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Freshwater Amphipods from Barrow Island, Western Australia

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ABSTRACT. Amphipods collected from bore-holes and caves on Barrow Island, Western Australia are reported. Seven new species of the family Melitidae, genus *Nedsia* Barnard & Williams, 1995, and one of the family Bogidiellidae, genus *Bogidomma* n.gen., are described. A key to the species of *Nedsia* is provided.

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Unlike many other areas of the world, gammarid amphipods have not often been reported as components of Australian subterranean freshwater faunas (Williams, 1986; Holsinger, 1994). Recent reports from Western Australia (Humphreys & Adams, 1991; Knott, 1993; Barnard & Williams, 1995), Tasmania (Horwitz, 1988; Eberhard *et al.*, 1991), New South Wales (Eberhard, pers. comm.), and Queensland (Barnard & Williams, 1995) indicate that there is, in fact, a significant and diverse amphipod component among aquatic stygofauna over a wide area of the continent. Moreover, this diversity appears to extend over the coastally located underground waters (e.g., anchialine caves; Bradbury & Williams, 1996). This communication reports a further eight new species of amphipod taken from underground waters of Barrow Island, Western Australia.

Barnard & Williams (1995) describe a mono-specific melitid amphipod genus *Nedsia* from underground waters of North West Cape, Western Australia. Extensive collections on Barrow Island (geologically, an isolated section of the Cape Range and located some 55 km off the coast of Western Australia at 20°46'S 115°24'E),

reveal eight species within underground water systems there. Several are unique, some damaged, but nevertheless described here. Conditions of collection prevailing on Barrow Island preclude re-examination of some sampling sites as many are temporary boreholes, or the fauna has been destroyed as part of the programme of electrolytic protection undertaken in oil drilling procedures. Seven new hadziid species and one new species of bogidiellid are described. Bogidiellids have not previously been recorded from Western Australia, the only other Australian record being from Heron Island, Queensland (Stock, 1984).

Methods of Dissection and Description

Methods of dissection and description closely follow those of Williams & Barnard (1988) and Barnard & Williams (1995) except in the use of upper case letters to indicate right or left.

The notation **M**, with an appended number, indicates the position of an object as a fraction of the distance

from the base to the apex of an appendage; **S**, large spine; **s**, small spine.

A key to the abbreviations used in the figures is as follows: **A**, antenna; **Abd**, abdomen; **acc**, accessory; **C**, coxa; **d**, dorsal; **dact**, dactylus; **E** [in figures only], epimeron (cf. E in text, for large seta); **fl**, flake; **flag**, flagellum; **g**, gill; **G**, gnathopod; **Hd**, head; **i**, inner; **juv**, juvenile; **L**, left; **lac**, lacinia mobilis mobilis; **LL**, lower lip; **MD**, mandible; **med**, medial; **mol**, molar; **MP**, maxilliped; **MX**, maxilla; **o**, outer; **O**, oostegite; **opp**, opposite; **p**, palp; **P**, pereopod; **PC**, prebuccal complex; **pl**, plate; **Pp**, pleopod; **R**, right; **sp**, spine; **sq**, square view; **sr**, setae removed (sometimes marked by sockets); **st**, sternal gill; **T**, telson; **U**, uropod; **UL**, upper lip; **UR**, urosome; **1, 2, 3... 7**, first, second, third... seventh article, segment, somite or epimeron (as appropriate).

Setae of the mandibular palp are described using the method of Karaman (1969) and Barnard & Barnard (1983). Lowry & Stoddart (1993) proposed a modification of that scheme which removes many of the discrepancies found in the original. However, as description of the few setae present on the mandibular palp of these taxa does not impinge upon the areas of confusion within the original scheme, nor contradict the new, we have been able to employ conventional terminology.

Family Melitidae

Barnard & Williams (1995) assigned *Nedsia* to the family Melitidae, within the hadzioid superfamily. The hadziid/melitid group is complex and not clearly defined. Holsinger (1994) groups Melitidae within the Hadziidae, pointing to "considerable taxonomic instability within this group, much of which has apparently resulted from rampant parallelism and excessive homoplasy." We do not wish to add to the confusion over affinities within this group, so accept Barnard & Williams (1995) placement for the present.

The genus displays similarities to eriopisids (Karaman, 1984), particularly in the presence of an elongate second article of the outer ramus of the third uropod, which is uncommon, but does occur elsewhere, for example, in *Pseudoniphargus adriaticus* Karaman, 1955 and *Niphargus longicaudatus* Costa, 1851. Unlike *Eriopisa* or *Psammogammarus*, however, the anterior coxae of *Nedsia* are not significantly reduced, nor is the female second gnathopod hadziid, or the first gnathopod ceradocid as in *Psammogammarus*. Moreover, the mandibular palp is reduced to two articles, although the terminal article is linear as in eriopisids, rather than falcate with distinct D- and E-setae as in *Hadzia*.

Nedsia Barnard & Williams, 1995

Nedsia Barnard & Williams, 1995: 197.

Type species. *Nedsia douglasi* Barnard & Williams, 1995, by original designation.

Introduction. This genus was erected by Barnard & Williams (1995) for a single species collected from North West Cape in Western Australia; only females were represented in the collection. We now redefine the genus, include description of a male specimen of *N. douglasi* and describe seven further *Nedsia* species from Barrow Island, Western Australia.

Modification of the original diagnosis is intended to accommodate: additional dorsal spination of the pleonites, variation in the ratio of lengths of articles of the peduncle of the first antenna and length of the second antenna, variation in the medial setation of the maxillae, asymmetry of the palps of the first maxilla, greater relative length of some coxae with more posterior spines, provision for some variation of length of the inner ramus of the third uropod and division of the telson. Additional diagnostic features include allowance for a symmetrical non-excavate upper lip, presence of three, rather than two, blunt naked spines on the inner plate of the maxilliped, and lack of a contiguous naked tooth spine on the maxillipedal outer plate. Reference to exclusively blunt submarginal setae is deleted, as are variation of the apex of the maxillipedal palp, additional numbers of peduncular setae of the pleopods, equal pleopodal rami, and reduction of the spination of the rami of the first and second uropods.

The species described in this report are congeneric with the hitherto mono-typic genus *Nedsia*. Examination of these new *Nedsia* species led to a review of generic characteristics and a redefinition of the genus. All the Barrow Island species of *Nedsia* display apically dentate palmar spines on the first gnathopod and several also bear posterior hadziid setae on the second gnathopod. Whilst the descriptions (Barnard & Williams, 1995) of *Nedsia* and *N. douglasi* do not make reference to bifid palmar spines, examination of others of the species from North West Cape indicates their presence in all cases. Included in the redefinition is information on sexual differences, since the original description was based only on females; male material is now available.

Diagnosis. *Pleonites* with few dorsal spines. *Head*: rostrum weak; lateral cephalic lobes moderately to strongly projecting, very broad; no antennal sinus present; eyes absent. *First antenna*: elongate, longer than antenna-2; ratio of peduncular articles from 3:2:1 to 2.7:2.6:1; accessory flagellum 2-articulate. *Second antenna*: short to very short; flagellum much shorter than peduncle; calceoli absent. *Mandible*: palp reduced, 2-articulate; ratio of mandibular palp articles variable, article-1 not setose, terminal article linear or tapered, subtruncate; setae few or nil C- or D-setae, 2 or 3 E-setae. *Lower lip*: with inner lobes. *Maxillae*: moderately to well setose medially; inner plate of maxilla 1 ovate with variable number of medial setae, outer plate with denticulate spines, palps symmetric or nearly so, with thin apical spines; inner plate of maxilla 2 with row of medial setae extending onto face apically, other medial setae few or absent. *Coxae*: 1-7 mostly short, broader than long, with few or no posterior spines; coxa

1 not expanded below; coxa 4 not excavate posteriorly; coxa 5 as long as 4. *Gnathopods* 1–2 diverse: first gnathopod small, feeble; carpus longer than propodus, not lobate; merus lacking hyaline lobe; palm transverse, spines simple, some bearing trigger hairs and thus asymmetrically bifid, some apically dentate; spines at corner of palm—lateral 2–4 long, medial 2–5 short; setae along palm moderate to sparse and simple; second gnathopod weakly enlarged; carpus short and lobate; propodus of medium enlargement and ovate; palm oblique, irregularly spinose and sparsely setose, defining corner with 1–3 spines. *Pereopods* 5–7 moderately elongate: pereopod 7 longer than pereopods 5–6; article-2 moderately expanded, ovato-rectangular, posteroventrally extended but not lobate; dactyls of pereopods 3–7 lacking accessory spinules. *Coxae*: 2–6 each with flask-shaped gill; coxal gill 6 not reduced; coxae 2–5 each with a thin, poorly setose oostegite. *Thoracic segments*: lacking sternal gills. *Uropod* 3: strongly extended, parviramous; peduncle short; outer ramus 2-articulate, huge; inner ramus scale like, reaching to M0.15–0.25 on article-1 of outer ramus. *Telson*: longer than broad; cleft 90–100%; lobes weakly convex laterally, with subapical setation; setal spines, where present, lateral; single lateral penicillate setules at M0.6 to M0.7 on each side.

Additional description. *Upper lip*: symmetrical or asymmetrical; sometimes weakly excavate below. *Mandibles*: accessory blades (rakers) very few (3–4) on right side, with or without interraker plumose setae between each main raker; both mandibles with few or no additional serrations beyond rakers. *Maxillae*: both plates of second maxilla with apical setae of medium length; inner plates of maxillae 1–2 and medial and lateral margins of maxilla 2 poorly covered with

pubescence. *Maxilliped*: inner plate very long with distal row of several plumose setae and 3 blunt naked spines, and short medial row of plumose setae; outer plate large, with few distal plumose setae, continuous with a blunt naked tooth spine in some; medial margin carved into sinuosities, spineless; submarginal face with pairs of setae; palp articles 2–3 weakly setose laterally, article-2 moderately setose medially, article-3 with setae or comb rows of setae near the base of the dactyl, apex weakly or not produced, dactyl unguiform, with short to moderate length nail. *Gnathopods*: dactyls lacking inner tooth spine, lacking nail; *first gnathopod* without rastellate seta of article-4. *Pereopods*: 3–4 of proportions similar to pereopods 5–7; posterior spine sets on article-6 of pereopods 3–4 unevenly spaced. *Pleopods*: similar; peduncles with 1–3 setae each; rami extending subequally to equally, basomedial setae of inner rami of some bifid; retinaculae 2 or 3, no more than one accessory retinaculum present. *Epimera*: posteroventral tooth of epimera 1–3 usually absent; posterior margins smooth, and/or sinuous and sparsely setulose; some bearing facial spines near ventral margin. *Uropods*: apicolateral corner of peduncles on uropods 1–2 with 1 and 2 spines (thus with no more than 1 ventrally displaced spine on uropod 2); dorsal margins with or without spines; medial margin of uropod 1 with 1 or 2 apical spines; rami of uropod 1 extending subequally; outer ramus of uropod 2 shortened; uropod 1 with basofacial spine; most rami of uropods 1–2 with two spine rows, albeit reduced; medial setae of outer ramus of uropod 3 sparse, usually with subdistal peduncular setae or spines. *Urosome*: ventrodorsal spine on urosomite 1 at base of uropod 1 absent.

Composition. *Nedsia* now contains eight species. All the species recorded here are thought to be marine invaders or “strandings”.

Key to Species of *Nedsia*

1. Second maxilla with sparse marginal basomedial pubescence on inner plate (e.g., Fig. 3) or no pubescence on either plate 2
- Second maxilla with moderate to dense marginal pubescence both plates (e.g., Fig. 6) 4
2. Pleonites without dorsal spines *N. straskraba*
- Pleonites with dorsal spines 3
3. Epimeron 1 without distolateral spines, peduncle of uropod 1 with a lateral row of short facial spines besides the basofacial and distal spines, the palmar corner of gnathopod 1 rounded, the outer plate of the maxilliped tapering apically and with weak medial cusps *N. fragilis*
- Epimeron 1 with distolateral spines, peduncle of uropod 1 without facial spines besides basofacial and distal spines, palmar corner of gnathopod 1 subquadrate, outer plate of maxilliped not tapering, but rounded apically and with strong medial cusps *N. humphreysi*

4. Posterior margins of pleon sculpted, epimera with facial spines as well as ventral submarginal spines (e.g., Fig. 18) 7
 — Posterior margins of pleon smooth, epimera without facial spines other than ventral submarginal spines (e.g., Fig. 8) 5
5. Epimera 2–3 with few ventral submarginal spines, urosomite 1 with a spine-like extension at the base of the first uropod, rami of pleopods with more than six articles, maxillipedal palp article-3 without organised comb rows of setae at base of dactyl *N. hurlberti*
 — Not as above 6
6. Coxa 1 with one or more anterior spines, without anterior setae, telson without dorsal setae, length of the maxillipedal outer plate 2 × width *N. urifimbriata*
 — Coxa 1 without anterior spine(s), with anterior setae, telson with dorsal setae, length of the maxillipedal outer plate not more than 1.6 × width *N. douglasi*
7. Posterolateral margins of pleonite 4 with spines, medial margin of outer plate of maxilliped rugose, with 5 indentations *N. macrosculptilis*
 — Posterolateral margins of pleonite 4 without spines, medial margin of outer plate of maxilliped not rugose, with 4 indentations *N. sculptilis*

Nedsia douglasi Barnard & Williams, 1995

Nedsia douglasi Barnard & Williams, 1995: 198–201.

Diagnosis. *Body*: only pleonite 6 with 2 dorsal spines. Lateral cephalic lobes strongly projecting. *Antennae*: ratio of length of peduncular articles of first antenna = 45:35:8. *Upper lip*: asymmetrical; weakly excavate below. Mandibles: accessory blades (rakers) very few (3–4), no additional serrations beyond rakers; mandibular palp 2-articulate, ratio of articles 5:8, article-2 linear, subtruncate, 2 or 3 E-setae. *Maxillae*: inner plates of maxillae 1–2 poorly covered in pubescence; well setose medially; inner plate of maxilla 1 with 6 medial setae, palps symmetric; inner plate of maxilla 2 with no setae other than medial row extending onto face apically. *Maxilliped*: naked tooth spine of outer plate blunt, palp articles 2–3 weakly setose laterally, setae of article-3 organised into comb rows near base of dactyl; nail of dactyl short. *Coxae*: 1–7 short; coxae 1–4 lacking posterior spines. *Gnathopods* 1–2 diverse in female (male unknown): palmar spines of *first gnathopod* asymmetrically bifid, spines at corner of palm = lateral 3 long, medial 4 short; setae along palm sparse and simple; defining corner of *second gnathopod* with 1 spine. *Gills*: coxae 2–4 each with flask shaped gill. *Oostegites*: present on coxae 2–5. *Pleopods*: peduncles

with 1 seta each; retinaculæ = 2, accessory retinaculæ = 1. *Epimera*: posteroventral tooth of epimera 1–3 absent. *Uropods*: apicolateral corner of peduncles on uropods 1–2 with 1 and 2 spines (thus with 0–1 ventrally displaced spines), dorsal margins spinose, medial margin of uropod 1 with 2 apical spines, all rami of uropods 1–2 with 2 spine rows, albeit weakly furnished; inner ramus of uropod 3 reaching to M0.16 on article-1 of outer ramus. *Telson*: cleft 100%; setal spines, where present, lateral; single lateral penicillate setules at M0.6 on either side.

Description. As recorded for the holotype (Barnard & Williams, 1995).

A single male specimen was collected from a related site on North West Cape. This specimen, male “c”, bears many similarities to the female holotype and is believed to represent the same species. Variations from the holotype are set out within the description below.

Material examined. Male “c”, 5 mm: Cape Range, Western Australia. North West Cape region, subterranean fresh waters of the coastal plain. Western Australian Museum sample BES186. Not from type locality.

Description of male “c” (Figs 1, 2). *Body* 5 mm. *First antenna*: ratio of peduncular articles 50:48:18

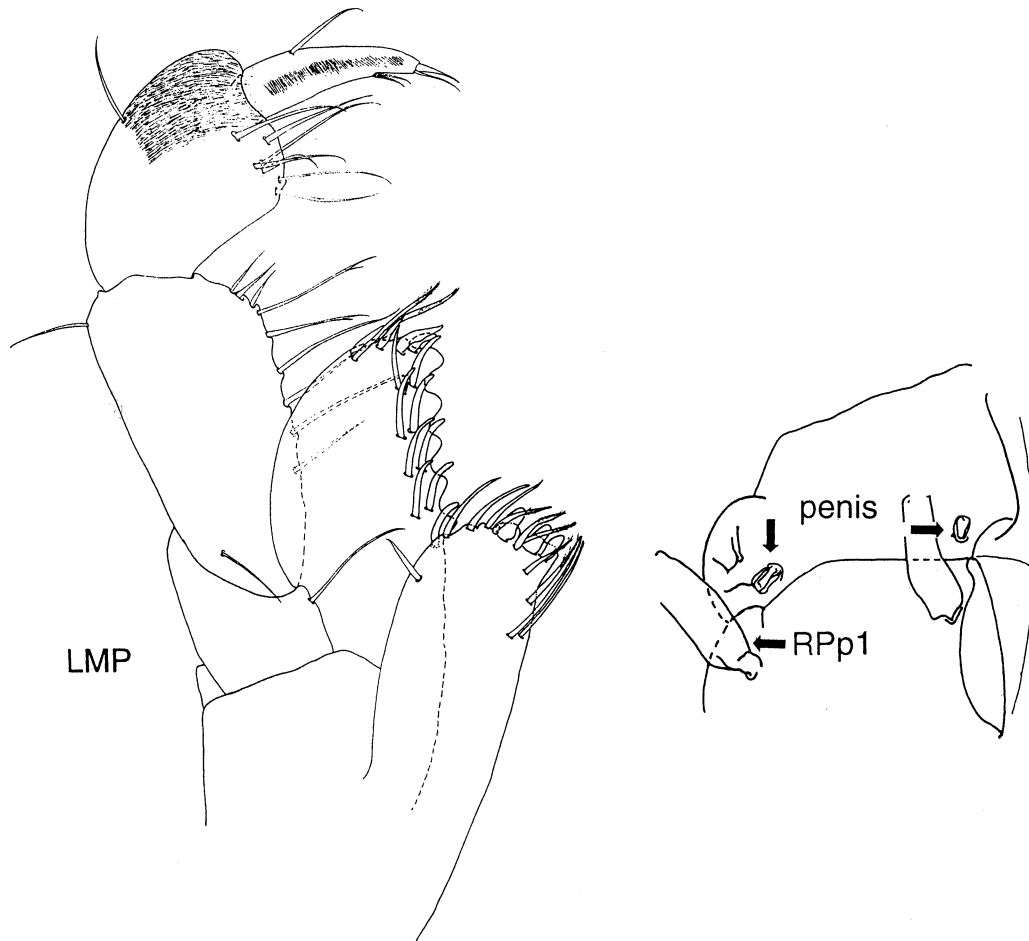


Fig. 1. *Nedsia douglasi* male "c" 5 mm. Maxilliped and penis.

(converts to 45:43:16 compared with female type = 45:35:8). *Upper lip*: apex rounded, not excavate, connection symmetrical. *Left mandible*: palp article-1 shorter than 2; article-2 with 2 apical setae; incisor 5 teeth; lacinia mobilis with 4 or 5 teeth; 5 setose accessory blades. *Right mandible*: incisor with 5 teeth; lacinia mobilis bifid; 4 moderately setose accessory blades. *Maxilliped* (Fig. 1): 3 blunt naked tooth spines on the inner plate. *Gnathopods* (Fig. 2): palm of gnathopod 1 more setose than female type, of gnathopod 2 similar. *Pereopods* (Fig. 2): similar to female type. *Uropods*: lengths relative to uropod 1 = 1:0.6:1.6 (vs. 1:0.5:1.33 in the female type); uropod 1 peduncle 1.14× outer ramus (vs 1.3×); inner ramus 1.14× outer; apices of both rami bearing 4 spines (vs 4–6); uropod 2 rami with marginal spines 1–1 and 1–2 (vs 1–1 and 1–3). *Telson*: fewer dorsal setae than the female type. *Penis*: small penial processes borne on either side of the posterior ventral surface of the seventh thoracic segment (Fig. 1).

Distribution. Coastal plain, North West Cape, Western Australia, Western Australian Museum sample BES186.

Nedsia straskraba n.sp.

Figs 3–5

Etymology. Named for Milan Straskraba, noted limnologist and early contributor to our knowledge of the taxonomy of Australian freshwater amphipods.

Type locality. Barrow Island, Western Australia, Western Australian Museum sample BES531.

Material examined. HOLOTYPE (Western Australian Museum WAM 1-96) male "a", 3 mm; male "b", 2.5 mm (collected at same site, at different date. Western Australian Museum sample BES539).

Diagnosis. *Pleonite* 6 without dorsal spines. *First antenna*: ratio of peduncular articles about 3:2:1. *Second antenna*: very short. *Upper lip*: margin not excavate; apically rounded and pilose. *Mandibles*: mandibular palp 2-articulate, article-2 cone like, setae 2E or 2D2E; interraker plumose setae absent; no additional serrations

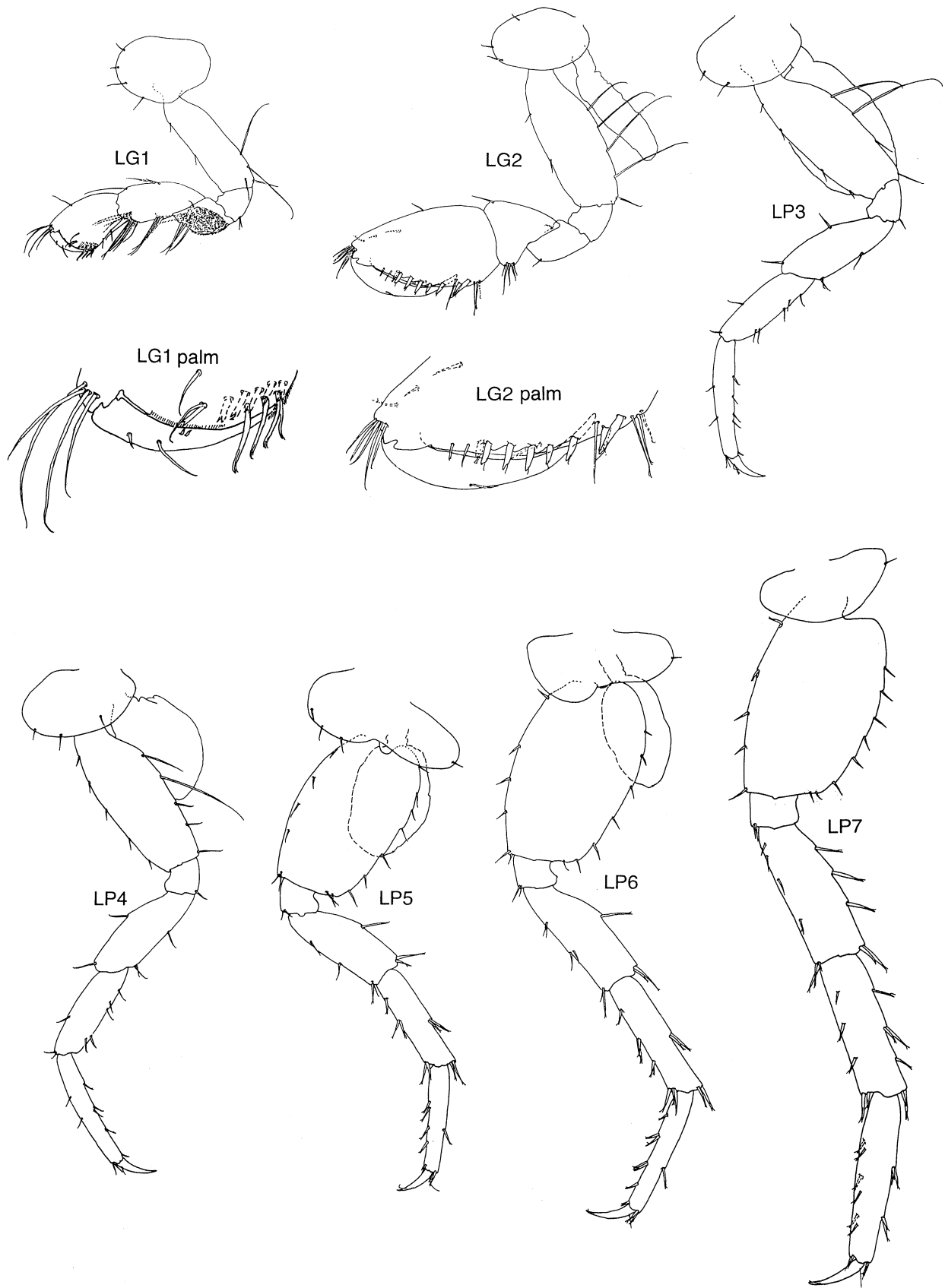


Fig. 2. *Nedsia douglasi* male "c" 5 mm. Legs.

