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A Revision of the Genus *Glabropilumnus* (Crustacea, Decapoda, Brachyura)

By

Bella GALIL

Department of Zoology, George S. Wise Faculty of Life Sciences,
Tel Aviv University, Tel Aviv, Israel

and

Masatsune TAKEDA

Department of Zoology, National Science Museum, Tokyo, Japan

Abstract Four new xanthoid genera, *Gorgonariana*, *Lentilumnus*, *Xlumnus* and *Serenolumnus* are established for the species formerly assigned to *Glabropilumnus* BALSS. Descriptions and illustrations are given for the five remaining species of *Glabropilumnus*. The various synonymies are discussed and a key is provided.

Introduction

Eleven species were assigned to the genus *Glabropilumnus*, erected by BALSS (1932) for glabrous pilumnoid crabs. Scarcity of distinguishing features coupled with the specimens' minute size has led to difficulties in their taxonomic placement. Study of extensive collections with the purpose of reviewing *Glabropilumnus* revealed the presence of four new genera, *Gorgonariana*, *Lentilumnus*, *Xlumnus* and *Serenolumnus*. Five species have been retained in the genus *Glabropilumnus*.

Materials

The specimens upon which this study is based are deposited in the following museums: American Museum of Natural History (AMNH); British Museum (Natural History) (BM); National Museum, Singapore (NMS); National Science Museum, Tokyo (NSMT); Muséum National d'Histoire Naturelle, Paris (PM); Institut Royal des Sciences Naturelles de Belgique (SNB); University Museum of Zoology, Cambridge (UMZ); National Museum of Natural History, Smithsonian Intsitution (USNM); Western Australian Museum (WAM).

Systematic Account

Glabropilumnus BALSS, 1932

Glabropilumnus BALSS, 1932, p. 516.

Carapace transversely ovate, nearly glabrous, moderately convex, regions of carapace poorly marked. Anterolateral margin arched, bearing three denticles. Posterolateral margin somewhat longer than anterolateral. Last segment of male abdomen triangular, longer than wide.

Front divided into two arched lobes, projecting slightly beyond indistinct superior orbital angle. Orbit too shallow to conceal eye, at anterolateral angle of carapace. Eye with globose calcareous stalk and large hemispherical cornea. Postorbital tooth indistinct. Lower orbital margin entire, crescentic. Inferior internal orbital angle produced.

Antennule folding transversely within subfrontal fosset. Antenna inserted in orbital hiatus between antennular groove and inferior orbital angle. Basal antennal segment not reaching front. Flagellum more than 1.6 orbital length.

Anterior margin of buccal frame sinuous, medially incised. External maxilliped subrectangular, exopod columnar, tapering, with uneven sulcus distally and granulate rounded tooth on internal margin; external margin setose. Ischium of endopod subrectangular, merus excavate at internal distal angle. Inner margins of ischium and merus setose.

Chelipeds massive, subequal in both sexes. Anterior margin of ischium tuberculate. Merus barely projecting beyond edge of carapace, bearing spinose teeth on anterior margin and distally on dorsal surface. Carpus inflated, inner angle produced. Manus of larger chela wide, its upper and lower margins smooth. Manus of smaller chela narrow, fingers distinctly grooved, dark; dactylus curved, fitting closely upon immovable finger. Pereiopods long, slender, setose. Dactylus slender, subcylindrical, densely setose, terminating in a long, cornute tooth.

First pleopod sinuous, distally curved, pilumnoid.

Type species: *Pseudozius dispar* DANA, 1852.

Remarks. BALSS (1932: 516) erected *Glabropilumnus* for glabrous *Pilumnus* species: "Carapax glatt, meist ganz unbehaart, höchstens die Stirnregion mit Haaren besetzt, ziemlich gewölbt. ... Seitenrand gleichmässig gerundet, mit drei kleinen Dornen oder Kerben versehen. Stirn nur zweilappig, ..." BALSS placed in this genus *Pseudozius dispar* DANA, which he designated genotype, *Pilumnus seminudus* MIERS, *Pilumnus edamensis* DE MAN and *Pilumnus laevis* DANA. In 1934 GORDON described *G. latimanus*. In 1935 BALSS added *G. gordonae* and *G. laevimanus* (DANA). TAKEDA and MIYAKE (1968) placed *Liomera* (?) *sodalis* ALCOCK in *Glabropilumnus*. SERÈNE described *G. kasijani* in 1969 and *G. nhatrangensis* in 1971. GARTH and KIM (1983) added *G. spinidentatus*. All in all, eleven species were included in the genus. However, based on examination of major collections it seems that the specimens' minute

size and the perplexing taxonomic difficulties in the Xanthoidea combined to obscure their taxonomic status and only five species truly belong to the genus *Glabropilumnus* designated by BALSS.

Glabropilumnus dispar (DANA, 1852)

(Figs. 1, 3A)

Pseudozius dispar DANA, 1852, p. 235; 1855, pl. 13, fig. 9; ORTMANN, 1893, p. 433; CALMAN, 1900, p. 14; BORRADAILE, 1902, p. 241; MCNEILL, 1926, p. 315; WARD, 1932, p. 252.

Pilumnus nitidus A. MILNE EDWARDS, 1873, p. 249, pl. 10, fig. 2; DE MAN, 1888, p. 305; LANCHESTER, 1901, p. 542.

Glabropilumnus dispar: BALSS, 1932, p. 517; GORDON, 1934, p. 54; MIYAKE, 1936, p. 509; SAKAI, 1939, p. 547; 1976, p. 500, pl. 178, fig. 1, pl. 179, fig. 1; MCNEILL, 1968, p. 62; SERÈNE, 1968, p. 87 (list); TAKEDA & MIYAKE, 1969, p. 131, fig. 13.

Material examined. Maldive Is. — Goifurfehendu Atoll, 3 ♂ 3 ♀; Funadu Velu, Miladumadulu Atoll, 1 ♀; Hulule, Male Atoll, 6 ♂ 13 ♀; 1900, coll. J. S. GARDINER (UMZ).

Philippines. — Gulf of Davao, Mindanao, 9 May 1936, 3 ♂ 3 ♀ (AMNH 8018, 8019); 20 June 1936, 1 ♂ (AMNH 8070).

Indonesia. — Banda Naira, 24 February 1929, 1 ♀ (BM 1935.1.28.14); Sosobok, Kao, Halmahera, 7 August 1985, coll. K. WADA, 2 ♂ (NSMT).

Malay Peninsula. — Kelantan, 1899, Skeat Expedition, 1 ♀ (UMZ).

Australia. — Great Barrier Reef, Low Isles, from dead coral, 2 ♂ 2 ♀; Batt Reef, near Low Isles, 29 October 1928, British Great Barrier Reef Expedition 1928–29, 1 ♂ 2 ♀ (BM 1937.9.21.149–151); Torres Straits, Murray I., coll. A. C. HADDON,

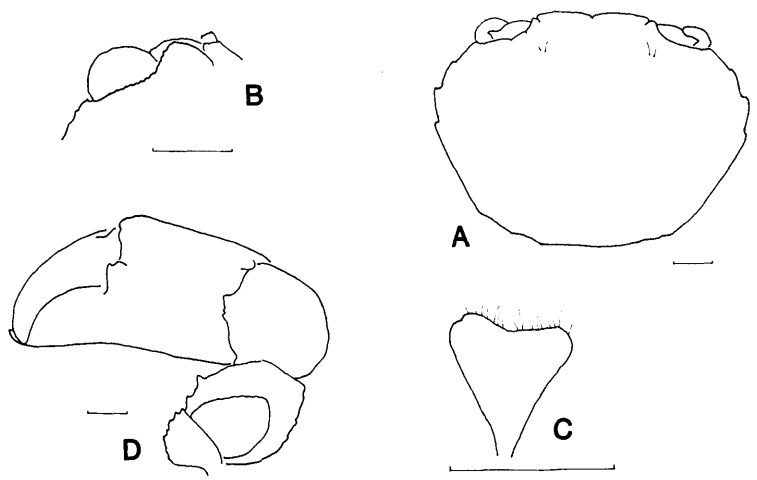

Fig. 1. *Glabropilumnus dispar* (DANA), ♂ from the Maldive Is. Carapace (A), infraorbital margin (B), first maxilliped endopod (C) and large cheliped (D). Scales represent 1 mm.

