

Three New Tanaids (Crustacea, Tanaidacea) from Southern Queensland¹

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DURING THE COURSE of benthic community investigations by W. Stephenson and F. C. Vohra in Moreton Bay and by me in the Brisbane River estuary, southeastern Queensland, apseudid tanaids were found to be consistent components of the fauna. Detailed examination revealed that the specimens recovered represented three new species, two of *Apsudes* and one of the recently created genus *Whiteleggia* (Lang, 1970). One of the *Apsudes* is a true estuarine species, even living in tidal freshwater. The other is a marine intertidal species, associated with marine phanerozoans. The new *Whiteleggia* is a sublittoral level-bottom dweller.

Holotypes and allotypes were deposited in the Australian Museum, Sydney; paratypes, in the Australian Museum and the Queensland Museum, Brisbane.

Apsudes caeruleus new species

Fig. 1, 2, 3

Material Examined

Six males (including holotype), seven females (one ovigerous) from intertidal eelgrass bed, Dunwich, N. Stradbroke Island, December 1971, D. F. Boesch, collector; one ovigerous female from eelgrass, South Dunwich, January 1963, F. C. Vohra, collector; one female, 5 m, south of Peel Island, September 1971, W. Stephenson and S. Cook, collectors. All specimens are from Moreton Bay, Queensland.

HOLOTYPE: male, 8.6 mm long, Australian Museum no. P. 18691; allotype female, 10.8 mm, Australian Museum no. P. 18743.

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Description of Male

Body depressed, elongate, tapering slightly posteriorly. CARAPACE: one-fifth length of body, slightly wider than long; anterior margin produced into large rostral lobe with long, terminal, anteroventrally directed tooth; ocular lobes clearly demarked, anterolaterally produced; eyes distinctly pigmented light brown; carapace with midlateral notches which continue dorsally as X-shaped groove; ventral margins rounded; clypeus with long, sharp tooth.

PEREON: three-fifths body length, lateral margins discontinuous, with indentations between pereon segments; segments each with only a few short setae; segment 2 (first free segment) as wide as carapace, following segments successively slightly narrower; segments 2, 4, and 7 subequal in length, longer than segment 3 but shorter than subequal segments 5 and 6; dorsolateral margins of segments rounded, without sharp processes, margins of segments 4-7 concave; dorsal surfaces of segments with paired submedial grooves of various bifurcating shapes; segments 2, 5, and 6 each with single midventral tooth, segments 3 and 4 with two, segment 7 with midventral tooth and male sexual tubercle with a pair of subapical pores.

PLEON: more than one-fifth body length, narrower than last pereon segment; pleon segments short and wide, subequal in length, posterolaterally produced into cusped teeth; lateral margins of segments 1-4 bear plumose setae; segments each with midventral spine; pleotelson subquadrate, broader than long, as long as first three pleon segments, posterior margin produced into short point medially.

ANTENNA 1: as long as combined length of carapace and pereon segment 2; peduncular articles 1 and 2 dorsally flattened, margins

