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# Crabs (Crustacea, Decapoda) from the Sea off East and Southeast Asia collected by the RV *Hakuhō Maru* (KH-72-1 Cruise) 1. Sulu Sea and Sibutu Passage

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**Abstract** Of the marine crab specimens collected by the RV *Hakuhō Maru* from East and Southeast Asia in 1972, the specimens from the Sulu Sea and the Sibutu Passage are identified and recorded in this first part. They comprise 17 species from 14 genera in 9 families, including three new species, *Cymonomus suluensis* (Cymonomidae), *Homolodromia hakuhoae* (Homolodromiidae), and *Lysirude goekei* (Lyreididae). *Cymonomus suluensis* is the 45th in the genus and the 32nd from the Indo-West Pacific, *H. hakuhoae* is the 7th in the genus and the 4th from the Indo-West Pacific, and *L. goekei* is the 4th in the genus and the 3rd from the Indo-West Pacific. Both of *C. suluensis* and *H. hakuhoae* are represented each only by one specimen obtained from the depth of 2,030 m, which is the deepest record among the known species of both genera.
**Key words:** Deep-water crabs, Brachyura, new species, taxonomy, *Cymonomus*, *Homolodromia*, *Lysirude*, Philippines, West Pacific.

## Introduction

In 1972, the KH-72-1 cruise of the RV *Hakuhō Maru* of the Ocean Research Institute, University of Tokyo, was carried out to study marine ecosystems in the seas off East and Southeast Asia (Fig. 1). The comprehensive marine biological studies have covered the research on phytoplankton, zooplankton, micronecton and benthos. According to the *Preliminary Report of the Hakuhō Maru Cruise KH-72-1 (CSK, IBP)* (62 pp.) published by the Ocean Research Institute, University of Tokyo in 1975, these works are pronounced as a part of International Biological Program (IBP) and a cruise of Cooperative Studies of the Kuroshio (CSK) supported by a grant from the Ministry of Education (now, the Ministry of Education, Culture, Sports, Science and Technology) of Japan.

One of the scientists who participated on this cruise, the late Dr. Minoru Imajima of the National Science Museum, Tokyo (now, the National Museum of Nature and Science, Tokyo) brought the specimens of decapod crustaceans together with annelid worms as his specialty, to the laboratory for subsequent study. The crustacean specimens were kept unidentified for a long time in the collections of the Tsukuba Research Departments, National Museum of Nature and Science, Tokyo (NSMT). The purpose of the present study is to document all the crabs collected during the RV *Hakuhō Maru* cruise KH-72-1 for further taxonomic and biogeo-

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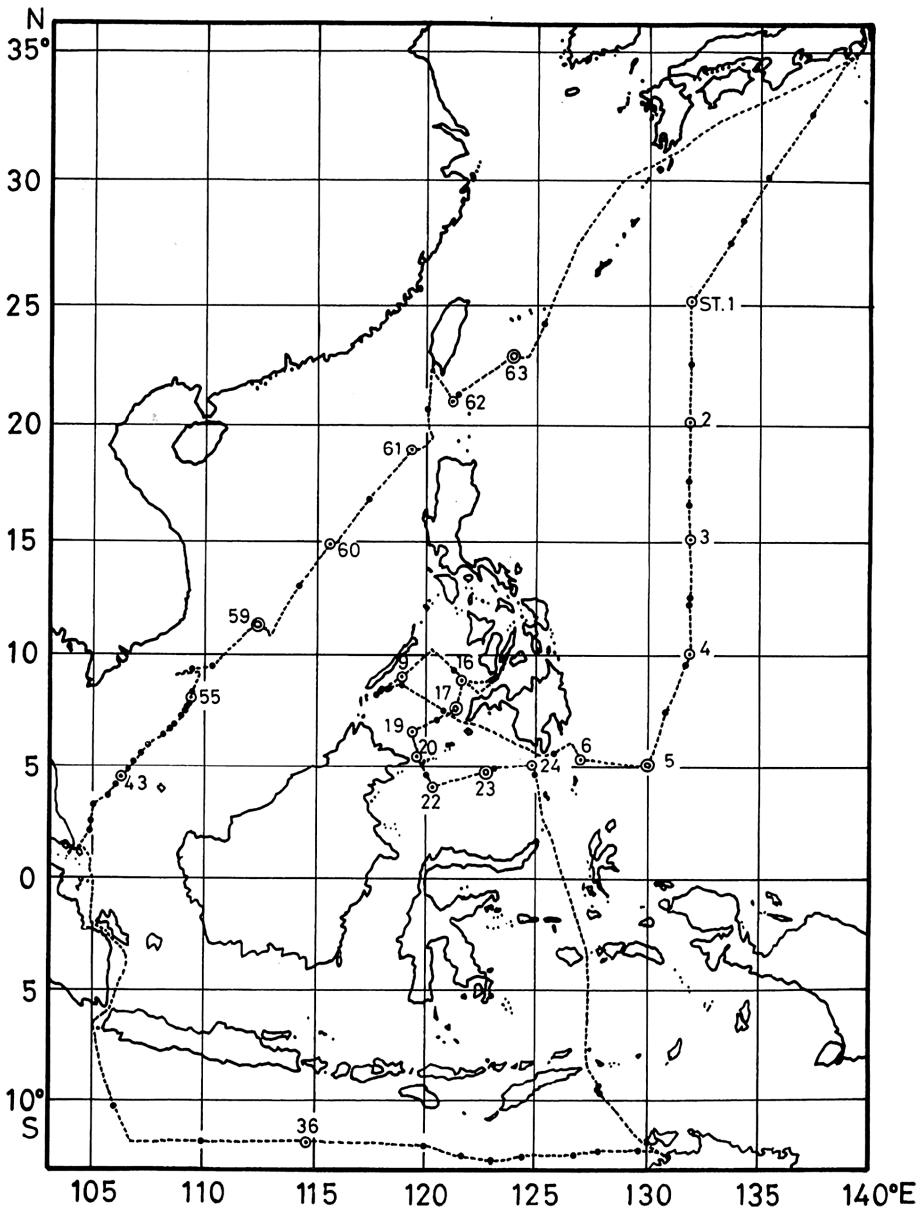


Fig. 1. Track chart of the RV *Hakuhō Maru* cruise KH-72-1, after Fig. 1 in the *Preliminary Report of the Hakuhō Maru Cruise KH-72-1 (CSK, IBP)* (Ocean Research Institute, University of Tokyo, 1975).

graphic studies of the deep-water crabs from off the East and Southeast Asia. The results will be reported in three parts, the collections from (1) the Sulu Sea and the Sibutu Passage, (2) the Timor Sea and the Sahul Shelf, and (3) the South China Sea. As it is unlikely in near future for us to be able to study the additional specimens of deep-water crabs collected by the Japanese research vessels, this is an important opportunity for us to contribute not only to the deep-water carcinology, but also to the deep-water biogeography.

In the following descriptions and notes, the breadth and length of the carapace are abbrevi-

ated as CB and CL, respectively, and the male first and second gonopods as G1 and G2, respectively.

All the specimens are registered under the heading of NSMT-Cr and deposited at the Tsukuba Research Departments, National Museum of Nature and Science, Tokyo.

## Taxonomic Accounts

Family CYMONOMIDAE Bouvier, 1897
Genus ***Cymonomus*** A. Milne-Edwards, 1880
***Cymonomus suluensis*** sp. nov.
(Figs. 2–3)

*Material examined*. RV *Hakuhō Maru* KH-72-1 cruise, sta. 08 (Sulu Sea; 08°44.6′N, 119°05.4′E – 08°44.8′N, 119°06.2′E; 2,030–2,030 m deep); 3 m beam trawl; 25 May, 1972; ♀holotype, NSMT-Cr 28965.

*Measurements*. CB 5.1 mm; CL 4.4 mm excluding rostrum; length of rostrum, 2.5 mm; length of eyestalk, 1.5 mm including basal segment; length of ambulatory leg, 14.5 mm.

*Diagnosis*. Small species. Carapace subquadrate in outline, slightly wider than long, with weakly convex branchial regions; carapace dorsal surface and lateral margins covered and fringed with many spinules and granules. Rostrum long, about one-third as long as carapace, directed forward, weakly tapering, armed with three spinules at each side along distal half. Inner half of supraorbital margin with some tubercles; external orbital tooth spiniform, about half as long as rostrum, directed obliquely outward. Eyestalk fixed, slender, directed obliquely outward along whole length, obliquely downward for its basal half, horizontal for its distal half; in dorsal view, distal end of eyestalk just at level of basal one third of rostrum; eyestalk armed with 2 distant spinules on upper surface; cornea distinct at tip of eyestalk, without pigments. Chelipeds armed with spinules along margins of merus, carpus and palm; distal part of carpus and proximal part of palm deeply excavated to form a deep cavity. Ambulatory leg slender.

*Description of holotype* (Female). Carapace (Figs. 2A, 3A) subquadrate in outline, only slightly wider than long; carapace lateral margins weakly convex outward along hepatic and branchial parts, shallowly concave between both parts; carapace dorsal surface (Fig. 2C–D) not convex as a whole, roughened with small, sharp dispersed granules mainly on branchial regions; gastric, branchial and cardiac regions weakly demarcated with shallow depressions or indistinct furrows; anterior extension of mesogastric region narrow, reaching nearly to basal part of rostrum; a suberect spinule at anterior part of protogastric region; protogastric and hepatic regions indistinctly confluent, separated from branchial region by an oblique furrow from shallow depression between hepatic and branchial outer margins to a transverse shallow, short furrow separating cardiac and intestinal regions; gastro-branchial oblique furrow turned obliquely outward to lateral end of carapace posterior margin along intestinal region.

Rostrum (Figs. 2A, 3A–C) long, about one-third as long as carapace, directed forward, weakly tapering, with 3 spinules on each margin along distal half; proximal spinules of both sides alternate in position, diminishing in length distally. Supraorbital margin (Figs. 2A, 3A–C) nearly concave along inner half, with some marginal spinules weakly directed outward; outer half of supraorbital margin unarmed, weakly curving downward toward external orbital tooth. External orbital tooth (Fig. 3A–C) spiniform, slender, with tip bifid in left side, broken off in right side, extending beyond tip of eyestalk. Subhepatic tooth (Fig. 3A–B) shorter than external orbital and hepatic spiniform teeth, but sharp, directed obliquely outward. Hepatic margin (Figs. 2A, 3A) weakly convex, with a strong spine at anterior one third, a shorter spine on posterior slope and some subsidiary spinules. Carapace branchial margin (Figs. 2A, C, 3A) twice as long as hepatic margin, armed with a series of 10–15 spinules of approximately similar size. Carapace posterior margin (Figs. 2A, C–D, 3A) as long as front-orbital margin, rather strongly

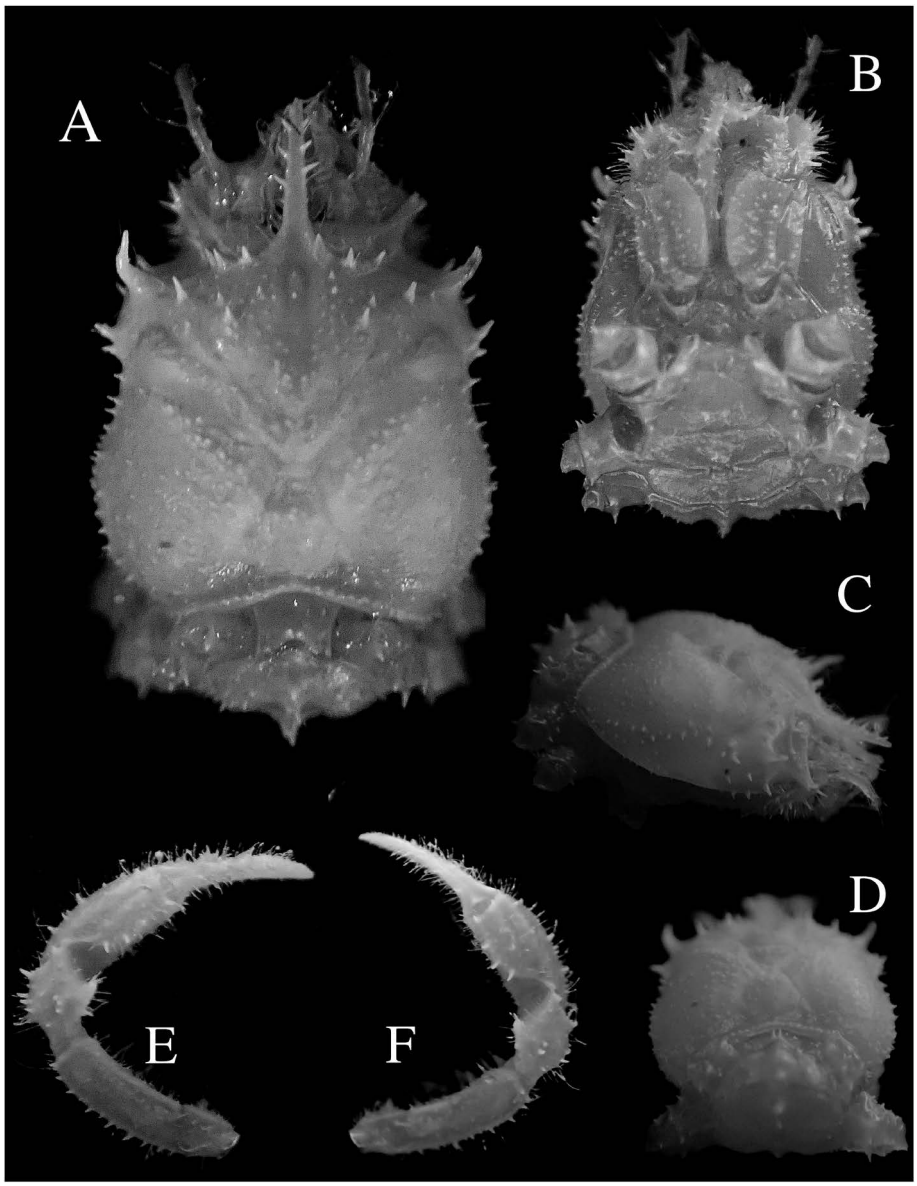


Fig. 2. *Cymonomus suluensis* sp. nov., female, holotype (NSMT-Cr 28965. CB 5.1 mm; CL 6.9 mm including rostrum). Carapace in different views (A–D), and both chelipeds in dorsal view (E–F).

concave at median part, with a narrow but deep marginal furrow along whole length of posterior margin.