2 ♀ (BM 1954.9.14.80–81).

Ryukyu Is. — Kabira, Ishigaki-jima I., 3 March 1970, coll. Y. NAKASONE, 1 ♂ (NSMT-Cr 6625), 1 ♂ 1 ♀ (NSMT-Cr 6819).

Description. Carapace feebly punctate, glabrous but for midprotogastrical tufts of setae. Anterolateral margin rounded, granular, bearing three effaced teeth. Frontal lobes minutely granular anteriorly, separated by shallow notch from rounded supraorbital angle (Fig. 1A). Supraorbital margin granulate. Infraorbital margin tuberculate, internal angle produced, triangular (Fig. 1B).

First maxilliped endopod distally heart-shaped, margin setose (Fig. 1C).

Anterior margin of cheliped ischium bearing four triangular teeth. Anterior meral margin bearing two teeth, the distal teeth curved, prominent (Fig. 1D). Dorsal meral margin serrate, the distalmost tooth largest. External surface of carpus tuberculate, tubercles progressively larger distally, bearing plumose setae near carpo-propodial articulation. Internal angle of carpus produced, bearing two tubercles and bristles. Manus of large chela with external surface tuberculate, tubercles appear somewhat seriate, and are the largest proximally. Sometimes, especially in larger specimens, tubercles are nearly effaced and appear only near carpal articulation. External surface of manus of small chela tuberculate, tubercles seriate. Pereiopodal meri, carpi and propodi smooth, sparsely setose; dactyli provided with short setae and larger plumose setae on upper and lower margins.

First pleopod with short setae proximally and three long setae externally near tip.

Remarks. DANA (1852: 235) erected *Pseudozius dispar* for a single female taken in the Sooloo Sea. The characteristic features – "Carapax ... smooth, somewhat shining, not at all areolate or uneven in any part, front ... faintly emarginate; anterolateral margin with three minute dentations. Anterior feet unequal, the larger stout, smooth, ... smaller hand minute tuberculate, tubercles in part somewhat seriate." – are apparent in the accompanying illustration. *Pilumnus nitidus* was described by A. MILNE EDWARDS (1873: 249) – "La carapace ... est étroite, médiocrement, bombée, lisse, brillante et sans indication des régions. ... Le front est formé de deux grands lobes déclives, ... Les bords latéro-antérieurs sont divisés en quatre lobes: ... La plus grosse pince est lisse en dessus et porte seulement quelques granulations en dehors, près de l'articulation avec l'avant-bras. ... La plus petite pince est granuleuse sur toute sa face externe. ... Les pattes ambulatoires sont dépourvues de granulations et de crêtes." Description and illustrations leave no doubt that it is identical with DANA's species. DE MAN (1888: 306), who redescribed *Pilumnus nitidus* in excellent detail, recognized this similarity: "Es kommt mir nun wahrscheinlich vor, dass diese Art mit *Pseudozius dispar* DANA identisch ist; ..." ORTMANN (1893) placed *Pilumnus nitidus* as a junior synonym of *Pseudozius dispar*. It was thus accepted by most subsequent authors (CALMAN, 1900; BORRADAILE, 1902; MCNEILL, 1926; BALSS, 1932; TAKEDA & MIYAKE, 1969).

Distribution. Male, Goifurfehendu, Fadifolu and Miladumadulu Atolls, Maldive

Is.; Kelantan, Malay Penin.; Murray I., Torres Str.; Queensland, Australia; New Caledonia; Ternate, Makassar, Celebes; Halmahera; Banda Naira, Moluccas; Amboina; Sulu Sea; Ngadarak Reef, Palau Is.; Mindanao, Philippines; Ishigaki-jima I., Ryukyu Is.

Glabropilumnus gordonae BALSS, 1935

(Figs. 2, 3B)

Pilumnus edamensis: MONTGOMERY, 1931, p. 445, pl. 27, fig. 1.
Glabropilumnus gordonae BALSS, 1935, p. 664, pl. 20, figs. 1–2; SERÈNE, 1968, p. 87 (list).

Material examined. Australia. — Abrolhos Is., November 1913, Percy Sladen Expedition, 7 ♂ 13 ♀ (BM 1931.7.24.105–114), type series.

Description. Frontal margin of carapace prominently denticulate. Frontal and anterolateral regions minutely granulate, covered with close tomentum. A transverse row of longer, plumose setae between orbits, shorter setae on anterolateral margins. Eyestalk setose. Supraorbital angle tuberculate. Orbital margin tuberculate. Tridentate anterolateral margin of carapace tuberculate, tubercles progressively larger anteriorly (Fig. 2A).

Distal half of first maxilliped endopod triangulate, inner distal angle lobulate, anterior margin with long setae (Fig. 2B).

Chelipeds subequal. Anterior margin of cheliped ischium bearing 5–6 triangulate

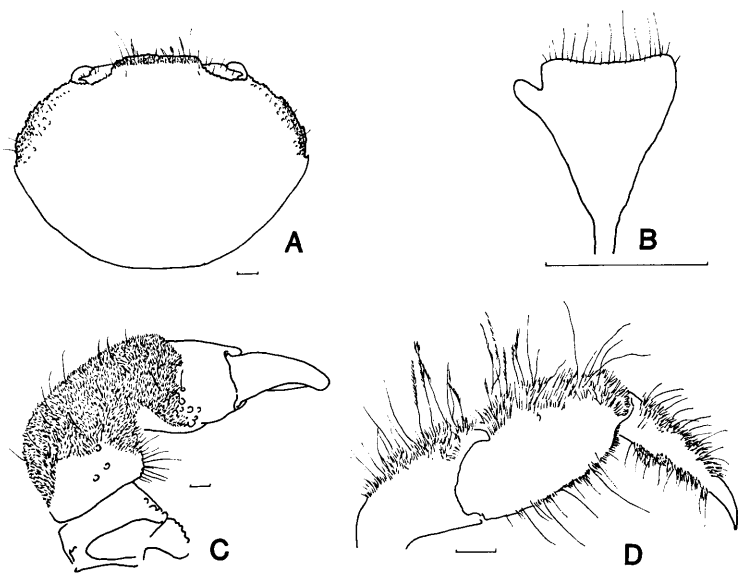

Fig. 2. *Glabropilumnus gordonae* BALSS, ♂ in type series from Australia. Carapace (A), first maxilliped endopod (B), large cheliped (C) and distal three segments of fifth pereiopod (D). Scales represent 1 mm.

teeth. Anterior margin of merus with 3 or 4 teeth, the distalmost largest. Outer surface of carpus tuberculate, tubercles nearly obscured by dense tomentum interspersed with long plumose setae. Internal angle of carpus tuberculate, bearing long bristles. Tubercles and tomentum extending to outer proximal half of larger chela; distally, palm naked, smooth (Fig. 2C). In smaller specimens (carapace width 11.5 mm) tomentum nearly covers entire outer surface. Fingers dark brown. Outer surface of smaller chela tuberculate, entirely covered with tomentum. Upper margin of pereiopodal merus carinate, serrulate. Upper surfaces of carpus and propodus densely tomentose, bearing long plumose setae. Dactylus densely setose, with plumose setae on upper margin and bristles on lower margin (Fig. 2D).

Pleopod setose, the longest setae distally on internal margin.

Distribution. Western Australia.

Glabropilumnus laevimanus (DANA, 1852)

(Figs. 3C, 4)

Pilumnus laevimanus DANA, 1852, p. 237; 1855, pl. 13, fig. 11a; A. MILNE EDWARDS, 1873, p. 250, pl. 10, fig. 4; DE MAN, 1888, p. 301; LANCHESTER, 1901, p. 542; LENZ, 1905, p. 356; NOBILI, 1906, p. 279; GORDON, 1934, p. 53.

Pilumnus edamensis DE MAN, 1888, p. 302, pl. 11, fig. 5.

Pilumnus laevis: LANCHESTER, 1900, p. 743.

Glabropilumnus edamensis: BALSS, 1932, p. 516 (list); 1933, p. 39 (list); TAKEDA & MIYAKE, 1969, p. 131 (list); SERÈNE, 1968, p. 87 (list); 1969, p. 288 (list).

Glabropilumnus laevimanus: BALSS, 1938, p. 61; GUINOT, 1962a, p. 273 (list); 1962b, p. 2, fig. 1.