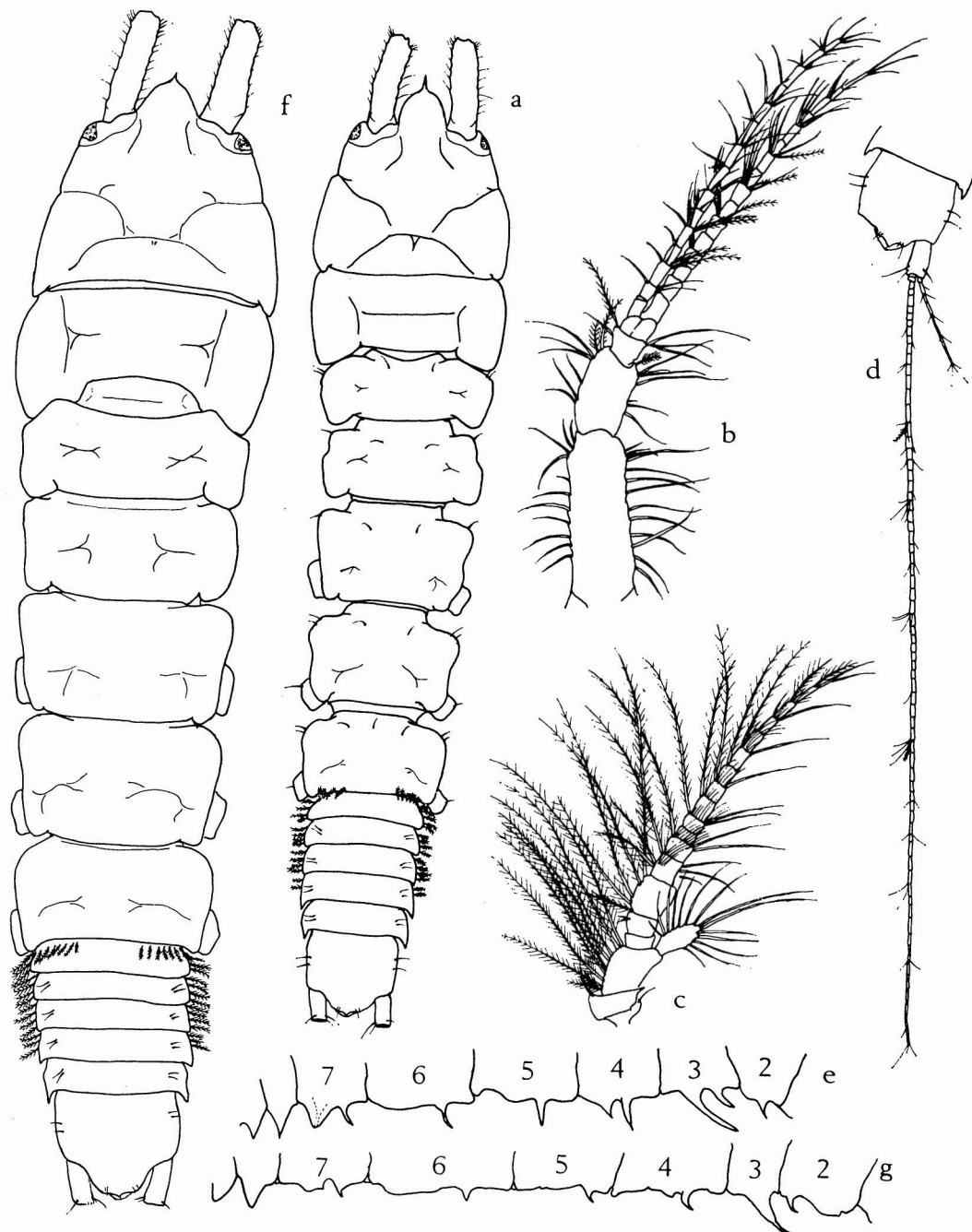


FIG. 1. *Apseudes caeruleus* new species. Holotype male, 8.6 mm: *a*, dorsal view of body; *b*, antenna 1; *c*, antenna 2; *d*, pleotelson and uropod; *e*, midventral margin of free pereon segments and first two pleon segments. Female, 10.8 mm: *f*, dorsal view of body; *g*, midventral margin.

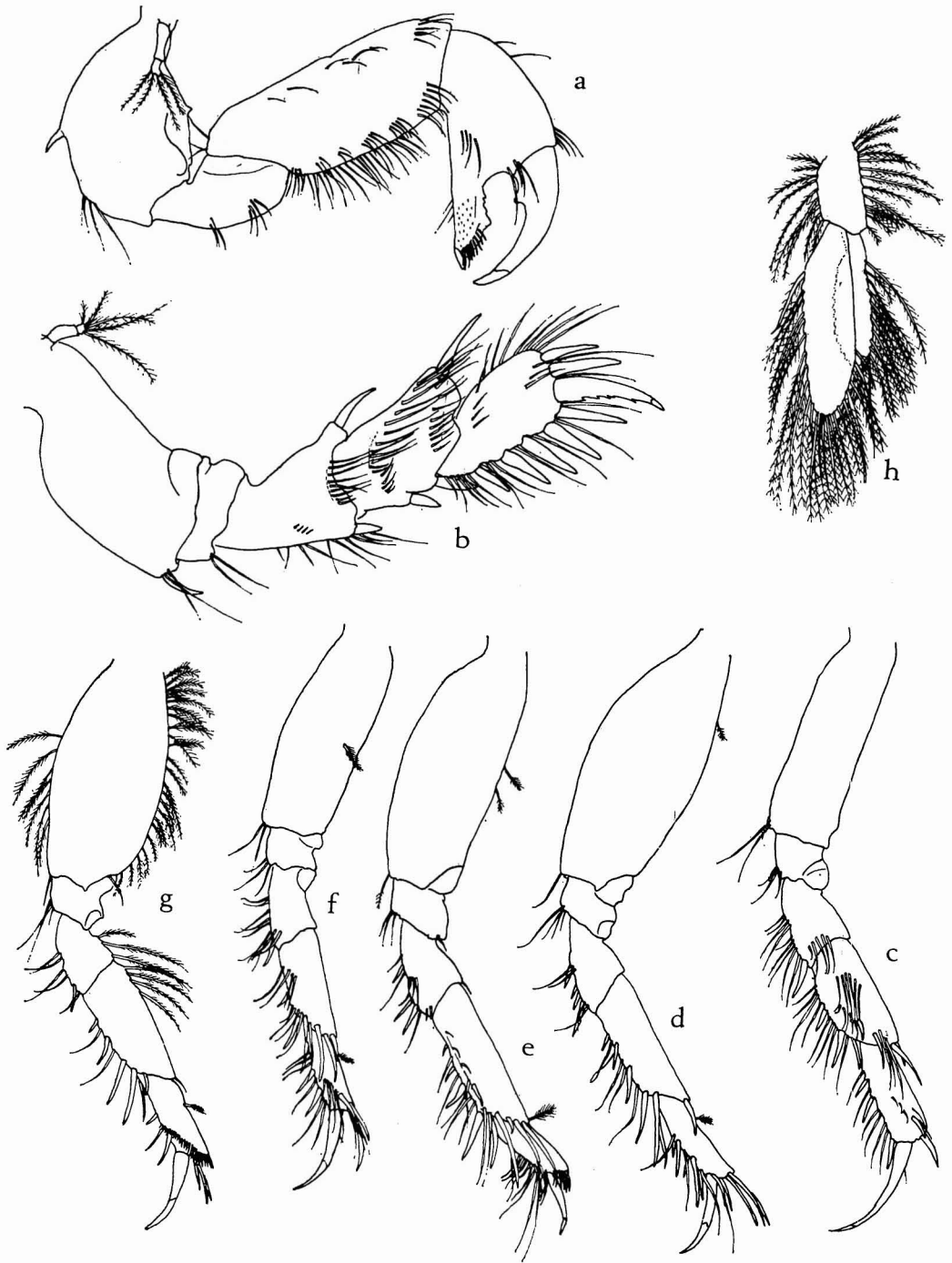


FIG. 2. *Apsudes caeruleus* new species. Holotype male: a, cheliped (pereopod 1); b, c, d, e, f, g, pereopods 2, 3, 4, 5, 6, 7; h, pleopod 1.