Eyestalk (Fig. 3A–C) slender, directed obliquely outward for whole length along external orbital tooth, obliquely downward for its basal half, horizontally for its distal half, distal end of eyestalk attaining to tip of inner infraorbital tooth; in dorsal view, distal end of eyestalk slightly exceeding one-third of, or slightly less than half of rostrum; cornea distinct at distal end of eyestalk, without pigment; upper surface of eyestalk armed with 2 outward-directed spinules with some distance.

Third maxilliped (Fig. 2B) pediform; ischium elongated, rectangular, curved outward distally;

merus half as long as ischium, weakly curved inward as a whole, with rounded disto-lateral angle; merus with spine at median part of basal one-third of outer surface; outer margin armed with 4 strong spines, basal 2 directed laterally, distal 2 obliquely forward, inner margin with a series of spines, 2 sub-erect spines at subdistal part much stronger than others; outer margin of exopod armed with 3 erect equidistant spines at side of ischium, each side of merus with an obliquely-forward directed spinule.

Pleon with 6 pleomeres and telson (Fig. 2B, D); pleomere 1 small, quadrate, lateral margins weakly concave for whole length; pleomere 2 prominent, widening posteriorly, with 2 spines along median line and a cluster of some spines at each lateral part; pleomere 3 similar to pleomere 2 in shape and armature, with much smaller spines and spinules; pleomere 4 as wide as pleomere 3, with vestigial tubercles in median line; pleomeres 5–6 and telson weakly tapering distally, with thin plate-like appearance, unarmed, each pleomere distinctly articulated, separated laterally from other pleomeres by V-shaped notch; telson obtuse at tip, forming rounded triangle as a whole.

Both chelipeds (Figs. 2E–F, 3D) equal in size and shape, not inflated. Merus weakly curved, with about equidistant 10 spinules of alternate sizes on posterior margin of merus. Carpus armed with some longer spinules and some smaller spinules on outer and upper surfaces, respectively; inner angle produced to be a tubercle directed forward. Palm and fingers together weakly curved inward; inner proximal part of palm (Figs. 2E–F, 3D) deeply excavated together with distal inner part of carpus to form a deep cavity. Palm and fingers (Fig. 3E) subequal in length, with untoothed cutting edges of fingers. A detached ambulatory leg of left side long, slender (Fig. 3F).

*Remarks*. Ng *et al.* (2008) enumerated 24 species in the genus *Cymonomus* A. Milne-Edwards, 1880 and five species in the genus *Cymonomoides* Tavares, 1993. Both genera are distinguished only by the fusion of the telson and the sixth pleomere being indistinguishably fused as a pleotelson in *Cymonomus*, but separated by a visible suture in *Cymonomoides*. Ahyong and Ng (2009), however, doubted the validity of *Cymonomoides* on the basis that in *Cymonomus diogenes* newly described by them from the Philippines, the sixth pleomere and the telson are immovably fused with a clear suture in males, but completely fused without a visible suture in females. Recently, Ahyong (2019) decidedly returned *Cymonomoides delli* (Griffin and Brown, 1976), *C. cubensis* (Chace, 1940) and *C. valdiviae* (Lankester, 1903) to the original position in the genus *Cymonomus*. As rightly mentioned by Ahyong and Ng (2017), the genus *Cymonomoides* may be restricted to the type species, *C. guinotae* (Tavares, 1991) from Brazil, and *C. fitoi* Lemaitre and Bermudez, 2000 from the Caribbean coast of Colombia.

Since the enumeration of the species by Ng *et al.* (2008), altogether 18 species were additionally described as follows: 1) one species from New Zealand (Ahyong, 2008); 2) four species from the Philippines (Ahyong and Ng, 2009); 3) one species from the Philippines (Ahyong and Ng, 2011); 4) one species from off Madagascar (Ahyong, 2014); 5) two species from Taiwan and Japan (Ahyong and Ng, 2017); 6) eight species from Australia and New Zealand (Ahyong, 2019); 7) one species from Indonesia (Ahyong *et al.*, 2020).

Ahyong and Ng (2017) reduced *Cymonomus sagamiensis* Sakai, 1983 from Japan to a synonym of *C. umitakae* Takeda, 1981 from Japan. As a result, the genus *Cymonomus* is composed of 31 Indo-West Pacific, 11 West Atlantic, and 2 Northeast Atlantic and Mediterranean species, and in this paper, *C. suluensis* is described as the 45$^{th}$ *Cymonomus* species and 32$^{nd}$ Indo-West Pacific species.

Ahyong (2019) revised the New Zealand and Australian cymonomid crabs and distinguished six species groups in the genus *Cymonomus*: 1) *C. bathamae* group, 2) *C. curvirostris* group, 3) *C. delli* group, 4) *C. granulatus* group, 5) *C. karenae* group, and 6) *C. soela* group.

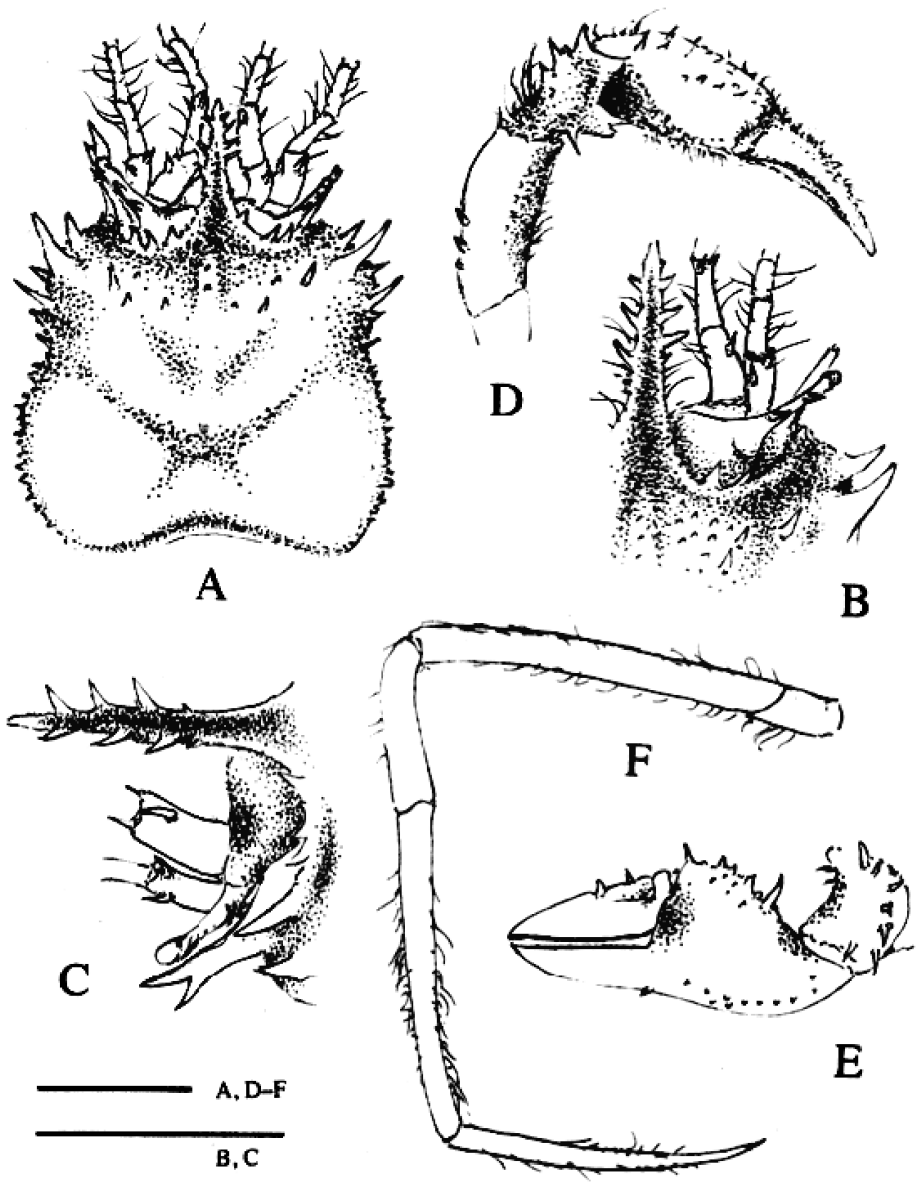


Fig. 3. *Cymonomus suluensis* sp. nov., female, holotype (NSMT-Cr 28965. CB 5.1 mm; CL 6.9 mm including rostrum). Carapace in dorsal view (A), right front-orbital region in dorsal view (B), left front-orbital region in lateral view (C), left cheliped in upper and outer views (D–E), and left ambulatory leg in dorsal view (F). Scale bars = 2 mm.

The new species described in this paper, *C. suluensis*, is quite distinctive in having the long rostrum and the long eyestalks directed obliquely outward as a whole, and downward along the basal half and horizontally along the distal half, with the distinct transparent cornea, and readily distinguished from all the known species. As far as the long rostrum concerned, the new species corresponds to the *C. granulatus* group which is composed of six species with the combination of a long rostrum that overreaches the eyestalks and well-developed outer orbital tooth. The six spe-

cies referred to this group by Ahyong (2019) are *C. aequilonius* Dell, 1971 from New Zealand, *C. alius* Ahyong, 2019 from New Zealand, *C. granulatus* (Norman, in Wyville Thomson, 1873) from the Northeast Atlantic and the Mediterranean Sea, *C. indicus* Ihle, 1916 from Indonesia, *C. japonicus* Balss, 1922 from Japan, and *C. magnirostris* Tavares, 1991 from Brazil. Of them, *C. granulatus* and *C. magnirostris* from the Atlantic Ocean are closer to the new species rather than four species from the Pacific Ocean.

The new species, *C. suluensis*, however, is quite characteristic in the carapace margin fringed with many spinules, and the rostrum armed with some spinules of good length at each side, and each eyestalk directed obliquely outward as a whole and downward for its basal half and horizontally for its distal half. These characters make this species distinct from all the species including the *C. granulatus* group and the sole representative of the seventh group in the genus *Cymonomus*, herein called the *C. suluensis* group.

*Etymology*. Named after the type locality, the Sulu Sea.

*Distribution*. Known only from the type locality. The bathymetric record, 2,030 m, is the deepest for any cymonomid species.

## Family HOMOLODROMIIDAE Alcock, 1899
## Genus ***Dicranodromia*** A. Milne-Edwards, 1880
## ***Dicranodromia foersteri*** Guinot, 1993
(Figs. 4–5)

*Material examined.* RV *Hakuhō Maru* KH-72-1 cruise, sta. 20 (Sibutu Passage; 05°40.9′N, 119°46.3′E – 05°43.1′N, 119°47.0′E; 460–514 m deep); otter trawl; 10 June, 1972; 1 ♀ (ovig.), NSMT-Cr 28966.

*Measurements*. CB 33.3 mm; CL in median line, 33.7 mm; length of rostrum, 3.3 mm; length of first ambulatory leg, 62.2 mm; diameter of egg, 2.2 mm.

*Remarks.* In the ovigerous female at hand, the carapace was cracked into two, with somewhat damaged posterior part (Fig. 4A), but there is no problem to depict the species characteristics. The key prepared by Guinot (1995) was used to identify the present specimen, with combination of the characters that 1) the carapace dorsal surface is smooth and not disguised by the setae of variable lengths, 2) the palm is granulated for its whole outer surface, 3) the last leg is rather long and slender. As a result, it was keyed out to *D. martini* Guinot, 1995 from the Philippines, or *D. foersteri* Guinot, 1993 from the Chesterfield Islands, New Caledonia and Vanuatu. Some differences between the two species were mentioned by Guinot (1995), viz. the antero-external tooth of the basal antennal segment is strong and long in *D. martini* (stout and short in *D. foersteri*), the infra-orbital tooth is large and bifid in *D. martini* (pointed and simple in *D. foersteri*), the epistome is armed with some sharp granules in *D. martini* (unarmed in *D. foersteri*), the anterior margin of the buccal frame is fringed with spinules in *D. martini* (only indistinctly dentated in *D. foersteri*), and the dactyli of the first two ambulatory legs are relatively long and subequal to the carpi in *D. martini* (comparatively short and slightly shorter than the carpi in *D. foresteri*). These differences are applicable to the ovigerous female examined, and the different length and stoutness of the ambulatory legs are the important criteria among the differences. It is recorded at present that the ambulatory dactyli are half as long as the propodi in *D. foersteri*, rather than two-thirds in *D. martini*, although Ng and Naruse (2007) found some variations in the length of the ambulatory carpi in *C. martini*.