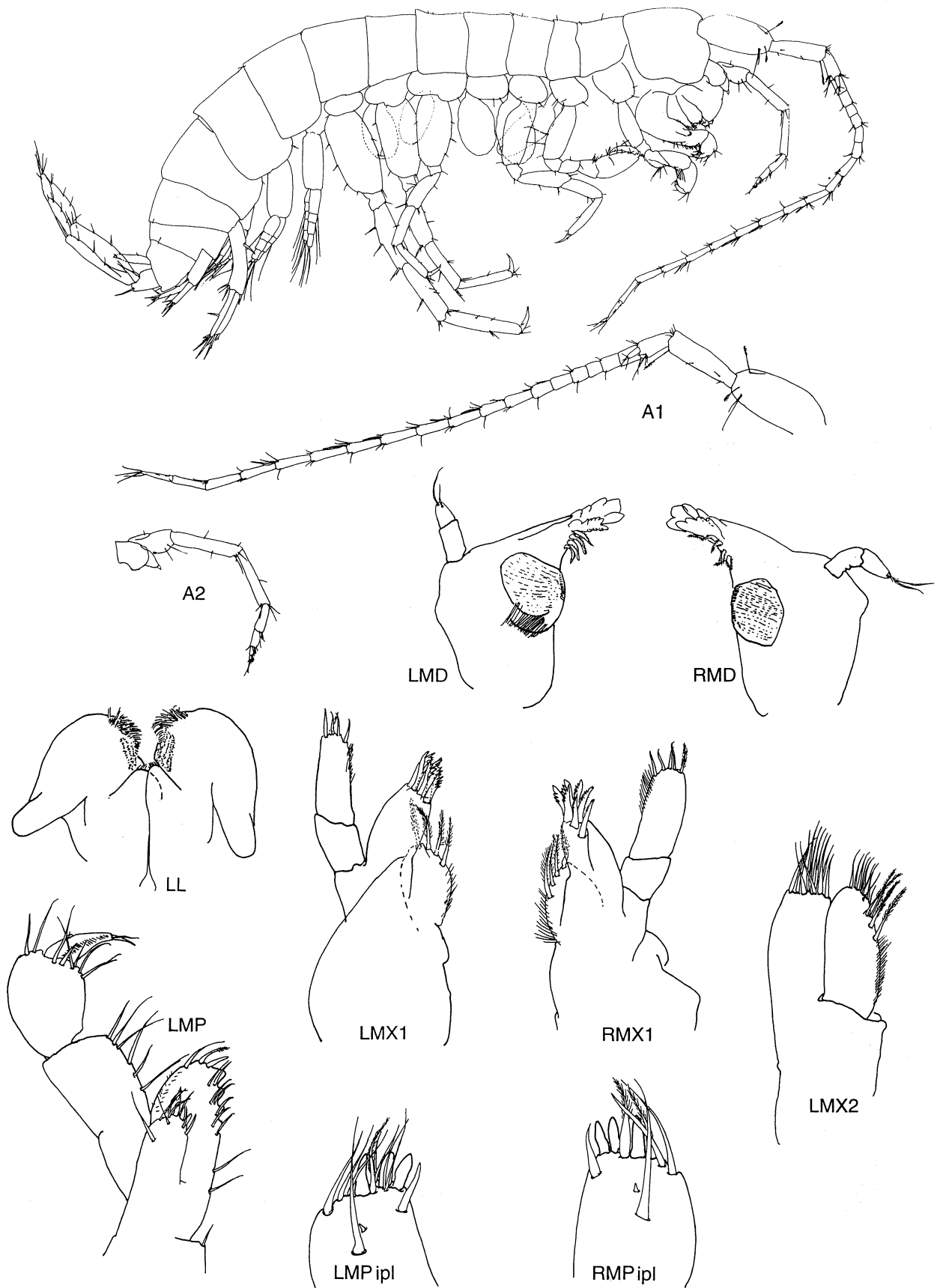


Fig. 3. *Nedsia straskraba* holotype male "a" 2.7 mm. Body, antennae, mouthparts.

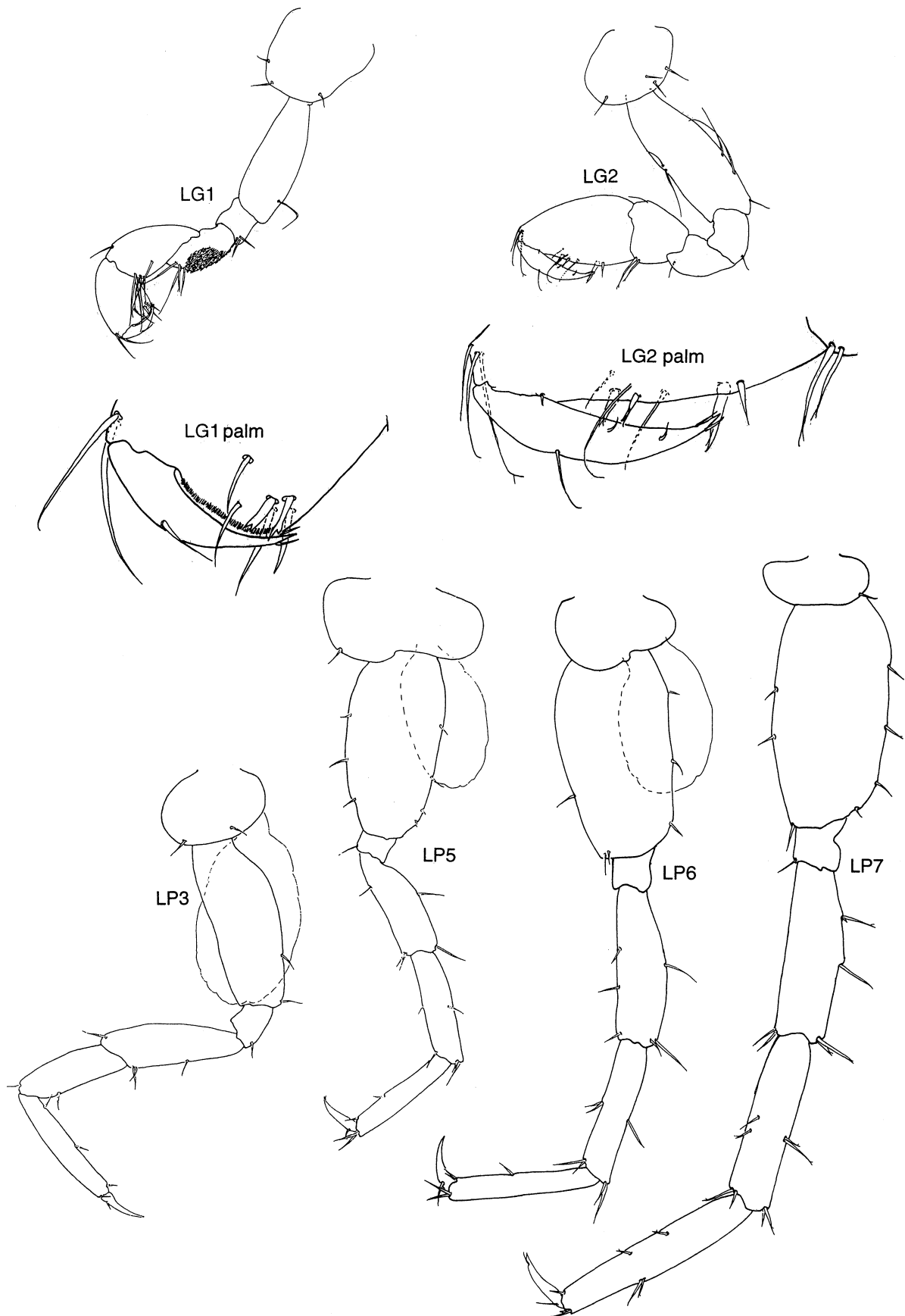


Fig. 4. *Nedsia straskraba* holotype male "a" 2.7 mm. Legs.

beyond rakers. *Maxillae*: moderately setose medially; *first maxilla* inner plate with 4 mediolateral setae; palps almost symmetric. *Maxilliped*: inner plate moderately long, no additional setae (plumose or naked) medially; outer plate with a blunt, naked tooth spine medially, the second pair of submarginal facial setae reduced to a single seta; palp article-3 lacking comb rows of setae near the base of the dactyl, facial comb row of setae from dactylar base to nail, nail of moderate length with similar length distal spine. *Coxae*: coxa 1 not expanded below; coxae 1–2 longer than broad with 1–3 posterior spines respectively; coxae 3–4 lacking posterior spines. *First gnathopod*: palmar spines evenly bifid; spines at corner of palm = lateral 2 long, medial 2 stout and bifid; setae along palm sparse; cutting edge of palm with many fine serrations. *Second gnathopod*: carpus only slightly lobate; defining corner of palm with 2 spines. *Pereopods*: posterior spine sets of article-6 of pereopods 3–4 reduced to 2 spines on pereopod 3. *Gills*: coxal gills 5–6 slightly reduced. *Pleopods*: peduncles with 0 or 1 seta each; rami extending subequally; basomedial seta on inner rami not bifid; retinaculae 2 on each pleopod, accessory retinaculae 1,0,1. *Uropods*: apicolateral corner of peduncles of uropods 1–2 each with 1 spine; dorsal margins of uropod 2 naked; spine rows of rami of uropods 1–2 reduced to 1 (uropod 1) and 2 (uropod 2) medial spines. *Telson*: cleft 100%.

Description of holotype (male “a”). *Body* (Fig. 3) 2.7 mm. *Urosome*: poorly armed dorsally. *Head*: rostrum obsolescent; eyes absent. *First antenna* (Fig. 3): length 0.9× body, 3.2× antenna-2; flagellum longer than peduncle (470:188); peduncular article-3 shortest, article-1 longest, ratio of lengths = 88:68:32; setae sparse; aesthetascs present on articles 8, 9, 11, 12, 14; calceoli absent; flagellum of 18 articles; accessory flagellum 2-articulate, reaching M0.7 of article-1 of primary flagellum, article-2 tiny; articles of primary flagellum not uniform, sparsely setulate. *Second antenna* (Fig. 3): length 0.28× body (206:745); peduncle much longer than flagellum, articles 4–5 equally long, 3–5 with weak ventral setation, article-3 with 1 dorsomedial spine; flagellum 4-articulate, no calceoli. *Upper lip*: margin not excavate. *Mandibles* (Fig. 3): left mandibular palp 2-articulate, articles unequal in length (17:10), article-2 with 2 long apical setae (2E) and 2 short setae (2D); incisor 5 toothed; lacinia mobilis with 4 denticles; 5 setose accessory blades; molar without distal plumose seta (probably lost by damage to specimen, tritritative; no other pubescence; right mandibular incisor 4 toothed; lacinia mobilis bifid, broad, finely denticulate; accessory blades of 5 plumose spines; palp 2-articulate, length ratio of articles 17:10. *First maxilla* (Fig. 3): palp article-2 with 5 thin apical spines, all naked on R, one plumose on left side; outer plate of left with 7 denticulate spines, of right with 6; inner plate bearing 4 terminal plumose setae medially, medial margin pubescent. *Second maxilla* (Fig. 3): outer plate devoid of pubescence; inner plate pubescent on basomedial margin. *Maxilliped* (Fig. 3): nail of palp short (11:32 of dactyl), article-3 with few thin setae at inner edge, none proximal; inner plate with single

ventrofacial spine and short spur at M0.5 and 0.6, and a single submarginal medial naked spine at M0.8. *First gnathopod* (Fig. 4): coxal plate with several short setae apically and one posteroventrally; article-4 slightly bulbous posteriorly, carpus not lobate; propodus trapezoidal, expanding slightly apically, longer than wide, the posterior edge naked, corner of palm rounded, 2 long, naked lateral spines, 2 stout bifid spines medially, palm slightly convex, dactyl reaching beyond the palm. *Second gnathopod* (Fig. 4): palm with 2 medial and 2 lateral spines, all but the corner spines being bifid, and 2 long and 1 medium setae; spines at palmar corner = 1 medial and 1 lateral (naked); coxal plate similar to first with 1 anterior and 3 posterior setae. *Pereopods* (Fig. 4): coxa 3 with setae similar to coxa 1, arranged 1 anterior, 1 posterior; coxa 4 similar, both setae anterior; pereopods 3–(4) longer than gnathopod 2; pereopods 3–5 approximately equal, articles 4,5 sparsely setose posteriorly, the posterior margin of article-6 (pereopod 3 only) with armament formula = ---1--1, thus with only one locking spine; pereopods 5–7 similar but consecutively elongate, with 1,2,1 locking spines; pereopod 7 anterior spines of articles 5 and 6 displaced inward by keel-like expansion of the segment; coxae 5–7 bearing 0,0,1 setae on posterior lobes, article-2 weakly expanded progressively from pereopods 5–7, not lobate, but extended posteriorly and bearing few setae on pereopod 5, becoming increasingly robust in pereopods 6 and 7; dactyls of pereopods 3–7 simple, naked except for an anterior basal penicillate setule, with the addition of an outer terminal setule on pereopod 7. *Gills*: coxae 2–6 with flask shaped gills, gill of coxa 3 largest, of coxae 5–6 slightly reduced. *Pleopods* (Fig. 5): retinaculae 2 per pleopod, one accessory each; peduncles 1 and 3 with an apicolateral seta, 2 without; rami extending subequally, the inner with 5:5:5 articles, the outer with 6:6:5; no bifid setae on basal articles. *Epimera* (Fig. 5): epimera posteroventrally quadrate; posterior margins scarcely convex on 1–2, concave on epimeron 3, all smooth, with few or no setae; epimera 2–3 with 2 and 1 weak ventral spines, lacking lateral oblique ridge. *Pleon* (Fig. 5): pleonites 1–4 with dorsolateral posterior setae; pleonite 6 with 1 dorsolateral and 1 distoventral spinule. *Uropods* (Fig. 5): uropod lengths relative to uropod 1 are uropod 2 = 0.6×, uropod 3 = 1.5×; uropod 1 peduncle length 1.3× inner ramus, the outer margin bearing a single apicolateral spine and reduced row of 2 mid-dorsal spines, the medial apex bearing 2 spines; rami of subequal length (inner : outer = 62:54), both naked except for a single mid-dorsal spine on the inner ramus; both rami with 5 terminal spines; uropod 2 peduncle length 0.9× inner ramus, bearing a single apicolateral spine only; inner ramus length 1.4× outer, the medial margin bearing 2 spines only, 5 terminal spines; outer ramus shorter, devoid of any but 5 terminal spines; uropod 3 strongly extended beyond uropods 1–2 in entire animal; peduncle length 0.14× outer ramus, shorter than urosomite 3 (25:50), bearing single mid-dorsal and laterodistal marginal setae, 1 subapical lateral seta, and 1 small mid-medial submarginal, facial seta; outer ramus proximal article

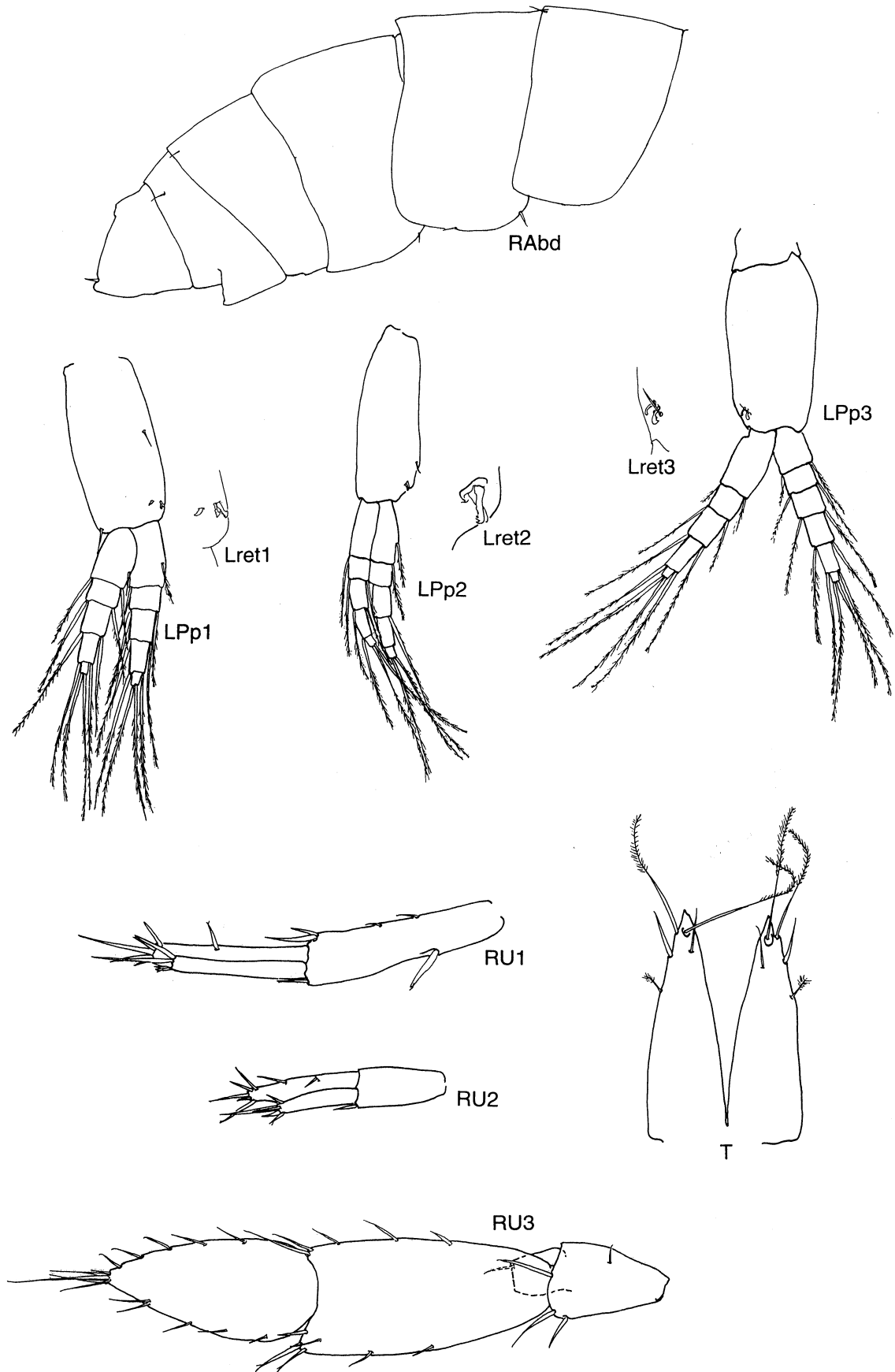


Fig. 5. *Nedsia straskraba* holotype male "a" 2.7 mm. Abdomen, pleopods, uropods, telson.

with few marginal setae, 2 apicomedial setae, 3 apicolateral setae and 1 subapical submarginal lateral seta, article-2 shorter (80:100), similarly armed, terminating in a cluster of 5 spines; inner ramus scale like, subquadrate, length 0.13× outer, bearing a single apicomedial spine. *Telson* (Fig. 5): length 1.5× width, widest at base, subequal in length to urosomite 3 (45:50), cleft 100%; apices slightly notched laterally female), apex of right lobe notched minutely medially; subapices with 2 long plumose setae, 1 submarginal medial seta and 1 lateral seta at M0.8, no other dorsal setae except for single penicillate setules on both lobes laterally at M0.7.

Description of other material. Specimen "b", male, length 2.5 mm. *Pleonite 6* with a single dorsolateral spine. *First antenna*: flagellum of 20 articles, aesthetascs present on articles 8,9,10,12,13,14,16. *Mandibles*: ratio of length of palp articles 1–2 = 15:12; setae of terminal article = 2E; interraker plumose setae present between accessory blades. *Left mandible*: palp article-2 shorter than in type; 15:12, setae = 2E; distal plumose seta present on both molars. *Maxillae*: spines of palp of left first maxilla not plumose *Maxilliped*: palp article-3 with rows of setae basal to dactyl; nail of dactyl short. *First gnathopod*: coxal plate without posteroventral seta. *Pleopods*: accessory spines adjacent to retinaculae = 1,0,0. accessory spine present adjacent to retinacula of pleopod 1 only. *Uropod*: lengths relative to uropod 1; uropod 2 0.7×, uropod 3 2×; peduncle of uropod 1 1.9× length of inner ramus, of uropod 2 equal to ramus; uropod 2 inner ramus 1.3× outer; peduncle of uropod 3 0.27× length of outer ramus (longer than in type; 0.14×), second article of outer ramus relatively longer than in type (90:102).

Relationship. *Nedsia straskraba* varies from *N. douglasi* in that pleonites lack dorsal spines, the second peduncular article of the first antenna is relatively shorter, the mandibular palp is similar being 2-articulate, with reduced terminal setation, the inner plate of the second maxilla has fewer medial setae, coxae 1–2 are longer than broad versus broader than long, the palmar spines of the first gnathopod are apically dentate, not asymmetrically bifid, there are no setae along the palm and the inner edge is finely serrate, the second gnathopod is weakly enlarged, melitid, the carpus less lobate, the palm more strongly oblique with few spines or setae and palmar corner poorly defined, the fifth and sixth coxal gills are reduced slightly compared with *N. douglasi*. The principle feature separating this species from all but *N. fragilis* and *N. humphreysi* is the absence of marginal pubescence on both plates of the second maxilla, and from *N. macrosculptilis*, *N. sculptilis*, *N. fragilis* and *N. humphreysi* the absence of dorsal spines or sculpturing of the pleon and of facial spines on the epimera. *Nedsia straskraba* is unlike *N. fragilis* in that the palmar corner of the gnathopod 1 is subquadrate and unlike *N. hurlberti* in lacking a spine-like extension of the first urosomite.

Distribution. Barrow Island, Western Australia.

Nedsia hurlberti n.sp.

Figs 6–8

Etymology. Named for S.H. Hurlbert, noted biostatistician and salt lake limnologist.

Type locality. Western Australia, Barrow Island, Western Australian Museum, Western Australian Museum sample site BES545.

Material examined. HOLOTYPE (Western Australian Museum WAM 2-96) female 4.5 mm, unique specimen.

Diagnosis. *Pleonite 6*: small dorsal spines, displaced laterally. *First antenna*: ratio of peduncular articles 45:40:15. *Second antenna*: very short. *Upper lip*: symmetrical, not excavate. *Mandible*: palp 2-articulate, article-1 not setose, article-2 linear, setae = 2E; plumose interraker setae present between each main raker; no additional serrations beyond rakers. *Maxillae*: well setose medially. *First maxilla*: inner plate with 7 plumose medial setae; palps symmetric with 7 thin apical spines. *Second maxilla*: inner plate with a row of medial setae barely extending onto face apically, no other medial setae. *Maxilliped*: outer plate large, with 2 stout plumose setae distally and a single naked tooth-spine; paired submarginal medial setae of the outer plate blunt, apically curved; palp articles 2–3 with single lateral setae, article-3 naked basally, moderately setose distally, with rows of short setae adjacent the base of the dactyl, the apex not produced. *Coxae*: coxae 1–4 lacking posterior spines. *First gnathopod*: palm slightly oblique, palmar spines apically dentate. *Second gnathopod*: defining corner with 2 spines. *Epimera*: without setae, each with some facial spines adjacent ventral and posterior margins. *Pleopods*: peduncles of pleopods 1–2 without setae, of pleopod 3 with 2 lateral setae; basomedial setae of inner rami bifid, no accessory retinaculae. *Telson*: cleft 100%.