FIG. 3. *Aapseudes caeruleus* new species. Holotype male: a, accessory lobe of lower lip; b, mandible (right), without molar process; c, maxilla 1; d, maxilla 2; e, maxilliped. Female: f, cheliped; g, pereopod 2.

fringed with simple setae; article 2 one-half the length of article 1; peduncular article 3 very short, narrower than article 2. FLAGELLA: subequal, longer than peduncle; basal articles of flagella partially fused; inner flagellum 15 articles with simple and few plumose setae; outer flagellum stouter than inner, 16 articles with simple and plumose setae. ANTENNA 2: two-thirds length of antenna 1, heavily setose with both simple and plumose setae; peduncular article 1 distolaterally produced as sharp tooth,

article 5 wider and longer than articles 3 and 4; antennal scale born on lateral projection of peduncular article 2, broadly ovoid and fringed with simple setae; flagellum stout, 13 articles.

UPPER LIP: broad, trapezoidal, slightly emarginate, devoid of setae. LOWER LIP: bilobed, lobes bear three apical spines and fine hairs near lateral and medial margins. MANDIBLE: stout with prominent triarticulate palp; incisor process with three teeth on right mandible, five

on left mandible; lacina mobilis present on left mandible, with three teeth; six or seven thin accessory spines arise from columnar process, minutely bifurcate apically; molar process with triturrative surface bordered by ridge of denticles; palp article 3 longer than article 2 which is longer than article 1; article 1 bears prominent spine distolaterally and long mostly plumose setae; articles 2 and 3 bear multiple rows of short, singly or doubly pectinate setae plus longer simple setae.

MAXILLA 1: outer lobe with 10 thick apical spines; inner with four branching spines and one simple spine; palp biarticulate, terminal article bears four subapical and four apical, thick filaments, some of which bear subapical spinules. **MAXILLA 2:** coxa with dense marginal fringe of thick setae, outer submargin with four doubly pectinate setae; inner lobe apically armed with spines of a variety of forked and simple forms; middle lobe bears curved simple setae; outer lobe bears long pectinate setae. **MAXILLIPED:** with short coxa, basis with endite, palp of four articles, and epipodite; basis broad, distolaterally produced into pointed cusp; endite semicircular, with short plumose setae on medial margin, pectinate spines on distal margin, and prominent coupling hooks; palp article 1 short, distolaterally produced, bears long simple setae; article 2 as broad as article 1, longest palp article, bears long setae distolaterally, distomedially, and on outer surface, with short thick setae along distal half of medial border; articles 3 and 4 narrow, with long setae near medial border.

CHELIPED (PEREOPOD 1): robust, extending anteriorly to anterior margin of carapace, held parallel to body, consists of five articles and biarticulate exopod, geniculate between basis (basi-ischium) and merus and between carpus and propodus. Basis more than one-half as broad as long, very narrow proximally, broadly convex posteriorly, anterolateral border with distal rounded projection, anteromedial border with short tooth, midposterior border with prominent spine and series of setae; merus narrow proximally, distally expanded, bears posterior series of short setae; carpus elongate, stout, nearly parallel sided, bears posterior

fringing setae and sparse setae anteriorly; propodus with triangular hand and stout, straight, immovable finger, sparse setae emanate from anterior and posterior margins and lateral surface of hand; immovable finger with a few blunt teeth and distal series of short, stout setae on cutting edge, terminal unguis and scattered small denticles on lateral surface; dactylus broad at base, curved, terminating in unguis which barely exceeds immovable finger, with a blunt tooth on cutting edge; exopod emanates from short peduncle, article 1 long, short article 2 bears four plumose setae.

PEREOPOD 2: slightly longer than pereopod 1, fossorial, articles 2-6 broad and flat; article 1 rudimentary; article 2 elongate, armed posterodistally with strong spine and few long setae, anterodistal corner with lateral subtriangular surface separated by groove; article 3 short with few setae posterodistally; article 4 expanded distally, with stout spine at both distal corners, series of setae along dorsal and posterior margins; article 5 subequal to article 4, with distally expanded anterior lobe bearing large spine, posterior margin with stout subterminal and terminal spines, lateral surface with series of setae near distal border and in oblique row extending from anterior spine; article 6 narrower, posterior margin bearing five stout spines interspersed among long setae, anterior margin with setae and two subterminal spines; article 7 four-fifths length of article 6, with posterior serrations; exopod like that of pereopod 1 but with five plumose setae.

PEREOPODS 3-7: ambulatory, subequal in length. **PEREOPOD 3:** article 1 very short; article 2 long and narrow, subequal to combined length of articles 3-5, posterior border with few setae terminally; article 3 short, with posterodistal setae; article 4 twice length of article 3, posterior border with marginal fringe of setae and subterminal spine, outer surface with row of setae; article 5 twice length of article 4, posterior border with marginal setae and two spines, anterodistal corner with two spines, lateral surface with two spines and three series of setae; article 6 subequal to article 5, with posterior marginal setae and three spines, large anterodistal spine, and lateral surface with