Ng and McLay (2005) described a new species, *D. danielae* from Balicasag Island in the Bohol Sea, 200–300 m deep, on the comparison with *D. doederleini* Ortmann, 1892 and *D. martini* Guinot, 1995. In *D. danielae*, however, the outer surface of the chela is smooth, the external orbital tooth is armed with spinules, the posterior margin of the epistome is spinulate, and the meri and propodi of the subdorsal legs are proportionately shorter. In *D. danielae*, the outer margin of the frontal lobe is straight, differing from the

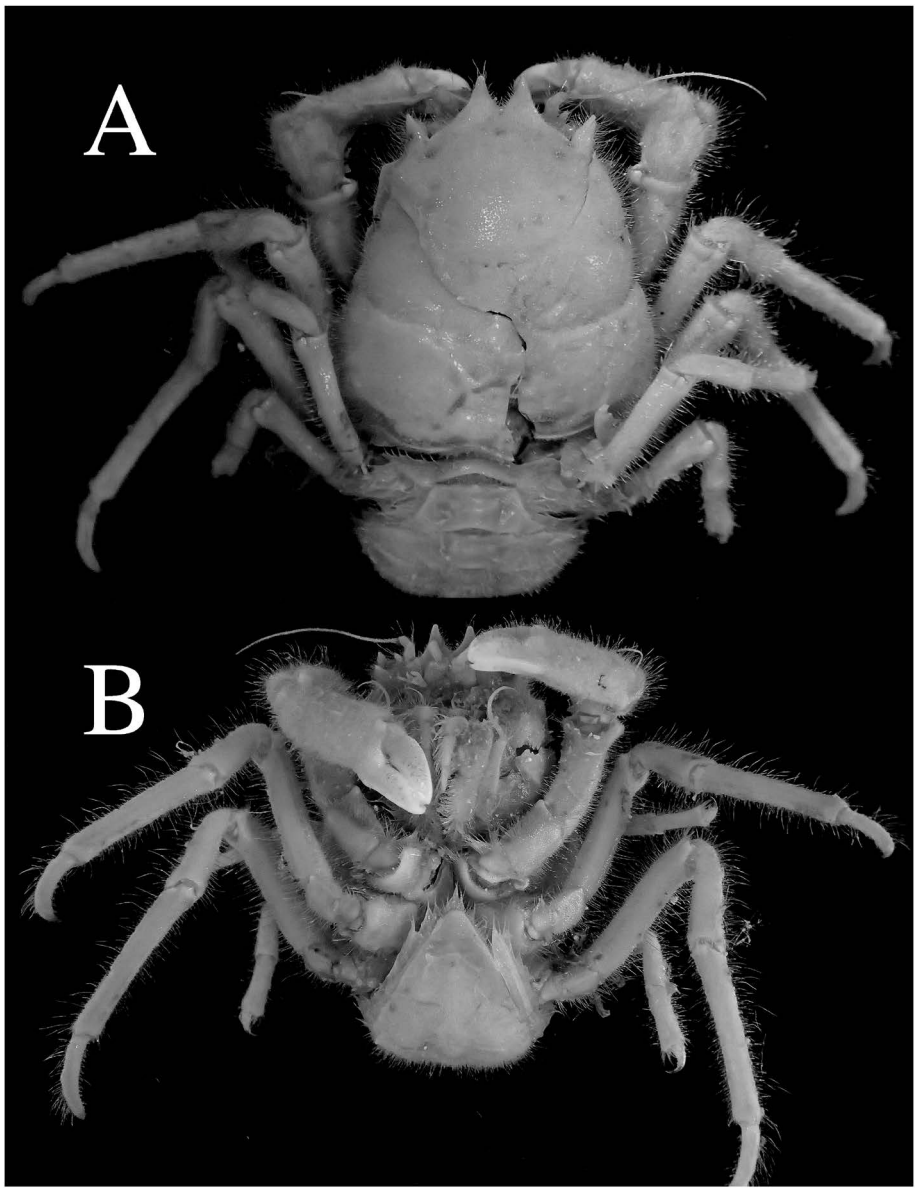


Fig. 4. *Dicranodromia foersteri* Guinot, 1993, ovigerous female (NSMT-Cr 28966. CB 33.3 mm; CL 37.0 mm including rostrum) in dorsal (A) and ventral (B) views.

weakly concave margin of *D. doederleini* and *D. martini.*

*Distribution.* This species has been previously recorded from Vanuatu, the Chesterfield Islands and New Caledonia, 495–660 m deep (Guinot, 1993, 1995), and the close congener, *C. martini*, from the Sulu and Bohol Seas, 437–930 m deep (Guinot, 1995; Ng and Naruse, 2007).

Genus ***Homolodromia*** A. Milne-Edwards, 1880

***Homolodromia hakuhoae*** sp. nov.

(Figs. 6–8)

*Material examined*. RV *Hakuhō Maru* KH-72-1 cruise, sta. 08 (Sulu Sea; 08°44.6′N, 119°05.4′E – 08°44.8′N, 119°06.2′E; 2,030–

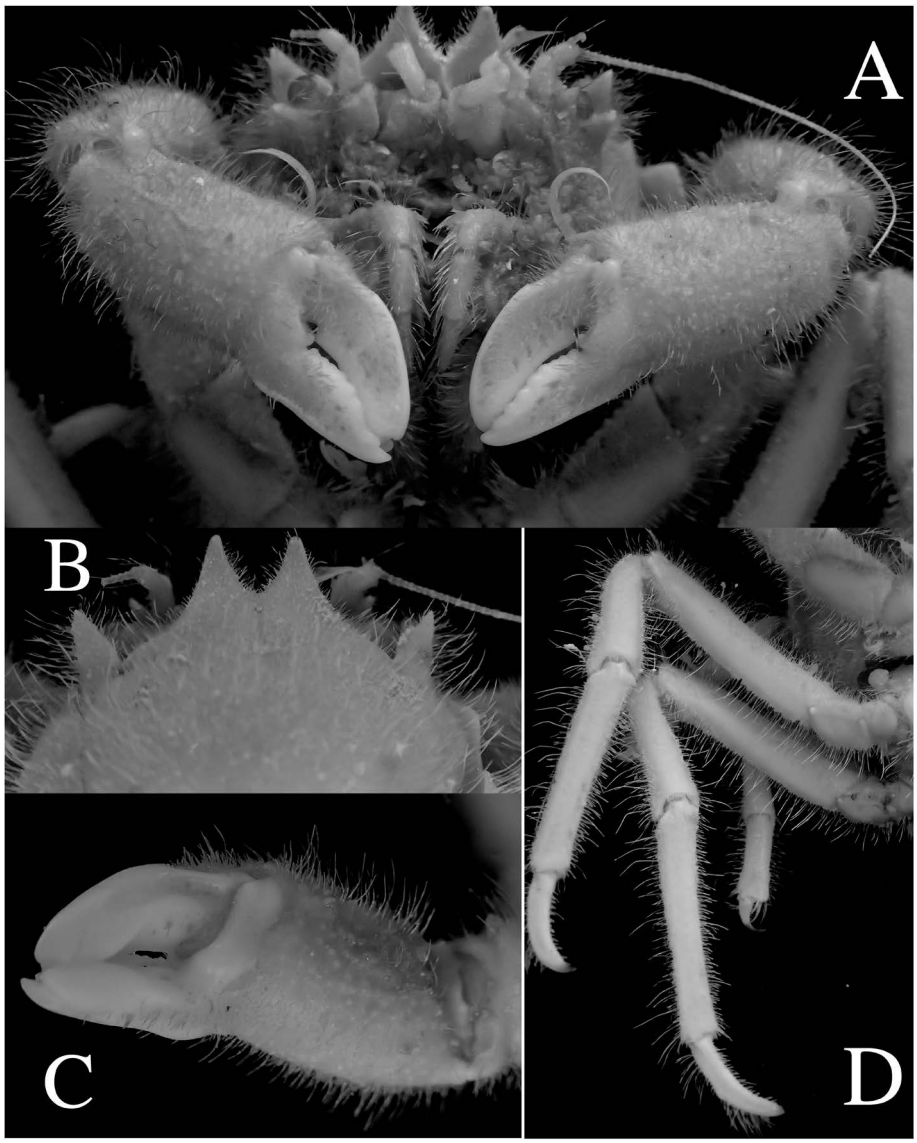


Fig. 5. *Dicranodromia foersteri* Guinot, 1993, ovigerous female (NSMT-Cr 28966. CB 33.3 mm; CL 37.0 mm including rostrum). Front-orbital region with both chelipeds in ventral view (A), front-orbital region in dorsal view (B), right chela in inner view (C), right ambulatory legs in ventral view (D).

2,030 m deep); 3 m beam trawl; 25 May, 1972; ♀ (ovig.) holotype, NSMT-Cr 28967.

*Measurements*. CB 12.8 mm; CL in median line, 17.3 mm; length of rostrum, 2.8 mm; length of first ambulatory leg, 67.0 mm; diameter of egg, 2.0–2.1 mm.

*Diagnosis.* Carapace, chelipeds and ambulatory legs thickly covered with short stiff setae; carapace narrow, convex dorsally, weakly widening posteriorly, with surface smooth. Front with deep U-shaped excavation, with a pair of strong, spiniform teeth directed forwards. External orbital tooth as long as, but narrower than frontal tooth, directed obliquely outward. Chelipeds slender, with weakly widening palm; fingers deeply excavated along grasping edges, fixed finger with bifid tip. Ambulatory legs long, cylindrical. Subchelae at tips of last 2 legs armed with 2

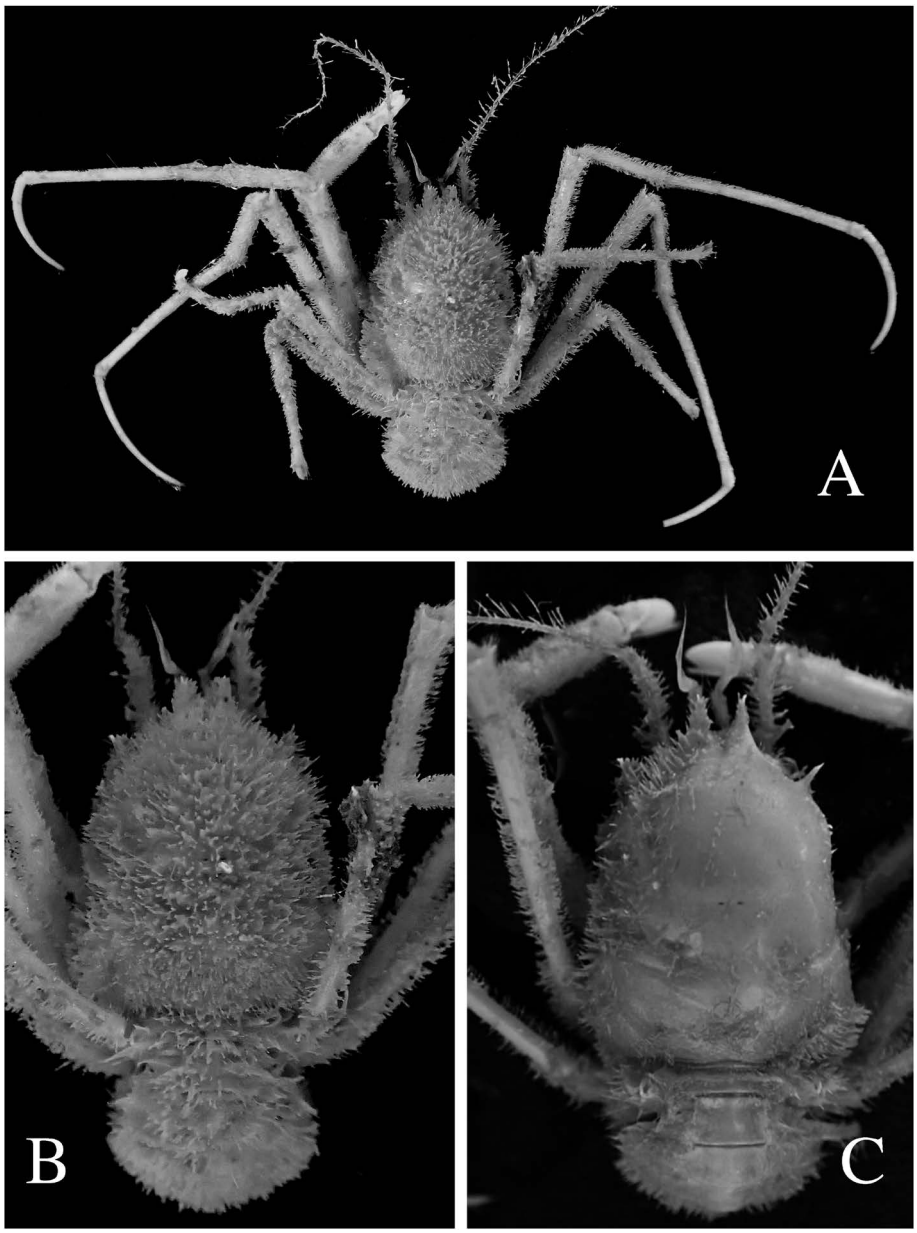


Fig. 6. *Homolodromia hakuhoae* sp. nov., ovigerous female, holotype (NSMT-Cr 28967. CB 12.8 mm; CL 20.1 mm including rostrum). Habitus in dorsal view (A), carapace (B), carapace partly denuded (C).

strong spines at distal part of the upper margin and 4 longer spines at truncated part of distal extension of palm.