Glabropilumnus loevimanus: SERÈNE, 1968, p. 87 (list).

Nec *Pilumnus edamensis*: MONTGOMERY, 1931, p. 445, pl. 27, fig. 1 (=*G. gordonae* BALSS).

Material examined. Indian Archipelago. — Noordwachter I., 1887, coll. J. BROCK, det. J. G. DE MAN, 1 ♀ (USNM 32395). Pulo, Edam, 1887. coll. J. BROCK, det. J. G. DE MAN, 1 ♂ 1 ♀ (USNM 32394), type series of *Pilumnus edamensis*; Malacca Straits, Pulau Pisang, January 1934, 1 ♂ 1 ♀ (NMS 1965.11.2.109–116).

Singapore. — Pulau Pawai, November 1933, 1 ♂ 4 ♀ (NMS 1965.11.2.136–140). Singapore, coll. BEDFORD & LANCHESTER, 1 ♂ 1 ♀ (BM 1900.10.22.130–131); 1983, coll. P. NG, 1 ♂ (NMS 1983.11.27–1); Raffles light house, 15 June 1964, coll. R. SERÈNE, 2 ♂ 2 ♀ (NMS 1970.1.10.14–17); Sentosa Reef, 19 May 1983, coll. P. NG, 1 ♂ 1 ♀ (NMS 1983.11.28.2–3); December 1985, coll. P. NG, 1 ♀ (NMS 1987.2521); March 1986, coll. P. NG, 1 ♀ (NMS 1987.2522); 31 December 1986, coll. P. NG, 1 ♀ (NMS 1987.2523); 19 April 1987, coll. P. NG, 1 ♀ (NMS 1987.2524); Labrador beach, February 1987, coll. P. NG, 4 ♂ 2 ♀ (NMS 1987.2515–2520); May 1984, coll. P. NG. 8 ♂ 6 ♀ (NMS 1987.2501–2514).

Gulf of Siam. — Koh Kahdat, January–February 1900, 1 fm, coral & coral blocks, 1 ♂ (USNM 39793); Koh Chang, January–March 1900, 1 fm, coral, 1 ♀ (USNM 39794); Goh Phuket, 4 February 1966, coral reef flat, coll. R. SERÈNE, 1 ♂ 1 ♀ (USNM 342105).

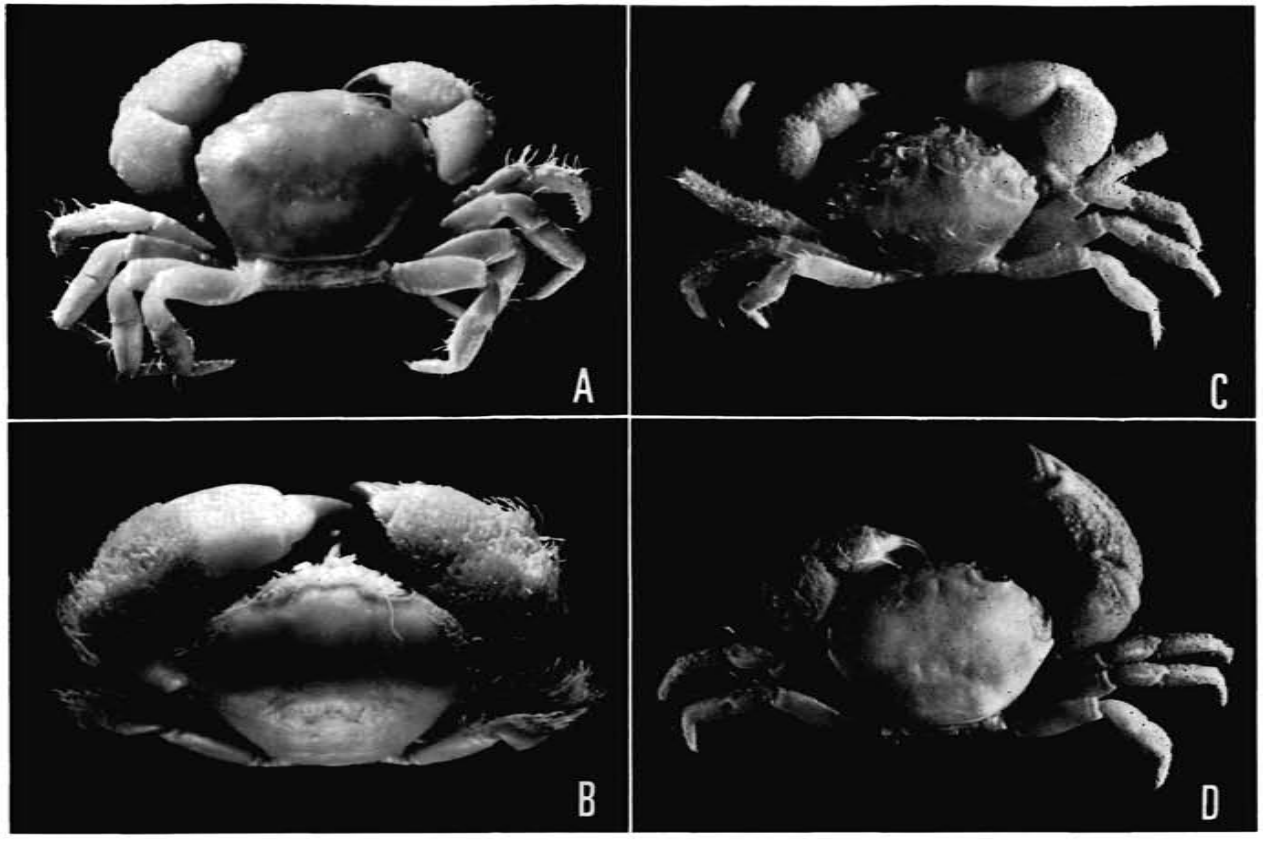

Fig. 3. A, *Glabropilumnus dispar* (DANA), ♂ (UMZ), Hulule, Male Atoll; B, *Glabropilumnus gordonae* BALSS, ♂ (BM 1931.7.24.105–114) in type series, Abrolhos Is.; C, *Glabropilumns laevimanus* (DANA), ♂ (NMS 1983. 11.28.2–3), Sentosa Reef, Singapore; D, *Glabropilumnus seminudus* (MIERS), ♂ (BM 1884: 31), Torres Straits, E. J. MIERS det.

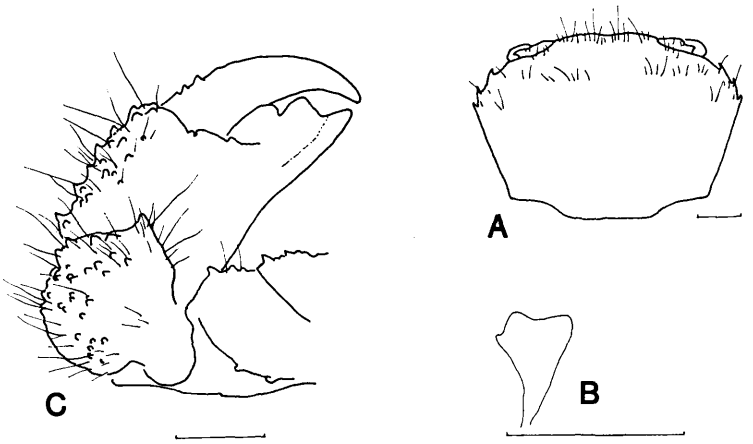

Fig. 4. *Glabropilumnus laevimanus* (DANA), ♂ from Pulo, in type series of *Pilumnus edamensis* DE MAN. Carapace (A), first maxilliped endopod (B) and large cheliped (C). Scales represent 1 mm.

South China Sea. — Pulao Aor, June 1938, 2 ♂ 3 ♀ (NMS 1965.11.2.102–106).

Hong Kong. — BARNEY Collection, 3 ♂ 3 ♀ (BM 1930.12.2.120–122).

Cocos-Keeling Is. — 1940, coll. C. A. GIBSON-HILL, 2 ♂ 2 ♀ (NMS 1965.11. 2.54–57).