subterminal spine and short setae; article 7 longer than article 6, thin, gently curving to acuminate unguis. PEREOPOD 4: article 1 longer than in pereopod 3; articles 2 and 3 as in pereopod 3 except that article 2 is slightly inflated; article 4, posterior margin with four spines and a few setae; article 5 narrower and longer than in pereopod 3, with marginal setae and four submarginal spines ventrally, and anterodistal spine; article 6 narrow, shorter than article 5, with series of setae and five spines submarginally along posterior and distal borders, with short plumose seta anteroproximally; article 7 shorter than article 6, gently curving to unguis. PEREOPOD 5: article 1 with laterally projecting coxal plate; articles 2-4 similar to pereopod 4; article 5 with setae and five spines along posterior margin and series of setae and one spine along submargin, distolateral margin with three very long and one short spine, one short plumose seta anterodistally; article 6 one-half length of article 5, with posterior marginal setae and circlet of spinules anterior to base of article 7; article 7 shorter than article 6, geniculate. PEREOPOD 6: article 1 with coxal plate; articles 2-4 similar to pereopod 3; article 5, ventral border with submarginal setae laterally and three submarginal spines medially, distolateral margin with row of four spines and few setae; article 6 little shorter than article 5, ventral margin with setae and two spines, lateral surface with subterminal, oblique row of setae and three spines, one short plumose seta anteroproximally; article 7 subequal to article 6, gently curving to acuminate unguis. PEREOPOD 7: article 1 with coxal plate; article 2 inflated, with plumose setae along entire anterior and distal two-thirds of posterior margins; article 3 with few posterior marginal simple setae; article 4 short, with plumose setae along anterior margin, simple setae and one spine along posterior margin; article 5 twice length of article 4, anterior margin with plumose setae proximally, posterior margin with five spines and two setae, distomedial margin with a long thin spine; article 6 shorter than article 5, bears anterior short plumose seta, posterior row of three marginal spines, and oblique line of closely set spinules which enclose three long spines and articulation of article 7; article 7 shorter than article 6, gently curving to unguis.

PLEOPODS: five pairs, all similar; peduncle elongate, bordered on both sides with long plumose setae; rami uniarticulate, elongate, fringed with longer plumose setae; inner ramus the longer.

UROPOD: filiform, longer than length of body from tip of rostrum to pleon segment 4; peduncle shorter than pleotelson, bears few subterminal setae; outer ramus eight articles, bears number of short setae including apical group; inner ramus seven times longer than outer, with approximately 70 articles, the segmentation being obscure, setation sparse, including apical group of setae.

Description of Female

Body much more robust than male; pereon segments, although similar in relative lengths, much broader, their lateral margins all nearly straight and segments close-fitting; carapace relatively slightly shorter, rostrum weaker, rostral tooth shorter, ocular lobes less produced anteriorly; midventral armament of pereon similar to male but teeth weaker, sexual tubercle absent, and pereon segment 3 bears only one tooth.

Antennae and mouthparts as in male. CHELIPED: similar in size and shape to that of male except that basis less robust and without anterodistal rounded process; chela more slender, straight fingers without teeth. PEREOPOD 2: article 2 without anterodistal groove on lateral surface; articles 4, 5, and 6 broader than in male. Remaining pereopods, pleopods, and uropod as in male. Oostegites rudimentary, arise from pereopods 1-5.

Size

The body lengths of the six males examined ranged from 6.8 to 8.6 mm. The width of the carapace of the holotype (8.6 mm long) was 1.9 mm, and the total length of pereopod 2 was 3.3 mm. The nine females examined ranged in length from 6.1 to 11.1 mm; the allotype, 10.8 mm long, was 2.4 mm wide. The two ovigerous females were 10.6 and 11.1 mm long. Because of their smaller size, the males examined may not have been completely mature and certain

characteristics described—especially the cheliped—may not represent the condition of the fully adult animal.

Coloration

The body of a live animal is speckled dark blue on a light blue background and the appendages are white. Upon being preserved in formalin, specimens developed a uniform sky-blue color on the body. Specimens lost their coloration after a month or two in alcohol.

Relationships

A lack of detail, especially of mouthparts and pereopods, in the descriptions of most *Apseudes* makes a thorough analysis of the relationships of this species impossible. The southern Australian *A. australis* Haswell (1882a) is similar in body form and in the lack of lateral teeth on pereon segments. It can be distinguished by its sharply triangular rostrum, setose pleon segments which are sharply produced laterally, unequal flagella of antenna 1, cheliped carpus which is shorter than the chela, and by having two, as opposed to five, posterior marginal spines on article 6 of pereopod 2. *A. caeruleus* bears resemblance to the eastern Pacific *A. permix* Menzies (1953) and *A. cedroensis* Menzies (1953) in the general body shape and similarity of pereopod 7. However, both species have biarticulate inner rami of the pleopods, laterally projecting lobes on the pleon segments, and unequal flagella of antenna 1.

Of the more completely described species, *A. caeruleus* perhaps most closely resembles *A. nigrifrons* Shiino (1963) which, although lacking distinct ocular lobes and possessing lateral teeth on some pereon segments, has a similar body shape, maxillae and maxilliped, pereopods (particularly pereopods 2 and 7), and similarly long uropods. Additionally, *A. nigrifrons* lacks the distal spine on article 1 and the pectinate setae on articles 2 and 3 of the mandibular palp, much of the ventral pereon armament, and the terminal group of spinules on article 6 of pereopod 5 of *A. caeruleus*. *A. caeruleus* also bears many similarities to *A. estuarius* n. sp. as discussed below.

A. caeruleus can be separated from every

known *Apseudes* by the combination of its lack of lateral teeth but presence of ventral teeth on every pereon segment, lack of laterally projecting lobes of the pleon segments, and possession of subequal flagella of antenna 1 and a large distal spine on article 1 of the mandibular palp.

Ecology

Vohra (1965) found *A. caeruleus* (identified by him as "tanaids") abundant from middle to lower tidal levels on eelgrass (*Zostera capricorni*) flats at South Dunwich, North Stradbroke Island, and rare at Victoria Point, on the mainland shore of Moreton Bay. At South Dunwich it accounted for 6 percent of the total macrobenthic fauna by number, and was the second most abundant crustacean. Only one specimen has been collected from intensive subtidal sampling in Moreton Bay by W. Stephenson; thus, it appears that its distribution is limited to eelgrass and/or intertidal areas.

