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The Wandinidae, a New Indo-Pacific Family of Lysianassoid Amphipoda (Crustacea)

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ABSTRACT. The family Wandinidae is established for *Pseudocyphocaris* Ledoyer and the new genus *Wandin*. Both genera are known only from the Indo-Pacific area. The Wandinidae is characterised by a peculiar hook-like process on the peduncle of antenna 2, a conical mouthpart bundle, coxae 1 to 3 variously reduced, coxa 4 greatly enlarged, and a 1-articulate outer ramus on uropod 3 with a subapical incision. The Wandinidae is considered to be the sister group of the amaryllidid family group. One new species of *Wandin* is described from the Great Barrier Reef, Australia and two new species of *Pseudocyphocaris* are described from north-eastern Papua New Guinea.

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Ledoyer (1986) described *Pseudocyphocaris coxalis* from Madagascar and placed it in the family Lysianassidae. J.D. Thomas recently collected two new species from Papua New Guinea which we describe here. A second closely related genus was found in collections from the Great Barrier Reef and is described here as *Wandin griffini*.

These two genera have simple first gnathopods and superficially resemble the Lysianassinae as defined by Hurley (1963). However, *Wandin* and *Pseudocyphocaris* share distinctive synapomorphies which preclude them from the subfamily Lysianassinae. They do not belong in the conicostomatid group of Lowry & Stoddart (1983) or the amaryllidid group of Lowry & Stoddart (in preparation) for similar reasons. We are therefore establishing a new family, the Wandinidae, for these genera.

Methods

All material is lodged in the Australian Museum, Sydney (AM). Abbreviations used in the figures are as follow: A1,2 – antenna 1,2; C – coxa; E – epistome and upper lip; EP3 – epimeral plate 3; G1,2 – gnathopod 1,2; H – head; MD – mandible; MP – maxilliped; MPp – maxilliped palp; MPIP – maxilliped inner plate; MPOP – maxilliped outer plate; MX1-2 – maxilla 1,2; P3-7 – peraeopod 3-7; ST1-7 – maxilla 1 outer plate outer row spine-tooth 1-7; STA-D – maxilla 1 outer plate inner row spine-tooth A-D; T – telson; U1-3 – uropod 1-3; l – left; r – right.

Most lysianassoids have 11 spine-teeth in two rows on the outer plate of maxilla 1. To clarify comparative studies and homologies a letter and number code for each of these teeth is introduced (Fig. 8). In some taxa the outer row contains 7 spine-teeth (ST1-ST7) and the inner row

contains 4 (STA-STD). In many taxa however, the outer plate is narrowed and the first spine-tooth of the outer row (ST1) is displaced onto the inner row. This in turn usually displaces the first spine-tooth of the inner row (STA). A more detailed report on maxilla 1 spine-teeth in lysianassoids is in preparation.

Wandinidae n.fam.

Type genus. *Wandin* n.gen.

Description. *Head deeper than long, with a subtriangular lateral cephalic lobe.* Antenna 1, peduncle slightly elongate, articles 2 and 3 not compressed; callynophore weakly developed in female and male; calceoli not present in female or male. *Antenna 2: laterodistal margin of peduncular article 3 produced into a large hook-like process; flagellum not elongate in male, calceoli not present in female or male.* *Mouthpart bundle conical.* Mandible, left lacinia mobilis a simple spine or peg; accessory spine row well developed, more than 3 accessory spines; molar absent; palp attached extremely proximally. Maxilla 1, inner plate narrow, with 1 simple apical seta; outer plate with 9–11 spine-teeth, ST1 displaced onto inner row; outer row with 5–6 spine-teeth, left and right ST7 asymmetrical; inner row with 4–5 spine-teeth; palp large, 1-articulate, not spinose apically. Maxilliped, inner plate densely covered in setae, oblique plumose setal row vestigial or absent, apical nodular spines vestigial or absent; outer plate without apical setae, apical spines, marginal spines or submarginal setae; palp article 4 vestigial or fused to article 3. *Coxae 1 to 3 variously reduced, coxa 4 greatly enlarged with well-developed posteroventral lobe, coxa 5 shallow, much broader than deep, not lobate.* Gnathopod 1 simple, propodus with strongly serrate posterior margin bearing a large midmedial spine. Gnathopod 2 subchelate, palm minutely developed, bordered by at least one strong spine. Peraeopods 3 and 4: male merus and carpus

without plumose setae. Peraeopods 5 and 6: basis linear. Peraeopod 7: basis greatly expanded. Gills present from gnathopod 2 to peraeopod 6 or 7, not pleated. Oostegites from peraeopods 2 to 5. Uropods well developed. Uropod 2: inner ramus incised or not. *Uropod 3: peduncle with well-developed lateral flange, rami lanceolate, outer ramus 1-articulate, with subapical incision.* Telson entire, longer than broad.

Remarks. The Wandinidae are most similar to lysianassoid family groups with simple first gnathopods. They do not belong to the Lysianassinae as defined by Hurlley (1963) because the mouthparts are conical, the accessory spine row on the mandible is very well developed, the palp of maxilla 1 is 1-articulate, the simple gnathopod 1 has a strongly serrate posterior margin, coxae 1–3 are variously reduced, coxa 5 is nonlobate and the third uropods are apically incised.

Wandinids differ from the conicostomatid group of Lowry & Stoddart (1983) because the accessory spine row on the mandible is very well developed, the arrangement and shape of spine-teeth on maxilla 1 is different, the posterior margin of gnathopod 1 is strongly serrate, coxae 1–3 are variously reduced and the third uropods are apically incised.

We consider wandinids and amaryllidids (Lowry & Stoddart, in preparation) to be sister groups. Both families share a fused epitome/upper lip, an elongate accessory spine row on the mandible, a peculiar rudimentary maxillipedal palp article 4, and almost identical first gnathopods with a posteriorly serrate margin on the propodus. Wandinids differ from the amaryllidid family group in having a short head which lacks a lateral cephalic cheek notch; no mandibular molar; a well-developed palp on maxilla 1; different spine-teeth on the outer plate of maxilla 1; a nonlobate coxa 5; apically incised third uropods; and an entire telson.

Wandinids are presumed to be commensals. There is some evidence that they are associated with colonial tunicates. They are currently known only from shallow coastal waters of Madagascar, Papua New Guinea and tropical Australia.

Key to the Wandinidae

1. Coxae 1–3 extremely reduced; anterior margin of coxa 4 convex; maxilla 1 with 11 spine-teeth 2
 - Coxa 1 extremely reduced, coxae 2–3 large; coxa 4 with straight anterior margin; maxilla 1 with 9 spine-teeth *Wandin griffini*
2. Coxa 6 with posterior lobe slightly produced or not produced ventrally; maxillipedal palp 3-articulate 3
 - Coxa 6 with posterior lobe greatly produced ventrally; maxillipedal palp 4-articulate *Pseudocyphocaris lobata*

3. Coxa 6 with posterior lobe not produced ventrally *Pseudocyphocaris coxalis*
 — Coxa 6 with posterior lobe slightly produced ventrally *Pseudocyphocaris gosema*

***Wandin* n.gen.**

Type species. *Wandin griffini* n.sp.

Diagnosis. *Mandible:* lacinia mobilis a narrow spine. *Maxilla 1:* outer plate with 9 spine-teeth. *Coxa 1:* extremely reduced, coxae 2–3 well developed. *Coxa 4:* greatly expanded anteriorly and posteriorly, anterior margin straight. *Uropod 2:* inner ramus not incised.

