.0: 5.2.

Pleopods with protopods moderately stout, widened distally, with thickened ventrolateral margins; appendix interna on second to fifth pleopods strongly compressed laterally, oblong or elongate oval in shape, with terminal cluster of cincinnuri. Endopod of male first pleopod (Fig. 6D, E) about half length of exopod, strongly curved mesially; ventral surface deeply concave, with strongly raised mesial margin; distal portion somewhat thickened, with cluster of cincinnuri distomesially. Appendix masculina (Fig. 6F) on second pleopod about twice length of appendix interna and slightly stouter than latter, tapering to blunt tip in lateral or mesial aspect, armed with numerous spiniform setae extending from tip to proximal 0.20 of dorsal surface, lateral, mesial and greater part of mesial surface naked. Uropod (Fig. 3B) with protopod bearing small posterolateral tooth; both endopod and exopod falling short of tip of telson; endopod elongate suboval in shape, with semi-circular depression filled with setae proximomesially; exopod with distinct lateral carina on dorsal surface, lateral margin weakly convex, posterolateral tooth slightly falling short of broadly rounded posterior margin; no transverse suture on exopod.

Variation.—As is apparent from the above description, teeth or serrations on the rostral dorsal margin and the longitudinal carinae on the carapace are fairly variable in numbers.

Sexual dimorphism in the antennular flagella and the thoracic sternum are similar to that of other crangonids. It is remarkable that the posterolateral extension of the eighth thoracic sternite bears a thin, plate-like projection in males. Such a structure is unknown in other crangonid taxa.

Color.—Entire body, including appendages, generally reddish orange. Antennular and antennal flagella, distal parts of uropods, anterior segments of second pereopod, dactyli of third to fifth pereopods semi-translucent. Dactylus of first pereopod somewhat whitish. Eyes orangish yellow to yellowish white on dorsal surface, red on ventral surface. Smaller individuals sometimes with pleon and pereopods more yellowish or even whitish.

Distribution.—So far known only from off eastern Taiwan, at depths of 4412–4824 m.

Remarks.—The strongly modified eyes in this new species are very extraordinary for decapod crustaceans. The entire eye is plate-like, with white to yellow reflecting pigment on the dorsal surface and red pigment on the ventral surface; there are no corneal facets on either dorsal or ventral surfaces. The different pigmentation suggests that the entire dorsal part may represent the cornea and the ventral part may be the eyestalk. Some albunoid crabs also have the eye flattened as a large plate, but the plate-like part is the distal segment of the eyestalk and the cornea is strongly reduced or completely absent (Boyko, 2002). The modified eye of the new species is likely a sensory organ because of the presence of strong reflecting pigments. Similar plate-like eyes are present in the deep-sea grideye fish *Ipnops* spp.

(cf. Munk, 1959), and in one station *P. formosa* were collected together with two *Ipnops* fishes. The functions of the eyes of both *Ipnops* and *Placopsicranganon* are still unknown, but they may represent a good example of convergence adapting to the abyssal environment.

Heretofore, five crangonid species have been recorded from the lower bathyal to abyssal zone in the world oceans, namely *Neocranganon abyssorum*, *Parapontophilus abyssii* (Bate, 1888), *P. occidentalis* (Faxon, 1893), *P. talismani* (Crosnier and Forest, 1973), and *Sclerocranganon zenkevitchii* (Kim et al., 2000; Komai, 2008). *Placopsicranganon formosa* is the sixth representative of the family occurring in the abyssal zone, and likely only restricted to that zone as the TAIWAN cruises have been collected extensively around Taiwan between 200-3000 m deep in the past 8 years but this species was only obtained in the recent deepest stations.

Etymology.—The new species is named after its type-locality Taiwan, and it is so far only known from this island. *Formosa* is an old name of Taiwan.

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