Apseudes estuarius new species

Fig. 4, 5, 6

Material Examined

Several thousand specimens, including males, females, ovigerous females, and juveniles, from the Brisbane River estuary, from Meeandah to Goodna, Queensland, August–December 1971, D. F. Boesch, collector; 24 males, 21 females, and 11 juveniles from the Fitzroy River estuary at Rockhampton, Queensland, November 1971, D. F. Boesch, collector.

HOLOTYPE: male, 8.6 mm long, Yeronga, Brisbane River, Australian Museum no. P. 18694; allotype female, 8.1 mm, Australian Museum no. P. 18744.

Description of Male

Body depressed, elongate, widest at carapace. CARAPACE: one-fifth body length, longer than wide; anterior margin produced into triangulate rostral lobe with short, terminal, anteroventrally directed tooth; ocular lobes distinct, anterolaterally produced; eyes on anterior margin, faintly pigmented brown; carapace

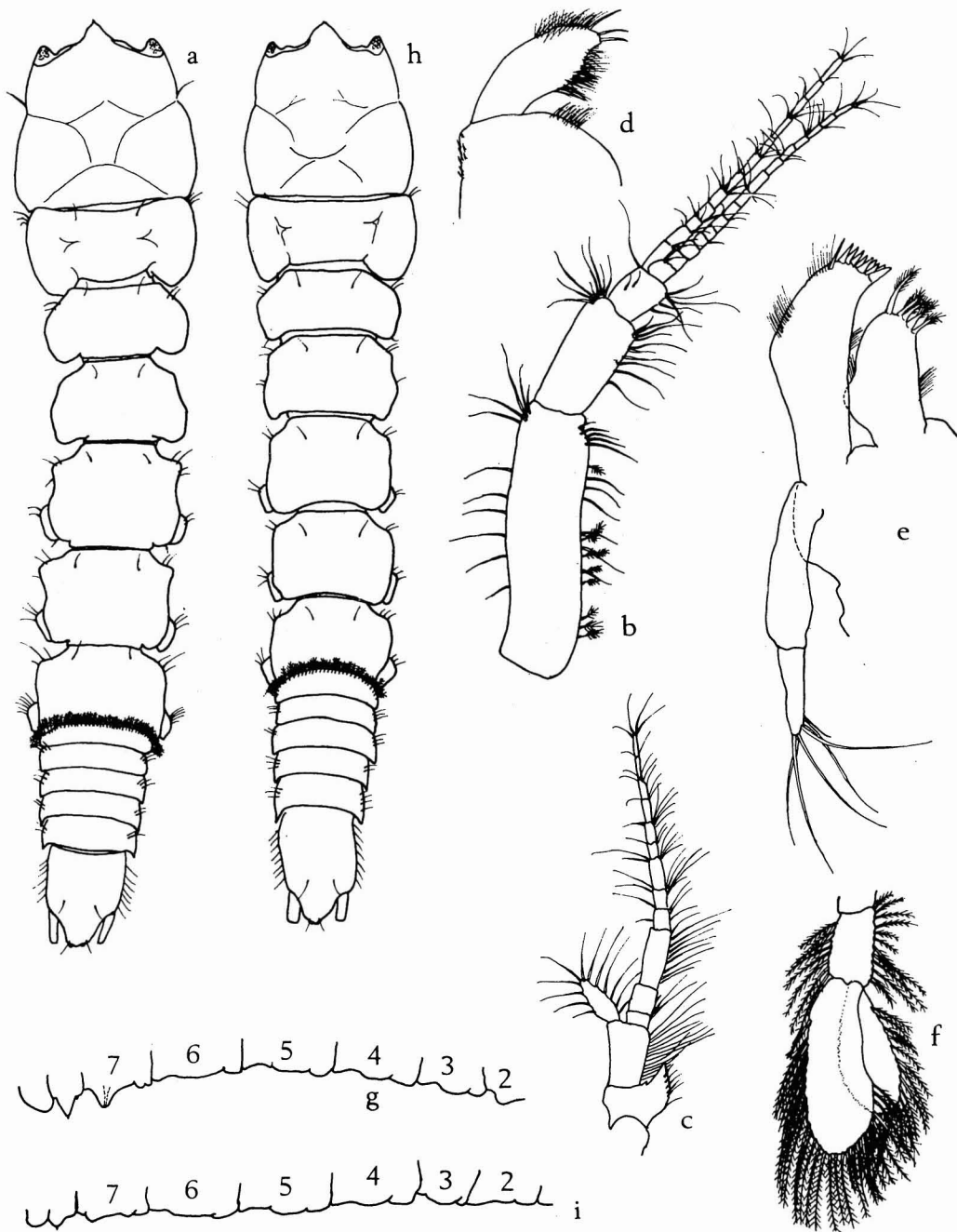


FIG. 4. *Apsendes estuarius* new species. Male, 8.6 mm: *a*, dorsal view of body; *b*, antenna 1; *c*, antenna 2; *d*, accessory lobe of lower lip; *e*, maxilla 1; *f*, pleopod 1; *g*, midventral margin of free pereon segments and first two pleon segments. Female, 8.2 mm: *b*, dorsal view of body; *i*, midventral margin.