Remarks. *Wandin* is currently a monotypic genus known only from tropical Australia. *Pseudocyphocaris* and *Wandin* are very similar genera. The main differences between them are the reduced number of spine-teeth on the outer plate of maxilla 1 in *Wandin*, the reduction of coxae 2 and 3 in *Pseudocyphocaris* and the shape of the anterior margin of coxa 4.

Etymology. “Wandin” is taken from the Guugu-Yimidhirr language of people in the Lizard Island area. It is the name for a bark shield used to protect the legs from spears and alludes to the large fourth coxal shield which characterises the family.

***Wandin griffini* n.sp.**

Figs 1–3, 8D

Type material. HOLOTYPE, sex indeterminate, 2.0 mm, AM P39209; PARATYPE, AM P39210; south end of reef north of Ferguson Reef, Great Barrier Reef, Australia, 12°20'S 143°51'E, rubble washings from coral slope, 10–12 m, I. Loch, 8 Dec. 1982, QLD-88; 4 PARATYPES, AM P39211, between Lizard Island and Carter Reef, Great Barrier Reef, 14°35'S 145°35'E, algae, 32–38 m, epibenthic sled, J.M. Leis, 26 Nov. 1981, JML 81/26-11-4; 7 PARATYPES, AM P39212, Mrs Watsons Bay, Lizard Island, Great Barrier Reef, 14°40'S 145°28'E, formalin wash of rubble from patch reef, 1–7 m, J.D. Thomas, 25 Jan. 1989, JDT/LIZ-7; 4 PARATYPES, AM P39213, Mermaid Beach, Lizard Island, Great Barrier Reef, 14°40'S 145°28'E, formalin wash of rubble, 1–2 m, J.D. Thomas, 26 Jan. 1989, JDT/LIZ-8; 7 PARATYPES, AM P39214, North Point, Lizard Island, Great Barrier Reef, 14°40'S 145°28'E, coral rubble, 12 m, J.D. Thomas, 28 Jan. 1989, JDT/LIZ-13.

Diagnosis. As for genus.

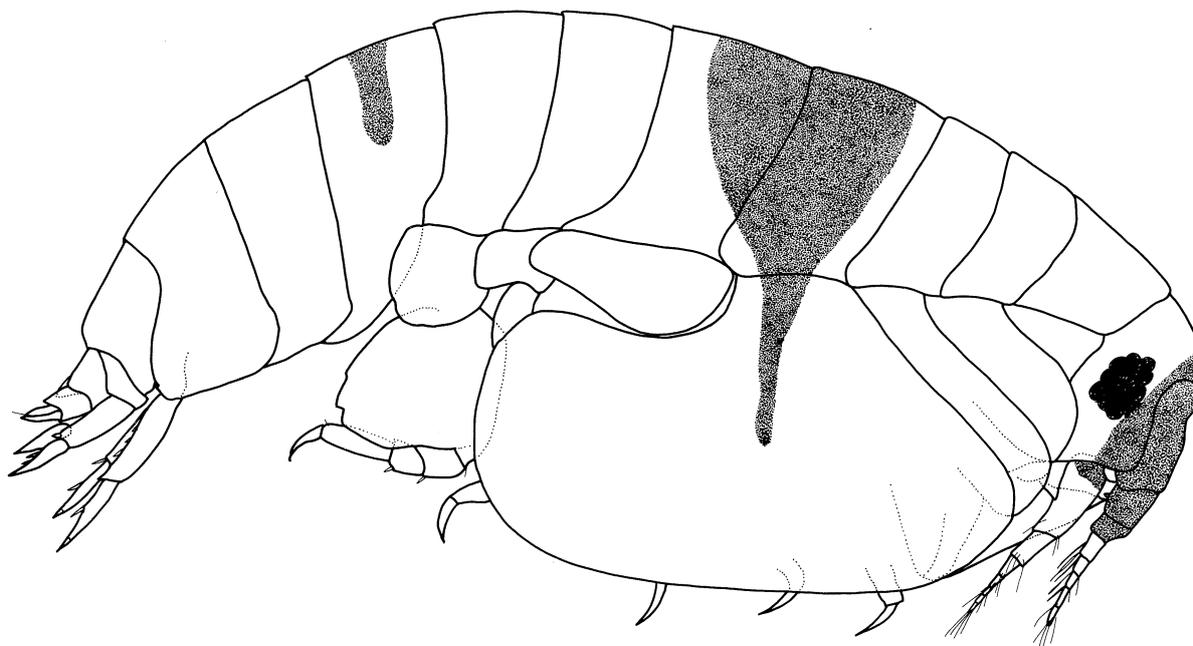


Fig.1. *Wandin griffini* n.gen., n.sp., paratype, AM P39212, Lizard Island, Great Barrier Reef, Australia.

Description. Based on holotype, 2.0 mm, ovigerous paratype female, 2.5 mm, AMP39212 and paratype male, 2.1 mm, AM P39214. *Colour in life:* translucent white with deep red colouring on peduncle of antenna 1, anterior portion of head, middle of body (in form of a ventrally tapered saddle on posterior half of peraeonite 4, anterior half of peraeonite 5 and part of coxa 4) and dorsum of pleonite 1. Eye black. *Head:* deeper than long, lateral cephalic lobe subtriangular; rostrum absent; eyes round, not enlarged in reproductive male. *Antenna 1:* short, 0.2 times as long as body, slightly shorter than antenna 2;

peduncular article 1 of medium length, 1.5 times as long as deep; without midmedial tooth; accessory flagellum 2-articulate, not forming cap; callynophore, reduced 1-field in female and male; flagellum short, 6-articulate; calceoli absent. *Antenna 2:* peduncle without brush setae, peduncular article 3 with a large distal hook on lateral face, peduncular articles 4 and 5 not swollen; flagellum not elongate in reproductive male; calceoli absent.

Mouthpart bundle: conical. *Epistome and upper lip:* fused, margin straight in profile. *Mandible:* incisors