*Description of holotype* (Ovigerous female). Carapace, chelipeds and ambulatory legs uniformly and thickly covered with short, stiff setae, without long setae (Fig. 6A–B). Carapace (Fig. 6C) narrowly oblong, strongly convex dorsally, weakly widening posteriorly, widest at posterior parts of branchial regions of both sides; carapace dorsal areolation obscured by setae, but surface (after denudation) smooth, without granules or spinules, roughly divided into three parts: 1) anterior part including protogastric and hepatic

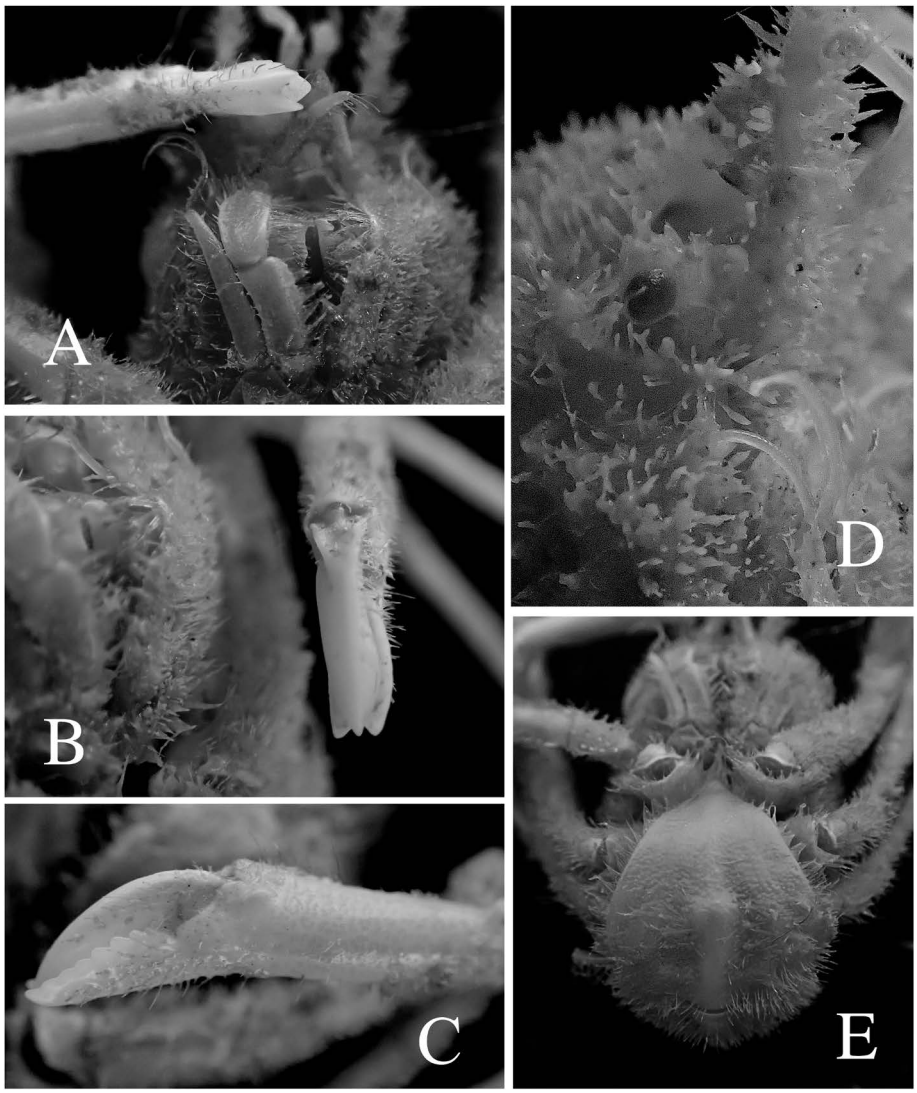


Fig. 7. *Homolodromia hakuhoae* sp. nov., ovigerous female, holotype (NSMT-Cr 28967. CB 12.8 mm; CL 20.1 mm including rostrum). Third maxilliped (A), fingers of left chela in dorsal view (B), left chela in outer view (C), right orbital region in obliquely frontal view (D), pleon (E).

regions in front of a pair of median small pits side by side at boundary between meso- and metagastric regions, 2) median part including metagastric, cardiac and mesobranchial regions, and 3) posterior part including intestinal and metabranchial regions; in dorsal view, a flattened hepatic swelling lateral to the buccal flame. Frontal teeth strong, tuberculate, tapering to sharp tip (Fig. 6C) separated by deep U-shaped sinus. Each supraorbital margin (Fig. 6C) provided with 2 granules at medially, followed by obliquely-outward directed spiniform tooth at external angle. Eyestalk (Fig. 7D) short, cornea distinct, mostly obscured by setae. Antennal flagellum (Fig. 6A) slightly longer than carapace length, each segment provided with some longish setae; basal segment armed with strong spine at distal part of outer margin.

Third maxilliped (Fig. 7A) long, rather pediform, with quadrate ischium and merus; outer

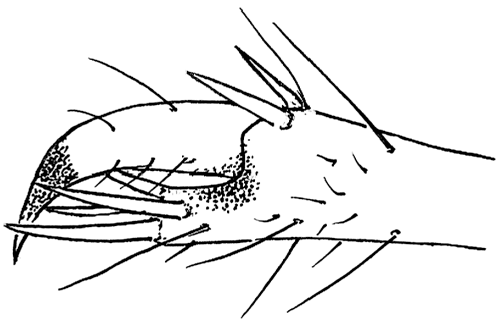

Fig. 8. *Homolodromia hakuhoae* sp. nov., ovigerous female, holotype (NSMT-Cr 28967. CB 12.8 mm; CL 20.1 mm including rostrum). Dactylus and distal part of propodus of right last leg in ventral view.

margin of merus armed with some spinules; exopod tapers, not reaching merus distal margin.

Pleon (Fig. 7E) seven-segmented, pleomeres 1–6 and telson strongly developed; surfaces of all pleomeres and telson smooth, covered with setae, longitudinally convex along median line; telson subequal in length to pleomeres 1–6 combined.

Chelipeds mostly subcylindrical, palm (Fig. 7C) only slightly widening distally, but not inflated at all; upper inner margin of movable finger strongly crested as a longitudinal edge, both of lower margins entire, resembling bird beak; immovable finger deeply excavated to receive movable finger, bifid at tip and toothed along inner margin (Fig. 7A–B).

Ambulatory legs (Fig. 6A) cylindrical, remarkably long, first leg ca 3.8 times as long as carapace. Last 2 pairs subdorsal as usual, about half as long as anterior 2 pairs; subchela of each pair similar in shape and armature, with 2 strong spines at distal part of propodus upper margin, 4 longer spines at truncated part of distal extension of propodus (Fig. 8).

*Etymology*. Named after the RV *Hakuhō Maru* of the Ocean Research Institute, University of Tokyo.

*Remarks*. The genus *Homolodromia* was extensively studied by Guinot (1995) who distinguished five species in the genus (*H. paradoxa* A. Milne-Edwards, 1880 and *H. monstrosa* Martin, Christiansen and Trautwein, 2001 from the West Atlantic; *H. robertsi* Garth, 1973 from the East Pacific; *H. kai* Guinot, 1993 from the West and South Pacific; *H. bouvieri* Doflein, 1904 from the western Indian Ocean). Recently, Padate *et al.* (2020) described the sixth species, *H. rajeevani* from the eastern Arabian Sea and the southwestern Bay of Bengal. All of the six species are deep-water inhabitants, with bathymetric range, 375–914 m (*H. paradoxa*), 631–814 m (*H. monstrosa*), 560–880 m (*H. robertsi*), 680–850 m (*H. kai*), 492–960 m (*H. bouvieri*), and 645–957 m (*H. rajeevani*).

Padate *et al.* (2020) prepared the key to the six species based on Guinot (1995) and Tavares and Lemaitre (2014). Following the key, the present new species, *H. hakuhoae*, is keyed out as follows: 1) "Propodal thumbs of P4–P5 pseudochelae terminating in more than 2 curved distal spines. Pollex of cheliped without occlusal notch; dactylus without proximal elevation," differing from *H. rajeevani* and *H. bouvieri.* 2) "Carapace and pereopods smooth, carpus of cheliped bearing short disto-lateral spine; anterolateral teeth oriented obliquely," differing from *H. robertsi.* 3) "Carapace and appendages covered with short, stiff setae; pseudo-rostral horns separated by V-shaped gap," differing from *H. kai*. 5) The remaining two species, *H. paradoxa* and *H. monstrosa* are differentiated in the characters that "Males having distinct supraorbital spine; antennal spine bifurcated. Mature females with relatively short P5, P5 meri not reaching the level of gastric pits on carapace in longitudinal position in *H. paradoxa*, and that "Males lacking supraorbital spine; antennal spine undivided. Mature females with relatively short P5, P5 meri the overreaching the level of gastric pits in folded position in *H. monstrosa*."

Apart from the key quoted above, the new species, *H. hakuhoae*, which is represented only by the female holotype, is seemingly close to *H. kai* in having the narrow carapace without a constriction between the hepatic and branchial margins, although as mentioned above, the carapace and appendages are covered with short stiff setae dif-

ferent from long soft hairs in *H. kai*.

*Distribution*. The holotype, a female, was obtained at 2,030 m deep in the Sulu Sea, as the deepest record among species of *Homolodromia*.

Family HOMOLIDAE De Haan, 1839
Genus ***Paromolopsis*** Wood-Mason, in Wood-Mason and Alcock, 1891
***Paromolopsis boasi*** Wood-Mason, in Wood-Mason and Alcock, 1891
(Fig. 11D)

*Material examined.* RV *Hakuhō Maru* KH-72-1 cruise, sta. 20 (Sibutu Passage; 05°40.9′N, 119°46.3′E – 05°43.1′N, 119°47.0′E; 460–514 m deep); otter trawl; 10 June, 1972; 1 ♀ (CB 32.0 mm; CL 35.3 mm including rostrum), NSMT-Cr 28968.

*Remarks*. This monotypic species of the genus *Paromolopsis* is rather well known as one of the representative deep-water crabs, and finely represented by Alcock (1901: Pl. 5 fig. 23). Then, this species was illustrated in color by Sakai (1976: Pl. 15 fig. 2), and photographed by Serène and Lohavanijaya (1973: Pl. 3 fig. D), Guinot and Richer de Forges (1981: Pl. 6 fig. 3), Miyake (1983: Pl. 5 fig. 4 in color), Guinot (1984: Pl. 3 fig. A), Davie and Short (1989: Fig. 1C), Ng *et al.* (2001: Fig. 1b in color), Ahyong *et al.* (2009: Fig. 82 in color), Ng and Richer de Forges (2017: Fig. 24H in color), Guinot and Richer de Forges (1995: Fig. 18f, g), Padate *et al.* (2020: Fig. 3k), and Richer de Forges and Ng (2020: Fig. 1E).

*Distribution*. Widely distributed in the Indo-West Pacific waters from Japan to Madagascar through the western Pacific and eastern Indian Oceans; 280–1,380 m deep.

Family LYREIDIDAE Guinot, 1993
Genus ***Lysirude*** Goeke, 1986
***Lysirude goekei*** sp. nov.
(Figs. 9–10)

*Lyreidus channeri*: Griffin, 1970, p. 107, figs. 6d, i, r, 7f, 8e, pl. 2 fig. B. [Not *Lyreidus channeri* Wood-Mason, 1885]

*Lysirude channeri*: Goeke, 1985 [1986], p. 215, fig. 6: Feldman, 1992, fig. 10: Tucker, 1998, fig. 1 (3–4); Ng *et al.*, 2008, p. 42 (in list), fig. 17: Guinot *et al.*, 2013, p. 289, fig. 40C–D. [Not *Lysirude channeri* (Wood-Mason, 1885)]

*Material examined.* RV *Hakuhō Maru* KH-72-1 cruise, sta. 13 (Sulu Sea, 08°20.8′N, 118°19.8′E – 08°20.6′N, 118°18.8′E; 730–738 m deep); 3 m beam trawl; 27 May, 1972; ♂ holotype, NSMT-Cr 28969.

*Measurements*. CB 16.6 mm excluding carapace anterolateral spines; CL 26.4 mm excluding rostrum; length of rostrum, 4.1 mm; length of eyestalk, 2.3 mm.

*Diagnosis.* Carapace pyriform, smooth, convex dorsally sideways; rostrum, external orbital spines and anterolateral spines of carapace elongate. Pleomeres 3–4 each with medial spine. Cheliped merus with proximal spine; carpus with distal spine; palm without tooth on upper margin, with 3 triangular teeth on lower margin, proximal tooth rudimental. Carpus of first ambulatory leg with subdistal tooth on upper margin. Propodus of third ambulatory leg strongly lobate on inner margin; dactylus paddle-shaped. Fourth ambulatory leg reduced. G1 with trilobate apex.

*Description of holotype* (Male). Carapace (Fig. 9A) narrowly pyriform, 1.59 times as long as broad, dorsally convex transversely, widest at anterolateral corner; anterolateral margin divergent toward anterolateral spine, with median inconspicuous hump, covered with minute granules; lateral margins of both sides subparallel in anterior half, convergent in posterior third, beaded with small granules in posterior half of lateral margin and posterior margin; posterior margin wider than frontal neck; dorsal surface seemingly smooth, but entirely covered with microscopic pits, with pair of shallow subparallel furrows along center of carapace. Rostrum (Figs. 9, 10A) elongate, triangular, ca. 1.7 times as long as broad, ca. 1.8 times as long as eyestalk. Supraorbital margin (Figs. 9–10A) U-shaped, provided with a very short, obliquely-outward directed furrow at base of external orbital spine; external orbital spine elongated, slightly longer than rostrum, ca. 2.0 times as long as eyestalk, slightly


Fig. 9. *Lysirude goekei* sp. nov., male, holotype (NSMT-Cr 28969. CB 16.6 mm; CL 26.8 mm including rostrum). Dorsal (A) and ventral (B) views.

directed outward. Eyestalk (Fig. 10A) short, lanceolate, movable, with small, pyriform, pigmented cornea on lateral side of apex.