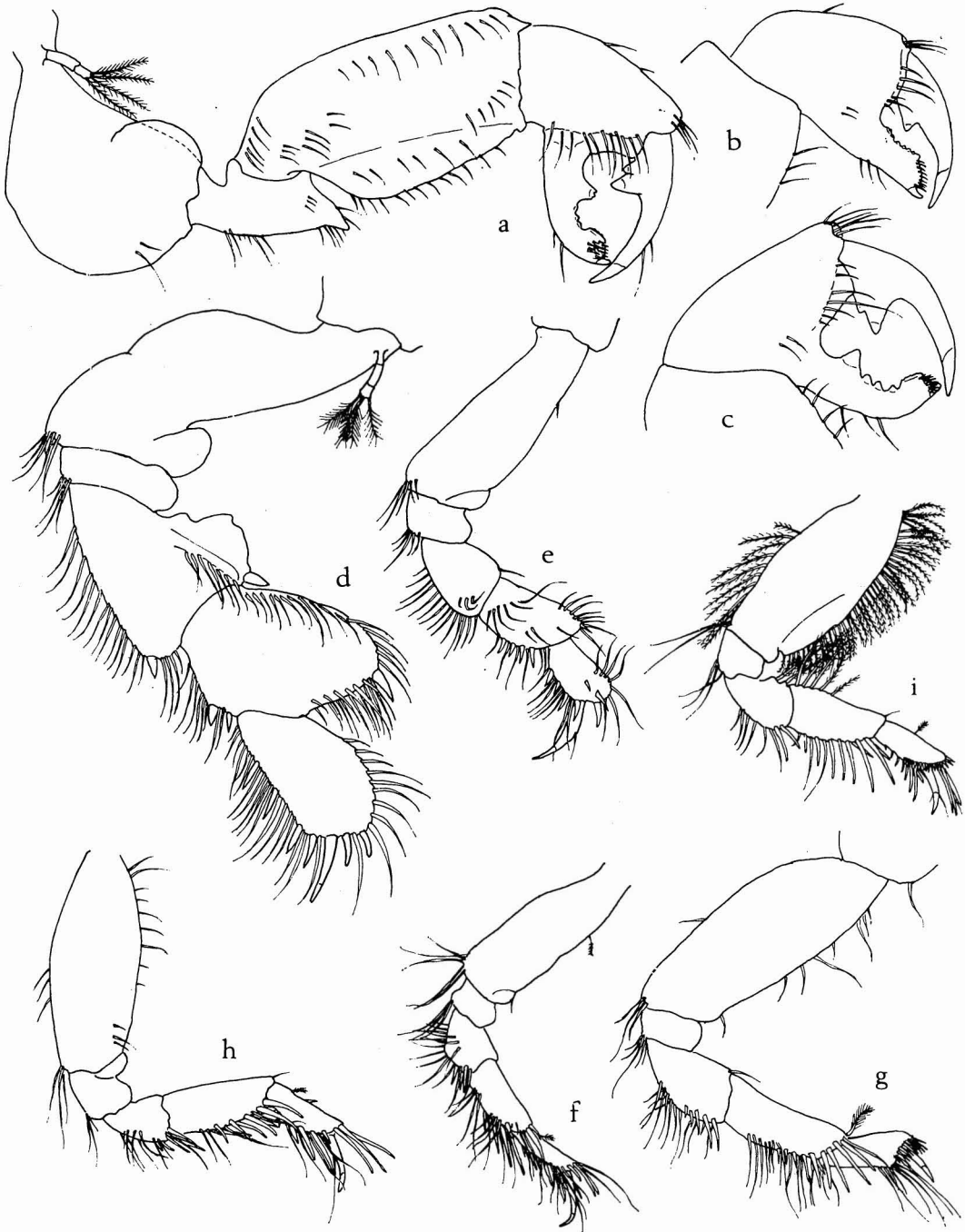


FIG. 5. *Aapseudes estuarius* new species. Male: *a*, cheliped (pereopod 1); *b*, partially developed chela of young male; *c*, fully developed chela of adult male; *d*, *e*, *f*, *g*, *h*, *i*, pereopods 2, 3, 4, 5, 6, 7.



FIG. 6. *Apsedes estuarius* new species. Male: *a*, mandible (right), without molar process; *b*, maxilla 2; *c*, maxilliped; *d*, uropods. Female: *e*, cheliped; *f*, pereopod 2.

with lateral notches which continue dorsally into series of grooves which enclose pentagonal surface; ventral margins rounded; clypeus with short, sharply produced tooth.

PEREON: three-fifths body length, lateral margins discontinuous, segments with few short setae near anterior and lateral borders; segment 2 (first free segment) as wide as carapace; following segments narrower and of almost uniform width; segments 2-4 subequal

in length and shorter than the subequal segments 5-7; dorsolateral margins of segments 5-7 rounded, without sharp processes; segments 5-7 with rounded anterolateral lobes and slightly concave lateral borders; only segment 2 strongly grooved dorsally; segments without midventral teeth, segment 7 with male sexual tubercle bearing a pair of subapical pores.

PLEON: one-fourth body length, narrower than last pereon segment; pleon segments short

and wide, segments 1-4 subequal in length, segment 5 slightly longer; segments postero-laterally produced into cusped teeth; lateral margins of segments 1-4 bear plumose setae; segment 1 with dorsal fringe of plumose setae near anterior margin and prominent midventral tooth tipped with minute spine; pleotelson longer than wide, as long as combined length of first four pleon segments, terminates medially as short point between submarginal lobes, laterally fringed with setae.

ANTENNA 1: longer than carapace plus pereon segment 2; peduncular articles 1 and 2 dorsally flattened, margins fringed with setae, lateral margin of article 1 with additional plumose setae, article 2 less than one-half length of article 1; article 3 less than one-half length and narrower than article 2; flagella subequal, shorter than peduncle, bear simple setae; inner flagellum with 12, outer with 15 articles. ANTENNA 2: subequal to peduncle of antenna 1, heavily setose; peduncular article 1 with medial projection terminating in sharp tooth, article 5 subequal to article 2; antennal scale born on lateral projection of peduncular article 2, ovoid, fringed with setae; flagellum thin, nine articles.