Description of holotype (female). *Body* 4.5 mm. *Head* (Fig. 6): rostrum obsolescent; eyes absent. *First antenna* (Fig. 6): length 0.5× body (broken at article-17), longer than antenna-2, flagellum much longer than peduncle; peduncle article-1 longest, 3 shortest, setae sparse; flagellum of many articles (17+), without calceoli or aesthetascs; accessory flagellum of 2 articles, article-2 tiny, extending to M0.7 of article-1 of the primary flagellum; articles of primary flagellum variable in length. *Second antenna* (Fig. 6): short, length 0.27× body; peduncle very much longer than flagellum, articles 4–5 equally long, articles 3–5 with weak ventral setation of 0-2-7 naked setae and 1-2-1 plumose setae, article-3 without dorsomedial spines; flagellum 4-articulate, without calceoli. *Upper lip* (Fig. 6): without excavation of the apical margin, connection to the epistome symmetrical. *Left mandible* (Fig. 6): palp article-1 shorter than 2 (11:35), setae

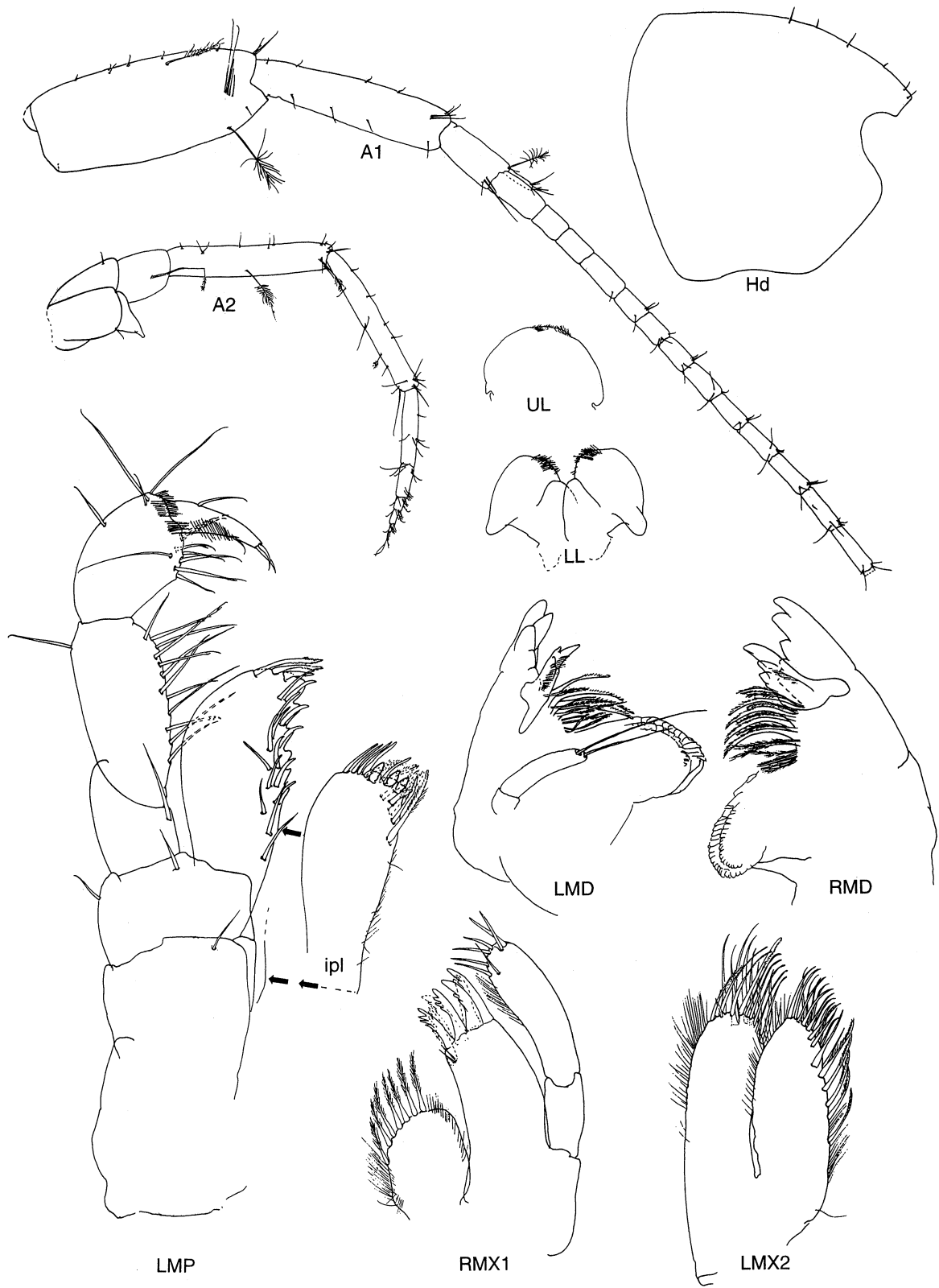


Fig. 6. *Nedsia hurlberti* holotype female 4.5 mm. Head, antennae, mouthparts.

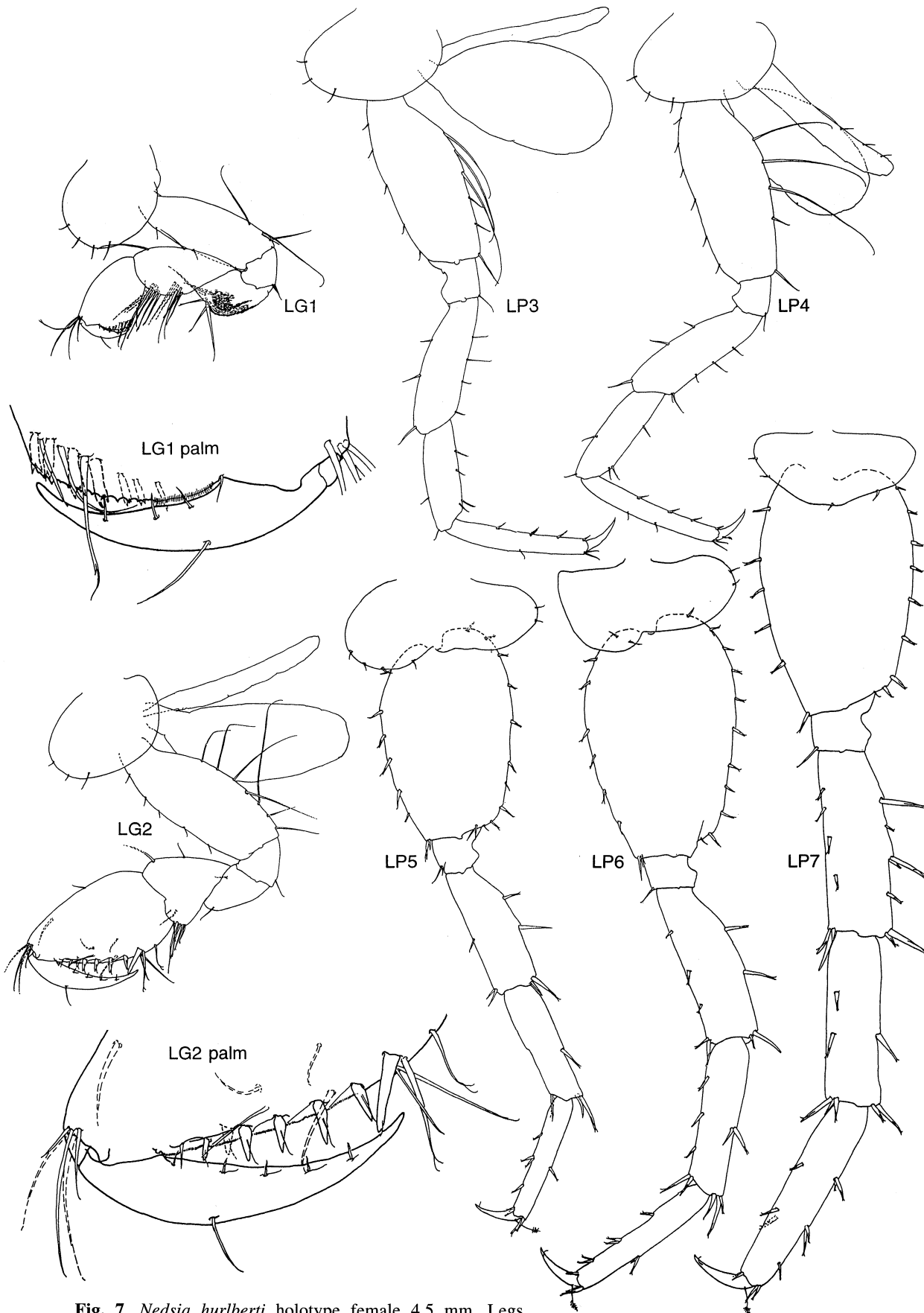


Fig. 7. *Nedsia hurlberti* holotype female 4.5 mm. Legs.

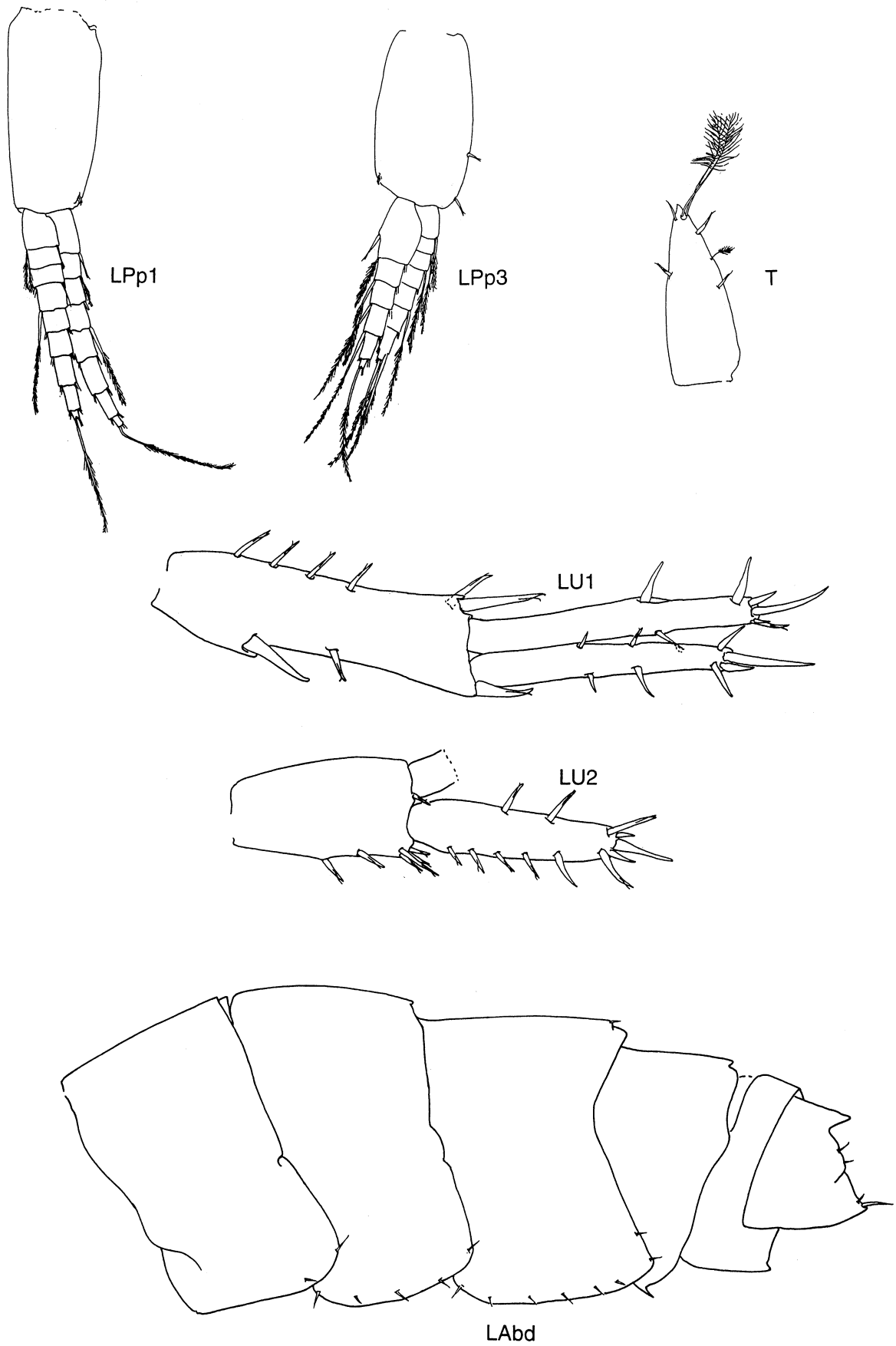


Fig. 8. *Nedsia hurlberti* holotype female 4.5 mm. Abdomen, pleopods, uropods, telson.

of article-2 = 2E: incisor 4 toothed; 4 setose accessory blades; lacinia mobilis bearing a row of short facial setae; plumose setae lying between each raker extend to the base of the molar; molar lacking distal plumose seta, without pubescence. *Right mandible*: incisor 5 toothed; lacinia mobilis 4 toothed and bearing facial setae; accessory blades of 5 plumose spines. *Maxillae* (Fig. 6): *first maxilla* palps of both sides bearing 7 thin apical and subapical spines; outer plate with 7 denticulate spines, the inner plate 7 medial setae; second maxilla, medial and apicomедial margin of both plates pubescent as is basomedial margin of inner plate. *Maxilliped* (Fig. 6): palp article-3 with moderate setae on the inner edge, dactyl bearing a row of mid-facial setae and terminal accessory spine slightly longer than the nail. *First gnathopod* (Fig. 7): coxal plate bearing 4 short setae apically, without posteroventral spines; article-4 posteriorly bulbous and facially pubescent; carpus not lobate; propodus trapezoidal, expanding slightly apically, longer than wide, the posterior edge naked, corner of the palm almost square marked laterally by 2 moderate unarmed spines and 1 long trigger spine, and medially by 4 stout trigger spines, palm convex, dactylus reaching the palmar corner, bearing 3 small spines submarginal to the inner edge. *Second gnathopod* (Fig. 7): coxal plate broader than coxa 1, poorly setose, with 3 anterior setae; propodus 2× that of gnathopod 1, palm bearing 5 lateral trigger spines, single unarmed distal spine, single medial trigger spine at M0.5 and a single long seta at M0.2 from the palmar corner; the palmar edge is finely serrated, the corner defined by a single long slender trigger spine, 1 long, stout trigger spine and 2 long setae. *Pereopods* (Fig. 7): coxa 3 slightly larger than coxa 2, coxa 4 more irregular, both with similar setae = 3 anterior, none posterior, coxae 5–7 with few setae on the ventral margin of posterior lobes (0-0-2); pereopods 3–7 longer than gnathopod 2, progressively elongate; pereopods 3–4 posterior armament formula of article-6 = S-S-S-S and S-2S-S-S, thus both with a single locking spine; pereopods 5–7 each with 2 locking spines; article-6 of pereopod 7 without posterior keel like expansion; article-2 of pereopods 5–7 expanded, but not posteroventrally lobate, bearing small trigger spines; pereopods 3–7 dactyls simple, naked, with an outer basal penicillate setule and a short subterminal seta. *Gills*: flask shaped gills on coxae 2–6; gill of coxa 6 not reduced. *Oostegites*: thin, strap like and poorly setose, present on coxae 2–5. *Pleopods* (Fig. 8): 2 retinaculae per pleopod, without accessory retinaculae, peduncle 3 only bearing a single apicolateral seta, rami extending subequally, the inner rami bearing 9-9-8 articles, the outer 9-9-6; basal article setae of rami 1–2 = 1-1-1-1, of which the inner seta is bifid on each. *Epimera* (Fig. 8): epimera 1–2 posteroventrally curved; epimeron 3 subquadrate, the posteroventral corners with 1-1-2 setae; posterior margins smooth, barely setulose, ventrofacial spines present as 1-4-6. *Pleon* (Fig. 8): pleonite 3 with a tiny posterior dorsal seta, pleonite

6 with 2 distolateral and 2 distoventral spines; uropod 3 strongly extended beyond uropods 1–2 in entire animal. *Uropod*: lengths relative to uropod 1 = uropod 2 0.6×, (uropod 3 1.3×). *Urosome* (Fig. 8): ventrodorsal spine at base of uropod 1 on urosomite 1 absent, although urosomite 1 extended ventrodorsally in a spine like projection. *Uropods* (Fig. 8): uropod 1 peduncle length equal to medial ramus, the outer margin bearing a single apicolateral spine and row of 4 dorsal spines, the medial margin 2 apical spines; rami subequal, both with 2 sparse rows of marginal spines, spines of the apex = 4 and 5; uropod 2 peduncle 0.9× length of outer ramus, bearing, as well as 2 apicolateral spines, single lateral and dorsal subapical spines, 1 dorsolateral spine at M0.7, 1 lateral spine at M0.5 and 1 mid-apical dorsal spine; no apical spines of the medial margin; (outer ramus shorter than inner) (both) with 2 rows of marginal spines of the form 5-1,(1-3), spines of the apex = (4)–5; uropod 3 (lost; similar to others of genus i.e. peduncle much shorter than outer ramus, shorter than urosomite 3, with subdistal seta, an apicolateral cluster of 5 spines, the outer ramus proximal article with several irregular spine/seta ranks, article-2 shorter but similarly armed; inner ramus much shorter than outer (0.4×) with a single apical spine). *Telson* (Fig. 8): 1.3× longer than broad, shorter than urosomite 3 (0.75×); cleft 100% of length; apices barely notched, 2 long penicillate setules and 1 shorter naked seta subapically, dorsal setae at M0.5 and M0.8, single medial seta at M0.6, and a single penicillate setule dorsolateral at M0.6.

Relationship. *Nedsia hurlberti* varies from *N. douglasi* in the shorter relative length of the first antenna and the variable length of the articles of the primary flagellum, no excavation or asymmetry of the upper lip, reduced dentition of the left mandibular incisor, inner plate of the first maxilla with an extra seta, the inner plate of the second maxilla apically pubescent, palp and dactyl of maxilliped more spinose, as are the propodus and dactyl of the gnathopods, absence of a posterior keel like extension of the sixth article of the seventh pereopod, the posterior margins of the epimera sinuous and epimeron 2 bearing an additional ventral seta, pleopods bearing an accessory retinaculum, the telson longer and more slender. *Nedsia hurlberti* differs from *N. straskraba*, *N. fragilis* and *N. humphreysi* in that the margins of both plates of the second maxilla bear pubescence, from *N. macrosculptilis* and *N. sculptilis* in that the pleon is not sculpted, nor the epimera bearing facial spines, and from *N. urifimbriata* in the presence of few ventrofacial spines on the second and third epimera, a spine like extension of the first urosome at the base of the first uropod, less than six articles of the pleopodal rami, and in the absence of organised comb rows of setae at the base of the dactylus of the maxillipedal palp.

Distribution. Barrow Island, Western Australia.

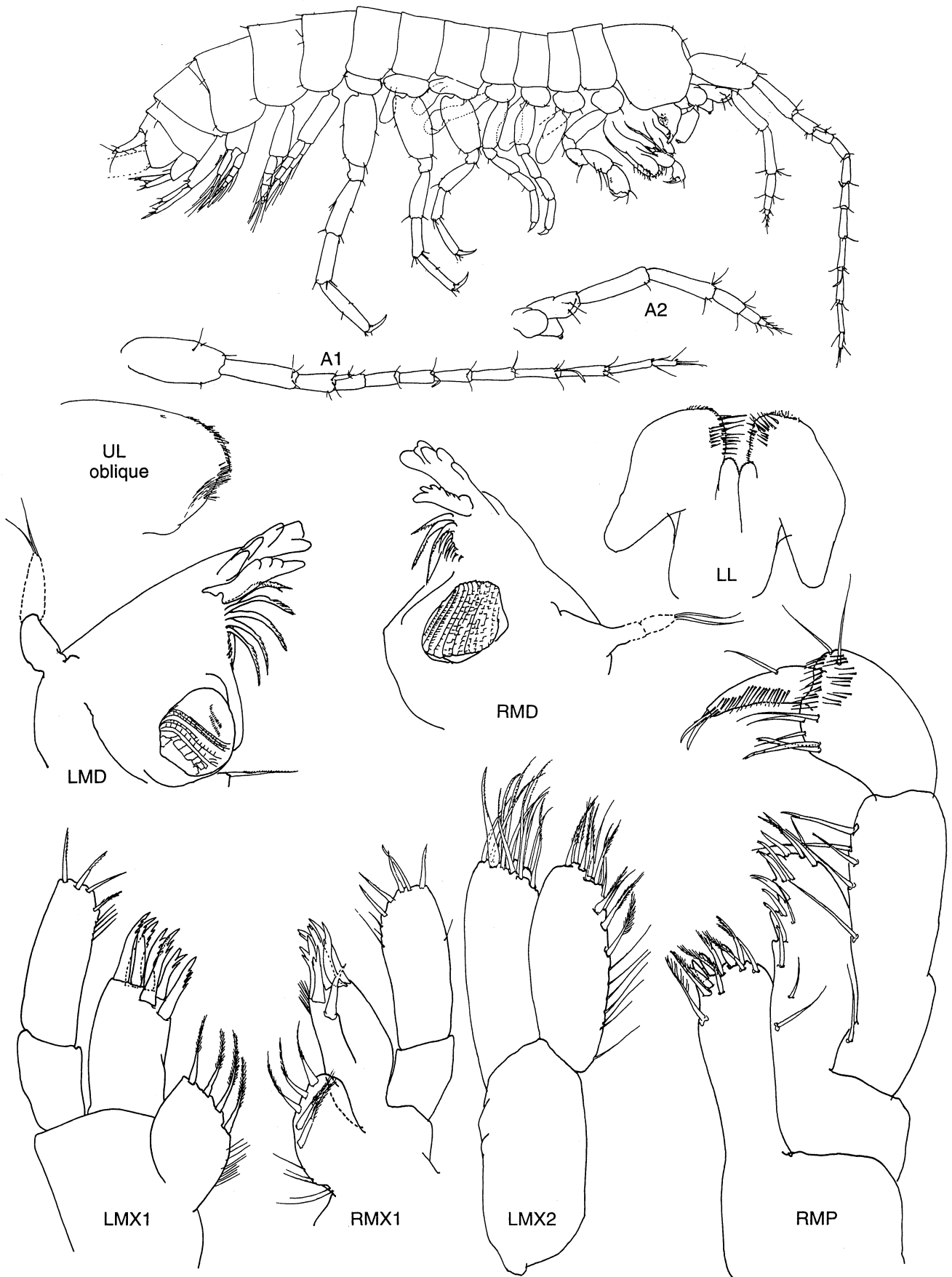


Fig. 9. *Nedsia humphreysi* holotype male 2 mm. Body, antennae, mouthparts.

Nedsia humphreysi n.sp.

Figs 9, 10

Etymology. Named for W.F. Humphreys, biologist, instrumental in the collection of Western Australian cave specimens.

Type locality. Barrow Island, Western Australia, Western Australian Museum sampling site BES710.

Material examined. HOLOTYPE (Western Australian Museum WAM 3-96) male 2 mm.

Diagnosis. Dorsal spines absent from pleonites 4–6. *Head:* lateral cephalic lobes slightly projecting. *Upper lip:* symmetrical, slightly excavate below. *Mandibular palp:* 2-articulate, 2E-setae only; lacking interraker plumose setae. *Maxillae:* without pubescence, sparse to moderately setose medially. *First maxilla:* palps asymmetric with thin apical plumose or serrate spines. *Second maxilla:* medial margins sparsely setulate, without pubescence. *Maxilliped:* apex of third article of palp slightly produced, dactyls with moderate nail and accessory spine of almost equal length. *Gnathopods:* (diverse, gnathopod 2 dominant); gnathopod 1 palmar spines bifid, spines at corner of palm submarginal = 2 lateral, 3 medial; palmar margin serrate, with submarginal row of fine setae. *Pereopods:* pereopods 3–4 lacking posterior spine sets on article-6. *Coxal gills:* gills 5–6 smaller but not substantially reduced. Sternal gills absent. *Epimera:* epimera 1–2 with 1, epimeron 3 with 2, posterior spines at the corner, ventrofacial spines absent. *Pleopods:* peduncles without setae, retinaculae = 2-3-2, accessory retinaculae absent. *Uropods:* apicolateral corner of peduncles on uropods 1–2 without spines, dorsal margins spineless, medial margins of both with 1 apical spine; rami of uropods 1–2 without spine rows except for inner ramus of uropod 1. *Telson:* cleft 100%; lobes with a small mid-lateral concavity.