Description. Carapace smooth. A transverse row of setae between orbits and posteriorly on hepatic region, additional setae on epibranchial regions. Anterolateral margin bearing three spinose teeth, the distalmost smallest. Margin between post-orbital angle and anterior tooth granulate. Frontal lobes minutely granulate, dipping imperceptibly to superior orbital angle (Fig. 4A). Supraorbital margin minutely granulate, infraorbital margin distinctly tuberculate.

Anterior margin of first maxilliped endopod concave, distal internal angle excavate (Fig. 4B).

Anterior margin of cheliped ischium bearing four triangular teeth, distalmost largest. Anterior meral margin bearing three teeth, distalmost largest, dorsal margin serrate. External surface of carpus tuberculate, setose, internal angle prominent, bearing a single tooth. Manus of large chela smooth, glabrous but for distinctly tuberculate, setose upper proximal external surface (Fig. 4C). External surface of manus of smaller chela entirely setose, tuberculate; tubercles and setae extending to upper proximal surface of dactylus. Upper margins of pereiopodal meri 2–4 carinate, serrulate. Carpi, propodi, dactyli heavily setose.

Remarks. DANA (1852: 237) characterized *Pilumnus laevimanus* as having "The carapax is not quite smooth towards the front on the antero-lateral region, ... very slightly pubescent in these parts. ... large hand ... quite smooth, with some faint traces of minute tubercles towards the base." and "smaller hand hirsute and minute tuberculate." A. MILNE EDWARDS (1873: 250) added to the description: "elle est finement granuleuse près des bords latéro-antérieurs. ... la plus grosse [chela] est

presque entièrement lisse et glabre. Cependant près du bord articulaire postérieur on remarque une petite zone granulée et tomenteuse." DE MAN (1888: 301–305) had before him material from Edam and Noordwachter Islands, which he divided into *P. laevimanus* and *P. edamensis* n. sp. and described in meticulous detail. DE MAN himself found little to differentiate between them: "unterscheidet sich ... durch die schmälere Stirn, ... Von dem *P. laevimanus* unterscheidet sie sich ausserdem durch die Oberfläche des Rückenschildes, welche keine Spur von Granulierung zeigt ... Die Vorderfüsse sind denen von *P. laevimanus* DANA ganz ähnlich." After careful examination of DE MAN's specimens and considerable amount of material we are of the opinion that the degree of hirsuteness and granulation is an unstable character and therefore the material and the synonymies mentioned above belong to a single valid species – *Glabropilumnus laevimanus* DANA.

LANCHESTER (1900: 743) described his *Pilumnus laevis* as having "finely granulous" infra-orbital margins. After a check of his material it was immediately apparent that it is *G. laevimanus*.

Distribution. Red Sea; Zanzibar; Cocos-Keeling Is.; Singapore; Kelantan, Malay Penin.; Malacca Str.; Gulf of Siam; South China Sea; Hong Kong; Pulo, Edam; Noordwacheter I.; New Caledonia; Balabac Str.

Glabropilumnus laevis (DANA, 1852)

Pilumnus laevis DANA, 1852, p. 238; DE MAN, 1887, p. 66. pl. 4, figs. 1, 2; 1895, p. 553.
Pilumnus (?) *laevis*: ALCOCK, 1898, p. 199.
Glabropilumnus laevis: BALSS, 1932, p. 516 (list); 1933, p. 39 (list); GUINOT, 1962a, p. 273 (list); SERÈNE, 1968, p. 87 (list).
Nec *Pilumnus laevis*: LANCHESTER, 1900, p. 743 (=*G. laevimanus*).
Nec *Glabropilumnus laevis*: TAKEDA & MIYAKE, 1969, p. 134, fig. 14.

Remarks. LANCHESTER (1900) assigned two specimens from Singapore to *Pilumnus laevis*. On checking the specimens they were identified as *Glabropilumnus laevimanus*. TAKEDA and MIYAKE (1969) identified as *G. laevis* specimens from the Ryukyu Islands. Their material differs in important details from DANA's original description as noted by the authors. In addition, the first pleopod as illustrated differs greatly from the pilumnoid type characteristic of the genus.

Distribution. Sullivan I., Mergui Arch.; Atjeh, Java; Mangsi I., Balabac Str.

Glabropilumnus seminudus (MIERS, 1884)

(Figs. 3D, 5)

Pilumnus seminudus MIERS, 1884, p. 222, pl. 21, fig. c; 1886, p. 161; CALMAN, 1900, p. 16; GORDON, 1931, p. 542, fig. 17.
Glabropilumnus seminudus: BALSS, 1932, p. 517, figs. 3, 4; EDMONDSON, 1952, p. 83, figs. 10–11; 1962, p. 257, fig. 29b; SERÈNE, 1968, p. 87 (list); TAKEDA & MIYAKE, 1969, p. 137.

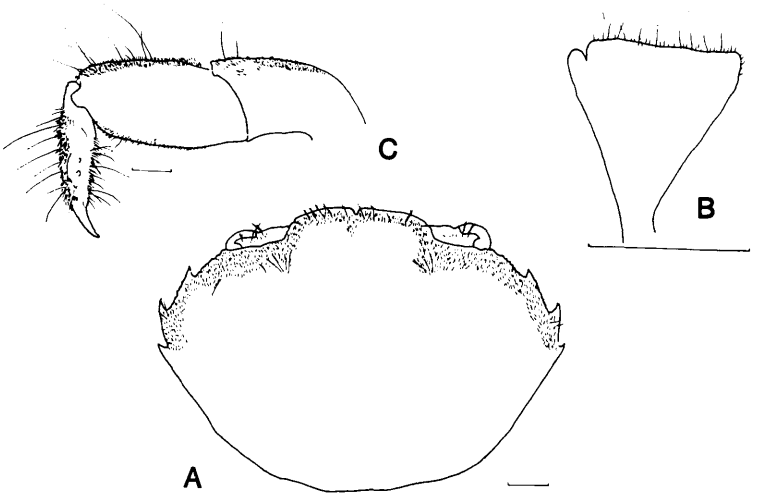

Fig. 5. *Glabropilumnus seminudus* (MIERS). Carapace (A) of ♂ from Australia; first maxilliped endopod (B) and distal three segments of fifth pereiopod (C) of ♂, paratype, from Australia. Scales represent 1 mm.

Material examined. Australia. — Thursday I., 'Alert', coll. R. COPPINGER, 1 ♀, holotype (BM 1882: 7); Port Denison, 'Alert', coll. R. COPPINGER, 1 ♂, paratype (BM 1881: 31); Torres Straits, August 1874, 'Challenger', 1 ♂ (BM 1884: 31); 'Mabuiag', coll. A. C. HADDON, 2 ♀ (BM 1954.9.14.56–57); Roebuck Bay, coll. Mrs. B. GRAY, 1 ♂ (BM 1932.11.30.117).

Description. Frontal region of carapace covered with granules and close tomentum extending to lateral borders, granules most prominent on hepatic region. A transverse row of long plumose setae between orbits, extending to eyestalks. A tuft of setae on midprotogastric region. Frontal lobes dipping imperceptibly to supraorbital angle. Upper orbital margin tuberculate. Anterolateral margin prominently tuberculate, bearing three spinose teeth, median tooth most prominent (Fig. 5A).

Distal half of first maxilliped endopod triangulate, inner distal angle lobulate, anterior margin setose (Fig. 5B). Inner lateral margin of endopodal ischium of third maxilliped denticulate.

Chelipeds subequal. Outer surface of carpus and palm covered with rounded tubercles, somewhat seriate, nearly obscured by short, dense tumentum; tubercles and tomentum extend to upper proximal surface of dactylus. Fingers deeply sulcate. Upper margins of pereiopodal meri carinate, serrulate. Carpi, propodi and dactyli tomentose, setose (Fig. 5C).

Distribution. Hongkong; Makassar, Celebes; Torres Str.; Queensland, Australia; Hawaii.

Gorgonariana n. gen.

Xanthoid crab associated with the gorgonarian *Solenocaulon* (ALCOCK, 1898; TAKEDA & MIYAKE, 1968). Carapace transversely oval, smooth, strongly convex. Anterolateral margin of carapace markedly arched, crested. Posterolateral margin sloping diagonally. Last abdominal segment of male rounded, somewhat longer than wide.

Interorbital margin bilobed, superior orbital angle effaced. Eye with short calcareous stalk and hemispherical cornea. Inferior orbital margin diagonally cut, minutely serrate, not extending to superior orbital angle. Inferior internal orbital angle effaced.