Pleon (Fig. 9A–B) with free 6 slender pleomeres and small triangular telson; first 3 pleomeres visible in dorsal view; surfaces of all pleomeres and telson smooth, longitudinally convex along median line, furnished with short setae along lateral margins; pleomeres 3–4 each with porximally recurved, medial spine.

Third maxilliped (Fig. 9B) elongate, narrow, with oblongly quadrate ischium and merus; ischium with transverse suture on mesial half of proximal 0.2; exopod reaching beyond ischium.

Cheliped segments (Fig. 9) subcylindrical to compressed; merus with short spine on proximal 0.3 of dorsal surface; carpus with strong spine on distal part of dorsal surface; palm (Fig. 10B) compressed, crested on upper margin, with 3 triangular teeth on lower margin, teeth becoming larger distally, proximal tooth rudimentry; upper margin of movable finger crested, cutting edge weak, without teeth; fixed finger broad, compressed, cutting edge irregularly crenulate.

Ambulatory legs (Fig. 9) different in shape from each other. First leg rather compressed; merus with a median line of scattered granules and very short setae on lower surface; carpus crested on upper margin with distal denticle; propodus broadened, crested on both margins; dactylus lanceolate. Second leg longest, subcylindrical, weakly crested on both margins of propodus, with lanceolate dactylus. Third leg short, rather compressed; ischium with a small distal tooth; propodus (Fig. 10C) short, crested on outer margin, with strongly expanded, ovate lobe on inner margin, lobe entirely fringed with long setae; dactylus foliaceous, paddle-shaped, entirely fringed with long setae along expanded inner margin. Fourth leg reduced, fringed with short setae on propodus and dactylus.

G1 (Fig. 10D–E) stout, trilobate at apex; distolateral lobe of apex rounded, with aperture; mesial lobe tongue-shaped; medial lobe small, triangular. G2 (Fig. 10F) stout, slightly shorter than G1, acuminate at tip,

*Etymology.* Named after Dr. Gary D. Goeke for his great contributions to the taxonomy on

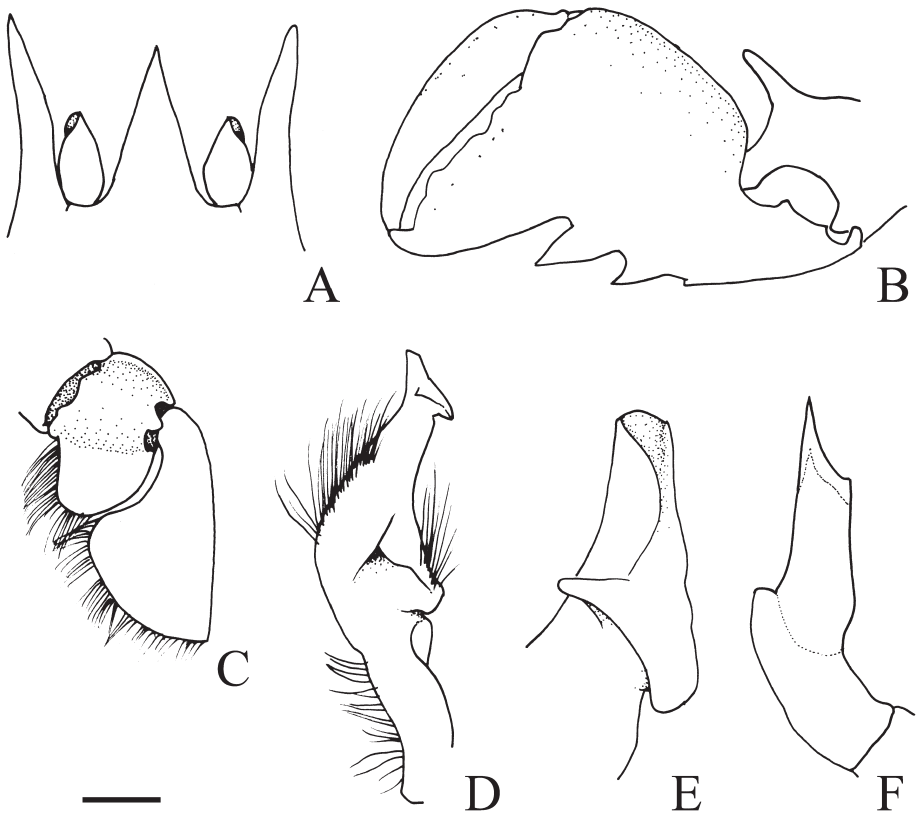


Fig. 10. *Lysirude goekei* sp. nov., male, holotype (NSMT-Cr 28969. CB 16.6 mm; CL 26.8 mm including rostrum). Orbital region in dorsal view (A), left chela in outer view (B), propodus and dactylus of left third ambulatory leg (C), left G1 in mesial view (D), apex of the same enlarged (E), left G2 in mesial view (F). Scale bar: 2 mm for A–C, 1 mm for D, F, and 0.25 mm for E.

raninid crabs.

*Remarks*. Currently, the genus *Lysirude* comprises three recent species, viz., *L. nitidus* (A. Milne-Edwards, 1880) from the western Atlantic, *L. channeri* (Wood-Mason, 1885) (with *L. gracilis* Wood-Mason, 1888 as a synonym) from the Indo-West Pacific and *L. griffini* Goeke, 1985 from the Philippines. However, the recent redescription of *L. channeri* on the basis of the holotype and recently collected specimens from the Bay of Bengal by Rozario *et al.* (2017) and the present study reveal that the records of *L. channeri* from the West Pacific are due to misidentification, representing a new species distinct from the Indian Ocean form. In this paper we described *L. goekei* sp. nov. based on the Sulu Sea specimen, with photographs and line drawings. The records of *L. channeri* listed in the above synonymy list (p. 77) are referrable to the new species.

*Lysirude goekei* is readily distinguished from *L. channeri* by the following features: 1) the rostrum and external orbital spine are elongate and ca. 1.7 and 2.0 times as long as the eyestalk, respectively (vs. slightly longer than the eyestalk in *L. channeri*); 2) the marginal spine between the external orbital spine and the anterolateral spine of the carapace is represented by a low swelling (vs. strong in *L. channeri*); 3) the upper margin of the cheliped palm has no tooth (vs. with a subterminal tooth in *L. channeri*); 4) proximal-most tooth of the lower margin of the cheliped palm is rudimentary, tubercle-like (vs. distinct and triangular in *L. channeri*). The

pigmentation of cornea may also differentiate both species (unpigmented in *L. channeri*).

Griffin (1970) considered that the lack of the intercalated spine of the carapace in the specimen from the South China Sea may be due to breakage during life, but the lack of this spine is constant as observed among the specimens from the Philippines (Goeke, 1985 [1986]; Feldman, 1992; Tucker, 1998; Ng *et al.*, 2008; Guinot *et al.*, 2013; this study). Goeke (1985 [1986]: fig. 6B) showed a variation in the presence of the intercalated spine on the carapace in the Philippine juvenile specimen, and also mentioned that the presence of the intercalated spine is also rarely seen among juveniles in the Atlantic species, *L. nitidus*.

*Distribution*. South China Sea and Philippines, 366–820 m deep.

## Family DORIPPIDAE MacLeay, 1838
## Genus ***Ethusa*** Roux, 1830
## ***Ethusa sexdentata*** (Stimpson, 1858)

*Material examined.* RV *Hakuhō Maru* KH-72-1 cruise, sta. 12 (Sulu Sea; 08°19.0′N, 118°09.1′E – 08°18.7′N, 118°08.5′E; 495–500 m deep); 3 m beam trawl; 26 May, 1972; 1 ♂ (CB 5.5 mm; CL 6.0 mm), NSMT-Cr 28970.

*Remarks*. The male specimen at hand agrees well with the males recorded by Stimpson (1858, 1907) in having the sharp external orbital tooth directed obliquely outward, and differs from the females illustrated by Sakai (1937, 1965, 1976), in which the external orbital tooth is stout and not tuberculated. In the present male, four frontal teeth are spiniform, weakly directed obliquely outward, and similar to, but shorter than the external orbital tooth; the tip of the frontal inner tooth slightly exceeds the tip of the frontal outer tooth; the tip of the external orbital tooth does not reach the basal part of the frontal teeth. The lateral margin of the carapace is directed obliquely outward, with the laterally convex branchial margin. The distal part of the whip-like G2 is sticking out from the subterminal part of the G1.

In the revision of the subfamily Ethusinae, Castro (2005) extensively studied all the Indo-West Pacific species of *Ethusa* including *E. sexdentata*. According to the monograph, *E. sexdentata* reported by Chen (1986) was misidentified and represents a new species, named by Castro (2005) as *E. abbreviata*.

*Distribution*. Known from Japan, Taiwan, the East and South China Seas, and the Philippines; 30–ca. 500 m deep.

## Family LEUCOSIIDAE Samouelle, 1819
## Genus ***Urashima*** Galil, 2003
## ***Urashima pustuloides*** (Sakai, 1961)
(Fig. 11A–C)

*Material examined.* RV *Hakuhō Maru* KH-72-1 cruise, sta. 11 (Sulu Sea; 08°12.7′N, 117°59.6′E – 08°11.8′N, 117°58.5′E; 285–306 m deep); 3 m beam trawl; 26 May, 1972; 1 ♂ (CB 42.4 mm including lateral teeth; CL 35.7 mm in median line), NSMT-Cr 28971.

*Remarks.* The male at hand is without doubt identified as *Urashima pustuloies* (Sakai, 1961) which was described in detail by Sakai (1961 and 1976, as *Randallia*), diagnosed briefly by Chen (1989) and Tan (1996) as *Randallia*, and studied deeply and designated as the type species of the new genus *Urashima* by Galil (2003). This species is comparatively large in the family Leucosiidae, having a nearly diamond-shaped carapace. The remarkable characters are noted and shown in Fig. 11A–C. The dorsal surface is separated into regions by the linear furrows and covered with the dispersed obtuse tubercles of variable sizes. The epibranchial tubercle at the anterolateral and posterolateral junction protrudes laterally and is bifid at the tip. The intestinal region is thick, more or less tuberculate as a whole, and tipped with a small tubercle. The male pleon narrows strongly toward the telson, the tip of which is distinctly bifid; the fused pleomere is armed with a sharp erect spine at the median part close to the telson. The color in life of an immature female was given by Richer de Forges and Ng (2020: Fig. 5H).

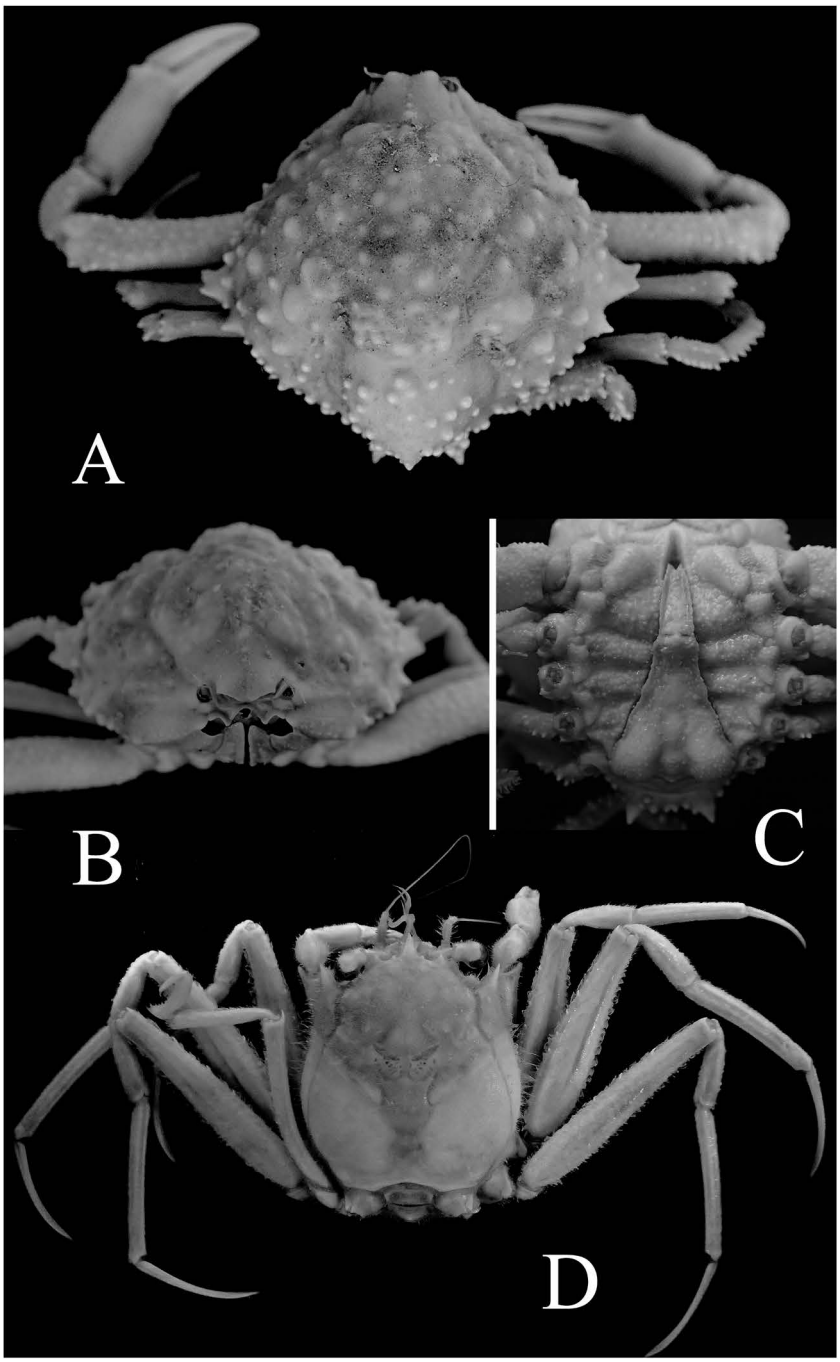


Fig. 11. A–C: *Urashima pustuloides* (Sakai, 1961), male (NSMT-Cr 28971. CB 42.4 mm including lateral teeth; CL 35.7 mm in median line). Habitus in dorsal view (A), carapace in frontal view (B), and pleon (C). D: *Paromolopsis boasi* Wood-Mason, 1891, female (NSMT-Cr 28968. CB 32.0 mm; CL 35.3 mm including rostrum). Habitus in dorsal view.