UPPER LIP: broad, slightly emarginate, devoid of setae. LOWER LIP: bilobed, lobes bear three apical spines and dense hairs on lateral and medial margins. MANDIBLE: stout, with prominent triarticulate palp; incisor process with four teeth on either mandible; lacina mobilis present on left mandible, with five teeth; five accessory spines, one simple and the remaining forked, arise from long columnar process; molar process with triturative surface bordered by ridge of denticles; palp article 3 shorter than article 2 but longer than article 1; article 1 with medial and outer subterminal rows of long plumose setae; articles 2 and 3 bear multiple rows of short singly or doubly pectinate setae plus longer simple setae.

MAXILLA 1: outer lobe with nine thick apical spines and one thin subapical spine; inner with five branching spines; palp biarticulate, terminal article bears six relatively short, tapering filaments. MAXILLA 2: coxa with marginal fringe of thick setae, outer submargin with three

doubly pectinate setae; inner lobe apically armed with three forked and six singly or doubly pectinate spines and one subapical simple spine; middle lobe bears curved pectinate and simple setae; outer lobe bears long pectinate setae. MAXILLIPED: with short coxa, basis with endite, palp of four articles, and epipodite; basis very broad, lateral margin finely scalloped; endite roundly triangulate, bears short plumose setae on medial margin, pectinate spines on distal margin, two short spines at the distostomial corner, and small coupling hooks; palp article 1 short, subquadrate, with short spine at distolateral corner; article 2 as wide as long, with setae distolaterally, medially, and on outer surface, and few short, thick setae along medial submargin; article 3 as wide as long, with long, submedial setae; article 4 subcircular, with many long setae.

CHELIPED (PEREOPOD 1): very large, exceeding peduncular article 2 of antenna 1, held parallel to body, consists of five articles and a biarticulate exopod; geniculate between basis (basis-ischium) and merus and between carpus and propodus. Basis more than one-half as broad as long, very narrow proximally, broadly convex posteriorly, anterolateral margin with large lobate projection distally; merus narrowest subproximally, distally produced into prominent tooth, with series of setae posteriorly; carpus narrow proximally, twice as long as wide, nearly parallel sided, bears posterior fringing setae and sparse setae near anterior and proximal margins of outer surface; propodus with subovoid hand and large immovable finger whose posterior margin meets that of the hand at nearly right angle, setae occur on outer surface of hand along line separating hand from immovable finger; immovable finger with blunt teeth along cutting edge born on proximal projection, terminal subquadrate projection and between these processes, subquadrate terminus bears apical unguis and multiple rows of spinules; dactylus long, curved, exceeding immovable finger, bears two large blunt teeth along proximal cutting edge, subterminal setae, and large apical unguis; fingers when closed enclose a large, roughly 8-shaped space; exopod emanates from short peduncle, article 1 long, short article 2 bears four plumose setae. Fully

mature males with the gaping chela described but smaller males with chelae in various stages of development, usually lacking strong teeth on the immovable finger and the proximal tooth of the dactylus and without the upturned subquadrate terminus of the immovable finger; as a result the fingers are more closely fitting.

PEREOPOD 2: fossorial, articles 2–6 broad and flat, shorter than pereopod 1; article 1 rudimentary; article 2 elongate, armed at posterodistal corner with short stout spine and setae, anterodistal corner with elevated rounded lobe separated from lateral surface by groove; article 3 short, with posterodistal setae; article 4 distally expanded, with short stout spines at both distal corners, anterior margin lobate and irregular, with setae on posterior margin and in oblique row on lateral surface; article 5 subequal to article 4, with distally expanded anterior lobe bearing stout spine, posterior margin with terminal and stout subterminal spines, setae fringe anterior and posterior margins; article 6 narrower, subequal in length to article 5, with marginal setae and four marginal spines posterior and two marginal spines anterior to articulation of article 7; article 7 one-half length of article 6, narrower, with apical unguis; exopod as on pereopod 1.

PEREOPOD 3: subfossorial; article 1 very short; article 2 elongate, slightly expanded distally, subequal to combined length of articles 3–5, with few posterodistal setae; article 3 short, with posterodistal setae; article 4 twice length of article 3, posterior border with marginal setae, lateral surface with short row of setae; article 5 less than $1\frac{1}{2}$ as long as article 4, broad, posterior border with four marginal spines interspersed with setae, anterodistal corner with one spine and few setae, lateral surface with rows of setae; article 6 shorter and narrower than article 5, distally expanded anterior margin bears fringe of setae and terminal spine, lateral surface with two distal spines, posterior margin with four spines interspersed with setae; article 7 shorter than article 6, bears anterior seta and acuminate unguis.

PEREOPODS 4–7: ambulatory; pereopods 5–7 subequal in length, longer than subequal pereopods 3 and 4.