Description of holotype, (male). *Body* (Fig. 9) 2 mm. *Head:* rostrum obsolescent; eyes absent. *First antenna* (Fig. 9): length 0.6× body, 2× antenna-2, flagellum 1.6× peduncle, peduncular article-1 longest without mediobasal spines or setae, article-3 shortest, setae sparse, flagellum of 9 articles, sparsely setulate, no aesthetascs or calceoli; accessory flagellum 2-articulate, article-2 tiny, total length 0.6× article-1 of the primary flagellum; length of articles of primary flagellum variable, article-7 longest. *Second antenna* (Fig. 9): length 0.3× body, peduncle longer than (3×) flagellum, articles 4–5 equally long, articles 3-4-5 with sparse ventral setation, article-3 with apicodorsal setae, no dorsomedial spines. Flagellum 4-articulate, no calceoli. *Upper lip* (Fig. 9): apical margin rounded, symmetrical. *Mandibles* (Fig. 9): left mandibular palp (2-articulate), article-1 very reduced, bud like, naked; incisor 5 toothed; lacinia mobilis with 4 teeth and 6 setose accessory blades; molar triturative with a

short distal plumose seta, lacking other setae or pubescence; right mandible palp 2-articulate, article-1 naked, short, bud-like, article-2 reduced, tapered, 2E-setae only; incisor with 5 teeth; lacinia mobilis with 7 denticles their size increasing distally; accessory blades of 3 plumose spines; a line of setae extending onto the base of the molar. *Maxillae* (Fig. 9): *first maxilla*, left palp 2nd article with 5 serrate apical spines, terminally rounded with 3 small to moderate apicomедial setae; right palp article-2 with 4 plumose apical spines, terminally subquadrate, 4 apicomедial setae; outer plate of both sides with 7 terminal spines, some of the left without denticles; left inner plate with 4 apicomедial and apical plumose setae, moderately setose basally; right inner plate with 4 apicomедial and apical plumose setae, moderately setose medially. *Second maxilla*, inner and outer plates devoid of pubescence. *Maxilliped* (Fig. 9): palp article-3 with apical pair of slender setae, 1 marginal, 1 submarginal; medial face with 5 slender setae, the basal pair denticulate. Inner plate without ventrofacial spine. *First gnathopod* (Fig. 10): coxal plate with 1 short seta apically, without posteroventral spines; article-4 posteriorly bulbous, carpus not lobate, propodus trapezoidal, expanding apically, longer than wide, posterior edge almost naked, corner of palm almost square, with 2 lateral and 3 medial spines and several lateral and medial setae set back from the corner; palm convex and serrate; dactylus reaching slightly beyond the corner of the palm. *Second gnathopod* (Fig. 10): coxal plate equal to coxa 1, with a single ventral spine. *Pereopods* (Fig. 10): coxa 3 with 1 anterior and 1 posterior ventral setae only; coxa 4 similar; pereopods 3-4-5 longer than gnathopod 1; pereopods consecutively elongate from pereopods 3–7; ratio of lengths = 137:–:140:155:185:220:270; all pereopods sparsely setose, posterior armaments of article-6 of pereopods 3–4 = 1–0, thus only pereopod 3 with 1 locking spine; pereopods 5–7 significantly longer than pereopods 3–4 with locking spines; 1,2,2; single anterior spines on article 6 of pereopods 6–7, one posterior spine on pereopod 7 only; no keel like expansion of article 6 of pereopod 7; coxae 5 and 7 bearing 1 anterior and 1 posteroventral seta and coxa 6 one anterior seta only; article-2 of pereopods 5–7 weakly expanded posteriorly, each with only 2 setae; dactyls of pereopods 3–7 simple, naked except for outer basal penicillate setule evident on pereopods 4–7 only. *Gills:* of coxae 2–6 flask shaped, of coxae 5–6, smaller, but not reduced. *Pleopods* (Fig. 10): retinaculae present on each pair, arranged 2-3-2, accessory retinaculae absent; peduncles without setae; rami extending equally, outer rami of 4-4-3 articles, inner 4-3-5. No setae bifid. *Epimera* (Fig. 10): each posteroventrally rounded, posterior margins slightly convex, smooth, without setae except for a single seta marking the posterior corner of epimera 1–2 and two on epimeron 3; ventrofacial spines absent; lacking oblique lateral ridge. *Pleon* (Fig. 10): pleonites with few posterior dorsal or lateral setae; pleonite 1 with 1 dorsal, 2 lateral; pleonite 2 with 1 submarginal and 1 marginal dorsal; pleonite 3 with 2 lateral; pleonites 4 and 5 with 1 lateral; pleonite 6 with

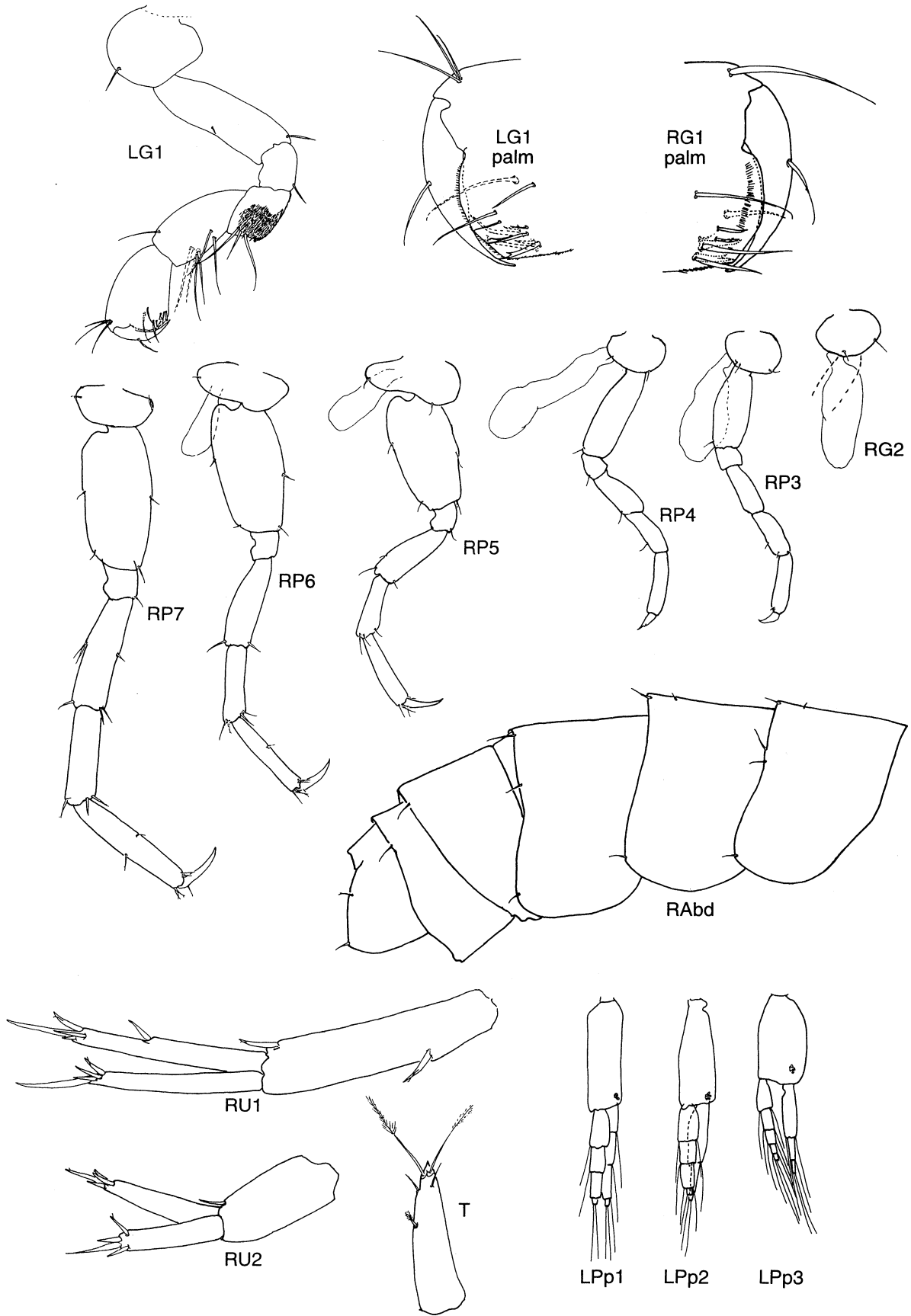


Fig. 10. *Nedsia humphreysi* holotype male 2 mm. Legs, abdomen, pleopods, uropods, telson.

1 mid-lateral and 1 distoventral seta. *Uropods* (Fig. 10): uropod 1 peduncle length 1.4× outer ramus, 1.2× inner ramus, apicodistal spines absent, bearing a single medial subapical spine, and basofacial spine at M0.3; inner ramus only with a mid-medial spine; both rami with 4 terminal spines; uropod 2 peduncle subequal to length of inner ramus, 1 apicodorsal spine slightly subdistal; other spines and setae absent; outer ramus shorter than inner (0.8×), both rami without spines, except 3–4 terminal spines. *Telson* (Fig. 10): longer than broad (1.8×), as long as urosomite 3; cleft 100%; apices pointed, not notched, each with 2 long plumose subapical setae, 2 apical setae, and a single lateral penicillate setule at M0.6.

Relationship. *Nedsia humphreysi* differs from *N. douglasi* in the reduced number of articles of variable lengths of the first antenna and relatively longer second antenna, a symmetrical and non-excavate upper lip, greater number of mandibular setose accessory blades and presence of a plumose molarial seta and basal molarial setae, palps of first maxilla asymmetrical, the inner plate with an extra seta, the second maxilla devoid of pubescence, the inner plate of the maxilliped without a ventrofacial spine, palmar corner of the first gnathopod with fewer armaments, the palm serrate and the dactyl reaching beyond the corner. The coxal plate of the second gnathopod is narrower, posteroventral margins of epimera rounded, epimera lacking ventrofacial spines, first uropod lacking apicodistal spines, second uropod peduncle less spinous, relatively shorter with only a single apicodorsal spine, the telson more slender, the apices pointed, not notched. *Nedsia humphreysi* is similar to *N. straskraba* and *N. fragilis*, but distinct from *N. hurlberti*, *N. urifimbriata*, *N. macrosculptilis* and *N. sculptilis*, in that marginal pubescence is not present on both plates of the second maxilla. *Nedsia humphreysi* differs from *N. straskraba* in that the pleonites bear dorsal spines, and from *N. fragilis* in that the first epimeron lacks distolateral spines, the peduncle of the first uropod is without a row of facial spines, the palmar corner of the first gnathopod is subquadrate rather than rounded, and the outer plate of the maxilliped is not tapering and is armed with distinct medial cusps.

Distribution. Barrow Island, Western Australia.

Nedsia urifimbriata n.sp.

Figs 11–13

Etymology. Named for the presence of marginal pubescence on the third uropod.

Type locality. Barrow Island, Western Australia. Western Australian Museum sampling site BES733.

Material examined. HOLOTYPE (Western Australian Museum WAM 4-96) male 2.5 mm. ALLOTYPE female 3 mm.

Diagnosis. *Mandibular palp*: 2-articulate, setae = 2E. *Second maxilla*: inner plate with submarginal mediobasal row of plumose setae barely extending onto the face apically, without medial setae, without pubescence. *Maxilliped*: inner plate with a reduced medial row of 1 faciodistal and 1 barely facial (submarginal) ventral seta; outer plate lacking a blunt naked tooth spine contiguous with distal plumose setae, an additional submarginal facial group of 4 setae at M0.3; palp article-3 with comb rows at the base of the dactyl, the apex weakly produced, dactylar nail moderately long, with a subequal accessory seta. *First gnathopod*: carpus equal to propodus in male, palmar spines symmetrically bifid. *Pereopods*: posterior spine sets of article-6 evenly spaced. *Pleopods*: peduncle 3 with 1 apicolateral seta, basomedial seta of inner rami not bifid; each with 2 retinaculæ, no accessory retinaculum. *Epimera*: posteroventral tooth of epimera 1–3 present, posterior margins without setae, without facial spines. *Uropods*: uropods 1–2 apicolateral corners of peduncles with 2 and 1 spines, both rami of both uropods with only a single, poorly represented spine row; uropod 3 without subdistal peduncular setae. *Telson*: cleft 100%, lobes weakly convex laterally and medially; setation subapical, lacking lateral setal spines, single lateral penicillate setules at M0.3–0.5.

Description of holotype (male “x”). *Body* (Fig. 11) 2.5 mm. *Urosome*: poorly armed dorsally. *Head* (Fig. 11): rostrum obsolescent; eyes absent. *First antenna* (Fig. 11): elongate, longer than antenna-2, broken at article-6 of flagellum—broken length 0.6× body, (length > 2× antenna-2); flagellum longer than peduncle, peduncular article-1 longest and bearing a strong mediobasal spine at M0.85, article-3 shortest, ratio of lengths 90:70:30, setae sparse; flagellum of many articles (broken at article-6), uniform, sparsely setulate; calceoli absent, no aesthetascs; accessory flagellum 2-articulate, reaching M0.5 article-1 of primary flagellum, second article tiny. *Second antenna* (Fig. 11): with weak ventral setation, article-3 without dorsomedial spines; flagellum 5-articulate, lacking calceoli. *Upper lip* (Fig. 11): (asymmetrical, weakly excavate below). *Left mandible* (Fig. 11): palp 2-articulate, article-1 shorter than 2 (35:47), article-2 bearing 2 apical E-setae; incisor 5 toothed, lacinia mobilis 5 toothed bearing on the medial face a row of short spines, 4 setose accessory blades and 3 inter-raker plumose setae; molar triturative, with a moderately long distal plumose seta. *Right mandible*: palp absent, incisor 5 toothed and lacinia mobilis 5 toothed with mediofacial spine row as on left side, 4 setose accessory blades and 2 inter-raker plumose setae; molar triturative, without distal plumose seta. *Maxillae* (Fig. 11): first maxilla palp article-2 bearing thin apical and subapical spines, configuration of the left side being; 4 naked, 1 denticulate, and 1 setate, the right side having one less naked spine, the outer plate of both sides with 7 denticulate spines; inner plate with 4 plumose mediobasal setae and 1 subdistal naked seta; second maxilla outer plate apicolateral margin pubescent, inner

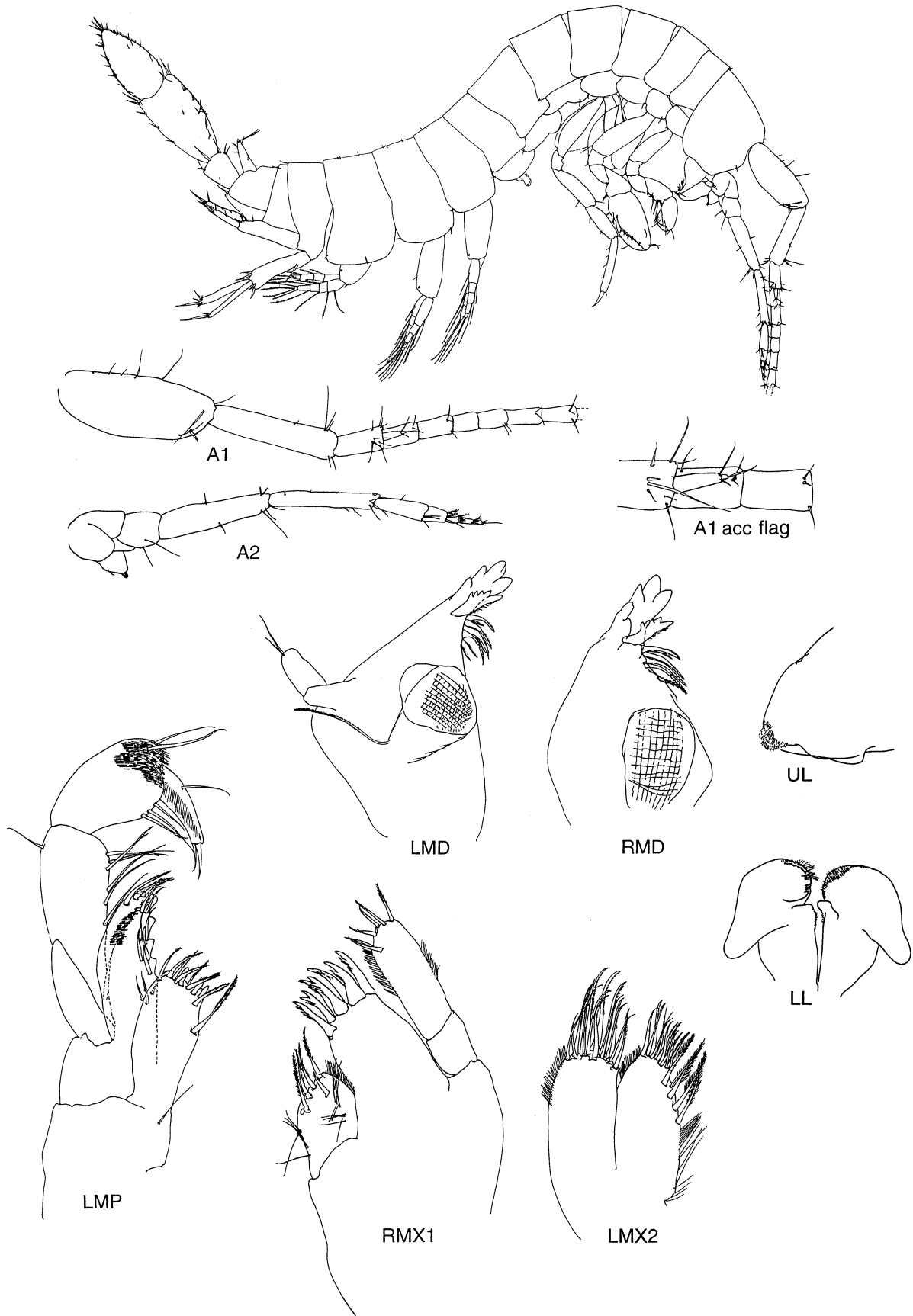


Fig. 11. *Nedsia urifimbriata* holotype male 2.5 mm. Body, antennae, mouthparts.

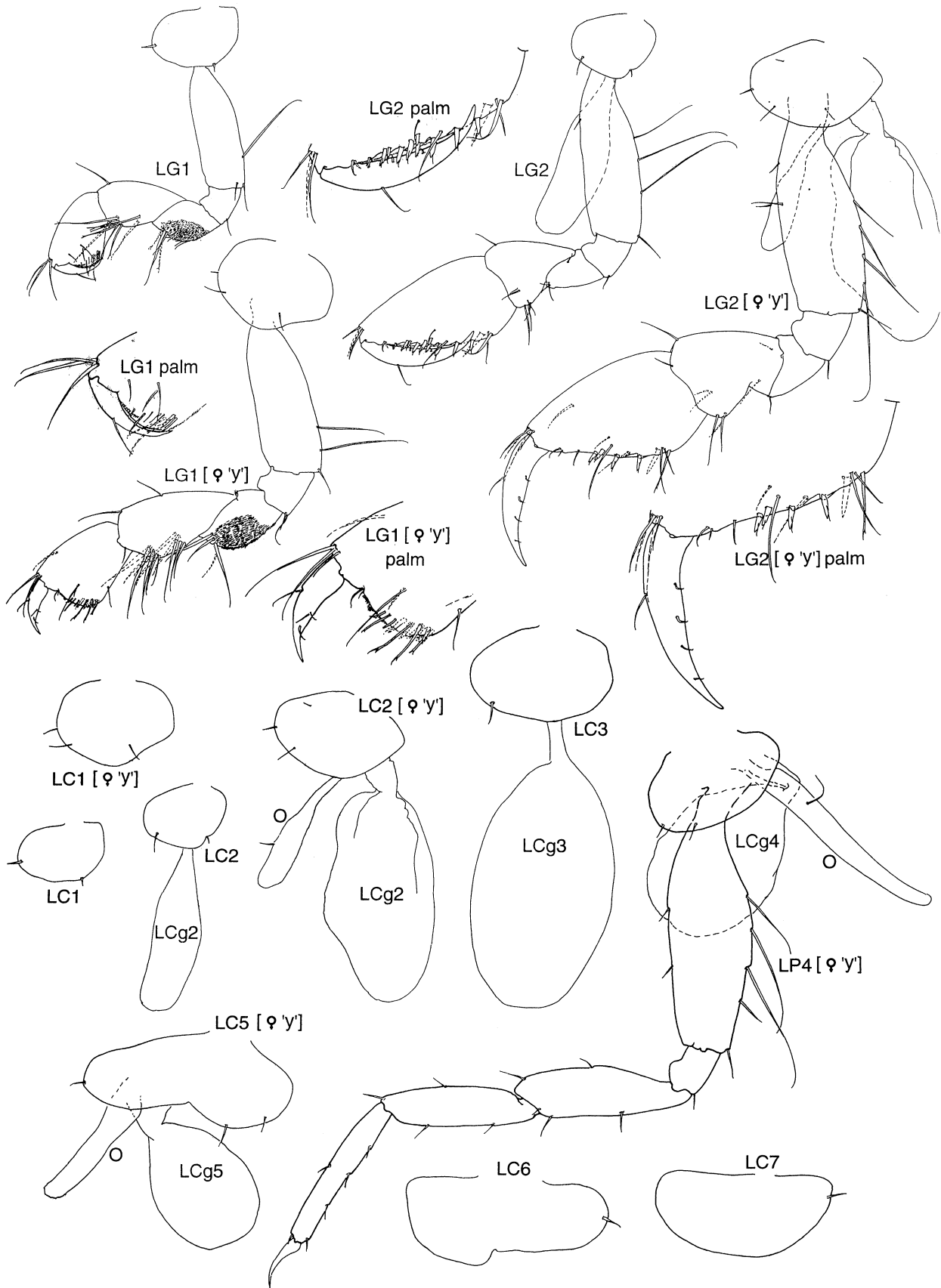


Fig. 12. *Nedsia urifimbriata* holotype male 2.5 mm: all drawings except those indicated as female "y". Legs.