Another congener is *U. lamellidentata* (Wood-Mason, 1892) known from the Andaman and Maldive archipelagoes and finely illustrated by Kumar *et al.* (2013), being characteristic in having the lamellate crest on the carapace anterolateral margin and also lamellate, rounded teeth on the carapace posterior margin.

*Distribution*. From Japan to Australia through East and Southeast Asian waters (Galil and Ng, 2015); 85–839 m deep. For records from the Philippines, see Chen (1989), Tan (1996), Galil (2003), Komatsu *et al.* (2005), and Galil and Ng (2007).

Family INACHIDAE MacLeay, 1838
Genus ***Cyrtomaia*** Miers, 1886
***Cyrtomaia horrida*** Rathbun 1916
(Figs. 12A–C)

*Material examined*. RV *Hakuhō Maru* KH-72-1 cruise, sta. 12 (Sulu Sea; 08°19.0′N, 118°09.1′E – 08°18.7′N, 118°08.5′E; 495–500 m deep); 3 m beam trawl; 26 May, 1972; 1 ♂ (Fig. 12A) (CB 15.2 mm excluding branchial spines; CL 15.0 mm excluding pseudorostral spines), NSMT-Cr 28972; 1 ♂ (Fig. 12B–C) (CB 9.0 mm; CL 8.3 mm), NSMT-Cr 28973.

*Remarks.* Among the known species of the genus *Cyrtomaia*, the taxonomic validity and status of *C. horrida pilosa* Ihle and Ihle-Landenberg, 1931 known only by the holotype from the Kei Islands, has been long discussed. It was considered as synonymous with *C. horrida* by Griffin (1976), but Guinot and Richer de Forges (1982) examined the holotype and tentatively elevated this taxon to the full species. Later, Guinot and Richer de Forges (1986) and Griffin and Tranter (1986) also considered it as a synonym of *C. horrida*. Recently, however, Richer de Forges and Ng (2007), who examined a long series of the specimens from the Bohol Sea, confirmed that the females of *C. horrida* are somewhat more pilose than the males especially in the small specimens, and decidedly synonymized *C. horrida pilosa* with *C. horrida*. At present, the genus *Cyrtomaia* is comprised of 29 species from the Indo-Pacific waters (Richer de Forges and Ng, 2007, 2009a; Ng *et al.*, 2008).

In the specimens at hand, all the chelipeds and ambulatory legs are missing, but the spinulation of the carapace surface agrees well with the description and figures by Guinot and Richer de Forges (1982: Fig. 24, as ?*Cyrtomaia pilosa*), though the carapace (Fig. 12A–B) is not pilose as in the holotype. They also agree essentially with the description by Guinot and Richer de Forges (1982), though the G1 may be not fully developed and rather similar to that of *C. suhmi* Miers, 1886 in general structure. According to Griffin and Tranter (1986), *C. suhmi*, *C. smithii* Rathbun, 1893 and *C. owstoni* Terazaki, 1903 have a slender simple type of the G1.

*Distribution*. West Pacific from Japan to the Solomon Islands through the Philippines, the South China Sea and Indonesian waters; 24–787 m deep.

***Cyrtomaia largoi*** Richer de Forges and Ng, 2007
(Fig. 12D–E)

*Material examined*. RV *Hakuhō Maru* KH-72-1 cruise, sta. 20 (Sibutu Passage; 05°40.9′N, 119°46.3′E – 05°43.1′N, 119°47.0′E; 460–514 m deep); otter trawl; 10 June, 1972; 1 ♂ (Fig. 12E) (CB 7.7 mm excluding branchial spines; CL 8.3 mm excluding pseudorostral spines), NSMT-Cr 28991; 1 ♀ (Fig. 12D) (CB 22.7 mm; CL 20.9 mm), NSMT-Cr 28974.

*Remarks*. The specimens at hand agree well with the original description. This species is readily distinguished from congeners by having subparallel pseudorostral spines. In the smaller male specimen (Fig. 12E), the pseudorostral spines are proportionately shorter and not subparallel, and also the protogastric spines are slightly divergent as noted by Richer de Forges and Ng (2007).

According to Richer de Forges and Ng (2007), *C. suhmi* Miers, 1886, *C. curviceros* Bouvier, 1915 (at present known as a junior subjective synonym of *C. suhmi*), *C. maccullochi* Rathbun, 1918 and this species form a group commonly

lacking the intermediate ocular spines and preocular spines. However, our specimens, as well as the holotype and also the holotype of *C. suhmi*, have very small but distinct intermediate ocular spine (Fig. 12D in the present study; Guinot and Richer de Forges 1982, fig. 11A; Richer de Forges and Ng, 2007, fig. 4B–D, 5A).

*Distribution*. Bohol Sea (type locality) and Sulu Sea, central Philippines; Taiwan (Richer de Forges *et al.*, 2009), South China Sea (Lee *et al.*, 2017); 437–443 m deep.

Genus ***Platymaia*** Miers, 1886

***Platymaia bartschi*** Rathbun, 1916

(Fig. 13)

*Material examined.* RV *Hakuhō Maru* KH-72-1 cruise, sta. 20 (Sibutu Passage; 05°40.9′N, 119°46.3′E – 05°43.1′N, 119°47.0′E; 460–514 m deep); otter trawl; 10 June, 1972; 1 young ♂ (CB 36.1 mm; CL 34.9 mm excluding rostral spine, soft shell), NSMT-Cr 28975.

*Remarks*. In addition to the soft shell male recorded above, the right half of the carapace and left cheliped are in the same vial. Considering the size of the half carapace with 73.7 mm in CL and the shape of the slender cheliped, the specimen is fully developed female. Although the rostral tooth is unfortunately broken off, the specimen is safely identified as *Platymaia bartschi*. In the soft shell male (Fig. 13), the rostral tooth is warped for its distal half, but it is clear that the main rostrum is slender and much longer than the lateral rostral teeth.

Griffin (1976) distinguished *Platymaia bartschi* from *P. wyvillethomsoni* Miers, 1886 based mainly on the Philippine specimens; in *P. bartschi* the inter-antennular spine is almost three times as long as the rostral spines (about twice as long as in *P. wyvillethomsoni*). Griffin (1976) and Griffin and Tranter (1986) also reported developmental variation, namely that in juveniles the carapace bears numerous spines including six lateral branchial spines, two on each protogastric, mesogastric, cardiac, epibranchial and mesobranchial regions. Guinot and Richer de Forges (1986) finely illustrated the front-orbital details and had little doubt about the occurrence of this species in Japan.

*Distribution*. Philippines (Rathbun, 1916; Griffin, 1976; Guinot and Richer de Forges, 1986), South China Sea (Griffin and Tranter, 1986), Taiwan (Griffin, 1976), and Japan (Sakai, 1965b, 1976), 185–592 m deep.

***Platymaia remifera*** Rathbun, 1916

(Fig. 12F)

*Material examined.* RV *Hakuhō Maru* KH-72-1 cruise, sta. 11 (Sulu Sea; 08°12.7′N, 117°59.6′E – 08°11.8′N, 117°58.5′E; 285–306 m deep); 3 m beam trawl; 26 May, 1972; 1 ♂ (CB 29.4 mm; CL 27.4 mm including rostral spine), 1 ♀ (ovig.) (CB 37.1 mm; CL 35.6 mm), NSMT-Cr 28976; 1 ♀ (Fig. 10F) (CB 31.6 mm; CL 28.7 mm), NSMT-Cr 28977.

RV *Hakuhō Maru* KH-72-1 cruise, sta. 12 (Sulu Sea; 08°19.0′N, 118°09.1′E – 08°18.7′N, 118°08.5′E; 495–500 m deep); 3 m beam trawl; 26 May, 1972; 6 ♂♂ (CB 9.2 mm; CL 8.4 mm–CB 21.8 mm; CL 20.1 mm), 6 ♀♀ (CB 9.9 mm; CL 9.3 mm–CB 21.5 mm; CL 19.3 mm), NSMT-Cr 28992.

*Remarks*. The genus *Platymaia* is comprised of 10 species from Indo-West Pacific (Griffin and Tranter, 1986; Ng *et al.*, 2008). We have many specimens of various sizes (CB 9.2–37.1 mm), which agree well with the description by Guinot and Richer de Forges (1986).

Lee *et al.* (2017) recently recorded *P.* aff. *remifera* from the South China Sea, noting that the interior border of the branchial region is armed with three strong spines in the South China Sea specimens and five weak spines in the Taiwanese specimens. Based on our specimens, however, this character seems variable. There is one strong spine followed by one to four spines of variable distinctness.

*Distribution*. Philippines (Guinot and Richer de Forges, 1986; this study), Taiwan (Ng and Huang, 1997), and South China Sea (Serène and Lohavanijaya, 1973); 100–700 m deep.

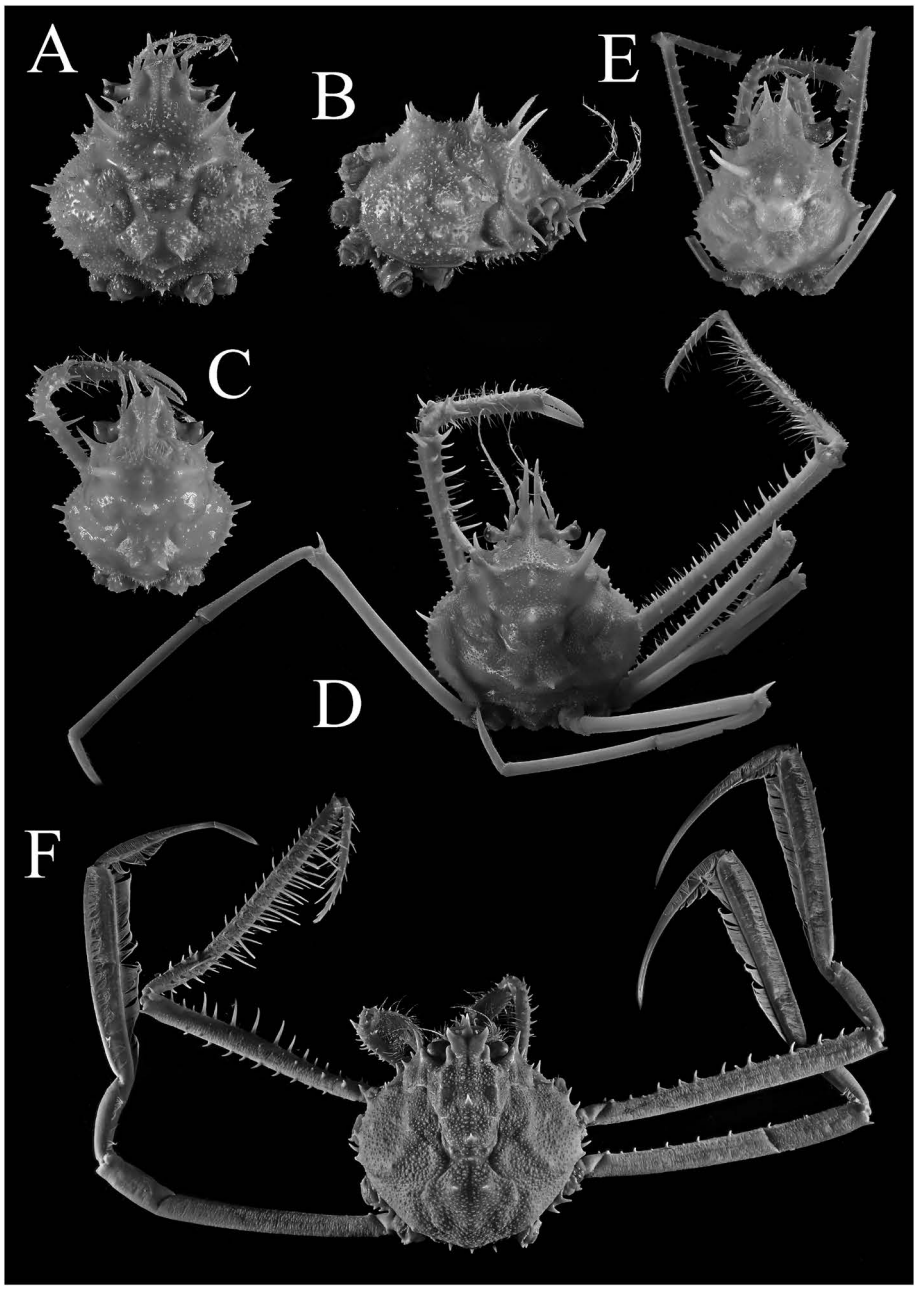


Fig. 12. A–C: *Cyrtomaia horrida* Rathbun, 1916, male (A) (NSMT-Cr 28972. CB 15.2 mm excluding branchial tubercles; CL 15.0 mm excluding pseudorostral spines), male (B–C) (NSMT-28973. CB 8.3 mm; CL 9.0 mm). D–E: *Cyrtomaia largoi* Richer de Forges and Ng, 2007, female (D) (NSMT-Cr 28974. CB 22.7 mm; CL 20.9 mm excluding pseudorostral spines), male (E) (NSMT-Cr 28991. CB 7.7 mm; CL 8.3 mm). F: *Platymaia remifera* Rathbun, 1916, female (NSMT-Cr 28977. CB 31.6 mm; CL 28.7 mm including rostral spine).