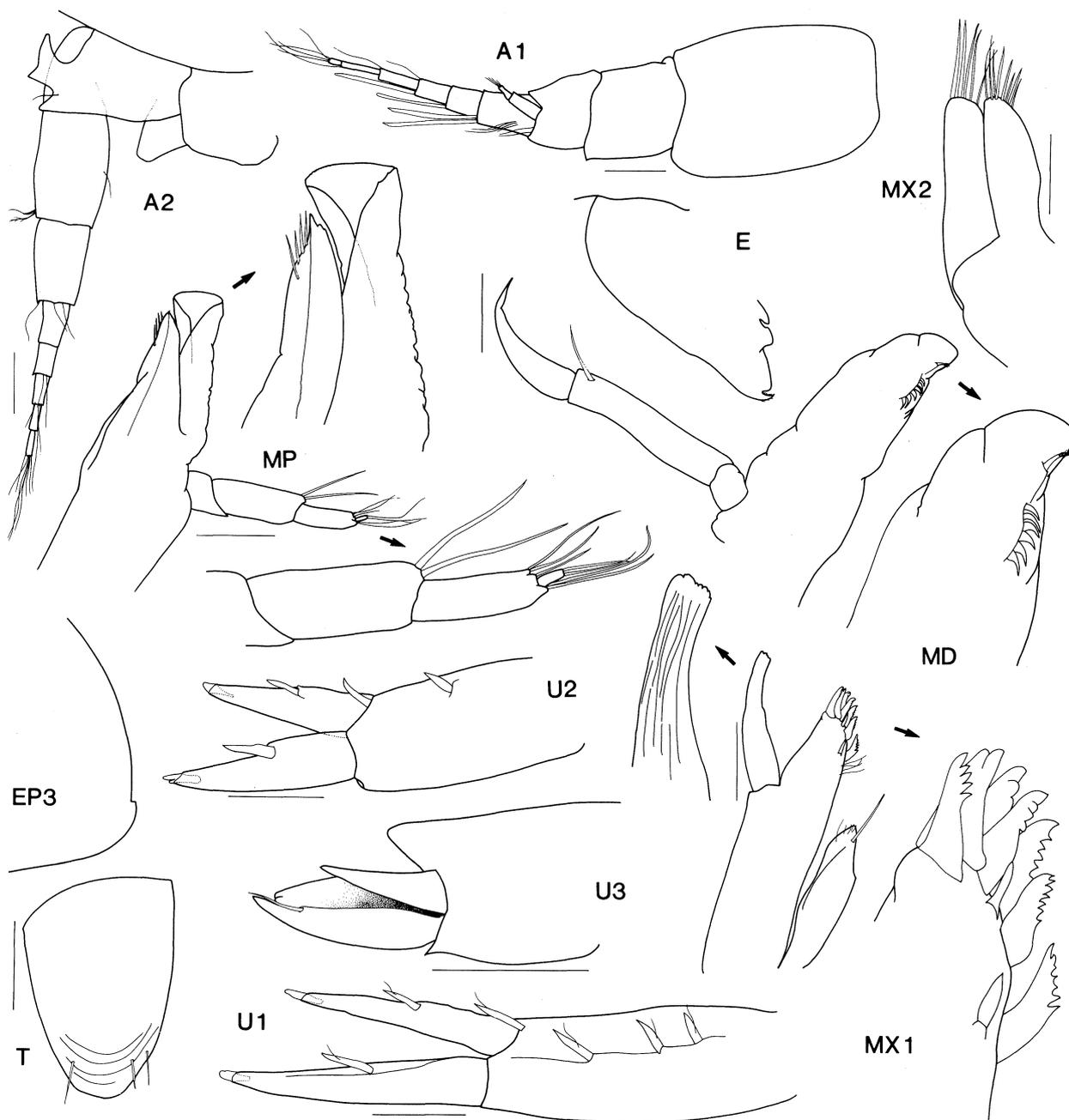


Fig.2. *Wandin griffini* n.gen., n.sp., holotype, 2.0 mm, AM P39209, Ferguson Reef, Great Barrier Reef, Australia. Scales represent 0.1 mm.

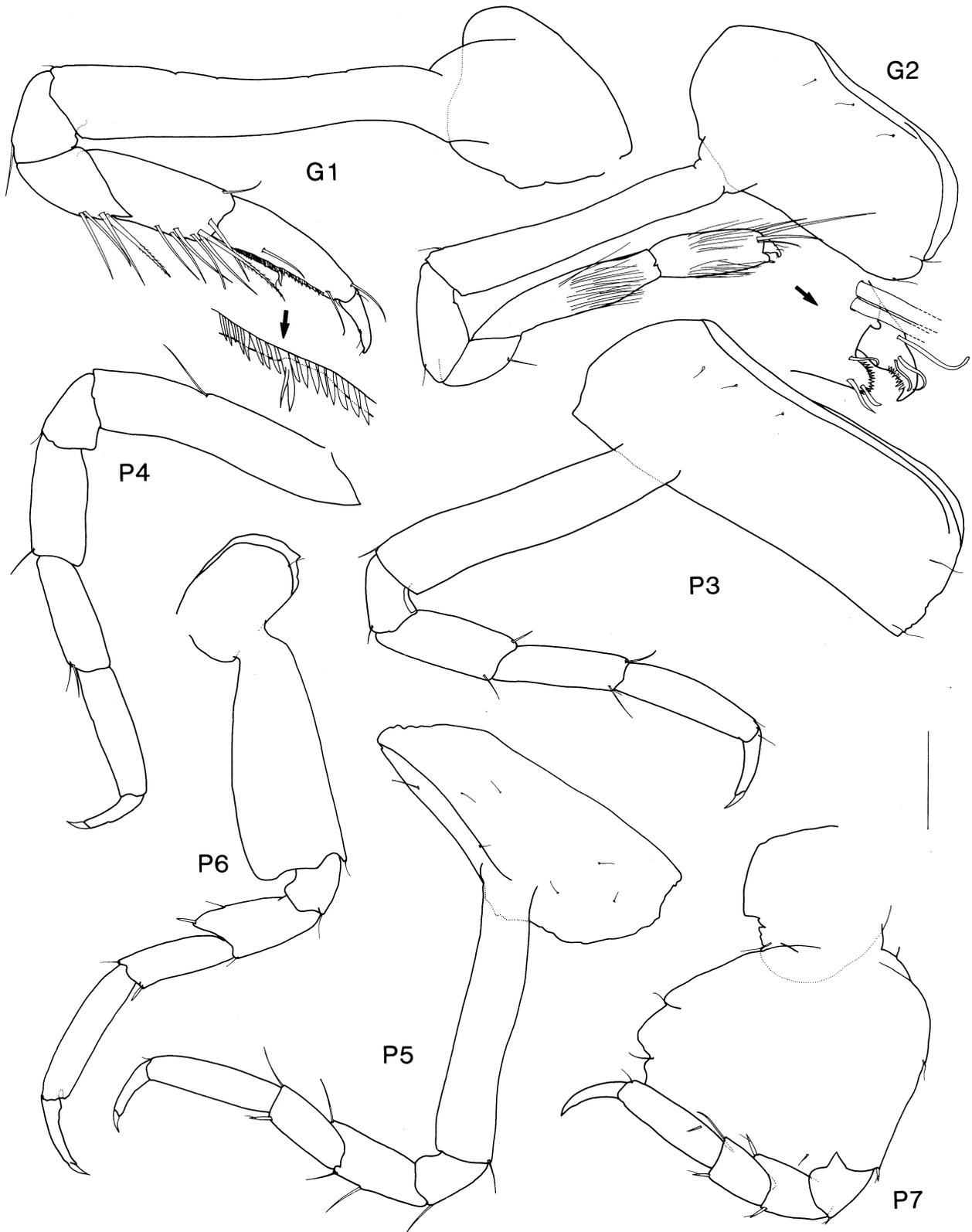


Fig.3. *Wandin griffini* n.gen., n.sp., holotype, 2.0 mm, AM P39209, Ferguson Reef, Great Barrier Reef, Australia. Scales represent 0.1 mm.

narrow, symmetrical, both with slightly convex margins; left lacinia mobilis a simple spine; accessory spine row, left and right each with 6 small stout spines; molar absent; mandibular palp attached extremely proximally; article 1 short, about as long as broad; article 2 elongate, slender, with 1 distomedial seta; article 3 weakly falcate, setae absent. *Maxilla 1*: inner plate narrow with 1 apical simple seta; outer plate narrow, with 9 spine-teeth in 2 rows, outer row (probably ST2 absent) with ST1, ST3 to ST7, large, weakly to multicuspidate, left ST7 with elongate inner margin, 6-cuspidate distal margin, right ST7 with short inner margin, 8-cuspidate distal margin, both displaced from ST6; inner row with STA large, 4-cuspidate distally, STB small, simple, STC absent, STD small, simple; palp large, 1-articulate, with minutely serrate apical margin. *Maxilla 2*: inner and outer plates subequal in length and breadth. *Maxilliped*: inner plate long, slender, without apical nodular spines, oblique setal row vestigial, with 4 simple setae; outer plate large, apical setae, apical spines, medial spines and submarginal setae all absent; palp small, 4-articulate, dactylus vestigial, unguis absent, 2 terminal setae.