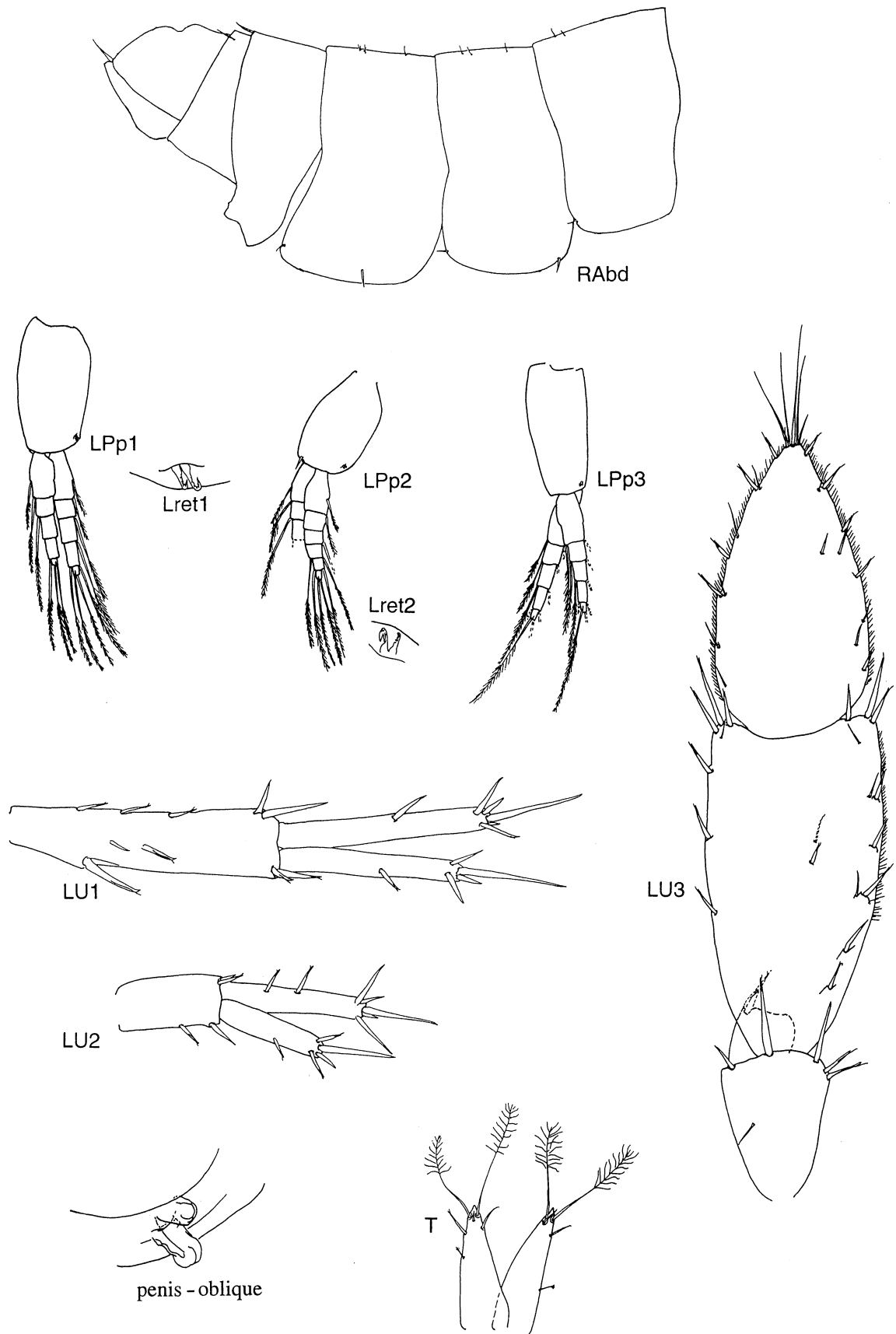


Fig. 13. *Nedsia urifimbriata* holotype male 2.5 mm. Abdomen, pleopods, uropods, telson, penis.

plate basomedial margin pubescent; apical spines of both plates mostly setate, but some naked. *Maxilliped* (Fig. 11): palp article-3 with 3 thin setae on the inner edge, no other facial setae; inner plate with a single mid-medial submarginal plumose spine. *First gnathopod* (Fig. 12): coxal plate bearing 1 or 2 short setae apically and 1 posteroventral spine; article-4 posteriorly bulbous and pubescent; carpus not lobate, propodus trapezoidal, expanding apically, length greater than width, the posterior edge naked; palmar corner rounded, marked by 2 lateral setae and 3 stout, bifid medial spines; palm convex, transverse, lined with fine setules; dactylus reaching slightly beyond the corner of the palm. *Second gnathopod* (Fig. 12): palm bearing 3 lateral and 6 medial spines, the spine at the palmar corner medial; coxal plate no broader than coxa 1, poorly setose. *Pereopods* (Fig. 12): coxa 3 bearing 1 anterior seta only, coxa 4 similar but with 1 small posterior seta; pereopods (3)–4 longer than gnathopod 2, pereopod (3) approximately equal to pereopod 4; articles 4–5 of pereopod 4 sparsely setulose posteriorly; posterior margin of article-6 of pereopods (3)–4 armament formula 1-1-1-1-1, i.e. with 1 locking spine; pereopods 5–7 absent; coxae 5–7 bearing few (1) setae on the ventral margin of posterior lobes; dactyls (3–7) simple as in pereopod 4, but without any basal penicillate setule. *Gills* (Fig. 12): coxal gills of limbs 2–4 flask shaped, none present on coxae 5–6(7); sternal gills absent. *Pleopods* (Fig. 13): peduncle of pleopod 3 only with an apicolateral seta; two retinaculae on each peduncle, without accessory spines; rami extending subequally, all with 5 articles; setae on basal articles = 3 for all rami, none bifid. *Epimera* (Fig. 13): epimera 1 and 3 posteriorly quadrate, epimeron 2 more rounded; posterior margins of epimera 1–2 weakly convex, of epimeron 3 linear; smooth, not setulose with no ventrofacial spines, lacking an oblique ridge. *Pleon* (Fig. 13): pleonites 4 and 5 with distolateral posterior seta, pleonite 6 with distoventral spine. *Uropods* (Fig. 13): uropod lengths relative to uropod 1 (300)—uropod 2 (165) = 0.55 \times , uropod 3 (485) = 1.6 \times ; uropod 1 peduncle length 1.3 \times inner ramus, outer margin without an apicodistal spine, with 2 apicomедial and 2 apicolateral spines, bearing a short row of 2 dorsal and 3 medial spines; rami of subequal length (lateral : medial = 116:130), both rami bear a single mid-dorsal spine, medial ramus with 5 terminal spines, the lateral with 4; uropod 2 peduncle 0.7 \times length of inner ramus, no apicodorsal spines, 1 mid-lateral spine, 1 sub-apicolateral spine, and 2 apicomедial spines; outer ramus shorter than inner (70:95), both with marginal spines; lateral ramus with 1 mid-lateral spine, medial ramus with 2 medial spines; apices of rami with 4 (lateral) and 5 (medial) terminal spines; uropod 3 peduncle length 0.24 \times outer ramus, shorter than urosomite 3 (47:52), with no subdistal setae, an apicolateral group of 3 spines, single mid-distal spine, single apicomедial spine, and single small mid facial spine; outer ramus lateral margins of both articles and medial margin of distal article, bearing short, marginal pubescent fringe; proximal article with several irregular spine-seta ranks, these

submarginal laterally, a pair of mid-facial setae, sparse medial setae, 3 apicolateral and 3 apicomедial setae, terminal article shorter (190:200), similarly armed, distally with a group of 4 long and 2 short setae. *Telson* (Fig. 13): 1.5 \times longer than broad, as long as urosomite 3, cleft 100%; apices minutely notched, subapices each with 2 long distal plumose setae, 2 or 3 distal and marginal setae, each lobe bearing a single penicillate setule at M0.3 or 0.5. Small penial processes borne on sternum of thoracic article-7 (Fig. 13).

Description of allotype (female “y”). *Body* 3 mm. *First gnathopod* (Fig. 12): coxa with 2 anterior setae, article-2 with 2 long posterior setal spines and 1 distal seta, merus with elongate seta of the pubescent posterior lobe and short setae anterodistally; carpus bearing 12 rather than 9 long spines, propodus and dactyl more spinous than male. *Second gnathopod* (Fig. 12): more setose and spinous than male; coxa without posterior seta, bearing 3 (rather than 1) anterior setae. *Oostegites* (Fig. 12): gnathopod 2–pereopod 5 each bearing a simple strap like oostegite with few setae or spines.

Relationship. *Nedsia urifimbriata* differs from *N. douglasi* in that the peduncle of the first antenna bears a strong mediolateral spine, the second antenna is slightly longer, the molar is triturate with a moderately long distal plumose seta, the palps of the first maxilla are symmetrical, the maxillipedal palp bears an extra medial seta, the inner plate a single mid-medial, submarginal plumose spine, the first gnathopod bears fewer palmar spines, the dactyl reaches beyond the palmar corner, the palm of the second gnathopod bears more spines, apical setae of the peduncles of the pleopods are present on pleopod 3 only, the first uropod lacks an apicodistal spine, and the rami with single mid-dorsal spines each, the peduncle of the second uropod is relatively short, without apicodorsal spines, and the telson longer than wide, as long as urosomite 3. *Nedsia urifimbriata* differs from *N. straskraba*, *N. fragilis* and *N. humphreysi* in the presence of marginal pubescence on both pates of the second maxilla, from *N. hurlberti* in the presence of ventral submarginal spines on the second and third epimera, of organised comb rows of setae at the base of the maxillipedal dactyl, and of more than six flagellar articles on the pleopods, and in the absence of a spine like extension of the first urosome at the base of the first uropod. *Nedsia urifimbriata* differs from *N. macrosculptilis* and *N. sculptilis* in the presence of anterior spines, but absence of setae, on the first coxal plate, the absence of dorsal setae on the telson and of sculpturing of the pleon, and in possessing a long outer plate on the maxilliped.

Distribution. Barrow Island, Western Australia.

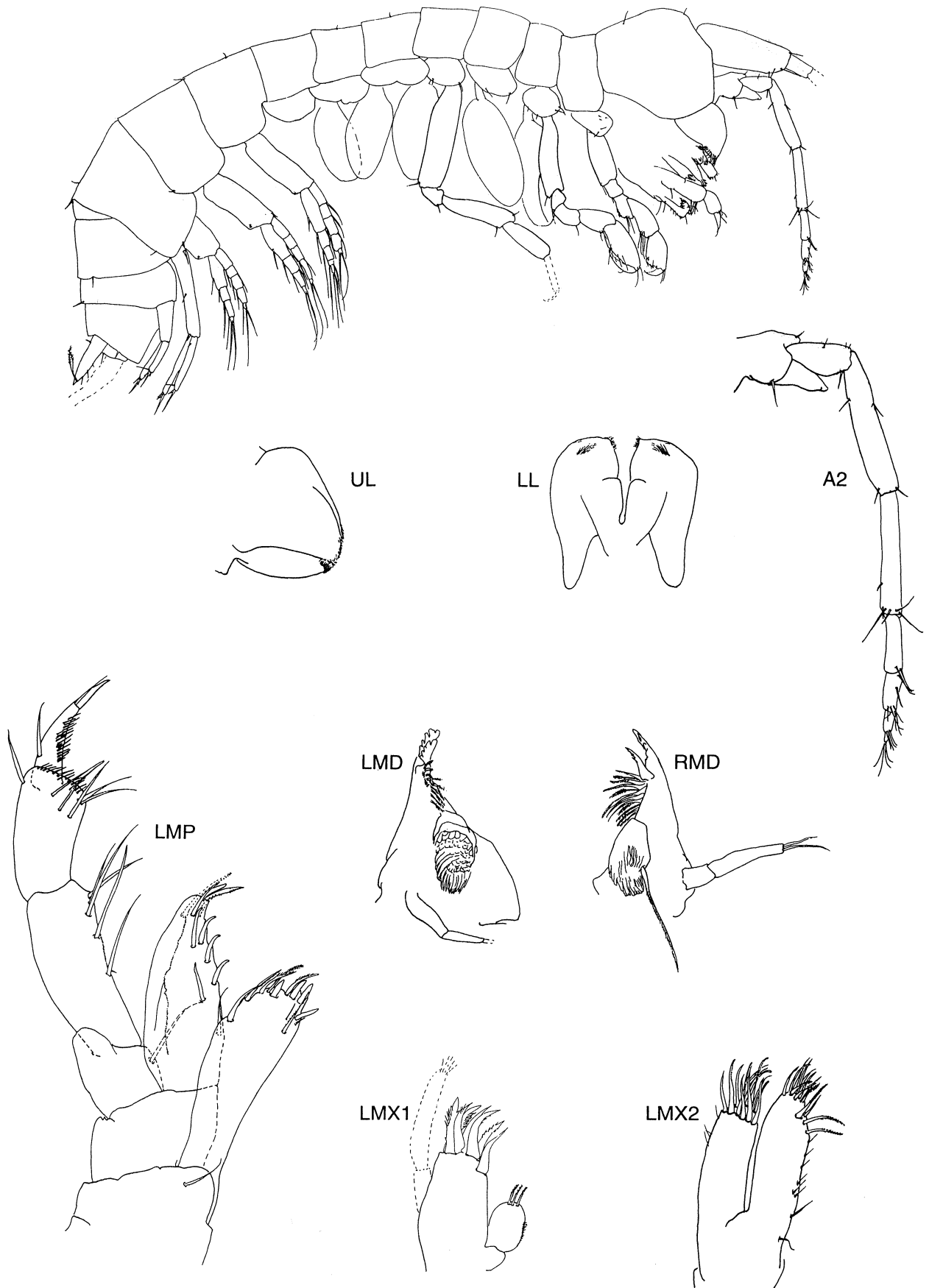


Fig. 14. *Nedsia fragilis* holotype male 2.4 mm. Body, antenna, mouthparts.

Nedsia fragilis n.sp.

Figs 14, 15

Etymology. Named for the fragile nature of the appendages.

Type locality. Barrow Island, Western Australia., Western Australian Museum sampling site BES738.

Material examined. HOLOTYPE (Western Australian Museum WAM 5-96), male 2.4 mm.

Diagnosis. *First antenna* (broken in type specimen): ratio of peduncular articles = 82:23:–. *Upper lip*: symmetrical, not excavate below. *Right mandible*: bearing inter-raker plumose setae, *left mandible* without; palp 2-articulate, article-1 reduced, subtruncate; article-2 linear, subtruncate, setae = 2E. *Maxillae*: inner plate of both maxillae without pubescence of medial or lateral margins; outer plate of first maxilla bearing 5 denticulate and 2 naked terminal spines. *Coxae*: coxa 1 longer than broad, slightly expanded below, coxa 2 lacking posterior marginal spines, coxae 3–4 with posterior spines. *Maxilliped*: inner plate with distal row of 4 plumose setae, lacking medial plumose setae; outer plate medial margin barely sinuous, paired submarginal setae curved and blunt, reduced in number; apex of palp article-3 not produced, setae not organised into combs; dactyl bearing a row of comb setae, single dorsal spine seta, moderate nail and equally long accessory spine. *First gnathopod*: palmar spines curved, not bifid except at palmar corner where spines = 3 lateral, 2 medial. *Second gnathopod*: defining corner of palm bearing 1 long lateral seta and 1 slender medial trigger spine. *Epimera*: posteroventral tooth present on epimera 2–3, epimeron 3 with small ventromarginal spine at M0.6. *Pleopods*: peduncles without setae, basomedial setae of inner rami not bifid, 2 retinaculæ on each peduncle, without accessory retinaculum. *Uropods*: dorsal margins of peduncles of uropod 2 not spinous, spine rows of rami reduced to 0 or 1 spine each. *Telson*: cleft 100%; single distolateral spine at M0.8; single lateral penicillate setule at M0.7 on either lobe.

Description of holotype (male). *Body* 2.4 mm. *Urosome*: poorly armed dorsally. *Head* (Fig. 14): rostrum obsolescent; eyes absent. *First antenna* (Fig. 14): ratio of peduncular articles = 82:23:–. Setae of peduncular article-1 limited to single dorsal and ventral sub marginal setae, one submarginal ventral and one long mediolateral setae; article two naked. *Second antenna* (Fig. 14): length 0.3× body, peduncle longer than flagellum, article-4 longer than article-5 (63:52), articles 3-4-5 with weak ventral setation, article-3 with 1 dorsomedial spine, flagellum of 4 articles, without calceoli. *Upper lip* (Fig. 14): apical margin rounded, not excavate, connection to epistome symmetrical. *Mandibles* (Fig. 14): left mandibular palp of 2 articles (broken), incisor 5 toothed, lacinia mobilis 5 toothed, 6 barely setose accessory blades, no inter-raker plumose setae; molar

tritulative, lacking distal plumose seta, slight pubescence around base of accessory blades; right mandible incisor 5 toothed, lacinia mobilis denticulate, accessory blades of 6 plumose spines; molar tritulative, with distal plumose seta; palp 2-articulate, reduced, ratio of articles 2:16, articles truncate, naked, terminal article with 2 E-setae only. *Maxillae* (Fig. 14): first maxilla palp article-2 bearing (5 spines), outer plate with 7 spines; 2 naked, 5 denticulate, inner plate (bearing fine medial setae); second maxilla outer plate, outer apical margin lacking pubescence with few fine setae; inner plate lacking pubescence; terminal spines of both plates half rastellate, half finely setulate. *Maxilliped* (Fig. 14): palp article-3 with a pair of long subterminal setae medially, diagonal distal row of 3 facial setae, apex with subterminal transverse row of unorganised comb setae; nail of moderate length with an accessory spinule of equal length; palp article-2 bearing mid-medial serrations; inner plate with a pair of plumose facial spines and two distal submarginal medial spines, one small and sharp the other moderate, stout and blunt. *First gnathopod* (Fig. 15): coxal plate with 1 moderate apical seta, several (3) anterior and posterior (2) facial setae, without a posteroventral spine; article-4 posteriorly bulbous and pubescent; carpus not lobate; propodus trapezoidal, slightly expanded apically, longer than wide; posterior edge naked except for an apical pair of long setae basal to the dactyl; palmar corner rounded, marked by 3 naked lateral spines and 2 stout bifid medial spines; palm convex, finely serrated, dactylus reaching the end of the palm. *Second gnathopod* (Fig. 15): palm with 4 setae; 2 lateral, 2 medial, the fourth marking the corner medially, along with a strong elongate lateral spine; palm finely serrate along most of its length; dactyl bearing a single dorsal spinule at M0.3, and small bent spinule laterofacial at M0.6; coxal plate 2 broader than coxa 1, poorly setose with 1 posteroventral marginal spine and a ventrofacial spine both at M0.6, as well as a single anteroventral spine at M0.1. *Pereopods* (Fig. 15): coxa 3 with 1 anteroventral spine, 1 posteroventral submarginal seta-spine; coxa 4 similar; pereopods (3)–4 longer than gnathopod 2, pereopod (3) equal to pereopod 4; pereopod 4 articles 4–5 sparsely setose posteriorly, (pereopods 5–7 similar, consecutively elongate, with 2 locking spines, pereopod 7 article-6 anterior spines displaced by an anterior keel); coxae 5–7 bearing no setae on ventral margins of the posterior lobes, article-2 weakly expanded, (not lobate but extended posteriorly, with thin, short posterior setae); coxae 3–7 dactyls simple, with no accessory spinules. *Gills*: coxal gills of limbs 2–6 flask shaped, simple, gill 6 not reduced, gill coxa 2 largest, gill coxae 5–6 smallest but not significantly reduced. *Pleopods* (Fig. 15): two retinaculæ per pleopod, with no accessory retinaculæ; peduncle 2 only with apicolateral seta; rami extend subequally, outer rami with 5 articles each, the inner with 5-4-4; setae of the basal articles = 1-1-1-1-, none are bifid. *Epimera* (Fig. 15): each posteroventrally quadrate, though epimeron 2 barely so; posterior margins scarcely convex, smooth, and barely setulose; epimeron 3 with 1 ventrofacial spine, lacking lateral oblique ridge.

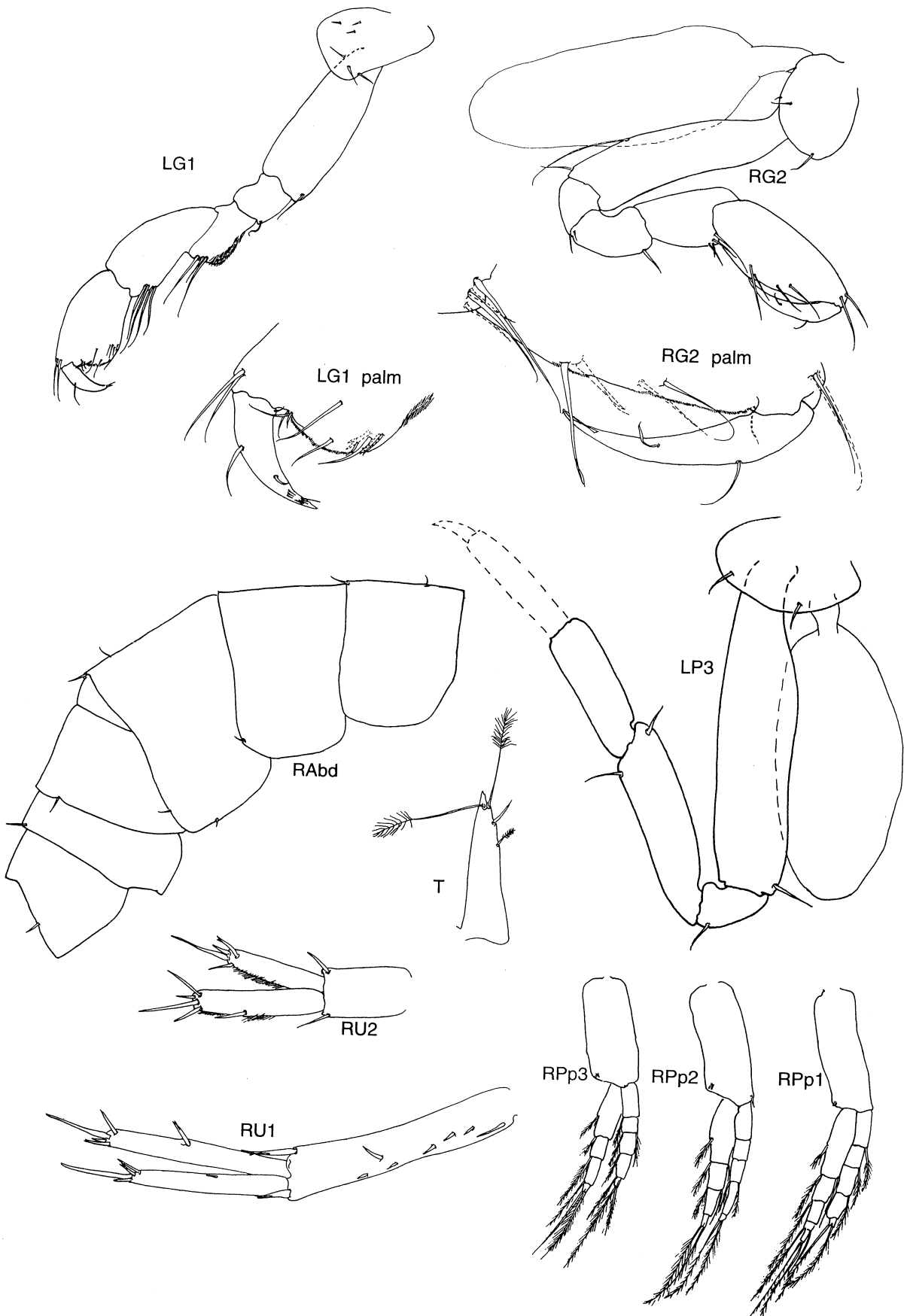


Fig. 15. *Nedsia fragilis* holotype male 2.4 mm. Legs, pleopods, uropods, telson, abdomen.

Pleon (Fig. 15): pleonite 2 only without dorsal or dorsolateral posterior setae; pleonite 6, no dorsolateral or distoventral spines. *Uropods* (Fig. 15): lengths relative to uropod 1—uropod 2 = 0.5, uropod 3 absent; uropod 1 peduncle length 1.3× medial ramus, outer margin with a row of 5 small submarginal spines and 1 moderate laterofacial spine at M0.6, single apicomedial and apicolateral trigger spines, basofacial spine weak, the medial ramus longer than the lateral; both rami with sparse setation, terminating in 4 spines; peduncle of second uropod 0.6× length of inner ramus, single apicomedial and apicolateral spines; medial margin of both rami pubescent; outer ramus shorter than inner (62:81), both bearing few marginal spines and 4 terminal spines; uropod 3 absent. *Telson* (Fig. 15): length 1.6× width, as long as urosomite 3, cleft 100%; apices notched, subapices with 2 long plumose setae; 1 marginal seta at M0.8, each lobe bearing a single penicillate setule marginal at M0.7.