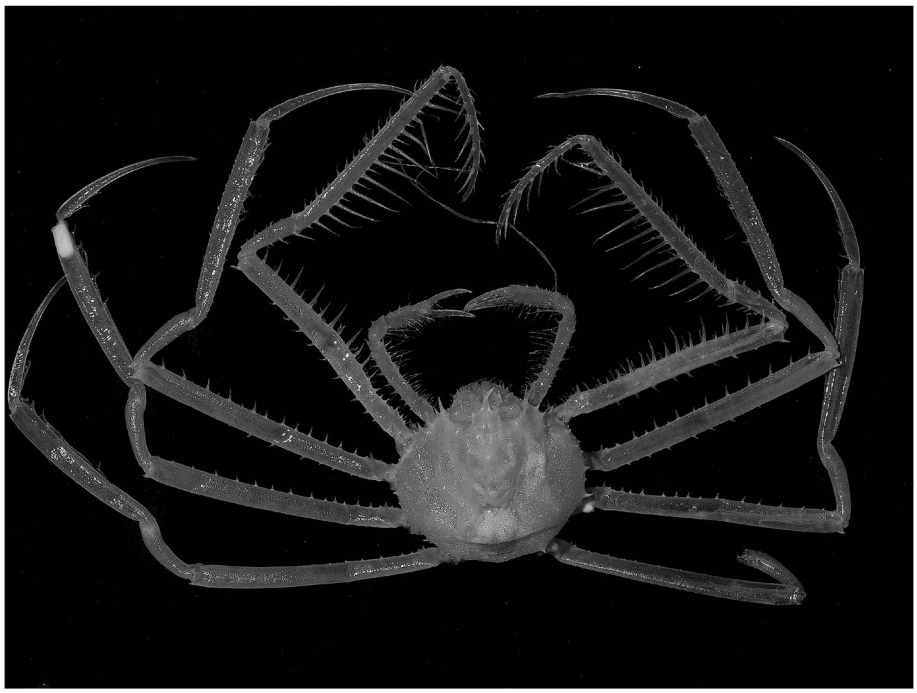

Fig. 13. *Platymaia bartschi* Rathbun, 1916, soft shell female (NSMT-Cr 28975. CB 36.1 mm; CL 34.9 mm excluding rostral spine).

Family OREGONIIDAE Garth, 1958
Genus ***Pleistacantha*** Miers, 1879
***Pleistacantha oryx*** Ortmann, 1893
(Fig. 14A–B)

*Material examined*. RV *Hakuhō Maru* KH-72-1 cruise, sta. 11 (Sulu Sea; 08°12.7′N, 117°59.6′E – 08°11.8′N, 117°58.5′E; 285–306 m deep); 3 m beam trawl; 26 May, 1972; 1 ♂ (CB 13.7 mm excluding branchial spinules; CL 18.3 mm excluding pseudorostral spines), NSMT-Cr 28978.

RV *Hakuhō Maru* KH-72-1 cruise, sta. 20 (Sibutu Passage; 05°40.9′N, 119°46.3′E – 05°43.1′N, 119°47.0′E; 460–514 m deep); otter trawl; 10 June, 1972; 2 ♀♀ (CB 9.3 mm; CL 6.4 mm; broken, soft shell), NSMT-Cr 28993.

*Remarks*. Ng *et al.* (2008) listed 14 species in the genus *Pleistacantha*. Recently, two synonymous genera of *Pleistacantha*, *Pleisticanthoides* Yokoya, 1933 and *Parapleisticantha* Yokoya, 1933, were reappraised as valid (Ng and Richer de Forges, 2012; Richer de Forges *et al.*, 2013). In addition, *Pleistacantha kannu* Ng, Ravinesh and Ravichandran, 2017 was described from the Indian Ocean, and Ahyong *et al.* (2019) recognized *Echinoplax rubida* Alcock, 1895 as a valid species of *Pleistacantha*. Consequently, the genus *Pleistacantha* at present consists of 12 species from the Indo-West Pacific region.

*Pleistacantha oryx* was confused with *P. maxima* Ahyong and Lee, 2006, but distinguished by the pseudorostral spines which are broadly convex in lateral view, the less spinulate carapace surface, and the different G1 structure (Ahyong and Lee, 2006). Otherwise, the smaller size at maturity can be a help to distinguish *P. oryx* from *P. maxima*.

*Distribution*. Most of the previous records of *Pleistacantha oryx* from Japan, the East China Sea, the Philippines and Australia were referred to those of *P. maxima* by Ahyong and Lee (2006), and therefore, the exact distributional range of *P. oryx* is uncertain at present. Although

the distributional ranges of both species may widely overlap each other, the reliable records of *P. oryx* are only those by Ortmann (1893: Sagami Bay, 90–180 m deep) and Ahyong and Lee (2006: Sagami Sea, 540 m deep, and off Kaohsiung County, southern Taiwan).

Genus ***Pleisticanthoides*** Yokoya, 1933

***Pleisticanthoides simplex*** (Rathbun, 1932)

(Fig. 14C)

*Material examined*. RV *Hakuhō Maru* KH-72-1 cruise, sta. 20 (Sibutu Passage; 05°40.9′N, 119°46.3′E – 05°43.1′N, 119°47.0′E; 460–514 m deep); otter trawl; 10 June, 1972; 1 ♂ (CB 5.9 mm; CL 8.2 mm excluding pseudorostral spines), NSMT-Cr 28979.

*Description of a male from the Sibutu Passage*. Carapace pyriform, dorsal surface covered with long hooked setae, posterior surface sparsely covered with granules, gastric, hepatic, anterior cardiac regions smooth; regions well-defined: gastric region slightly elevated; branchial region inflated, separated from cardiac, gastric regions by deep groove. Front with 2 sharp, short, diverging pseudorostral spines; pseudorostral spine basally with 4 sharp accessory spines (1 on ventolateral surface, 3 directed anteriorly); supraocular eave fringed with 5 spines (anterior 3 long, posterior 2 short); postocular spine strong, with small accessory spines anteriorly, dorsally, posteriorly; interocular spine strong, directed dorsally, proximally with small spine; subhepatic region weakly inflated, with long spine bearing some accessory spines, followed by 4 long spines bearing stiff setae (shorter than supraocular tooth). Eyestalk relatively long, slender, subdistally with small spine ventrally; cornea rounded, diameter greater than that of peduncle. Inter-antennular spine (= true rostrum) pointed downwards, medially divided by U-shaped concavity to form 2 spines. Antennae almost twice as long as pseudorostral spines; basal antennal article slender, fused with carapace, with long, sharp spine on distolateral angle; urinary article with large green gland opening, surrounded by raised rounded margin, outer border with strong flattened triangular tooth. Epistome smooth; buccal frame quadrangular. Third maxilliped with segments flattened, covered with long setae; outer border of carpus crenulated.

Chelipedal merus moderately inflated, dorsomesial margin armed with long, sharp spines. Carpus globular. Chela inflated, with 6 spines on dorsal surface, row of 7 strong spines on outer surface, row of 4 spines on inner surface, immovable finger, dactylus smooth on surface.

Ambulatory legs conspicuously long, length decreasing posteriorly. Meri and carpi with row of long hooked setae and/or long stiff setae. Propodi and dactyli with row of very long, relatively rigid setae on flexor surface.

Male pleon with 6 free pleomeres and telson, covered with subacute granules and long stiff setae; pleomeres 4–5 with large, elongated median tubercle on distal margin; pleomere 6 with distolateral margins not expanded; telson with rounded distal margin. G1 curved in entire length, distal third dorsolaterally flattened.

*Remarks*. The genus *Pleisticanthoides* was established by Yokoya (1933) for this species by monotypy. This genus had once synonymized with *Pleistacantha* Miers, 1879 by Sakai (1938), but recently, Ng and Richer de Forges (2012) recognized *Pleisticanthoides* as a distinct genus from *Pleistacantha* and added two species from the Philippines, Papua New Guinea, and Vanuatu to this genus. The genus *Pleistacanhoides* is distinguished from *Pleistacantha* by 1) the carapace dorsal surface with few spinules or setae (versus with numerous spines in *Pleistacantha*), 2) the margins of the meri and propodi of the second to fourth ambulatory legs lined with only stiff setae (versus lined with hard spines, spinules and stiff setae in *Pleistacantha*), and 3) the G1 evenly curved, with the distal third dorsoventrally flattened, and without trace of a subdistal process (versus the relatively slender and straight, distal third is evenly cylindrical and there is a recurved process just before the tip in *Pleistacantha*).

The present specimens generally agree with the description and illustrations given by Yokoya (1933) and Ng and Richer de Forges (2012), and

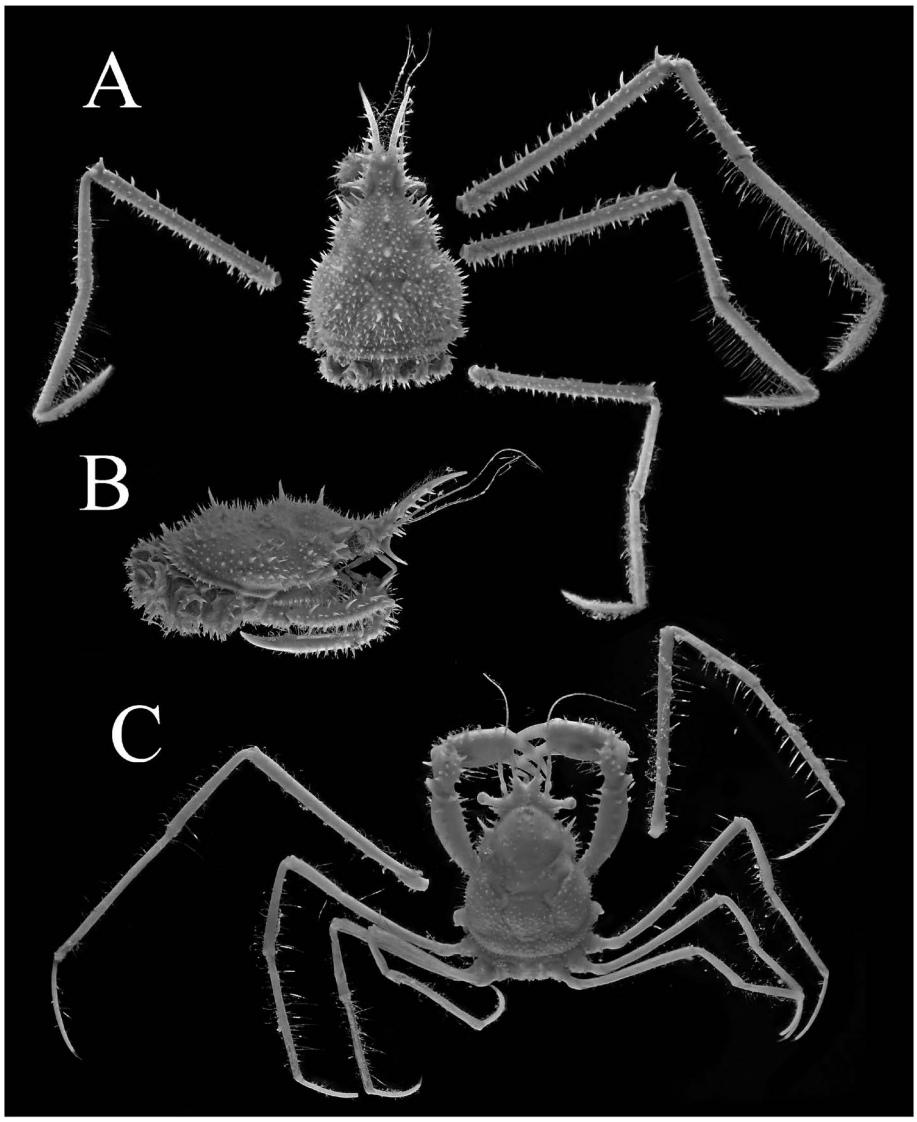


Fig. 14. A, B: *Pleistacantha oryx* Ortmann, 1893, male (NSMT-Cr 28978. CB 13.7 mm; CL 18.3 mm excluding pseudorostral spines) in dorsal (A) and lateral (B) views. C: *Pleisticanthoides simplex* (Rathbun, 1932), male (NSMT-Cr 28979. CB 5.9 mm; CL 8.2 mm) in dorsal view.

keyed out correctly to "*Pleistacantha simplex*" following Ahyong *et al.* (2005). The distinguishing characters of *Pleisticanthoides simplex* from the other two congeners were discussed by Ng and Richer de Forges (2012), and recently, Takeda and Komatsu (2020) recorded a pair of specimens from Amami-Oshima Island in the northern Ryukyu Islands, ca. 200 m deep.

*Distribution*. This species is known from Japan (from Sagami Bay to Amami-Oshima Island) (Sakai, 1976; Ng and Richer de Forges, 2012; Takeda and Komatsu, 2020), and the Sulu Sea and Indonesian waters (Griffin and Tranter, 1986). The known bathymetric range is from 60 to 540 m.