Gnathopod 1: simple; coxa extremely reduced; carpus subrectangular, 2.4 times as long as deep, posterior margin not lobate, subequal in length to propodus; propodus subrectangular, 3.0 times as long as deep, tapering distally; posterior margin serrate, straight, with 1 midmedial spine; dactylus simple, without subterminal tooth. *Gnathopod 2*: minutely subchelate; coxa large, about two thirds length of coxa 3; carpus linear, elongate, 4.6 times as long as deep; propodus subrectangular, 2.6 times as long as deep; palm obtuse, with convex margin; posterodistal corner with 1 medial spine.

Peraeopods 3-7: with short, slender dactyli. *Peraeopod 3*: simple; coxa large. *Peraeopod 4*: simple; coxa extremely large, produced anteriorly and posteriorly, anterior margin straight with rounded anteroventral corner, posterior lobe produced as far as coxa 6. *Peraeopod 5*: coxa shallow, much broader than deep, tapering posteriorly, not lobate; basis linear with posterior margin straight. *Peraeopod 6*: coxa small, not lobate posteriorly, basis linear, broader than basis of peraeopod 5, slightly expanded posterodistally. *Peraeopod 7*: basis extremely expanded posteriorly, subtriangular posterior margin slightly crenulate, with a long, slightly rounded posteroventral margin; merus slender, only slightly expanded posteriorly. *Gills*: from gnathopod 2 to peraeopod 6, not pleated.

Epimeron 3: with a rounded posteroventral corner and a high tiny notch on posterior margin. *Uropod 1*: outer ramus slightly longer than inner. *Uropod 2*: peduncle elongate; outer ramus slightly longer than inner, not incised; each ramus with simple spine. *Uropod 3*: peduncle short, 1.2 times as long as deep, with dorsolateral flange; rami lanceolate; inner ramus 0.67 times as long as outer ramus; outer ramus 1-articulate, broad with a subapical incision; plumose setae absent in female and male. *Telson*: 1.5 times as long as broad, entire, without dorsal spines, distal margins rounded, with 2 pairs of subapical simple setae.

Remarks. *Wandin griffini* is presumed to be a commensal because of the structure of its mouthparts. It is currently known only from the northern part of the Great Barrier Reef in depths of 1 to 38 m.

Etymology. We are especially pleased to name this species after Dr D.J.G. Griffin in recognition of his significant contribution to Indo-Pacific carcinology.

Pseudocyphocaris Ledoyer

Pseudocyphocaris Ledoyer, 1986: 802.

Type species. *Pseudocyphocaris coxalis* Ledoyer, 1986, by original designation.

Diagnosis. *Mandible*: lacinia mobilis a small peg. *Maxilla 1*: outer plate with 11 spine-teeth. *Coxae 1-3*: extremely reduced. *Coxa 4*: greatly expanded anteriorly and posteriorly, anterior margin convex. *Uropod 2*: inner ramus incised.

Remarks. *Pseudocyphocaris* is known from Madagascar and Papua New Guinea. For comments on similarities to *Wandin* see remarks for that genus.

Pseudocyphocaris gosema n.sp.

Figs 4-5, 8C

Type material. HOLOTYPE, female, 2.5 mm, AM P39215, Paddock Reef, off Gosem Island, near Madang, Papua New Guinea, approx. 5°12'S 145°47'E, in association with *Didemnum molle*, formalin wash of coral rubble from patch reef, 3 m, J.D. Thomas, 7 Jan. 1989, JDT/PNG-1.

Diagnosis. *Colour*: body pale orange mottled with darker orange spots; antenna 1 peduncle light red with dark red stripe on article 1; peraeonite 4 with a dark red tapering stripe. Eye pale orange. *Maxilla 2*: inner plate broader than outer. *Maxillipedal palp*: 3-articulate, propodus and dactylus fused. *Coxa 4*: posterior margin reaching to coxa 6. *Peraeopod 6*: coxa slightly lobate posteriorly.

Description. Holotype female, 2.5 mm; male not known. *Colour one week after preservation*: body pale orange mottled with darker orange spots; antenna 1 peduncle light red with dark red stripe on article 1; peraeonite 4 with a dark red tapering stripe. Eye pale orange. *Head*: deeper than long, lateral cephalic lobe subtriangular; rostrum absent; eyes oval. *Antenna 1*: short, 0.2 times as long as body, slightly shorter than antenna 2; peduncular article 1 of medium length, 1.5 times as long as deep; without midmedial tooth; accessory flagellum

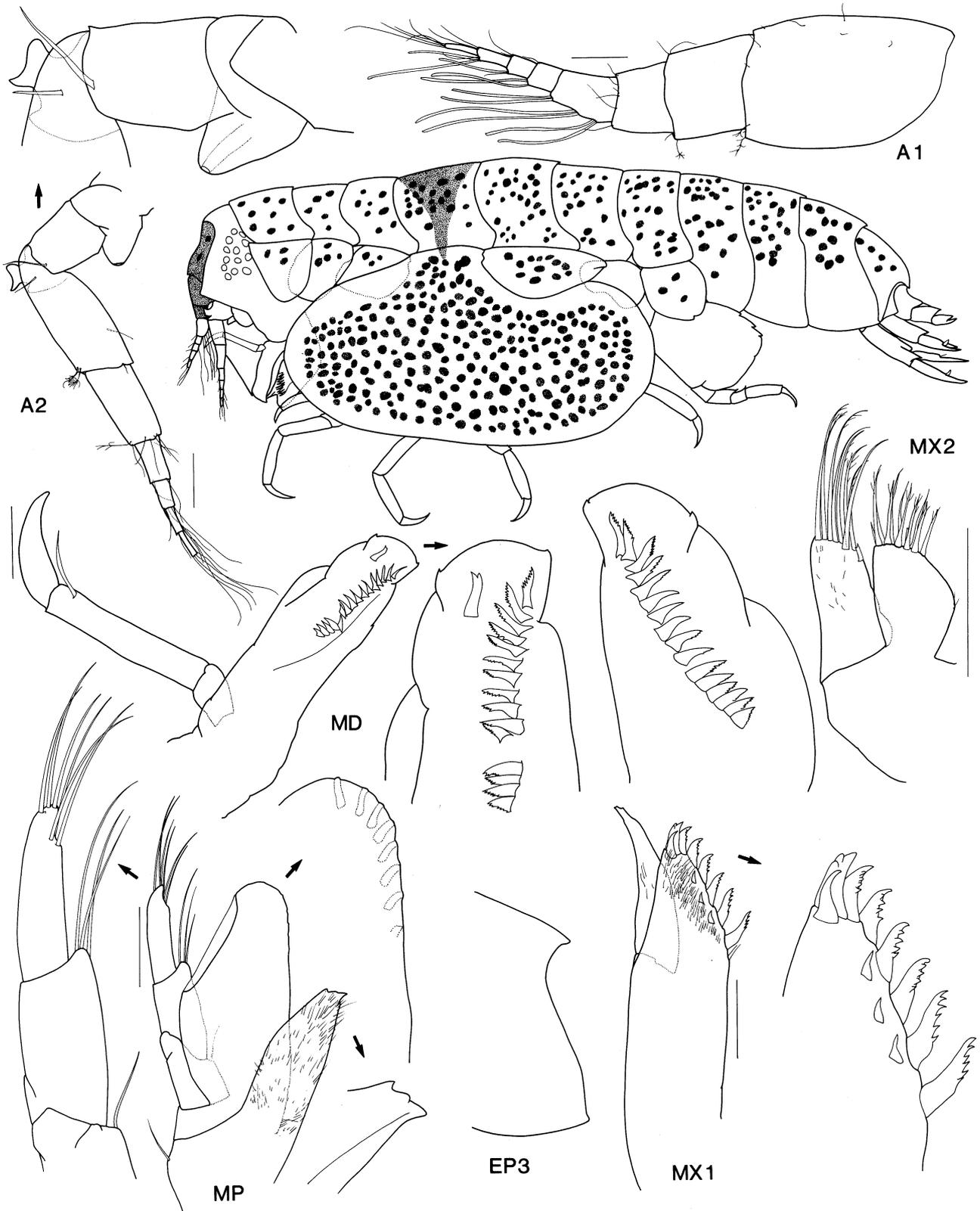


Fig.4. *Pseudocyphocaris gosema* n.sp., holotype, female, 2.5 mm, AM P39215, Gosem Island, Papua New Guinea. Scales represent 0.1 mm.