Relationship. *Nedsia fragilis* varies from *N. douglasi* in the relative length of the second antenna, the greater length of the second peduncular article, the presence on the third article of a dorsomedial spine, a round and symmetrical upper lip, mandible bearing additional accessory blades, the molar bearing a distal plumose seta, palp of right mandible with elongate first article, second maxilla lacking pubescence, terminal spines of both plates either rastellate or terminally setulate, first gnathopod palmar corner rounded not square, with fewer medial spines, palm of second gnathopod with fewer spines, retinaculæ of pleopods not associated with an accessory, rami of pleopods with fewer articles, epimera 2–3 without ventrofacial spines, pleonite 6 without dorsolateral or distoventral spinules or spines, basofacial spine weak, peduncle of the second uropod short and less spinous, rami marginally pubescent with fewer terminal spines, telson more slender. *Nedsia fragilis* differs from others of the genus in lacking marginal pubescence on both plates of the second maxilla, except for *N. straskraba*, from which it differs in possessing dorsal pleonal spines, and from *N. humphreysi* in lacking distolateral spines on the first epimeron, possessing a row of facial spines on the peduncle of the first uropod, the outer plate of the maxilliped tapers apically and is weakly cuspidate, and the palmar corner of the first gnathopod is rounded.

Distribution. Barrow Island, Western Australia.

Nedsia macrosculptilis n.sp.

Figs 16–18

Etymology. Named for the deep sculpturing of the pleon.

Type locality. Barrow Island, Western Australia, Western Australian Museum sampling site BES786.

Material examined. HOLOTYPE (Western Australian Museum WAM 6-96) female 5.5 mm Barrow Island, Western Australia.

Diagnosis. *Pleonites* 5–6: with 3 pairs of small dorsolateral spines. *Head*: rostrum absent, lateral cephalic lobes moderately projecting. *First antenna*: ratio of peduncular articles about 3:3.5:1. *Upper lip*: symmetrical, apically rounded. *Mandible*: palp of 2 small articles, truncate, cone like, setae of article 2 = 2E; accessory blades (rakers) = 5 right or 6 left with 3 right and 4 left interraker plumose setae between each main raker. *Maxillae*: first maxilla inner plate facially pubescent with 8 plumose medial setae, both plates of the second maxilla with distolateral fine pubescence, outer plate with fine pubescence medially. *Maxilliped*: medial setae of inner plate submarginal to facial, with 1 short, naked, submarginal spine at the base of the first of these, medial margin of face of outer plate scalloped and bearing rugosities; palp third article apex setae not organised to comb rows, apex not produced; dactyl facially setose with 2 medial and 1 terminal accessory spines, the latter as long as the moderate nail. *Coxae*: coxae 1–4 lacking posterior spines. *First gnathopod*: palmar spines symmetrically bifid, and without triggers, spines at corner of palm = lateral 4 long and medially a continuous row of 5 bifid and 2 naked spines, palmar edge finely serrated anteriorly. *Second gnathopod*: enlarged, 2× gnathopod 1, carpus moderate, shorter than propodus; defining corner of palm with 1 enlarged spine. *Epimera*: posterior margin of epimeron 3 sculptured; epimera with facial and ventral submarginal spines. *Coxal gills*: 5–6 reduced slightly. *Uropods*: rami of uropods 1–2 with 2 spine rows; uropod 3 medial setae of outer ramus moderately long; spines of peduncle apical and mid-lateral. *Telson*: cleft 100%.

Description of holotype (female). *Body* (Fig. 16) 5.5 mm. *Pleon*: pleonite 6 with 3 dorsolateral spines and 2 distoventral spines; pleonite 5 with 4 dorsolateral spines. *Head*: rostrum obsolescent; eyes absent. *First antenna* (Fig. 16): length about 1.5× body, 2.9× antenna-2, flagellum longer than peduncle, peduncle article-2 longest, 3 shortest, article-1 bearing a strong mediodistal spine; setae moderate, flagellum of many articles (44), and a few aesthetascs; accessory flagellum 2-articulate, 2nd article tiny; article-1 of primary flagellum fused, other articles shortest proximally, longest distally. *Second antenna* (Fig. 16): moderately short, length 0.4× body; peduncle longer than flagellum, articles 4–5 equally long, with weak ventral setation, article-3 without dorsomedial spines; flagellum 5-articulate, lacking calceoli. *Upper lip* (Fig. 16): apical margin convex, slightly extended, spinose and pilose, connection to epistome symmetrical. *Left mandible* (Fig. 16): left mandible palp missing, incisor 5 toothed, lacinia mobilis 5 toothed and very broad; 6 setose accessory blades; molar with distal plumose seta, trititative, an area of pubescence leading from accessory blades to the base of the molar. *Right mandible*: palp 2-articulate, reduced,

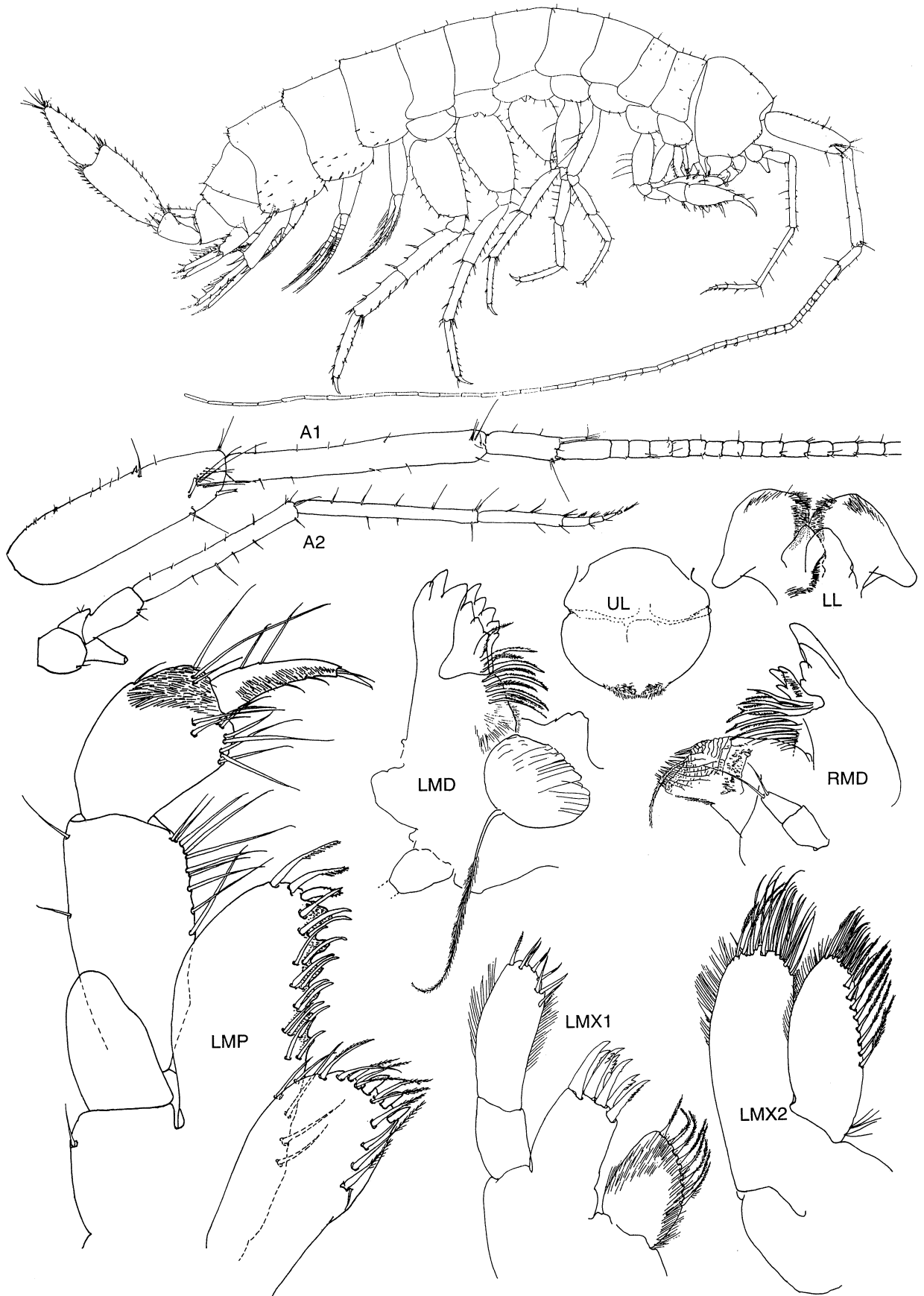


Fig. 16. *Nedsia macrosculptilis* holotype female 5.5 mm. Body, antennae, mouthparts.

article-1 short, naked, second article tapered, setae = 2E; lacinia mobilis with 3 smooth teeth and small denticle medial between 1st and last tooth, 5 setose accessory blades and 3 plumose interraker setae; line of pubescence leading to edge of molar. *Lower lip* (Fig. 16): bearing prominent inner lobes, outer lobes apically pilose and spinose. *First maxilla* (Fig. 16): right and left palp article-2 bearing 4 naked thin apical setae, 3 with fine distal setulate rugosities, and 1 plumose thin apical seta; outer plate with 6 denticulate, and 1 naked spines; inner plate ovate and pubescent, with 8 medial plumose setae. *Second maxilla*: both plates with the outer margin pubescent, as well as the median distal margin of the outer plate; basomedial margin of the inner plate with 5 fine setae grouped 2,3. *Maxilliped* (Fig. 16): palp article-3 with 2 thin, moderately long setae subdactylar on the inner face, and a longer pair on the outer face; article-3 moderately setose distally leading to the base of the dactyl. *First gnathopod* (Fig. 17): coxal plate with 5 short setae apically, without posterior ventral spines; article-4 posteriorly bulbous, marginally pubescent, but without a hyaline lobe; carpus not lobate, propodus trapezoidal, slightly expanded apically, longer than wide, posterior margin almost naked with 2 setae only; corner of palm rounded, not clearly defined, with row of 4 lateral setae, medially 2 naked spines and 5 bifid spines; palm convex, dactyl not reaching corner. *Second gnathopod* (Fig. 17): palm strongly oblique with 5 lateral and 2 medial spines all unevenly bifid with triggers; defining spine near corner medial, dactyl reaching spine, but not corner of palm; coxal plate broader than long, 4 anterior, 1 posterior setae. *Pereopods* (Fig. 17): coxa 3 with 3 anteroventral setae, similar; coxa 4 with 4 similar setae; pereopods 3–4 longer than gnathopod 2 (287,250:215), pereopod 3 shorter than pereopod 4, articles 4,5 sparsely setose posteriorly; posterior armament formulae of pereopods 3–4; S,S,S,S,S,0 and S,S,s,S,S,S thus with a single locking spine on pereopod 4 only; pereopods 5–7 similar but consecutively elongate, each with 3 locking spines; slight inward expansion of the anterior spines of article-6 of pereopod 7 revealing a slight keel; coxae 5–7 bearing single posteroventral setae on posterior lobes; article-2 of pereopods 5–7 moderately expanded, not lobate, but extended posteriorly, bearing short but moderately stout posterior setae; dactyls of pereopods 3–7 simple with single basal outer penicillate setule, and no accessory setules. *Gills*: of coxae 2–6 flask shaped, gills 5–6 smaller but not significantly reduced; gill 4 largest, gills 5–6 smallest. *Oostegites* (Fig. 17): of coxae 2 small, 3–5 thin, strap like, only those of coxa 5 with a few small setae. *Pleopods* (Fig. 18): retinaculæ 2 each, no accessory retinaculæ; peduncle of the first pleopod with no setae, of the second with 1 seta, of the third with 4; setae unevenly bifid with triggers; rami extending equally, the inner with 10,10,9 articles, the outer with 11,11, 10 articles. Setae on basal articles of rami = 1-1,1-1,1-0. *Epimera* (Fig. 18): epimera 1–2 posteroventrally subquadrate, epimeron 3 slightly lobate; posterior margins slightly convex, of epimeron 1 smooth, of epimeron 2 sculptured at the posteroventral corner and posteriorly sinuous, of epimeron 3 finely sculptured

posteriorly; epimera with facial and submarginal spines, posterior corners marked with 2-2-1 spines, each lacking an oblique ridge, but with an incomplete row of facial spines. *Pleon* (Fig. 18): pleonites 1–4 bearing dorsal and dorsolateral posterior setae, and posterior margins sculptured into sharp serrations; pleonites 4–6 with lateral and/or dorsolateral posterior spines—pleonite 4 with 2 lateral, pleonite 5 with 4 dorsolateral, pleonite 6 with 3 dorsolateral as well as 2 blunt ventrolateral spines. *Uropods* (Fig. 18): uropod 3 strongly extended in entire animal; uropod lengths relative to uropod 1—uropod 2 = 0.6×, uropod 3 = 1.3×; uropod 1 peduncle length subequal to inner, longer ramus (175:165), outer margin with 1 long apicodistal spine besides a row of 6 dorsal spines (the 6th spine subapical), one apicomедial spine and a medial row of 7 spines (the 7th spine subapical); rami of uropod 1 subequal in length, the medial ramus being the longer (155:165); both rami with two rows of marginal spines, and 5 terminal spines, distal margins of the inner ramus finely pubescent; uropod 2 peduncle 0.85× length of inner (longer) ramus, outer margin with 1 apicodorsal and 1 apicoventral spines, dorsolateral row of 5 unevenly spaced spines, medial margin with 2 apicoventral spines and 2 subdistal apicodorsal spines, 1 mid submarginal spine and a single basomarginal spine at M0.3; outer ramus shorter than inner, both with 2 rows of marginal spines in formulae 4,3 and 3,7; distolateral and medial margins of the outer ramus and both margins of the inner ramus finely pubescent; both rami terminating in 4 apical spines; uropod 3 peduncle length 0.24× outer ramus, longer than urosomite 3 (50:40), bearing an apical cluster of 4 dorsolateral spines, 1 mid-lateral spine; all spines marginal; outer ramus proximal article long, 2.3× peduncle, with lateral and medial marginal trigger spines, regularly spaced, an irregular, medial submarginal row of 4 small spines, one displaced toward the mid line, the medial and lateral apices each with a cluster of 4 spines extending partially across the distal margin; article-2 shorter, 0.8× article-1, margins bearing regularly spaced trigger spines, paired distally, the mediolateral and apical margins setae, setae increasing in length distally and with a single apical plumose seta; inner ramus scale like, of 1 article, length 0.1× the length of the proximal article of the outer ramus (16:117), bearing 1 short and 1 medium length apicolateral trigger spines and 1 postero-mid-lateral, submarginal medium-length trigger spine. *Telson* (Fig. 18): length 2.9× width, longer than urosomite 3 (47:40), cleft 100% of its length; subapices with sinuous lateral notch, long, paired, plumose setae arising subapically, a short row of 2 distal medial setae, 3 lateral trigger spines and weak dorsal setation; single small submarginal lateral penicillate setule at M0.6 on either lobe.

Relationship. *Nedsia macrosculptilis* varies from *N. douglasi* in that the pleon is more spinous and setous, the posterior margins of pleosome 1–4 finely sculpted and setate and of 5–6 dorsolaterally spinous, the flagellum of the first antenna extremely long bearing aesthetascs, the second peduncular article is longest, the first article

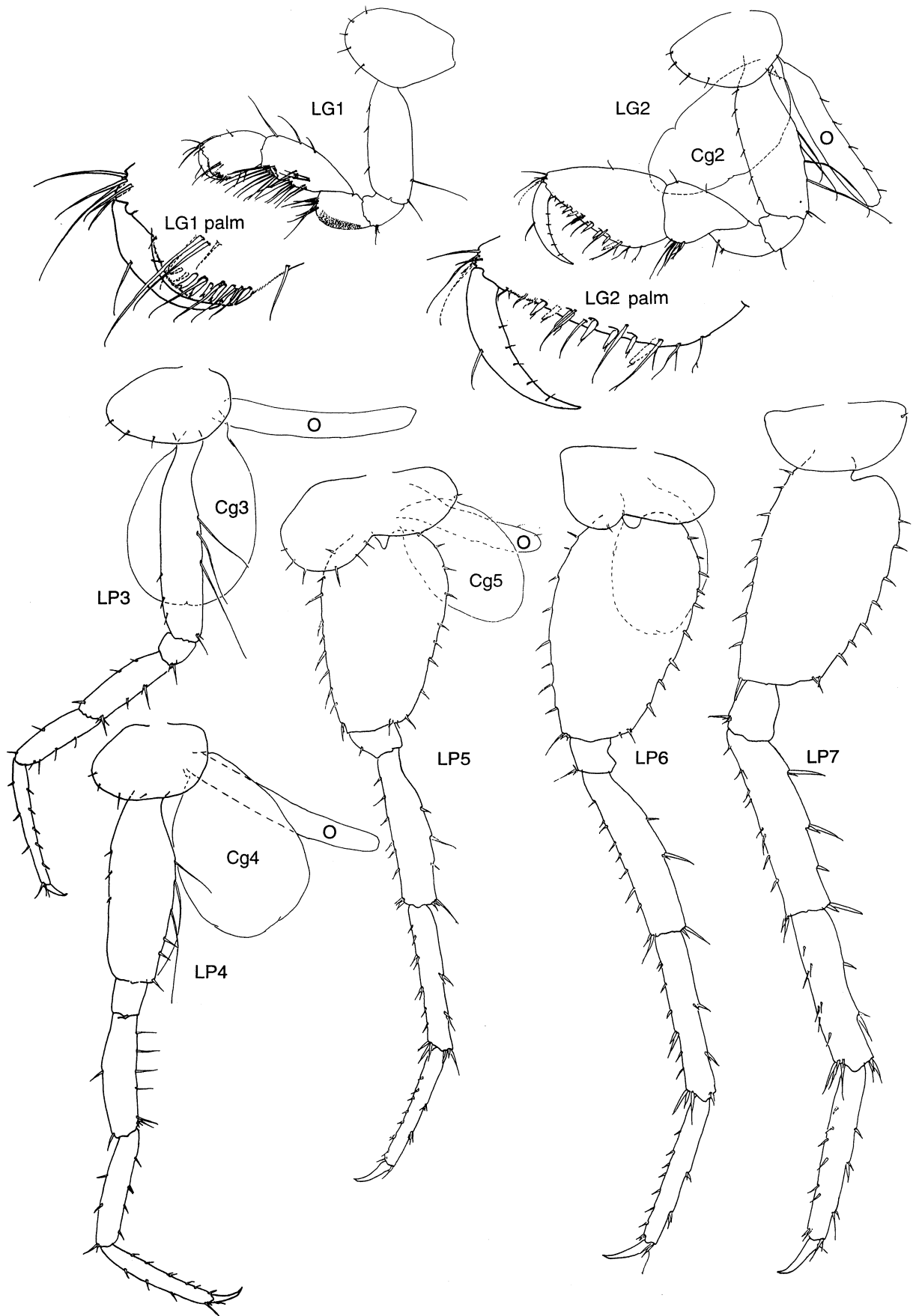


Fig. 17. *Nedsia macrosulptilis* holotype female 5.5 mm. Legs.

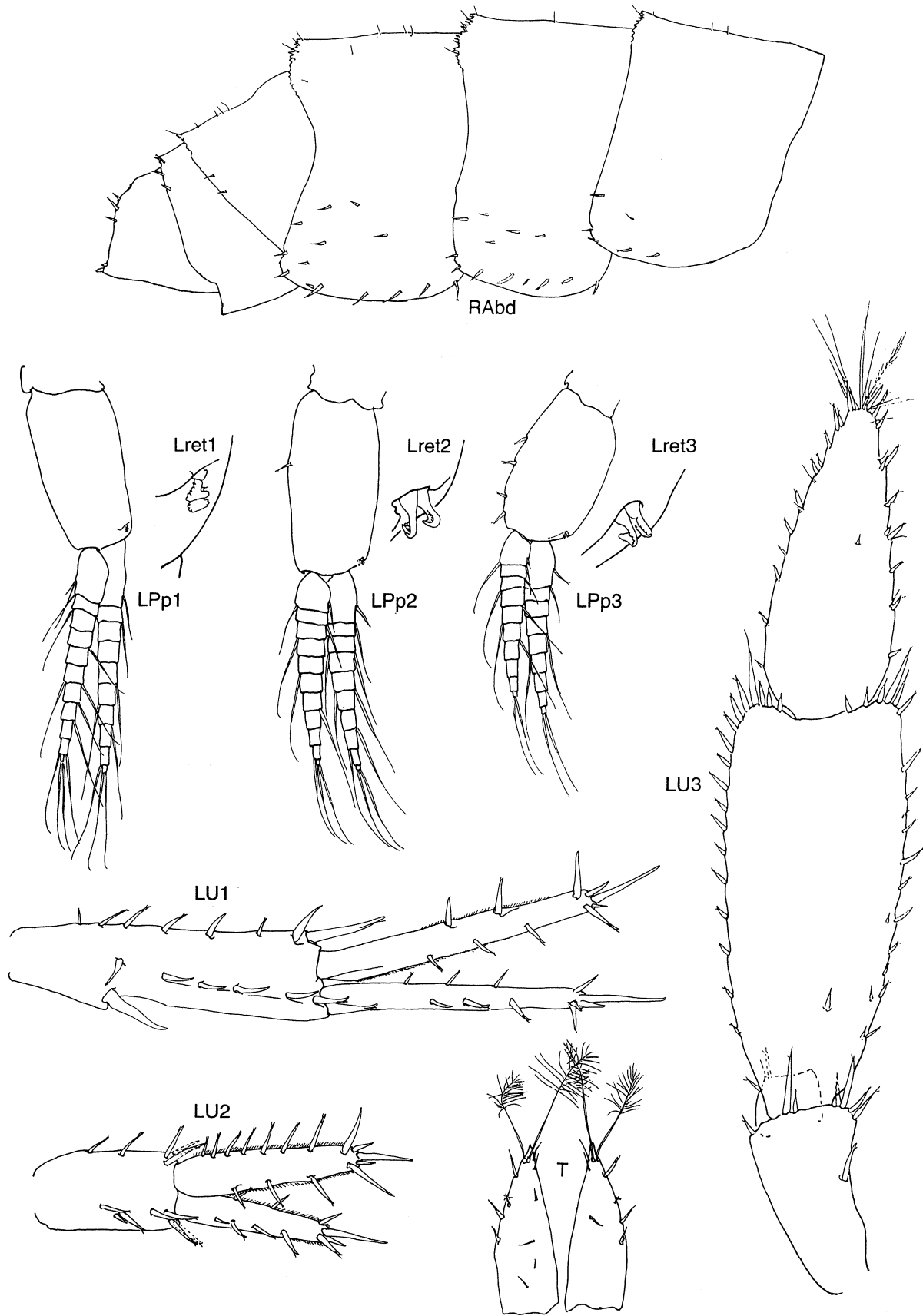


Fig. 18. *Nedsia macrosculptilis* holotype female 5.5 mm. Abdomen, pleopods, uropods, telson.

bearing a strong mediobasal spine, and moderately setate, the first article of the primary flagellum is fused and subsequent articles increase in length distally. The second antenna is proportionally longer, the flagellum 5-articulate, the upper lip is slightly convex apically, extended and symmetrical. Left molar bearing long plumose distal seta, is pubescent from the accessory blades to the base of the molar. Right mandibular palp 2-articulate, with a medium length plumose molarial seta, and pubescence. Palp of first maxilla bearing 8 thin apical setae, symmetrical, inner plate with 8 medial plumose setae, second maxilla basomedial margin of inner plate bearing 5 fine setae in 2 groups, maxillipedal palp article-3 with moderate distal setae leading to the base of the dactyl, gnathopod 1 palmar corner rounded, not clearly defined with more setae and spines, The second gnathopod is more spinous in the palm, epimera with facial and submarginal spines and posterior corners with 2-2-1 spines, pleon sculptured to sharp serrations, and bearing setae and dorsolateral spines on pleon 5-6, peduncle of uropod 1 shorter than in *N. douglasi*, distal margins of inner ramus finely pubescent, uropod 2 shorter, outer ramus shorter than inner, distolateral and medial margins of outer ramus and all of inner ramus covered in fine pubescence, uropod 3 peduncle longer than urosomite 3, all spines marginal, article-2 0.8× article-1, inner ramus relatively longer than in *N. douglasi*, telson much longer than wide, subapical notch broader, telson more spinous. *Nedsia macrosculptilis* differs from *N. sculptilis* in the absence of spines on the posterolateral margins of the fourth pleonite and of rugosity on the medial face of the maxillipedal outer plate, and in reduced scalloping of the medial margin of that plate. *Nedsia macrosculptilis* differs from all the other *Nedsia* in the presence of deep sculpturing of the pleonic posterior margins and of facial spines on the epimera. The species differs from *N. straskraba*, *N. fragilis* and *N. humphreysi* in bearing marginal pubescence on both plates of the second maxilla.