Family EPIALTIDAE MacLeay, 1838
Genus ***Laubierinia*** Richier de Forges and Ng, 2009
***Laubierinia nodosa*** (Rathbun, 1916)
(Fig. 15E)

*Material examined*. RV *Hakuhō Maru* KH-72-1 cruise, sta. 20 (Sibutu Passage; 05°40.9′N, 119°46.3′E – 05°43.1′N, 119°47.0′E; 460–514 m deep); otter trawl; 10 June, 1972; 1 ♂ (CB 11.0 mm including branchial tubercles; CL 16.5 mm excluding pseudorostral spines), 1 ♀ (ovig.) (CB 15.0 mm; CL 21.4 mm), NSMT-Cr 28980.

*Remarks.* This species was originally described in *Sphenocarcinus* by Rathbun (1916), but Garth (1958) regarded the genera *Sphenocarcinus* A. Milne-Edwards, 1878 and *Oxypleurodon* Miers, 1886 as synonymous with the genus *Rochinia* A. Milne-Edwards, 1875. However, Richer de Forges (1995) transferred this species, *Rochinia nodosa*, to *Oxypleurodon* reappraised by Tavares (1991b). Richer de Forges and Ng (2009b) further transferred this species, *Oxypleurodon nodosus*, to their new genus *Laubierinia*. The genus *Laubierinia*, the type species of which is *Rochinia carinata* Griffin and Tranter, 1986, was defined as distinct from the closest genus *Rochinia*, in having the rounded carapace (versus pyriform in *Rochinia*), the flattened pseudorostral spines (versus long slender spines in *Rochinia*), and the large tubercles on the hepatic and branchial regions (versus large spines in *Rochinia*).

As a result through the current studies, this species was assigned to the genus *Laubierinia* as *L. nodosa* (Rathbun, 1916), together with the type species, *L. carinata* (Griffin and Tranter, 1986). Recently, *Pugettia globulifera* Wood-Mason, in Wood-Mason and Alcock, 1891, which has been recorded by Alcock (1895) and Alcock and Anderson (1895) as *Scyramathia globulifera*, and by Griffin and Tranter (1986) as *Rochinia globulifera*, was transferred to *Laubierinia* by Lee *et al.* (2021). *Laubierinia nodosa* is characteristic among the three congeners in having the broad blunt tubercles instead of well-developed islets in the midline of the mesogastric, cardiac and intestinal regions, the absence of a small central mesogastric tubercle, the large nodular projection instead of strong epibranchial spine, and the non-carinate extensor surfaces of the chelipeds and ambulatory legs.

The present specimens show good matches with Rathbun (1916, as *Sphenocarcinus*), Griffin (1976, as *Sphenocarcinus*), and Richer de Forges and Ng (2009b).

*Scyra tuberculata* Yokoya, 1933, which is known only by the original description based on the specimens from the south of Satsuma, Kagoshima-ken (= -Prefecture), 133 m deep, and near the Koshiki Islands, 300 m deep, was remarked to be synonymous with *Sphenocarcinus nodosa* Rathbun, 1916 (Sakai, 1976, as *Rochinia*; Miyake, 1983, as *Rochinia*), though it is not referenced in recent studies (Ng *et al.*, 2008; Richer de Forges and Ng, 2009b). The present specimens also agree well with the original description (Yokoya, 1933: 156, fig. 55), but could not be compared with the type specimens. With kind help of Dr. F. Takeshita, the type specimens of *S. tuberculata* were determined to be not located in the Kitakyushu Museum of Natural History and Human History (KMNH), where Yokoya's extant specimens are deposited.

*Distribution*. Japan (from Mikawa Bay at the Pacific coast of central Honshu to Shimo-Koshiki Island in the west of Kyushu), Philippines, Indonesia, northwestern Australia, Papua New Guinea, Solomon Island, Vanuatu, and New Caledonia; 135–905 m deep.

Genus ***Oxypleurodon*** Miers, 1886
***Oxypleurodon sphenocarcinoides*** (Rathbun, 1916)
(Fig. 15F)

*Material examined.* RV *Hakuhō Maru* KH-72-1 cruise, sta. 11 (Sulu Sea; 08°12.7′N, 117°59.6′E – 08°11.8′N, 117°58.5′E; 285–306 m deep); 3 m beam trawl; 26 May, 1972; 1 ♂ (CB 7.4 mm excluding branchial tubercles; CL

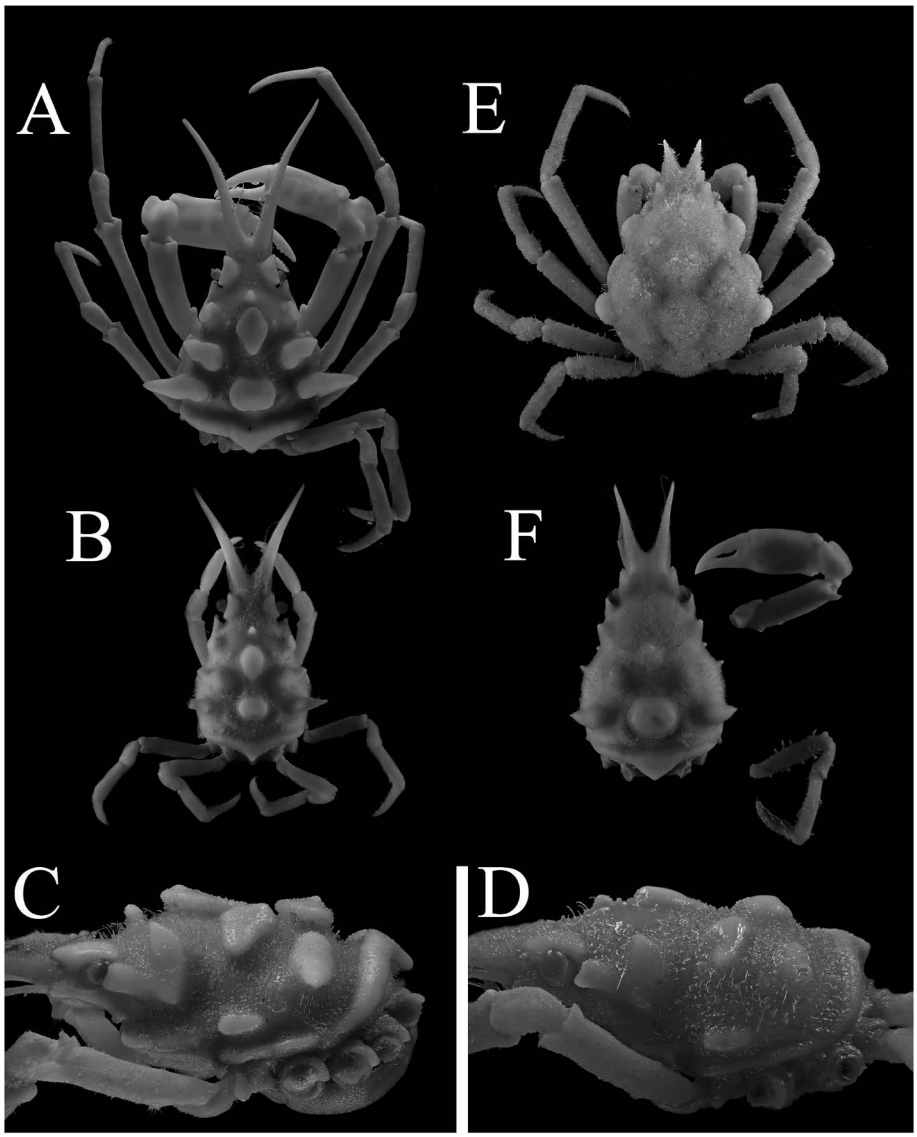


Fig. 15. A–D: *Oxypleurodon wilsoni* Richer de Forges and Poore, 2008, full-grown male (A) (NSMT-Cr 28982. CB 10.6 mm excluding branchial tubercles; CL 16.9 mm excluding pseudorostral spines), female (B, D) (NSMT-Cr 28983. CB 6.0 mm; CL 10.1 mm), full-grown female (C) (NSMT-Cr 28984. CB 8.2 mm; CL 14.0 mm). E: *Laubierinia nodosa* (Rathbun, 1916), female (NSMT-Cr 28980. CB 15.0 mm excluding branchial tubercles; CL 21.4 mm excluding pseudorostral spines). F: *Oxypleurodon sphenocarcinoides* (Rathbun, 1916). Male (NSMT-Cr 28981. CB 7.4 mm excluding branchial tubercles; CL 11.8 mm excluding pseudorostral spines).

11.8 mm excluding pseudorostral spines), NSMT-Cr 28981.

*Remarks*. This species was originally described from the Philippines as *Chorilia sphenocarcinoides*, but transferred to the genus *Sphaerocarcinus* by Griffin (1976), to the genus *Rochinia* by Griffin and Tranter (1986), and then, to the present genus, *Oxypleurodon*, by Tavares (1991b). The specimen examined agrees well with the original description (Rathbun, 1916),

and the later accounts (Griffin, 1976; Richer de Forges and Ng, 2009b).

*Distribution*. Only known from the Philippines at the depths of 200–300 m.

### ***Oxypleurodon wilsoni*** Richer de Forges and Poore, 2008
(Figs. 15A–D, 16)

*Material examined*. RV *Hakuhō Maru* KH-72-1 cruise, sta. 20 (Sibutu Passage; 05°40.9′N, 119°46.3′E – 05°43.1′N, 119°47.0′E; 460–514 m deep); otter trawl; 10 June, 1972; 1 ♂ (Fig. 15A) (CB 10.6 mm excluding branchial tubercles; CL 16.9 mm excluding pseudorostral spines), NSMT-Cr 28982; 1 ♀ (Figs. 15B, D) (CB 6.0 mm; CL 10.1 mm), NSMT-Cr 28983; 1 ♀ (Fig. 15C) (CB 8.2 mm; CL 14.0 mm), NSMT-Cr 28984; 1 ♀ (ovig.) (CB 9.6 mm; CL 15.5 mm), NSMT-Cr 28985.

*Remarks*. Our specimens generally agree with the original description, but the supraorbital plates are more strongly thickened as shown in Fig. 15A, and in our smallest specimen (Fig. 15B, D), the dorsal plates are not fully developed, and look more sparsely distributed.

The present species closely resembles *O. luzonicum* Rathbun, 1916 distributed in the West Pacific from the Kii Peninsula in the Pacific coast of central Japan to northwestern Australia (Richer de Forges and Poore, 2008; Marumura and Takeda, 2012). According to Richer de Forges and Poore (2008), *O. wilsoni* is distinguished from *O. luzonicum* by 1) the anteriorly sharpened supraocular plate, 2) the lozenge-shaped mesogastric plate, 3) the small, round and medially elevated cardiac plate, 4) the oblong, externally pointing epibranchial plates, and 5) the presence of a small tubercle between the mesogastric and hepatic spines. In addition, the following characters can be also helpful to differentiate the two species: the longer pseudorostral spines, and absence of the subhepatic plate and a tubercle among the closely gathered hepatic, subbranchial and anterior epibranchial plates. The G1 (Fig. 16) also differs from the G1 drawings of *O. luzonicum* represented by Guinot and Richer de Forges (1985: Fig. 21C–D).

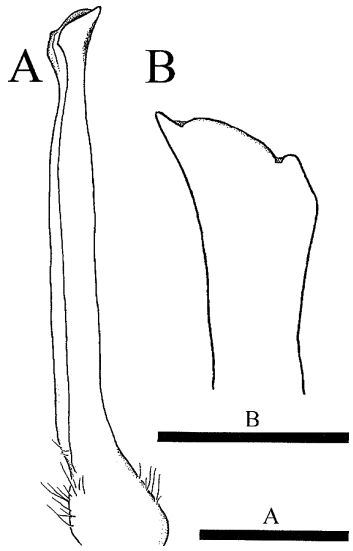


Fig. 16. *Oxypleurodon wilsoni* Richer de Forges and Poore, 2008, Right G1 of full-grown male (NSMT-Cr 28982. CB 10.6 mm excluding branchial tubercles; CL 16.9 mm excluding pseudorostral spines), entire length in ventral view (A) and distal part of the same in sternal view of (B). Scale bar: 1 mm for A, and 0.5 mm for B.

*Distribution*. Western Australia and the Sulu Sea; 329–514 m deep.

## Family GONEPLACIDAE MacLeay, 1838
### Genus ***Pycnoplax*** Castro, 2007
### ***Pycnoplax surugensis*** (Rathbun, 1932)

*Material examined*. RV *Hakuhō Maru* KH-72-1 cruise, sta. 20 (Sibutu Passage; 05°40.9′N, 119°46.3′E – 05°43.1′N, 119°47.0′E; 460–514 m deep); otter trawl; 10 June, 1972; 1 ♀ (CB 19.2 mm including second anterolateral teeth; CL 17.3 mm), NSMT-Cr 28986.

*Remarks*. This species has been placed in *Carcinoplax* since the original description in 1932, and wholly figured in some monographic works such as Guinot (1989), Sakai (1976), Chen (1984a, b), and Dai and Yang (1991) together with several taxonomic records. In the monographic work of the family Goneplacidae, how-

ever, Castro (2007) designated this species as the type species of the new genus *Pycnoplax*, and referred *C. bispinosa* Rathbun, 1914, *C. meridionalis* Rathbun, 1923, *C. vioctoriensis* Rathbun, 1923 and *P. latifolia* Castro, 2007 to the new genus. Some characters important to distinguish *P. surugensis* from the congeners are that the external orbital angle is triangular with an obtuse tip, the carapace first anterolateral tooth is narrow, sharp and directed forward, and the second (last) anterolateral tooth is markedly strong, sharply tuberculate and directed obliquely forward.

*Distribution*. West to South Pacific (Japan, East China Sea, Taiwan, Philippines, Indonesia, and New Caledonia); 65–496 m deep.

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