Antennule folding transversely within subfrontal fosset. Basal antennal segment stout, lying within large orbital hiatus. Flagellum as long as orbit. Anterior margin of buccal frame with median notch and two lateral indentations at termination of efferent branchial canal. Distal half of first maxilliped endopod triangulate, medially lobulate. External maxilliped close-fitting, exopod columnar, not quite extending to distal angle of endopod; distal internal margin with rounded tooth, distal margin sulcate. Ischium of endopod subrectangular, lateral margins almost parallel, outer proximal margin obliquely truncate and distal margin slightly concave. Merus of endopod subquadrate, its inner angle obliquely truncate. Inner margins of both ischium and merus setose.

Chelipeds considerably unequal in both sexes, massive. Ischium anteriorly tuberculate. Merus barely projecting beyond carapace. Carpus globose. Chela robust, external surface covered with numerous conic granules. Pereiopods slender, setose. Meral dorsal margin granulate, crested. Broad dorsal margins of carpi and propodi prominently tuberculate. Ventral margin of last pereiopodal merus spinulose. Pereiopodal dactylus setose with short, cornute apical tooth.

First male pleopod sinuous, distally curved, pilumnoid.

Type species: *Liomera*? *sodalis* ALCOCK, 1898.

Remarks. ALCOCK (1898) who described *Liomera sodalis*, has already had some reservations concerning its generic placement, prefacing it with a question mark. ODHNER (1925: 26) recognized its uniqueness and its pilumnoid affinities: "*L. sodalis* ... mit Fragezeichen zu *Liomera* gestellt, hat sicherlich mit den anderen *L.*-Arten gar nichts zu tun, sondern scheint eine eigene Gattung zu vertreten, die ich in Beziehung zu *Pilumnus* bringen möchte." ODHNER placed *Liomera spinipes* BORRADAILE (1902) in synonymy with *P. sodalis*. On checking the type specimens of *L. spinipes* deposited in the University Museum, Cambridge, England, we agree with his synonymization. TAKEDA and MIYAKE (1968: 558) transferred it "on account of the glabrous carapace and the shape of the anterolateral border" to the genus *Glabropilumnus* established by BALSS (1932), to which it bears but a slight resemblance. *Gorgonariana* may be distinguished from *Glabropilumnus* by its ventrally spinose fifth pereiopodal merus, entire anterolateral margins and form of external maxillipeds.

Gorgonariana sodalis (ALCOCK, 1898)

(Figs. 6, 7C)

Liomera? *sodalis* ALCOCK, 1898, p. 88.
Liomera spinipes BORRADAILE, 1902, p. 253, fig. 52.
Pilumnus sodalis: ODHNER, 1925, p. 26; SAKAI, 1939, p. 538.
Glabropilumnus sodalis: TAKEDA & MIYAKE, 1968, p. 558, fig. 3, pl. 6, figs. c-d; 1969, p. 133; 1972, p. 83; GARTH & KIM, 1983, p. 701.

Material examined. Maldive Is. — Mulaku Atoll, 30 fms, coll. J. S. GARDINER, 1 ♂ 1 ♀ (UMZ), types of *Liomera spinipes* BORRADAILE.

East China Sea. — 122°27'E-27°20'N, 55 fms, 25 July 1913, in *Solenocaulon*, 1 ♀ ovi. (USNM 200678).

Philippines. — Palanog Lt., east of Masbate I., 21 April 1908, 218 fms, 'Albatross' Philippine Expedition, 1 ♀ (USNM).

Japan. — Shionomisaki, Kii Penin., coll. S. NAGAI, 1 ♂ (NSMT-Cr 5673); Minabe, Kii Penin., 22 March 1985, coll. M. MARUYAMA, in *Solenocaulon*, 2 ♂ (NSMT).

Description. Carapace as broad as long. Anterolateral margin widely convex, entire. Frontal margin deflexed, medially divided into two shallow lobes indistinctly separated by feeble notch from supraorbital angle. Supraorbital margin minutely granular and continuous with lateral margins (Fig. 6A). Infraorbital margin granular, its internal angle rounded.

Anterior margin of first maxilliped endopod almost straight, interior margin

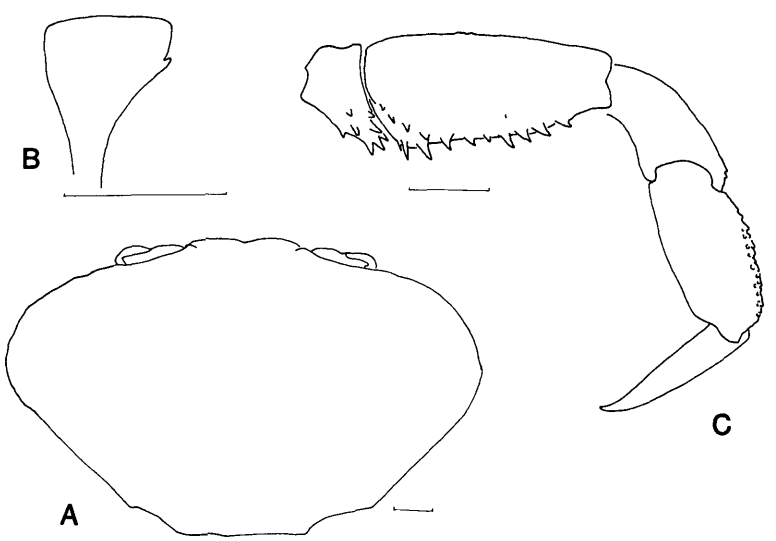

Fig. 6. *Gorgonariana sodalis* (ALCOCK). Carapace (A) of ♂, type of *Liomera spinipes* BORRADAILE from the Maldive Is.; first maxilliped endopod (B) and fifth pereiopod (C) of ♀ from the Philippines. Scales represent 1 mm.

medially lobulate (Fig. 6B). Merus of external maxilliped with internal margin tuberculate.

Anterior margins of cheliped ischium and merus prominently granular. Large cheliped carpus swollen, its outer surface smooth, a prominent tuberculate tooth on internal margin. Outer surface of larger manus covered with numerous granules, sometimes effaced in larger specimens. Few granules on upper proximal portion of dactylus. Outer surface of carpus of smaller cheliped minutely tuberculate, outer surface of manus with spinose granules, interspersed with long setae; granules and setae extend to upper proximal portion of dactylus.

Meri of pereiopods 2–4 triangular in cross section, with dorsal margin cristate, tuberculate; ventral margins granulate. Carpi, propodi and dactyli bear numerous spinose tubercles interspersed with long setae dorsally. Meral dorsal margin of fifth pereiopod rounded, smooth, its ventral margin provided with 10–12 prominent curved spines (Fig. 6C). Dorsal margins of carpus, merus and dactylus of fifth pereiopod minutely granulate.

Remarks. *Gorgonariana sodalis* is reported to inhabit hollow stems of the gorgonacean *Solenocaulon* (ALCOCK, 1898; TAKEDA & MIYAKE, 1968; present material).

Distribution. Mulaku Atoll, Maldive Is.; Sri Lanka; East China Sea; Masbate I., Philippines; Kii, Japan; Ogasawara (=Bonin) Is.

Lentilumnus n. gen.

Carapace lenticular, glabrous, regions unmarked. Anterolateral margins of carapace convex, bearing three triangulate teeth. Posterolateral margins strongly convergent, much longer than anterolateral. Abdominal penultimate segment of male somewhat wider than long; ultimate segment as wide as long and rounded distally.

Interorbital margin horizontal, imperfectly divided into two obsolescent lobes. Orbit occupying anterolateral angles. Eye with elongated columnar calcareous stalk, deeply fissured ventrally; small, hemispherical cornea (Fig. 8B). Upper orbital margin oblong, entire. Lower orbital margin minutely granulate, inferior orbital angle obsolete.

Antennule folding transversely within subfrontal fosset. Basal antennal segment cylindrical, lying within orbital hiatus, nearly reaching supraorbital margin. Antennal flagellum 1.25 orbital length.

Anterior margin of buccal frame sinuous, medially incised. Exopod of external maxilliped elongated, with rounded tooth at internal distal margin extending to distal angle of endopod. Ischium of endopod subrectangular, 1.5 meral length. Merus excavate at inner distal angle, inner margin medially produced. Inner lateral margins of both ischium and merus fringed with setae.