Distribution. Barrow Island, Western Australia.

Nedsia sculptilis n.sp.

Figs 19-21

Etymology. Named for the sculpturing of the pleon.

Type locality. Barrow Island, Western Australia. Western Australian Museum sampling site BES787.

Material examined. HOLOTYPE (Western Australian Museum WAM 7-96) male 4.0 mm.

Diagnosis. *Pleonites*: without dorsal spines. *Head*: rostrum obsolete, lateral cephalic lobes moderately projecting. *First antenna*: bearing aesthetascs, *Second antenna*: short. *Upper lip*: symmetrical, not excavate. *Mandibular*

palp: 2-articulate, articles equal in length, terminal article tapered terminating in 2 E-setae; accessory blades on rakers = 6 left, 4 R, with one interraker plumose seta on the right and one additional seta beyond the left rakers. *Maxillae*: without medial setae or pubescence except for the lateral margins of the second maxilla; inner plate of the first maxilla ovato-triangular with six mid-medial to mediobasal plumose setae; palps symmetric; inner plate of the second maxilla with a row of medial setae barely extending onto the face apically with few other medial setae. *Coxae*: short, broader than long with few posterior spines. *Maxilliped*: inner plate bearing three distal plumose setae and three blunt naked terminal spines, without plumose medial setae, the outer plate bearing two distal plumose setae contiguous with a blunt naked tooth spine; palp articles 2-3 weakly setate laterally, setae at the dactylar base not organised into comb rows, the palp apex weakly produced, the dactyl with a moderately long nail. *First gnathopod*: palmar corner marked with one long lateral spine, moderate numbers of setae along palm. *Second gnathopod*: carpus barely lobate. *Pereopods*: 3-6 without accessory spinules on dactyls, posterior spine sets on article-6 of pereopod 3 evenly spaced, those on pereopod 4 uneven; dactyl of pereopod 7 with an extra terminal spinule. *Gills*: present on coxae 2-6. *Pleopods*: peduncles with 0,2,2 setae, 2 retinaculae and no accessory retinaculae. *Epimera*: epimeron 3 only with a small posteroventral tooth. *Uropods*: apicolateral corners of peduncles of uropods 1-2 with 3 and 2 spines respectively, the dorsal margins bearing few spines, the medial margin of uropod 1 with 2 apical spines. *Telson*: longer than broad, cleft 85%, bearing some medial spines.

Description of holotype (male). *Body* 4 mm. *Pleon*: pleonite 6 without dorsal spines, bearing two laterodistal and single ventrodistal spines; pleonite 5 with distal dorsolateral spines. *Head* (Fig. 19): rostrum obsolete; eyes absent. *First antenna* (Fig. 19): longer than second (broken at article-11); flagellum longer than peduncle; peduncular articles 1-2 equal in length, 2.7× article-3, the first article bearing a cluster of ventral subdistal spines and setae, a row of small ventral spines, a dorsal row of three strong spines and a weak distal seta; flagellum moderately setate, bearing aesthetascs on some articles, article-1 of the primary flagellum fused, accessory flagellum 2-articulate, second article tiny, extending to M0.8 of the first article of the primary flagellum. *Second antenna* (Fig. 19): moderately short, 0.3× body length; peduncle longer than flagellum, articles 4-5 subequal with weak setation, article-3 bearing a single dorsomedial spine and 4 ventrodistal spines; flagellum of 5 articles of diminishing dimension, lacking calceoli or aesthetascs. *Upper lip* (Fig. 19): apically convex, pilose and spinose; symmetrical. *Left mandible* (Fig. 19): without palp (broken), incisor 5 toothed, lacinia mobilis 5 toothed and elongate, extending to the apex of the incisor; mandible bearing 6 large setose and 1 small naked accessory blades between the incisor and molar, without interraker plumose setae or pubescence; molar triturative, without

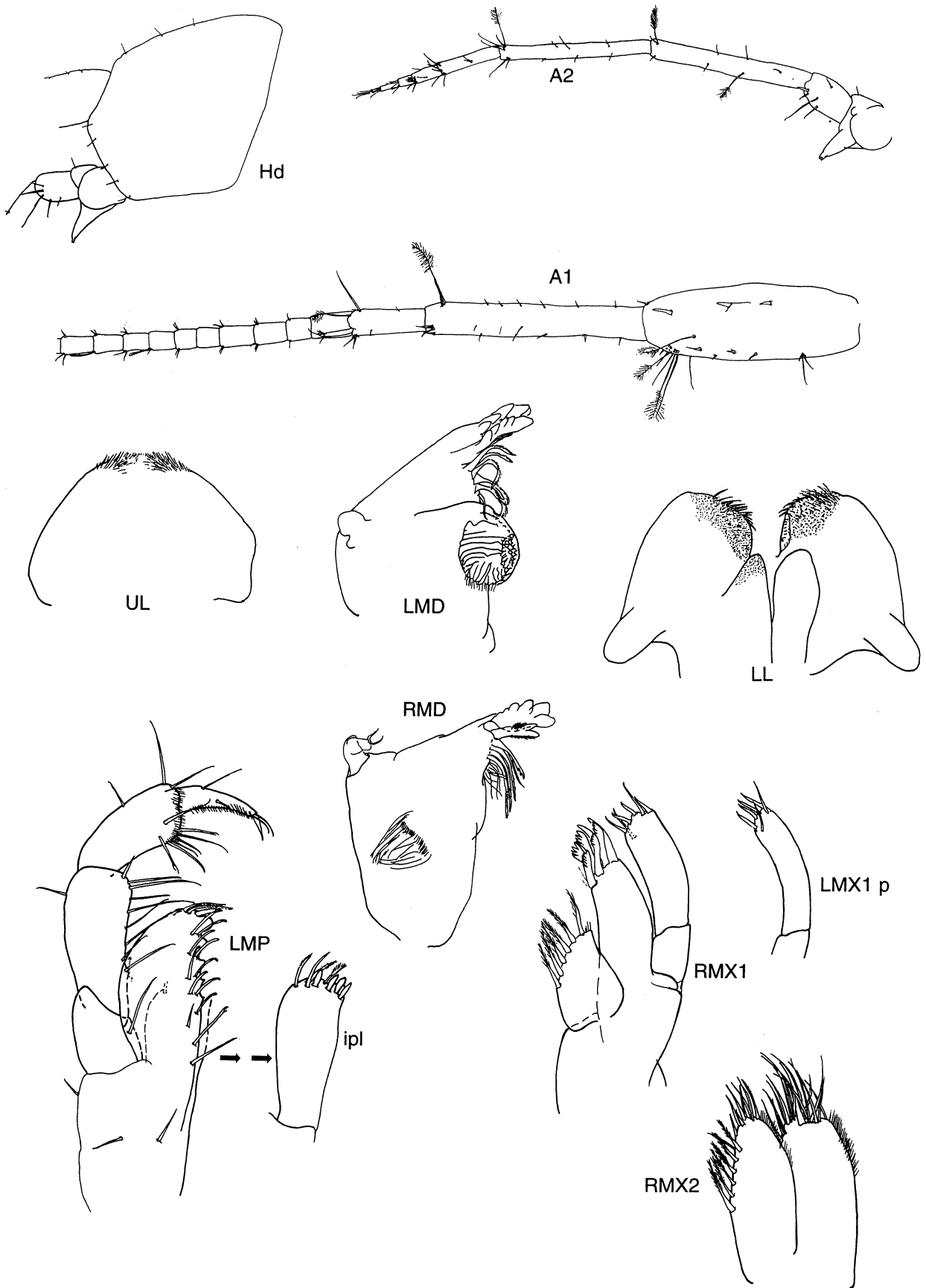


Fig. 19. *Nedsia sculptilis* holotype male 4 mm. Head, antennae, mouthparts.

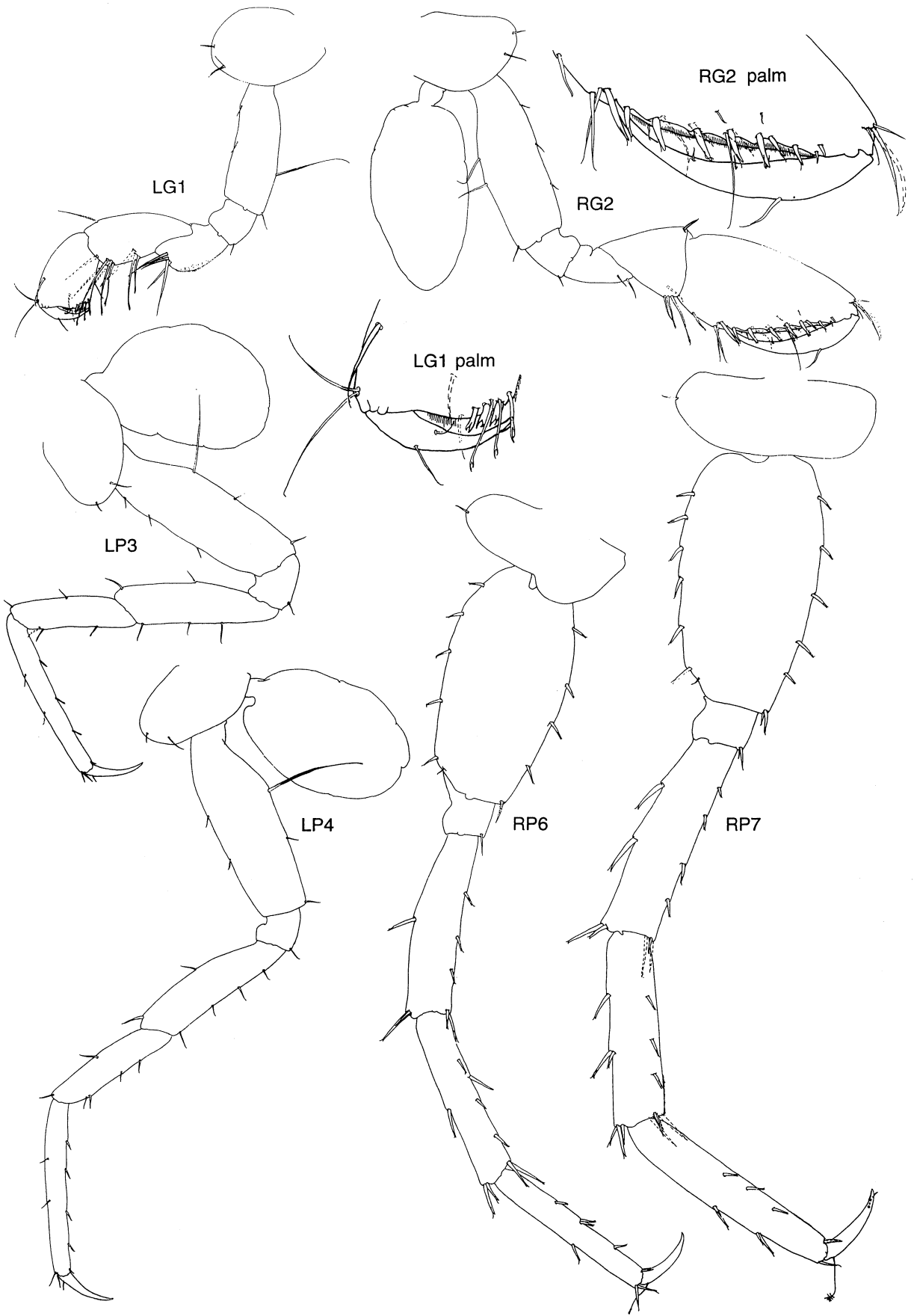


Fig. 20. *Nedsia sculptilis* holotype male 4 mm. Legs.

distal seta. *Right mandible* (Fig. 19): bearing a short palp of two subequal articles, the first truncate and naked, the second cone like bearing 2 short apical E-setae; incisor of 5 teeth; lacinia mobilis shorter than incisor, bifid, bearing anteriorly a median row of short spines, posteriorly a marginal row of setae; mandible bearing 4 accessory blades, the first denticulate, the remainder setose, with a single interraker seta lying between first and second blades, and a row of setae extending posteriorly; molar triturative, without a distal seta. *Lower lip* (Fig. 19): bearing prominent inner lobes extending to M0.7 of the outer lobes; anterior surfaces of both lobes rugose, inner lobes naked, outer lobes bearing apicomedial spines and setae. *First maxilla* (Fig. 19): palps of two articles, almost symmetrical, the left side more slender than the right, possibly regenerative, each with 5 apical and 1 subapical slender naked spines; inner plate ovatotriangular, without pubescence except for a small lateral terminal cluster, bearing on the medial margin to the apex 6 plumose setae; outer plate bearing two naked and five denticulate terminal spines. *Second maxilla* (Fig. 19): outer distal margin of both plates pubescent, facial and medial regions lacking pubescence, outer plate bearing a single distal spine additional to the terminal setae; both plates without other setae. *Maxilliped* (Fig. 19): palp third article with medial setae confined to the margin of the apex, bearing a single facial spine adjacent the dactylar base; apical setae marginal, not organised to comb rows; dactyl with two accessory spines arising adjacent the base of the nail and as long as the nail; medial margin of the outer plate carved into 4 sinuous indentations, without marginal spines, but associated with each a pair of long submarginal, curved, blunt spines. *First gnathopod* (Fig. 20): coxal plate bearing 2 apical setae, the fourth article posteriorly bulbous and pubescent, carpus not lobate; propodus trapezoidal and slightly expanded apically, longer than wide, posterior margin naked but for a single submarginal spine and a pair of long apical spines; margin of the palm lined with fine setae anteriorly, posteriorly the palmar corner rounded, marked by a single long lateral bifid spine, the posterior margin of the hand pubescent; adjacent the palmar corner three stout bifid spines and two long terminally bifid spines; dactyl bearing a subterminal accessory spinule extending to the nail-less apex, which reaches to the palmar corner. *Second gnathopod* (Fig. 20): coxa bearing 2 anterior setae, the palm strongly oblique, bearing 7 lateral and 2 medial stout trigger spines and marginally bordered with short setae, the palmar corner defined by a long lateral trigger spine; dactyl bearing 3 small spines along the inner margin, and extending to a point slightly short of the palmar corner. *Pereopods* (Fig. 20): coxae 3–4 with 2 anterior setae only, pereopods 3–4 longer than gnathopod 2, pereopod 3 < pereopod 4, both sparsely armed, pereopod 6–7 similar, pereopod 6 < pereopod 7, articles 5 of pereopod 6 and 5–6 of pereopod 7 bearing a slight anterior keel, the anterior spines consequently slightly submarginal; coxae 6–7 bearing single posterior spines, articles 2 of pereopods 6–7 posteriorly expanded but not lobate and bearing stout trigger spines; dactyls

of pereopods 3–6 without accessory spinules, pereopod 7 bearing a single subterminal spinule on the dactyl. *Gills*: flask shaped, present on coxae 2–6, gill 6 not reduced. *Sternal gills* absent. *Pleopods* (Fig. 21): each with 2 retinaculæ, without accessory retinaculæ, peduncles bearing 0,1,1 setae and 0,1,1 spines, all distal, the lateral spine of peduncle 3 bearing a trigger; rami extending subequally, of 7,6,6 inner and 8,8,7 outer articles; setae of basal articles of rami = 3-2,3-2,3-2. *Epimera* (Fig. 21): first epimera posteroventrally rounded, second posteroventrally quadrate, third slightly extended posteriorly and bearing a small posteroventral tooth, otherwise posterior margins smooth; epimera 1–3 bearing facial and submarginal ventral spines, the posterior corners marked by 2-1-1 spines, epimeron 2 bearing a single anteroventral marginal spine. *Pleon* (Fig. 21): pleonites 1–4 bearing dorsal and dorsolateral posterior setae, the posterior margins sculptured, with many serrations, less so on pleonite 4; without spines except for pleonite 5 which bears 3 dorsal and dorsolateral spines of moderate length, and pleonite 6 with 2 lateral and 1 ventrolateral posterior spines. *Uropods* (Fig. 21): first uropod 1.9× length of second, peduncle length greater than rami, outer margin bearing a strong basofacial spine and row of 4 dorsolateral spines, the last subapical, the medial margin bearing 2 anterior and 1 subapical dorsal spines; distal apices of peduncle bearing 1 medial and 1 lateral spines; inner ramus longer than outer, with single marginal spine at M0.6, and terminating in 5 spines, the outer ramus with 2 lateral spines at M0.4 and M0.6, terminating in an apical cluster of 4 spines; second uropod peduncle subequal to outer ramus, outer margin with 3 apical spines, inner margin with 1 mid-marginal and 3 apical spines; outer ramus bearing 1 mid-medial and 2 lateral spines at M0.5 and M0.7, and 4 terminal spines; inner ramus with 1 lateral spine at M0.7, a row of 4 medial spines and 4 terminal spines. Uropod 3 absent. *Telson* (Fig. 21): length equal to width, as long as urosomite 3; cleft 85% of its length, the subapex notched around an apical spine like extension, the notches bearing long plumose setae; left lobe bearing small lateral spines at M0.6 and M0.8, medial spines at M0.7 and M0.9, and a single penicillate facial setule at M0.5; right lobe bearing small lateral spines at M0.6 and M0.8, facial spines at M0.85, and single lateral penicillate spinule at M0.7.

Relationship. *Nedsia sculptilis* in the form of the pleonites which are setate and complexly sculptured, and the epimera which are facially and submarginally spinous is similar to *N. macrosculptilis* and differs from other *Nedsia* in these ways. *N. sculptilis* is distinguishable from *N. macrosculptilis* in that the posterior margins of the fourth pleonite are without spines, and the medial margin of the outer plate of the maxilliped is without facial rugosity and is carved into 4 rather than 5 indentations.

Distribution. Barrow Island, Western Australia.

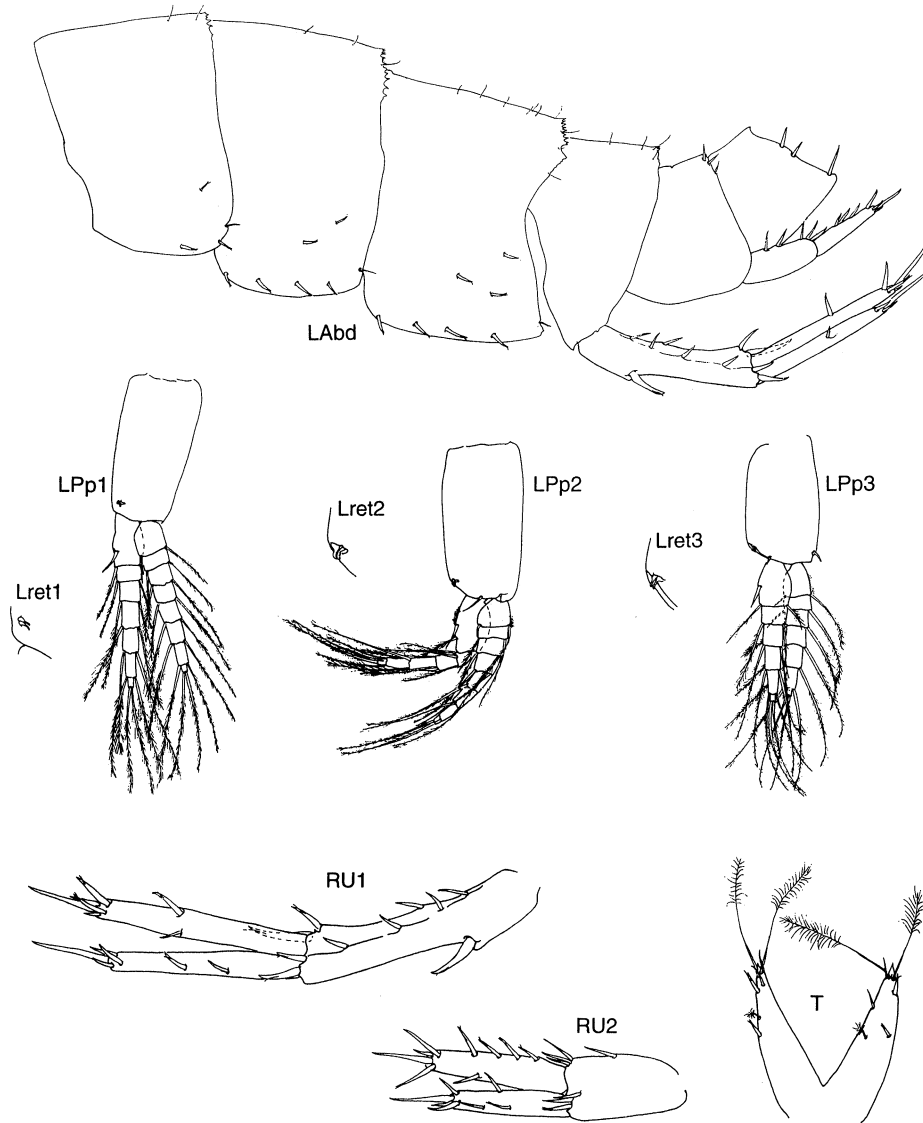


Fig. 21. *Nedsia sculptilis* holotype male 4 mm. Abdomen, pleopods, uropods, telson.

Family Bogidiellidae

A species of this family is recorded from a single Barrow Island site described as cave WL8. This record of a bogidiellid from Western Australia is unique. While Stock (1984) recorded *Bogidiella* (*Xystriogidiella*) *capricornea* from Heron Island on the Great Barrier Reef, the nearest record is of *Bogidiella* (*Medigidiella*) *sarawacensis* Stock, 1983 from Sarawak.

All Bogidiellids are hypogean or interstitial stygobionts of marine and fresh waters. Holsinger (1993) records 86 subterranean species of 16 genera.

The species recorded here possesses Bogidiellid characteristics of vermiform body, absence of sternal gills, restriction of coxal gills to coxae 4-5-6 without reduction of the sixth gill, free urosomites, gnathopods not mittenform and the first gnathopod dominant, palmar spines simple, rami of uropod three equal and extended beyond the first and second in the entire animal and without article-2 of the outer ramus, the telson

uncleft and scarcely emarginate, pleopods uniramous, the lower lip broadly spread by forward extension of the inner lobes, setae of the terminal article of the mandible reduced, the maxillae reduced and without medial setae, and the maxilliped reduced (Barnard & Barnard, 1983).

Bogidomma n.gen.

Etymology. Named for the presence of eyes, unique among the family.

Type species. *Bogidomma australis* n.sp.

Diagnosis. *Body:* pleonite 6 naked, rostrum obsolescent, lateral cephalic lobes strongly projecting, broad, with slight antennal sinus present; tending vermiform. *Urosome* without armaments. *Head:* first antenna moderately elongate, longer than antenna-2, ratio of peduncular articles 2:2:1, accessory flagellum 2-articulate; second

antenna, shorter than A1, flagellum much shorter than peduncle, calceoli absent. *Mandibles*: palp 3-articulate, ratio of articles 4:11:6, article-1 not setose, article-2 with few setae, article-3 with 2 E-setae only. *Lower lip*: broad, inner lobes elongate. *Maxillae*: without pubescence or peripheral setae except a single mid-medial seta on the inner plate of the second maxilla; inner plate of the first maxilla ovato-rectangular to subrectangular, without setae or pubescence, bearing 6 or 7 terminal spines, palp of two articles, with thin apical spines. *Coxae*: 1–7 short, longer than broad, coxae 1–2 lacking posterior spines, coxa 1 not expanded below, coxa 4 not excavate posteriorly, subquadrate, coxae 4–5 of approximately equal length. coxae 3–7 each with single posterior spines, coxae 1–4,6 each with single anterior spines. *Gnathopods*: similar. *First gnathopod*: dominant, hand ovate, carpus much shorter than propodus, strongly lobate, merus posteriorly extended but without hyaline lobe, palm strongly oblique, palmar spines not symmetrically bifid but with small trigger like extensions, spines at corner of palm; 2 long, lateral, 1 moderate medial; few simple setae along the palm; dactyl not reaching the end of the palm. *Second gnathopod*: smaller than gnathopod 1; carpus short, weakly lobate; hand moderately enlarged, ovate, palm acutely oblique, sparsely setulose, irregularly spinose; palm without distinct corner, bearing single slender medial and lateral trigger spines at point of intersection of dactyl. *Pereopods*: 6–7 moderately elongate, pereopod 7 longer than pereopod 6, pereopod 7 article-2 moderately expanded and posteriorly extended but lacking a posteroventral lobe; dactyls of pereopods 3–7 with 1 or 2 accessory spinules. *Gills*: coxae 4–6 each with a flask shaped gill; gill 6 not reduced; sternal gills absent. *Oostegites*: coxae 2–5 each with an elongate, thin, poorly setose oostegite. *Uropods*: uropod 3 extended beyond uropods 1–2 in entire animal, outer ramus with 1 article only, inner rami of equal length. *Telson*: broader than long, uncleft, laterally convex and terminally concave, subapical spines and paired penicillate setules on either lobule at M0.85.