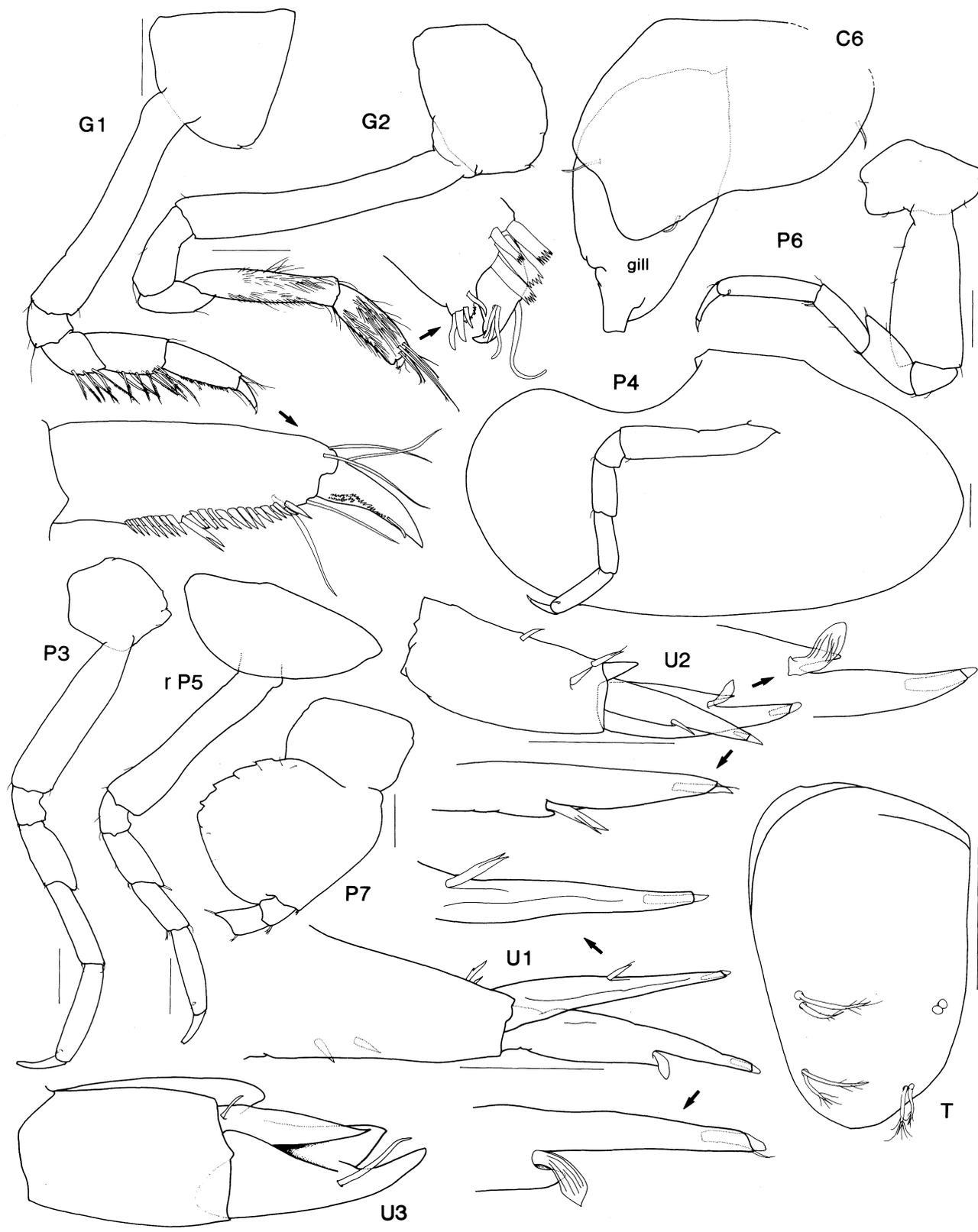


Fig.5. *Pseudocyphocaris gosema* n.sp., holotype, female, 2.5 mm, AM P39215, Gosem Island, Papua New Guinea. Scales represent 0.1 mm.

1-articulate, not forming cap; callynophore, reduced 1-field; flagellum short, 5-articulate; calceoli absent. *Antenna 2*: peduncle without brush setae, peduncular article 3 with a large distal hook on lateral face, peduncular articles 4 and 5 not swollen, calceoli absent.

Mouthpart bundle: conical. *Epistome* and *upper lip*: fused, margin straight in profile. *Mandible*: incisors narrow, symmetrical, both with slightly convex margins; left lacinia mobilis a cuspidate peg; accessory spine row, left and right each with 16 small stout spines; molar absent; mandibular palp attached extremely proximally; article 1 elongate, nearly twice as long as broad; article 2 elongate, slender, with 1 large distomedial seta; article 3 weakly falcate, setae absent. *Maxilla 1*: inner plate not known; outer plate narrow, with 11 spine-teeth in 2 rows, outer row with ST1 to ST7, large, weakly to multicuspidate, left ST7 with elongate inner margin, 5-cuspidate distal margin, right ST7 with short inner margin, 7-cuspidate distal margin, both displaced from ST6; inner row with STA displaced from STB, large, simple, STB–STD small, simple; palp large, 1-articulate, with bifurcate apical margin. *Maxilla 2*: inner plate broader than outer, plates subequal in length. *Maxilliped*: inner plate long, slender, apical nodular spines and oblique setal row absent; outer plate large, apical setae, apical spines, medial spines and submarginal setae all absent; palp small, 3-articulate, propodus and dactylus fused, 4 terminal and 2 subterminal setae.

Gnathopod 1: simple; coxa extremely reduced; carpus subrectangular, 2.1 times as long as deep, subequal in length to propodus; propodus subrectangular, 2.75 times as long as deep, margins tapering distally; posterior margin serrate, straight, with 1 midmedial spine; dactylus simple, without subterminal tooth. *Gnathopod 2*: minutely subchelate; coxa extremely reduced, subequal in size to coxa 3; carpus elongate, subrectangular, 4.6 times as long as deep; propodus elongate, subrectangular, 2.6 times as long as deep, not broadly lobate; palm transverse, with convex margin; posterodistal corner with 2 medial spines.