Chelipeds considerably unequal in both sexes. Frontal margin of ischium granulate. Merus barely projecting beyond lateral margin of carapace, granulate anteriorly. Carpus large, globose, covered externally with conic granules and bristles, inner angle

produced, tuberculate. Manus of larger chela globose, of smaller chela subcylindrical. Outer surface of manus convex, entirely covered with tubercles and bristles. Dactylus curved, smooth but for few tubercles near articulation with chela. Pereiopods laterally compressed, setose. Dactylus slender, tapering to an elongate cornute apical tooth.

First male pleopod sinuous, distally curved, pilumnoid.

Type species: *Glabropilumnus latimanus* GORDON, 1934.

Remarks. GORDON (1934: 56) described *Glabropilumnus latimanus* and recognized its uniqueness: "This specimen differs from all species referred to this genus by BALSS (1932: 516)." Yet she chose to include it in *Glabropilumnus* probably following BALSS' words to her, "gehört, wie ich glaube, in die Gattung *Glabropilumnus* mihi, wenn auch der Seitenrand nicht in Zähne geteilt ist."

The following features are important in distinguishing the new genus from *Glabropilumnus* BALSS: a) In *Lentilumnus* the large chela is rounder and shorter than in *Glabropilumnus* and is externally covered with characteristic conic granules and bristles. b) The eyestalk is tubular, deeply fissured ventrally and the cornea is smaller. c) The antennal flagellum is 1.25 orbital length; *Glabropilumnus* has a longer flagellum, over 1.6 orbital length. d) Inner inferior orbital angle effaced; in *Glabropilumnus* the inner angle is triangulate, produced. e) The basal antennal segment almost touching supraorbital margin; in *Glabropilumnus* they are widely separated.

Lentilumnus latimanus (GORDON, 1934)

(Figs. 7A, 8)

Glabropilumnus latimanus GORDON, 1934, p. 54. fig. 30; SERÈNE, 1968, p. 87 (list); 1969, p. 288 (list); TAKEDA & MIYAKE, 1969, p. 131 (list); GARTH & KIM, 1983, p. 701.

Material examined. Indonesia. — Banda Naira, 24 February 1929, 1 ♀ (SNB 9223), holotype.

Philippines. — Sulu Archipelago, Tinakta I., 21 February 1908, 10 fms., coral sand, 'Albatross' Philippine Expedition, det. GARTH & KIM, 1 ♀ ov. (USNM).

Micronesia. — Truk, 7 February 1981, in sponge, coll. Y. KURATA, many ♂ and ♀ (NSMT); Palau Is., 1986, in sponge, coll. Y. KURATA, many ♂ and ♀ (NSMT).

Description. Carapace minutely punctate. Interorbital lobes shallow, dipping imperceptibly to superior orbital angle. Postorbital angle effaced. Anterolateral margin granulate, bearing three shallow, triangular lobes (Fig. 8A).

Distal half of first maxilliped endopod trapezoid (Fig. 8C).

Ischium of endopod of external maxilliped nearly quadrangular, proximal margin obliquely truncate; lateral margins subparallel.

Anterior margins of both cheliped ischia and meri cristate, granulate; few larger granules, nearly blunt spines, medially on meral anterior margin. A single large spine distally on dorsal meral surface. Carpus of large chela with conic granules, progressively larger and denser distally; few large tubercles and long bristles on carpal internal angle. Carpus of smaller chela with spinose granules and on internal

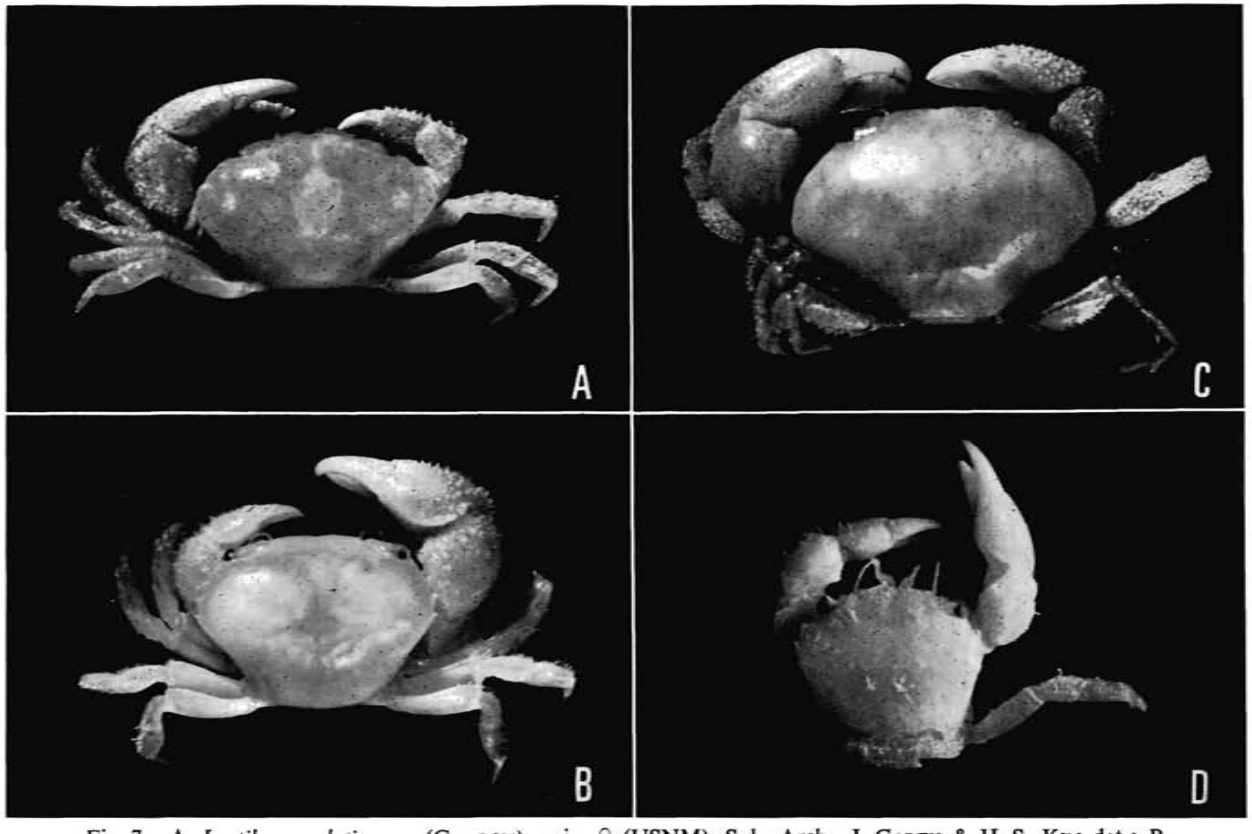

Fig. 7. A, *Lentilumnus latimanus* (GORDON), ovig. ♀ (USNM), Sulu Arch., J. GARTH & H. S. KIM det.; B, *Lentilumnus spinidentatus* (GARTH et KIM), ♂ (USNM 195352), paratype, Ibugos I.; C, *Gorgonariana sodalis* (ALCOCK), ♀ (USNM 200678), East China Sea; D, *Itampolus peresi* SERÈNE et PEYROT-CLAUSADE, ♂ (PM 6700), holotype, Recif de St. Pierre, Réunion.