Additional description. *Upper lip*: symmetrical, laterally and distally setose, weakly excavate below. *Mandibles*: accessory blades (rakers) few (3), with no inter-raker plumose setae, but a few additional plumose setae basal to the molar. *Maxilliped*: both plates short, inner plate bearing 3 long distal setae and 2 blunt naked tooth spines, but no other setae or pubescence; outer plate bearing 4 distal setae and a single medial seta at M0.5, medial margin otherwise without sinuosities, setae or pubescence; palp long, articles 2–3 weakly setose medially, naked laterally, article-3 with a single comb row of fine setae at base of dactyl, few distomedial setal-spines, apex not produced; dactyl unguiform with an oblique row of comb setae, a slender, elongate nail and pair of terminal spines one of which is equal to the nail. *Gnathopods*: dactyls of gnathopods 1–2 without recumbent inner tooth spine, lacking nail; gnathopod 1 without rastellate seta of article-4. *Pereopods*: 3–4 smaller than pereopods 5–7; posterior spine sets of article-6 of pereopods 3–4

evenly spaced. *Pleopods*: similar, peduncles devoid of setae, each with a single outer ramus, no setae bifid; each peduncle with 2 retinaculæ, no accessory retinaculæ. *Epimera*: Post-ventral tooth of epimera 1–3 absent, posterior margins without spines or setae, smooth, slightly convex. *Uropods*: apicolateral corners of peduncles of uropods 1–2 with small single spines, dorsal margins without spines except for 1 medium size mid-dorsal spine at M0.85 on uropod 1; medial margin of uropods 1–2 with 1 apical spine; rami of uropods 1–2 subequal, without spine rows; uropod 1 without basofacial spine; uropod 3; medial setae of outer ramus absent; peduncle with 1 medial subdistal and 1 apicolateral spine. *Urosome*: ventrodorsal spine on urosomite 1 at base of uropod 1 absent.

Relationship. This genus is unique among recorded bogidiellids in possessing well-developed eyes. All previously recorded bogidiellids are without eyes (Stock, 1984). Except in the presence of eyes *Bogidomma* is unequivocally a bogidiellid. Absence of inner rami of the pleopods suggests it is closest to either *Bollegidia* or *Bogidiella*.

Bogidiellids are categorised by Barnard & Barnard (1983) as probably a mixture of descendents from various Crangonyctoids. Barnard & Karaman (1980) discussed and dismissed Bousfield's (1977) elevation of the Bogidiellidae to superfamily status pointing out that the only consistent characteristic of the group is the dominant first gnathopod, a common occurrence among many groups, and therefore no basis for allocation to superfamily. Stock (1981) and subsequent authors have retained family status for this loose group characterised by a number of features which, however, do not all occur in all genera. Stock's (1981) cladistic analysis of the then known genera and species of the family translates into a position for *Bogidomma australis* somewhere within the *Bogidiella* group of subgenera, or possibly, though more remotely, on the basis of configuration of the lobes of the maxilliped, with *Marigidiella* (split from *Bogidiella*), although the new genus is unlike it in possessing two elements to the palp of the first maxilla, as well as a naked inner lobe and reduced setal cover of the second maxilla. Using the keys of Barnard & Barnard (1983), the new genus fits closely to *Bogidiella* except for the presence of eyes, ratio of the lengths of peduncular articles of the first antenna and of the length of the primary flagellum of the first antenna.

Geographically bogidiellids have been regarded as primarily Neotropical. They have, however, been reported from all the major continents, except Antarctica. The only record of a bogidiellid from Australia is of *Bogidiella (Xystriogidiella) capricornea* Stock, 1984, from the tropical marine atoll Heron Island, situated off the Pacific coast, a first recording of the family from the Pacific Ocean. *Bogidiella* is Palaearctic and Palaetropical (Oriental) as well as Neotropical (Hertzog, 1933; Stock, 1983). Stock (1983) considered the distribution of the Bogidiellidae can be explained as the result of the break up of Pangea in the Mesozoic and

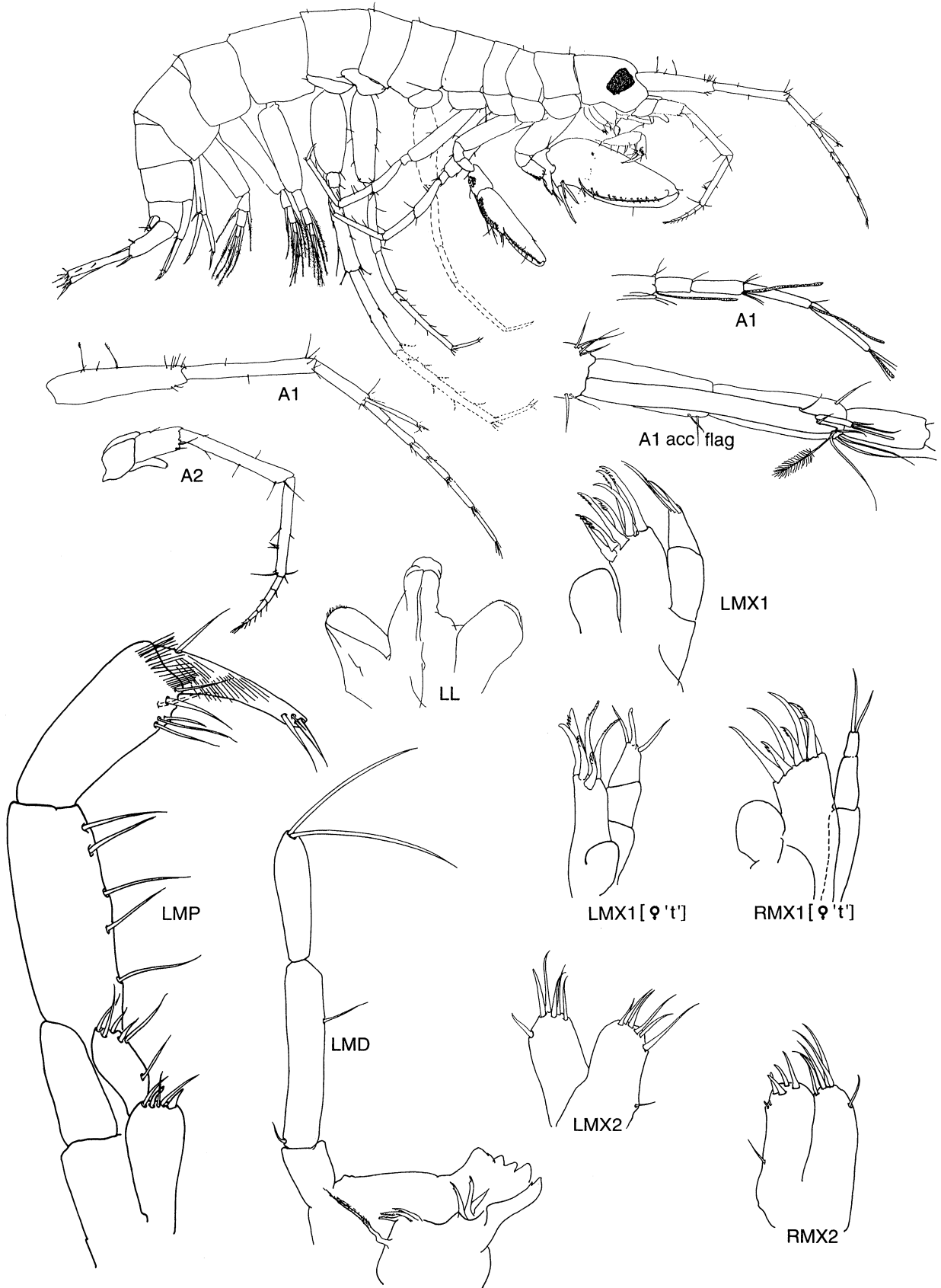


Fig. 22. *Bogidomma australis* holotype female 2.8 mm: all drawings except those indicated as female "t". Body, antennae, mouthparts.

isolation of populations in the Tertiary, and that the limited distributions and low fecundities of many species indicates their poor dispersive abilities.

***Bogidomma australis* n.sp.**

Figs 22–24

Etymology. The name refers to the type locality region.

Type locality. Cave number WL8, Barrow Island, Western Australia.

Material examined. HOLOTYPE (Western Australian Museum WAM 8-96) Barrow Island, Western Australian Museum collection BES799, female 2.8 mm collected 2 December 1992. Other specimen: BES716 female “t” 2.5 mm (broken) collected 28 November 1992.

Diagnosis. As in the genus.

Description of holotype (male). *Body* (Fig. 22) 2.8 mm; urosome without armaments, length 2.5–3 mm. *Head:* rostrum absent; eyes present, large, about 0.3× head, ovate, pale and indistinct in the preserved specimen; antennal sinus absent except for a small concavity of the ventral lateral cephalic lobes. *First antenna* (Fig. 22): length 0.4× body, 1.5× antenna-2; primary flagellum of 6 articles, shorter than peduncle (120:200); peduncular articles 1 and 2 equal, article-3 shortest, setae sparse; primary flagellum with aesthetascs but without calceoli, article-3 smallest, remainder of uniform length, sparsely setulate; accessory flagellum 2-articulate, (Fig. 22) extending to M0.1 of the third article of the primary flagellum; second article tiny (1:8), articulated subdistally and extending only 0.4 of its length beyond the terminus of the first. *Second antenna* (Fig. 22): short, length 0.3× body, peduncle much longer than flagellum (195:35), articles 4–5 longest, articles 3–5 with weak ventral setation and a weak single mid-dorsal seta; article-4 with proximal and mid-dorsal setae; flagellum of 5 articles of progressively reduced length, all articles with weak dorsal setation; calceoli absent. *Upper lip* (Fig. 22): symmetrical, laterally and distally setose. *Mandibles* (Fig. 22): similar; palp 3-articulate, article-1 short, ratio of article lengths 4:11:6, article-3 with 2 apical setae (2E) only, incisor 4 toothed, lacinia mobilis bifid, with 3 setose accessory blades, and a short row of 3 plumose setae leading to the molar; molar indistinct, weakly or non-triturative, bearing distal plumose seta; no other pubescence. *Lower lip* (Fig. 22): outer lobes finely pilose apically, spread broadly by forward intrusion of elongate inner lobes; inner lobes naked, projecting beyond outer lobes, relative lengths; 33:23. *First maxilla* (Fig. 22): first maxilla asymmetric; palps of two articles, left palp with 3 apical spines, right palp with 2; left outer plate with 5 denticulate spines and 1 or 2 naked spines all of approximately equal length, right outer plate with 3

short denticulate spines, 1 short and 3 long curved, naked spines. *Second maxilla:* both plates without pubescence, asymmetric; left inner plate bearing 4 blunt apical spines and 2 short distomedial spines; right inner plate bearing 3 apical and 2 subapical slender, sharp spines, and an elongate slender distomedial spine which extends as far as the longest apical spines. *Maxilliped* (Fig. 22): palp article-3 with 3 distal and 3 apical spine-setae, nail of dactyl slender, with 2 subterminal setae, the longer extending as far as the nail itself; article-3 with a transverse comb-row of setae basal to the dactyl, the dactyl with basal setae and an oblique row of similar setae, as well as a single dorsal setule at M0.2. *First gnathopod* (Fig. 23): dominant, 1.5× gnathopod 2; article-4 posteriorly linear, carpus strongly lobate, propodus ovate, much longer than broad, tapering apically, posterior edge naked except for a single distal submarginal spine at M0.7; corner of palm recurved with 2 lateral and 1 medial spines, palm convex, finely serrated, spines and setae all submarginal, dactylus not reaching end of palm. *Second gnathopod* (Fig. 23): smaller than gnathopod 1; hand ovate, elongate, width 0.3× length; palm finely serrated, convex except at the posterior end where it is broadly sinuous, palmar spines and setae all submarginal, spines not symmetrically bifid but with triggers; dactyl not reaching palmar corner, which is marked by a pair of slender trigger spines with a further slender spine posteriorly; hand facially and posteroventrally pubescent; carpus posteriorly pubescent; coxal plate subequal to coxa 1 with a single anteroventral spine. *Pereopods* (Fig. 23): pereopods 3–4 shorter than gnathopod 1, pereopod 3 longer than gnathopod 2, pereopod 4 subequal to gnathopod 2, pereopod 3 longer than pereopod 4, pereopods 3–4 articles 1–5 sparsely setose posteriorly and anteriorly, posterior margin of article-6 on pereopods 3–4 with armament formula S-S-S-Ss and S-S-S-S, thus with only 1 locking spine; pereopods 6–7 similar but consecutively elongate, with 2 locking spines on pereopod 6; article-2 of pereopod 7 weakly expanded, but not posteriorly lobate, without posterior setae; article-2 of pereopod 6 not expanded with few posterior setae; dactyls of pereopods 3,4,6 bearing 2,2,1 accessory spinules. *Gills* (Fig. 24): of coxae 4–6 flask shaped, of coxa 6 not reduced. *Oostegites* (Fig. 24): strap like, length 0.5× article-2 of pereopods, bearing few distal setae. *Pleopods* (Fig. 24): similar. Retinaculae 2 per pleopod without accessory, peduncles without setae, each uniramous, the outer ramus only present, of 3 articles, each article with 2 plumose setae, none bifid. *Epimera* (Fig. 24): epimera 2–3 post ventrally quadrate, epimeron 3 slightly extended, epimeron 1 more rounded, subquadrate; posterior margins slightly convex, smooth, without setae or spines, without a lateral ridge. *Pleon* (Fig. 24): only pleonites 2–3 with a single posterior dorsolateral seta on either side; posterior margins of 1–3 convex, remainder linear, all smooth, without setae or teeth except as above. *Uropods* (Fig. 24): uropod 3 longest, extending beyond uropods 1–2 in the entire animal; uropod lengths relative to uropod 1—uropod 2 = 0.75, uropod 3 = 1.3; peduncle length

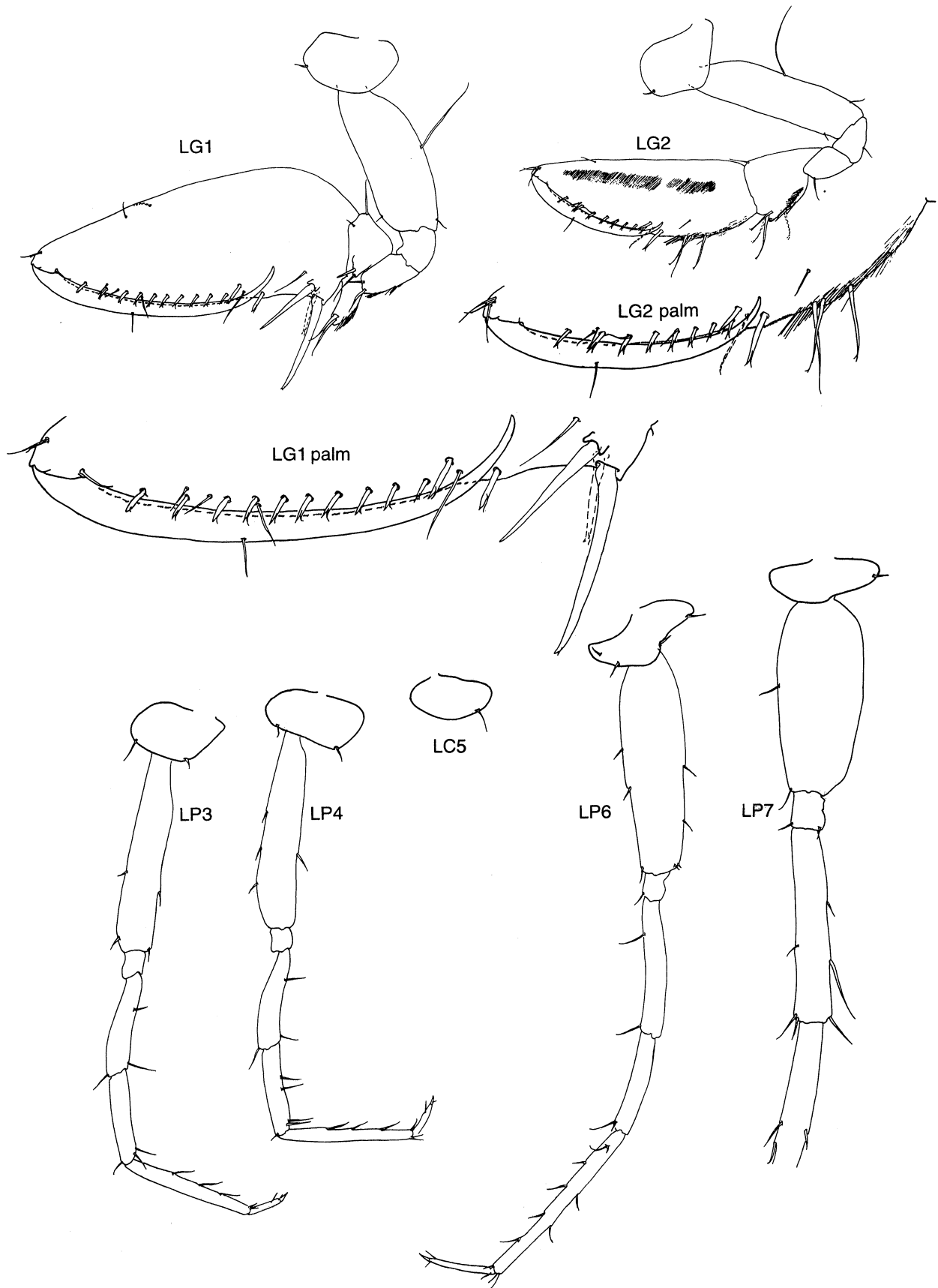


Fig. 23. *Bogidomma australis* holotype female 2.8 mm. Legs.

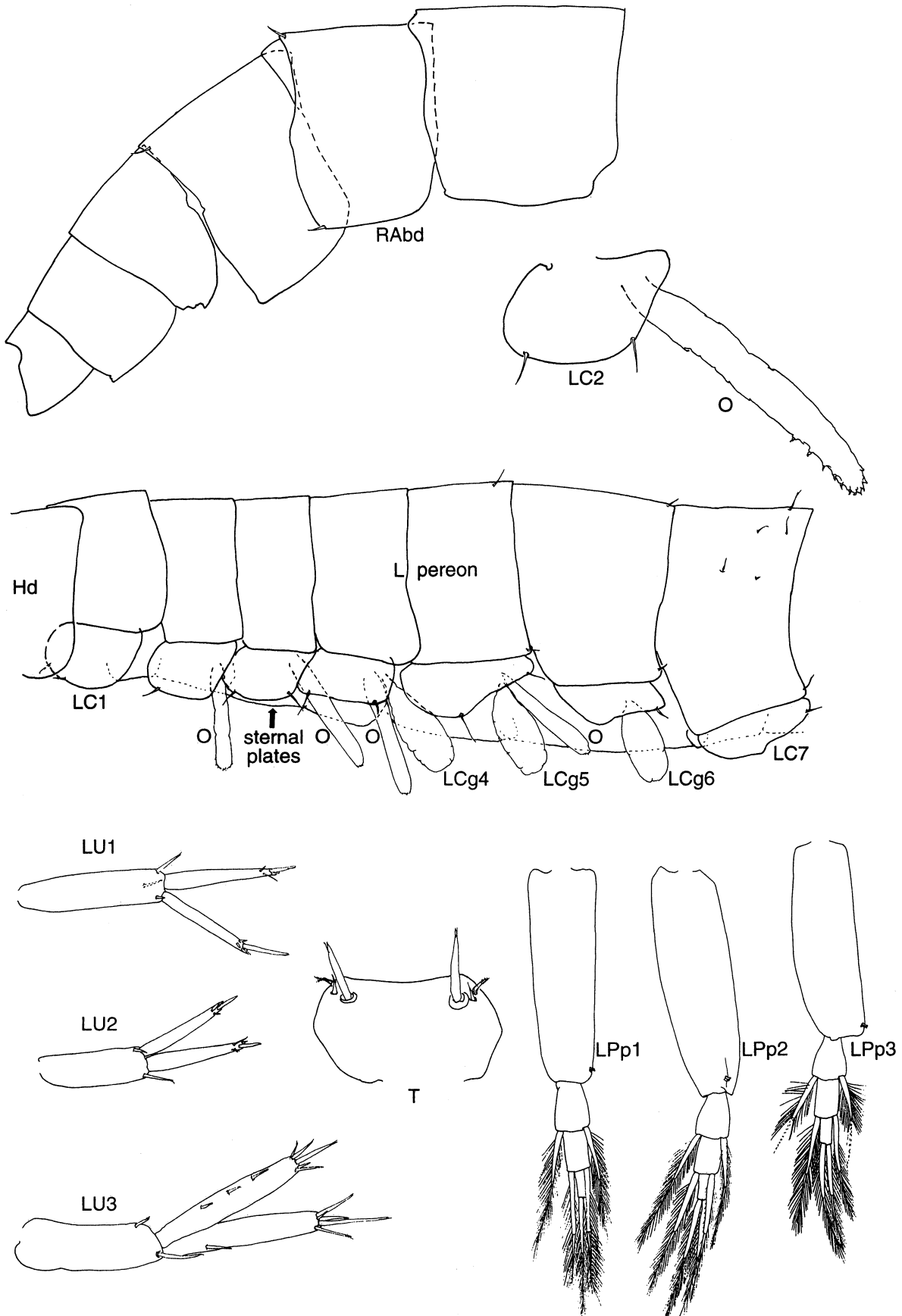


Fig. 24. *Bogidomma australis* holotype female 2.8 mm. Abdomen, gills and oostegites, pleopods, uropods, telson.

of uropod 1 = 1.3× inner ramus, outer margin with 1 small apicodistal spine, inner apical margin with a single, longer spine, without dorsal spine rows except for a single mid-dorsal spine at M0.85; rami of subequal length, lacking marginal spines; terminal spines = 5 lateral, 4 medial, the basal pair on each displaced subapically; uropod 2 peduncle length equal to length of inner ramus; peduncle naked except for a single apicomedial and a smaller apicolateral spine; outer ramus 0.9× inner; both rami without marginal spines, terminal spines = 4 lateral, 5 medial, several displaced subapically; uropod 3 rami equal in length; peduncle length 0.85× rami, 3× urosomite 3, bearing a single long apicolateral spine, and single smaller, apicomedial spine (the medial apex rounded, not subquadrate as is the lateral, thus displacing the apical spine subapically); outer ramus bearing a single laterofacial spine at M0.3 and 5 terminal spines; inner ramus bearing a row of 3 dorsomedial spines and 5 terminal spines. *Telson* (Fig. 24): width 1.8× length, approximately equal to, urosomite 3, not cleft, the apex concave to M0.9; 1 large trigger spine and 1 smaller spine submarginal, subapical on either lobe; paired penicillate setules at M0.85 on either side, submarginal on the left side.

Distribution. Barrow Island, Western Australia, in cave.

ACKNOWLEDGMENTS. We thank the collectors of the material, Dr W.F. Humphreys and his assistants at the Western Australian Museum, and the Western Australian Museum for permission to examine and describe the specimens. The useful comments of an anonymous referee, and of Dr D.R. Duckhouse are acknowledged, with thanks. The Australian Biological Resources Study provided financial support.

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