Peraeopods 3–7: with short, slender dactyli. *Peraeopod 3*: simple; coxa extremely reduced. *Peraeopod 4*: simple; coxa extremely large, produced anteriorly and posteriorly, anterior margin convex, posterior lobe produced as far as coxa 7. *Peraeopod 5*: coxa shallow, much broader than deep, tapering posteriorly, not lobate; basis linear with posterior margin straight. *Peraeopod 6*: coxa small, slightly lobate posteriorly; basis linear, broader than basis of *peraeopod 5*, slightly expanded posterodistally. *Peraeopod 7*: basis extremely expanded posteriorly, subtriangular posterior margin crenulate, with a long slightly rounded posteroventral margin; merus slender, only slightly expanded posteriorly. *Oostegites*: from *gnathopod 2* to *peraeopod 5*. *Gills*: from *gnathopod 2* to *peraeopod 6*, not pleated.

Epimeron 3: with a small tooth on posteroventral corner.

Uropod 1: outer ramus slightly longer than inner with large striated spine inserted in deep cleft; inner ramus with simple spine in shallow cleft. *Uropod 2*: peduncle elongate; outer ramus slightly longer than inner with large striated spine inserted in deep cleft; inner ramus with simple spine

in shallow cleft. *Uropod 3*: peduncle short, 1.4 times as long as deep, with lateral flange; rami lanceolate; inner ramus 0.72 times as long as outer ramus; outer ramus 1-articulate, broad with a subapical incision; plumose setae absent. *Telson*: 1.5 times as long as broad, entire, without dorsal spines, distal margin rounded, with 2 pairs of subapical penicillate setae.

Remarks. *Pseudocyphocaris gosema* is related to *P. coxalis* by its 3-articulate maxillipedal palp. It is similar to *P. lobata* in coxa 6 which is slightly lobate posteroventrally.

Etymology. The species takes its name from the type locality, Gosem Island.

Pseudocyphocaris lobata n.sp.

Figs 6–8B

Type material. HOLOTYPE, sex not known, 2.2 mm, AM P39216, Paddock Reef, off Gosem Island, near Madang, Papua New Guinea, approx. 5°12'S 145°47'E, in association with *Didemnum molle*, formalin wash of coral rubble from patch reef, 3 m, J.D. Thomas, 7 Jan. 1989, JDT/PNG-1.

Diagnosis. *Colour*: translucent green with deep red colouring on peduncle of antenna 1, anterior portion of head, middle of body (in form of a ventrally tapered saddle on posterior half of pereonite 4, anterior half of pereonite 5 and part of coxa 4) and dorsum of pleonite 1. *Maxilla 2*: inner and outer plates subequal in breadth. *Maxillipedal palp*: 4-articulate, article 4 vestigial. *Coxa 4*: posterior margin reaching to coxa 6. *Peraeopod 6*: coxa greatly lobate posteriorly.

Description. Holotype, 2.2 mm. *Colour in life*: translucent green with deep red colouring on peduncle of antenna 1, anterior portion of head, middle of body (in form of a ventrally tapered saddle on posterior half of pereonite 4, anterior half of pereonite 5 and part of coxa 4) and dorsum of pleonite 1. Eye black. *Head*: deeper than long, lateral cephalic lobe subtriangular; rostrum absent; eyes oval. *Antenna 1*: short, 0.2 times as long as body, slightly shorter than antenna 2; peduncular article 1 of medium length, 1.5 times as long as deep; without midmedial tooth; accessory flagellum 1-articulate, not forming cap; callynophore, reduced 1-field; flagellum short, 5-articulate; calceoli absent. *Antenna 2*: peduncle without brush setae, peduncular article 3 with a large distal hook on lateral face, peduncular articles 4 and 5 not swollen; calceoli absent.

Mouthpart bundle: conical. *Epistome* and *upper lip*: fused, margin straight in profile. *Mandible*: incisors narrow, symmetrical, both with slightly convex margins; left lacinia mobilis a cuspidate peg; accessory spine row, left and right each with 13 small stout spines; molar absent; mandibular palp attached extremely proximally, article 1 elongate,

nearly twice as long as broad, article 2 elongate, slender, with 1 large distomedial seta; article 3 weakly falcate, setae absent. *Maxilla 1*: inner plate not known; outer plate narrow, with 11 spine-teeth in 2 rows, outer row with ST1 to ST7, large, weakly to multicuspitate, left ST7 with elongate inner margin, 6-cuspidate distal margin, right ST7 with short inner margin, 10-cuspidate distal margin, both displaced from ST6; STA displaced from STB, large, simple, STB–STD small, simple, STD

displaced from STC; palp large, 1-articulate, with bifurcate apical margin. *Maxilla 2*: inner and outer plates subequal in length and breadth. *Maxilliped*: inner plate long, slender, apical nodular spines and oblique setal row absent; outer plate large, apical setae, apical spines, medial spines and submarginal setae all absent; palp small, 4-articulate, dactylus vestigial with 2 terminal setae.

Gnathopod 1: simple; coxa extremely reduced; carpus subrectangular, 2.4 times as long as deep, subequal in