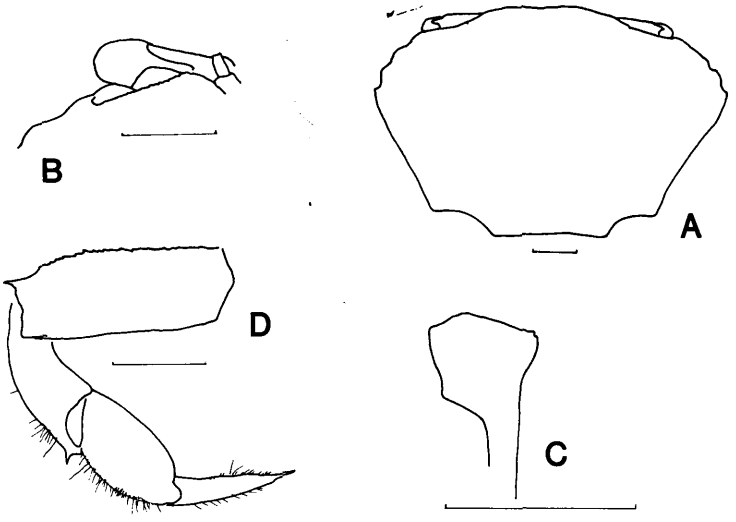

Fig. 8. *Lentilumnus latimanus* (GORDON), ♀ from the Philippines. Carapace (A), infraorbital margin (B), first maxilliped endopod (C) and fifth pereiopod (D). Scales represent 1 mm.

angle, in addition to tubercles and bristles, a prominent spine. Manus of large chela ovate, inner surface smooth, outer surface covered with tomentum, long bristles and conical granules progressively larger and sharper proximally. Dactylus with few rounded tubercles proximally; immovable finger bearing a row of setae on interior surface. Manus of smaller chela with few, slender granules. Dactylus with several spinose granules proximally on upper surface. Rows of stiff setae interiorly on both fingers.

Anterior margin of pereiopodal merus cristate, serrate, distally set with a large spine. Dorsal surface of pereiopodal carpus with setae and spinules, a single prominent spine distally. Carpal spine larger than terminal propodal spine. Dactylus bearing conical tubercles and long setae (Fig. 8D).

Remarks. More than one hundred specimens from Micronesia were found in holes of some large masses of sponge in shallow water. Each hole was occupied by a crab which was uniformly brick-red.

Distribution. Banda Naira, Indonesia; Tinakta I., Sulu Arch.; Truck; Palau Is.

Lentilumnus spinidentatus (GARTH et KIM, 1983)

(Fig. 7B)

Glabropilumnus spinidentatus GARTH & KIM, 1983, p. 701, fig. 9.

Material examined. South China Sea. — Ibugos I., 20°19′30″N, 121°51′15E, 9 November 1908, 26 fm, white sand, coral, broken shell, 'Albatross' Philippine Expedition, 3 ♂ 5 ♀ (USNM 195352), paratypes.

Remarks. GARTH and KIM (1983) described *spinidentatus* and recognized its affinity with *latimanus* GORDON, and following TAKEDA and MIYAKE (1969) and SERÈNE (1971) assigned it to *Glabropilumnus*. It is indeed very close to *Lentilumnus latimanus* in the form of chelipeds, the elongated, cylindrical, ventrically fissured eyestalk, the short antennal flagellum and the effaced inferior orbital angle, though easily distinguished by its spinose anterolateral border, and the prominently spinose pereiopods.

Distribution. Known only from the type locality in the South China Sea.

Serenolumnus n. gen.

Carapace transversely ovate, regions unmarked, moderately convex, entirely glabrous, smooth. Anterolateral margin arched, bearing three teeth, the last distal to mid carapace. Posterolateral margin strongly convergent. Last abdominal segment of male triangulate, as long as wide.

Front, evenly arched, imperceptibly divided into two shallow lobes by minute declivity. No supraorbital angle. Orbit cut diagonally at anterolateral margin. Superior orbital margin with two minute notches. Lower orbital margin minutely tuberculate. Inferior internal orbital angle indistinct. Eye with cornea longer than rounded calcareous stalk.

Antennule folding transversely within subfrontal fosset. Antennae inserted between antennular groove and lower orbital angle. Basal antennal segment trapezoid, short. Flagellum half as long as orbit.

Anterior margin of buccal frame notched medially and laterally. Distal half of first maxilliped endopod cordate, medially lobate on internal margin. External maxilliped exopod bearing a prominent triangular tooth distally on internal margin, 2/3 endopod length. Ischium of endopod subrectangular, slightly concave at internal margin; merus with produced external distal angle and excavate internal distal angle.

Chelipeds subequal, glabrous. Anterior margin of ischium granulate. Merus not projecting beyond carapace edge. Carpus inflated, costate, inner angle produced, bearing a main tooth and an ancillary tooth behind it. Manus of chela smooth, its upper and lower margins rounded, a furrow on its external upper surface. Fingers grooved. Pereiopods setose. Upper margin of pereiopodal meri carinate, minutely serrulate. Fifth pereiopodal carpus nearly as long as propodus; dactylus conical.

Type species: *Glabropilumnus kasijani* SERÈNE, 1969.

Remarks. SERÈNE (1969: 291) on describing *kasijani* expressed severe doubts as to its placement: "Je la rapporte à *Glabropilumnus* avec un léger doute. ... La presénte espèce *kasijani* diffère de toutes les espèces décrites à ce jour. ..." However, he placed it in *Glabropilumnus* on account of its glabrous carapace and anterolateral teeth. Indeed there exists a slight resemblance, but the following features are helpful in distinguishing *Serenolumnus* from *Glabropilumnus* BALSS: a) In *Serenolumnus* the antennal flagellum is half as long as orbit, in *Glabropilumnus* over 1.6 orbital length.

b) The cornea is elongate, *Glabropilumnus* has a rounded cornea. c) Inner inferior orbital angle is effaced, in *Glabropilumnus* the inner angle is triangulate, produced. d) Superior external surface of chela is grooved, in *Glabropilumnus* the external surface is rounded.

Serenolumnus kasijani (SERÈNE, 1969)

(Fig. 9)

Glabropilumnus kasijani SERÈNE, 1969, p. 288, figs. 16–24, pl. 4; TAKEDA & MIYAKE, 1969, p. 131 (list); GARTH & KIM, 1983, p. 701.

Material examined. Indonesia. — 104°08′20″E, 01°30′09″S, 6 October 1967, 12 m, coll. R. SERÈNE 1 ♂ (PM 17778), holotype; 1 ♂ 2 ♀ (PM 17777), paratypes.

South China Sea. — 1970, 1 ♂ 5 ♀ (NMS 1970.8.8.1–6).

Singapore. — Jurong, 30 December 1969, mangrove sponges, 3 ♀ (NMS 1969. 12.30.2–4).

Philippines. — Tanguingui Id., North of Cebu, 16 March 1909, 30 fm, sand, 'Albatross' Philippine Expedition, 4 ♂ 3 ♀ (USNM).

Sulu Archipelago. — Pearl Bank, 22 February 1964, 'Peli', coll. B. R. WILSON, 1 ♂ (WAM).

Description. Front arched, median sinus feebly notched. Anterolateral margins minutely granular, bearing three rounded teeth, their short anterior margins tuberculate. Last anterolateral tooth much smaller than preceding (Fig. 9A).

Interior distal angle of first maxilliped endopod rounded, interior margin medially with small rounded lobe (Fig. 9B). External maxilliped exopod with prominently tuberculate tooth. External distal angle of merus granulose (Fig. 9C).

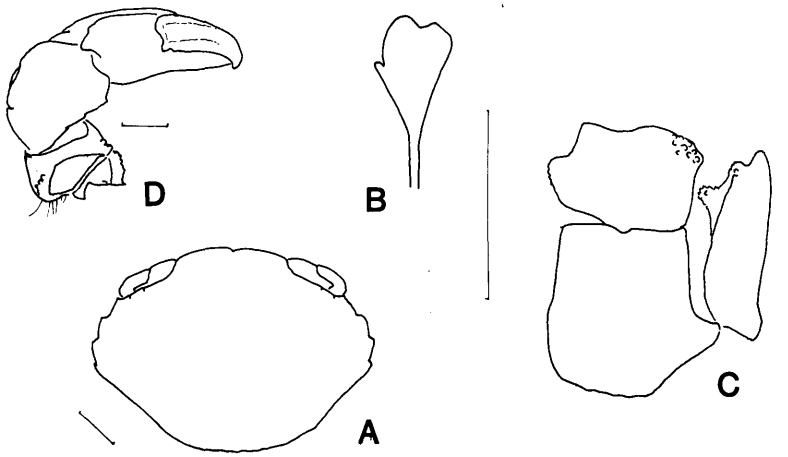

Fig. 9. *Serenolumnus kasijani* (SERÈNE), ♂ from the Philippines. Carapace (A), first maxilliped endopod (B), third maxilliped (C) and large cheliped (D). Scales represent 1 mm.

Cheliped merus bearing few tubercles proximally on anterior margin and distally on dorsal margin. Carpus with two finely granular transvers furrows and a longitudinal rib proximally on exterior surface. Manus of chela punctate externally. Upper surface of dactylus with two deep longitudinal furrows (Fig. 9D).