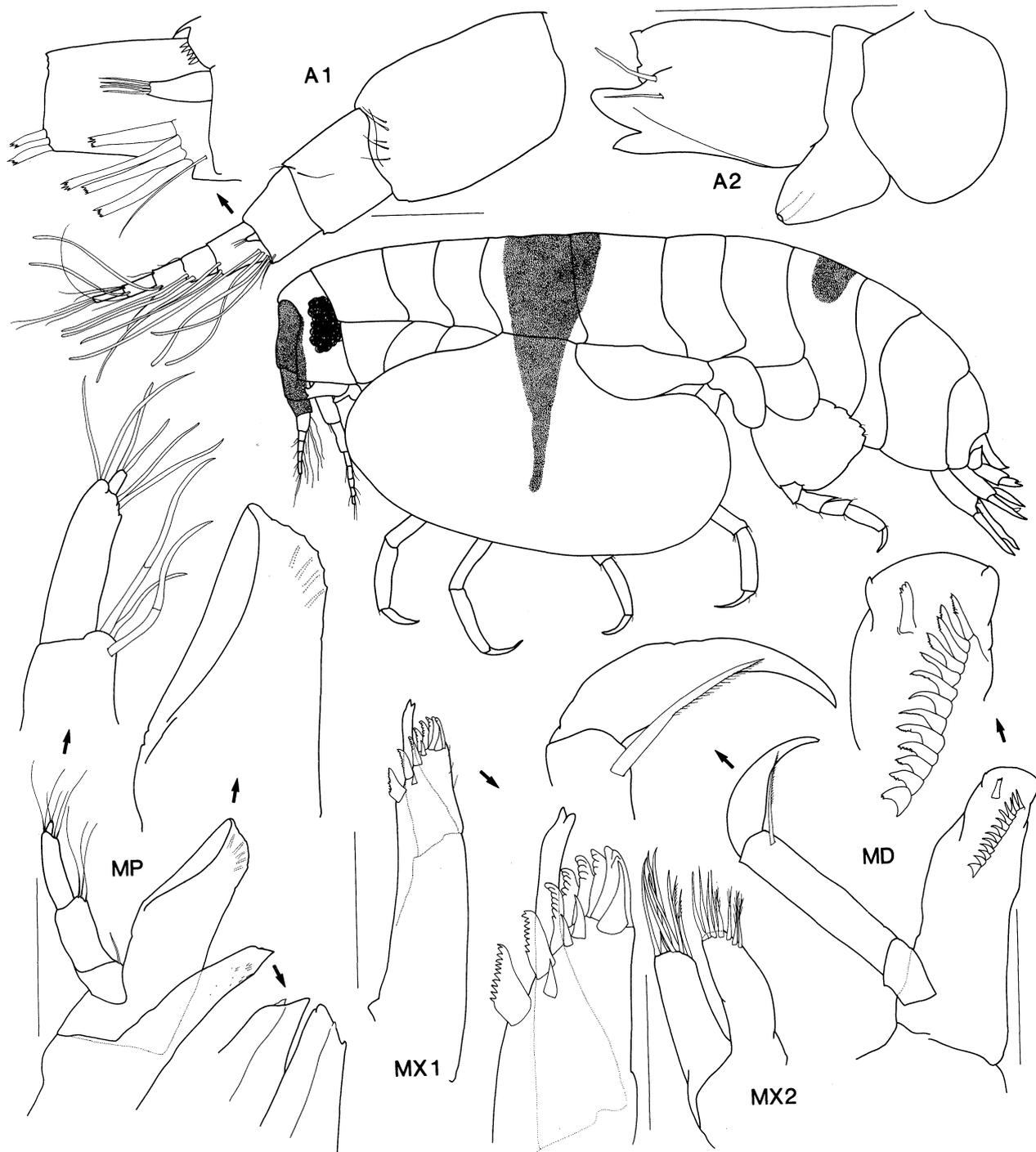


Fig. 6. *Pseudocyphocaris lobata* n.sp., holotype, 2.2 mm, AM P39216, Gosem Island, Papua New Guinea. Scales represent 0.1 mm.

length to propodus; propodus subrectangular, 2.8 times as long as deep, tapering distally; posterior margin serrate, straight, with 1 midmedial spine; dactylus simple, without subterminal tooth. *Gnathopod 2*: minutely subchelate; coxa extremely reduced, subequal in size to coxa 3; carpus subrectangular, 5.2 times as long as deep; propodus subrectangular, 2.9 times as long as deep, not broadly

lobate; palm transverse, with convex margin; posterodistal corner with 1 medial spine.

Peraeopods 3-7: with short, slender dactyli. *Peraeopod 3*: simple; coxa extremely reduced. *Peraeopod 4*: simple; coxa extremely large, produced anteriorly and posteriorly, anterior margin convex, posterior lobe produced as far as coxa 6. *Peraeopod 5*: coxa shallow,

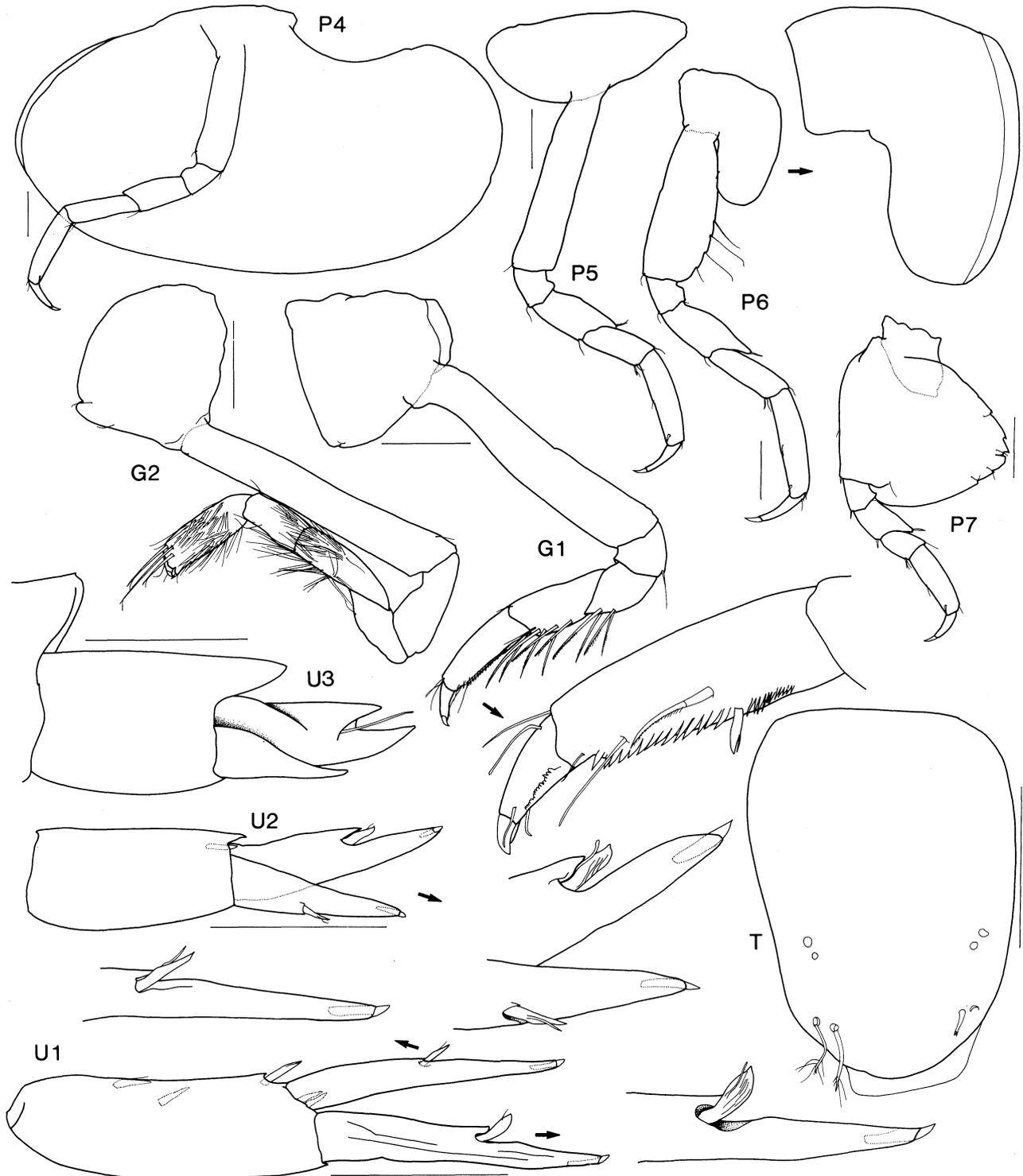


Fig.7. *Pseudocyphocaris lobata* n.sp., holotype, 2.2 mm, AM P39216, Gosem Island, Papua New Guinea. Scales represent 0.1 mm.

broader than deep, tapering posteriorly, not lobate; basis linear with posterior margin straight. *Peraeopod 6*: coxa small, greatly lobate posteriorly, basis linear, broader than basis of *peraeopod 5*. *Peraeopod 7*: basis extremely expanded posteriorly, subtriangular rounded posteroventral margin; merus slender, only slightly expanded posteriorly. *Oostegites*: from gnathopod 2 to *peraeopod 5*. *Gills*: from gnathopod 2 to *peraeopod 7*, not pleated.

Epimeron 3: with a small tooth on posteroventral corner. *Uropod 1*: outer ramus slightly longer than inner with large striated spine inserted in deep cleft; inner ramus with simple spine in shallow cleft. *Uropod 2*: peduncle elongate; outer ramus slightly longer than inner with large striated

spine inserted in deep cleft; inner ramus with simple spine in shallow cleft. *Uropod 3*: peduncle short, 1.7 times as long as deep with lateral flange; rami lanceolate; inner ramus 0.7 times as long as outer ramus; outer ramus 1-articulate, broad with a subapical incision; plumose setae absent. *Telson*: 1.4 times as long as broad, entire, without dorsal spines, distal margin rounded, with 2 pairs of subapical penicillate setae.

Remarks. *Pseudocyphocaris lobata* and *P. gosema* both have posteriorly lobate coxa 6, but they differ in the development of the lobe and in the number of articles in the maxillipedal palp. *Pseudocyphocaris lobata* is related to *Wandin griffini* in two important ways. It has the same colour pattern and the vestigial dactylus on the

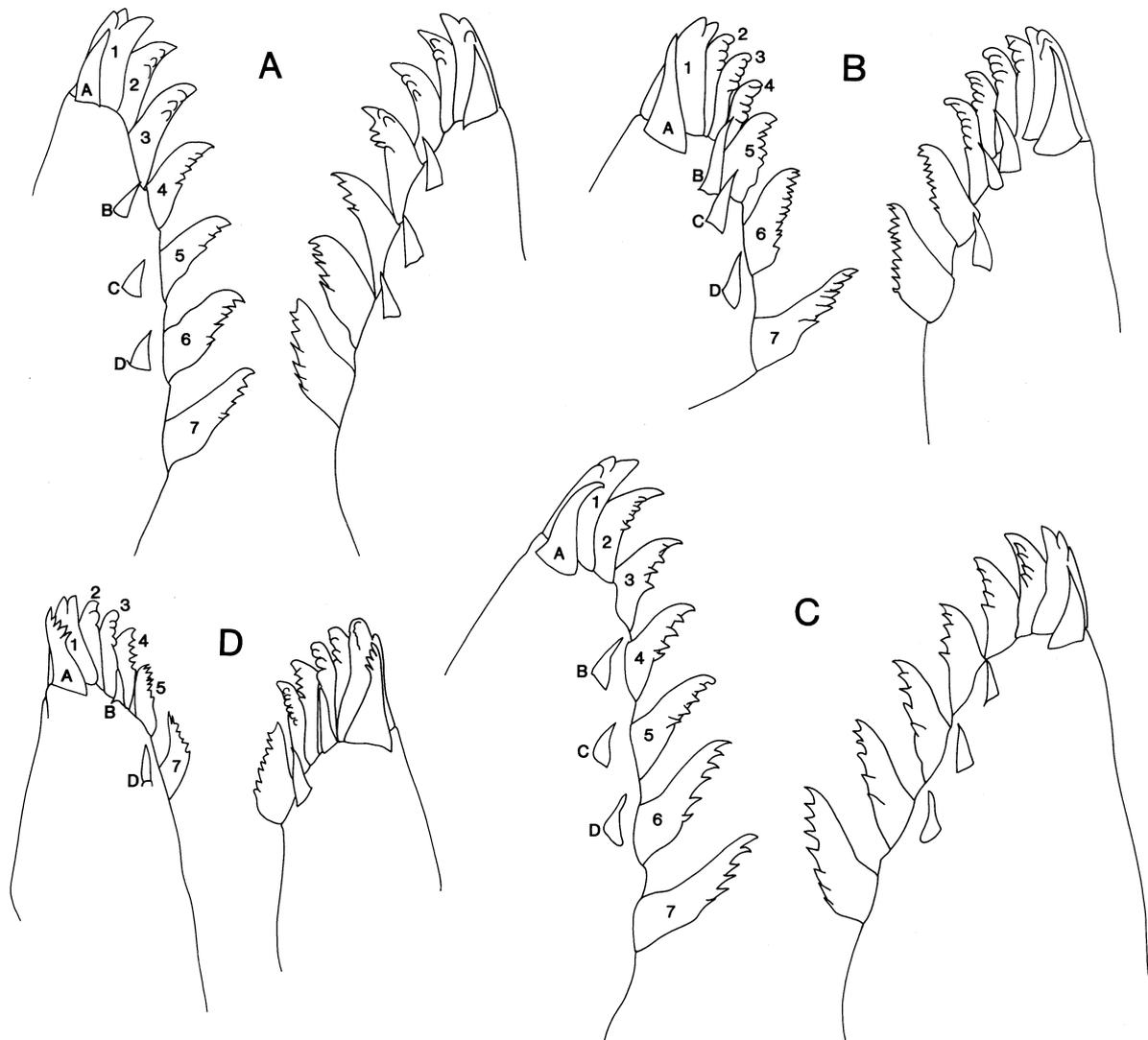


Fig. 8. Examples of spine-tooth arrangements on the outer plate of maxilla 1. Outer row spine-teeth are labelled from the internal margin (ST1) to the medial margin (ST7). Inner row spine-teeth are labelled in a similar way, medial margin (STA) to lateral margin (STD). A: *Pseudocyphocaris coxalis* Ledoyer, MNHN Am 3988; B: *Pseudocyphocaris lobata* n.sp., AM P39216; C: *Pseudocyphocaris gosema* n.sp., AM P39215; D: *Wandin griffini* n.sp., AM P39209.

maxillipedal palp is present. These character states emphasise the phylogenetic similarity between the genera.

Etymology. The specific name refers to the unusually large posterior lobe on coxa 6.

Wandinid Evolutionary Trends

The family Wandinidae is a monophyletic group of taxa which exhibits strong evolutionary trends, towards commensalism. Members apparently have no secondary sexual characters. The peduncle of antenna 2 has a peculiar hook-like process. The mouthparts are long and slender, forming a conical bundle, and individual mouthparts are simplified in various ways. The anterior coxae are variously reduced in size and the bases of pereopods 5 and 6 are slender. Coxa 4 is produced anteriorly and posteriorly to cover most of the side of the body.

There are striking similarities between wandinids and anamixids. Both groups live in tunicates. Thomas and Taylor (1981) reported *Anamixis hanseni* Stebbing from the tunicate *Ecteinascidia turbinata* Herdman. J.D. Thomas has seen *Pseudocyphocaris gosema* and *P. lobata* sitting on the lip of the tunicate *Didemnum molle* (personal communication).

Both groups have reduced anterior coxae. In *Anamixis hanseni* and *Wandin griffini* the first coxa is extremely reduced, and in *Pseudocyphocaris* coxae 1 to 3 are extremely reduced. From discussions with Thomas it appears that the size reduction of the anterior coxae allows the head to be tucked back under the body into a feeding position.

Both groups apparently have a mechanism for locking the head in place. According to Thomas (*in litt.*) in anamixids the lateral margins of the head and pereonites 1 and 2 are produced in such a way as to lock the head between the coxae during feeding. The hook-like structure on the peduncle of antenna 2 in all wandinid taxa so far described may lock the head in a similar position.

Both groups have large coxae which form a lateral shield. In *Anamixis hanseni* coxae 2 to 4 are enlarged to form a lateral shield which probably helps direct pleopod-generated feeding currents (Thomas & Taylor, 1981). In *Wandin* the same coxae form the shield, but in *Pseudocyphocaris* the fourth coxa is extremely enlarged anteriorly and posteriorly to produce the shield. In wandinids the lateral shield projects posteriorly to pereopod 7 and the bases of all pereopods except 7 are slender. Coxa 4 may act in the same way as coxae 2 to 4 in anamixids and channel pleopod-generated feeding

currents to the mouthparts.

One apparent contradiction in this hypothesis is that male anamixids have rudimentary mouthparts and wandinids have well developed mouthparts. However, female anamixids (leucomorphs) and leucothoids have well-developed subquadrate mouthparts and feed in the same way as male anamixids. It could be argued that wandinids feed by piercing and sucking or are mucus feeders, but the majority of existing morphological evidence indicates that they have a feeding strategy more similar to anamixids.

All of these adaptations apparently result in an efficient feeding mechanism for a tunicate commensal. Thus wandinids appear to be the lysianassoid equivalent of anamixid leucothoids. They show a number of examples of parallel evolution which have produced striking morphological similarities and apparently resulted in two unrelated groups filling similar habitats as tunicate commensals.

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