Distribution. Cebu, Philippines; Sulu Arch.; South China Sea; Singapore; Indonesia.

Xlumnus n. gen.

Carapace transversely oval, glabrous, regions unmarked. Anterolateral margin bearing three spinose teeth. Posterolateral margin strongly convergent, as long as anterolateral.

Interorbital margin bilobed, superior orbital angle effaced. Eye with pyriform calcareous stalk and small hemispherical cornea. Upper orbital margin sinuous. Inferior orbital margin diagonally cut, serrate, not extending to superior orbital angle. Inferior internal orbital angle prominent.

Antennule folding transversely within subfrontal fosset. Basal antennal segment slender, cylindrical, lying within orbital hiatus, nearly reaching supraorbital margin. Flagellum 1.25 orbital length.

Anterior margin of buccal frame sinuous, medially incised. Distal half of first maxilliped endopod triangulate. Endopod of external maxilliped columnar, not quite extending to distal angle of endopod; internal margin with rounded tooth distally, dental margin sulcate. Ischium of endopod subrectangular, lateral margins almost parallel, outer proximal margin obliquely truncate and distal margin slightly concave. Merus of endopod subquadrate, its inner distal angle obliquely truncate. Inner margins of ischium and merus setose.

Chelipeds subequal. Ischium anteriorly tuberculate. Merus barely projecting beyond carapace. Carpus globose, massive, inner angle produced. Palm of larger chela globose, of smaller chela subcylindrical. Outer surfaces of carpus and palm covered with numerous conic granules. Pereiopods slender, setose. Meral dorsal margin granulate, crested. Dactylus slender, tapering to an elongate, cornute apical tooth.

Type species: ? *Glabropilumnus nhatrangensis* SERÈNE, 1971.

Remarks. SERÈNE (1971: 906) while describing *nhatrangensis* had severe reservations as to its generic placement: "L'espèce est classée avec réserve dans *Glabropilumnus*" and prefaced it with a question mark. Despite a superficial similarity *Xlumnus* is easily distinguished from the closely resembling *Lentilumnus* by its more distally placed lateral spines, pronounced and rounded frontal lobes, pyriform eyestalks, trapezoid manus of large cheliped and deeply sulcate cheliped dactylus.

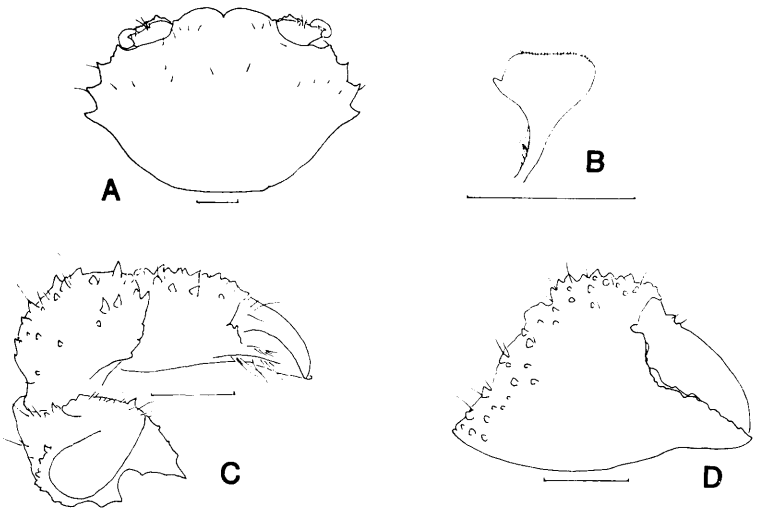

Fig. 10. *Xlumnus nhatrangensis* (SERÈNE), ♀, holotype, from Vietnam. Carapace (A), first maxilliped endopod (B), small cheliped (C) and large chela (D). Scales represent 1 mm.

Xlumnus nhatrangensis (SERÈNE, 1971)

(Fig. 10)

? *Glabropilumnus nhatrangensis* SERÈNE, 1971, p. 906, pl. 2, fig. c.

Material examined. Vietnam. — Nhatrang Bay, 1958, coll. R. SERÈNE, 1 ♀ (NMS 1969.12.15.4), holotype.

Description. Carapace feebly punctate, glabrous but for single setae anteriorly. Interorbital lobes distinctly rounded. Supraorbital margin minutely granulate distally. Infraorbital margin tuberculate, internal angle apparent in dorsal view. Anterolateral margin, minutely granular anteriorly, bearing three spinose teeth (Fig. 10A).

First maxilliped endopod distally lozenge-shaped, its anterior margin minutely setose, lobulate medially on interior margin (Fig. 10B).

Anterior margin of cheliped ischium minutely tuberculate. Anterior meral margin bearing a single prominent tooth proximally. Dorsal meral margin serrate, two distalmost teeth spinose. Carpus with conic tubercles, progressively larger distally, bearing long bristles; internal angle bearing a large spinose tubercle (Fig. 10C). Manus of large chela trapezoid, sparsely setose, with conic tubercles on upper surface and proximally near carpal articulation (Fig. 10D). External surface of manus of small chela with seriate conic tubercles, largest on upper surface. Dactylus with few rounded tubercles proximally, interiorly concave, immovable finger, deeply sulcate interiorly, sulcus bearing a row of long setae.

Anterior margins of pereiopodal meri cristate, minutely serrulate, pereiopodal

carpi each with a single prominent spine distally.

Distribution. Known only from the type locality, Nhatrang Bay, Vietnam.

Key to the Species of *Glabropilumnus* and its Related Genera

1. Anterolateral margins smooth. Row of spinose teeth on posterior margin of fifth pereiopodal merus. ..... *Gorgonariana sodalis*
— Anterolateral margins tridentate. Posterior margin of fifth pereiopodal merus entire, devoid of spines. 2
2. Eyestalk cylindrical, longer than cornea. External surface of large chela covered entirely with acuminate granules. ..... *Lentilumnus* spp. 4
— Eyestalk pyriform, longer than cornea. External surface of large chela bearing acuminate granules proximally. ..... *Xlumnus nhatrangensis*
— Eyestalk globose, as long as cornea. External surface of large chela smooth or tuberculate. 3
3. Inferior orbital angle effaced. Antennal flagellum not as long as orbit. .... *Serenolumnus kasijani*
— Inferior orbital angle produced. Antennal flagellum longer than orbit 5
4. Anterolateral teeth spinose. Ambulatory propodi anteriorly spinose. .... *Lentilumnus spinidentatus*
— Anterolateral teeth effaced, rounded. Ambulatory propodi devoid of spines anteriorly. ..... *Lentilumnus latimanus*
5. First male pleopod sinuous, distally curved, pilumnoid. Inferior orbital angle projecting forward to basal antennal article, antennal flagellum 1.6 orbital length. ..... *Glabropilumnus* spp. 6
— First male pleopod distally enlarged, bifid. Inferior orbital angle not projecting as far as basal antennal article, antennal flagellum 1.2 orbital length. .... *Itampolus peresi* SERÈNE et PEYROT-CLAUSADE[1)]
6. Frontal and anterolateral margins as well as chelipeds covered with short, dense tomentum. 7
— Frontal and anterolateral margins glabrous or with plumose setae behind front and setal tufts distally. Chelipeds glabrous or setose. 8
7. Anterolateral teeth prominent, spiniform. External surface of large chela wholly tomentose. ..... *Glabropilumnus seminudus*
— Anterolateral teeth minute, little more than tubercles. External surface of larger chela glabrous distally. ..... *Glabropilumnus gordonae*
8. Palm of cheliped entirely devoid of tubercles. ..... *Glabropilumnus laevis*
— Palm of cheliped tuberculate, at least on external proximal surface. 9
9. Anterolateral teeth spiniform. Chelipeds densely setose. First maxilliped endopod heart-shaped distally. ..... *Glabropilumnus dispar*

1) On the type (PM 6700) (Fig. 7D), kindly sent by Alain CROSNIER (PM), the label was written in SERÈNE's own hand *Itampolus madagascariensis*, La Réunion, Recif de St. Pierre.

— Anterolateral teeth effaced. Chelipeds very sparsely setose. First maxilliped endopod medially lobulate interiorly. ..... *Glabropilumnus laevimanus*

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