PEREOPOD 4: article 1 longer than in pereopod 3; articles 2 and 3 as in pereopod 3, except that article 1 narrower and bears an anterior short plumose seta; article 4 with number of spines at the posterodistal corner and posterior marginal setae; article 5 narrower and longer than in pereopod 3, with number of spines near distal and posterior margins; article 6 narrow, subequal in length to article 5, with spines and setae near distal and posterodistal margins, with short plumose seta anteroproximally; article 7 shorter than article 6, slightly geniculate, with terminal unguis. **PEREOPOD 5:** article 1 with laterally projecting coxal plate; article 2 nearly parallel sided, with sparse anterior marginal setae and few posterodistal setae; article 3 short, with posterodistal setae; article 4 with few spines along distal half of both lateral and medial posterior submargins; article 5 with posterior submarginal row of setae on lateral and medial surfaces, row of nine spines submarginal to posterodistal and distal borders, and one short plumose seta at anterodistal corner; article 6 more than one-half length of article 5, with posterior marginal setae and circlet of spinules anterior to base of article 7; article 7 shorter than article 6, with unguis. **PEREOPOD 6:** article 1 with coxal plate; articles 2–4 like those of pereopod 5; article 5 with submarginal spines along lateral and medial surfaces of posterior submargin; article 6 shorter than article 5, with ventral and distal marginal setae and spines, and ventroproximal short plumose seta; article 7 shorter than article 6, gently curving to unguis. **PEREOPOD 7:** article 1 with coxal plate; article 2 inflated, with plumose setae along entire anterior and distal two-thirds of posterior margins; article 3 with few posterodistal simple setae; article 4 short with anterior marginal plumose setae and simple setae and two spines along posterior margin; article 5 twice length of article 4, anterior margin with plumose setae proximally, posterior margin with seven marginal spines and few setae; article 6 shorter than article 5, bears one short plumose seta on anterior margin, row of seven spines on posterior margin, and oblique row of closely set spinules which enclose three long spines and articulation of article 7; article 7 shorter than 6, gently curving to unguis.

PLEOPODS: five pairs, all similar; peduncle elongate, bordered on both sides with long plumose setae; rami uniarticulate, fringed with longer plumose setae; rami long but wide, inner ramus the longer.

UROPOD: filiform, subequal in length to pleon; peduncle much shorter than pleotelson, bears dense subterminal setae; outer ramus six articles, bears number of setae including apical group; inner ramus four times longer than outer, with approximately 30 articles, with plumose and long simple setae and apical group of simple setae.

Description of Female

Body as in male except that abdomen slightly longer; sexual tubercle of pereon segment 7 absent, midventral tooth on pleon segment 1 smaller than in male.

ANTENNA 1: (especially peduncular article 1) shorter, only slightly longer than carapace. Antenna 2 and mouthparts as in male. CHELIPED: much feebler, extending only to anterior margin of carapace; basis narrow, posterior margin with small tooth and subterminal clump of setae, without anterodistal lobe; merus distally produced but without strong tooth; carpus elongate and narrow; chela weak, with long, straight fingers; immovable finger with multiple rows of denticles. PEREOPOD 2: article 2 shorter than in male, without anterodistal lobe; article 4 less expanded, anterior border regular; articles 5-7 similar to male. Remaining pereopods, pleopods, and uropods as in male. Oostegites rudimentary, arise from pereopods 1-5.

Size

Recognizable male specimens ranged in length from 4.6 to 9.1 mm. The holotype male (8.6 mm long) had a carapace width of 1.8 mm and its pereopod 2 was 3.1 mm long. The smallest male with a fully developed chela was 6.2 mm long; however, males with chelae less than fully developed were as large as 8.3 mm. Recognizable females ranged from 4.7 to 8.7 mm. The allotype, 8.1 mm long, had a carapace

width of 1.4 mm. The smallest ovigerous female was 5.8 mm long. Indications are that young *A. estuarius* leaving the marsupium are about 1.7 mm long, although the smallest juveniles taken were 2.5 mm.

Coloration

Live animals are cream-colored; the antennae and pereopods 1 and 2 faintly iridesce green, blue, and pink.

Relationships

A number of Indo-Pacific *Apsudes* are found in brackish water habitats, although it is sometimes difficult to interpret from brief or non-existent ecological notes whether species were collected from truly low-salinity conditions or merely from ocean inlets. *A. chilkenis* Chilton (1924) and *A. sapensis* Chilton (1926) are found in estuaries in the Indian subcontinent and may be one species (Barnard, 1935). *A. killaiyensis* Balasubrahmanyam (1959) was described from the Vellar estuary, India, in which *A. chilkenis* was also found. *A. digitalis* Brown (1956) and *A. cooperi* Brown (1954) were found in South African estuaries and *A. mussauensis* Shiino (1965) was reported from a brackish pond on an island in the Bismarck Archipelago. *A. gymnophobia* Barnard (1935) is also an estuarine species but should probably be assigned to the genus *Pagurapsendopsis* (Shiino, 1963).

Of these, *A. mussauensis*, *A. chilkenis*, and *A. killaiyensis* superficially resemble *A. estuarius* in the slenderness of the body, the unarmed pereon, and the large size of the male gnathopod. All three species differ in their unequal flagella of antenna 1 (in males outer longer in *A. mussauensis* and *A. killaiyensis*, inner longer in *A. chilkenis*) and their lack of the distal prolongation of the merus of the cheliped of both sexes of *A. estuarius*. The form of the male chela is quite distinctive in all four species. In *A. mussauensis* the dactylus bears a large tooth and extends well beyond and does not act against the immovable finger, which bears no teeth on its cutting edge. In *A. killaiyensis* the fingers are relatively straight and without teeth. The male chela of *A. chilkenis* has a tooth on the dactylus and an "incisiform crenu-

late cutting edge" on the immovable finger (Barnard, 1935) and most closely resembles *A. estuarius*. The remaining appendages of only *A. mussauensis* have been described or figured in detail, and they differ from those of *A. estuarius* on a wide range of characters, notably the setation of the mandibular palp (without pectinate setae) and the spination of the pereopods (particularly pereopods 2 and 7). Although similar in general form, the estuarine *Apseudes* probably are not closely related and have invaded the estuarine environment independently.

Of the more completely described species, *A. estuarius* most resembles *A. caeruleus* n. sp. in the general body shape of the male, the antennae, mouthparts, and especially the pereopods (particularly pereopods 2 and 7). *A. estuarius* can be easily distinguished from this species by its much shorter uropod, the absence of mid-ventral armament on the pereon, and the presence of four rather than five posterior marginal spines on article 6 of pereopod 2.

Ecology

A. estuarius inhabits soft muddy sediments under a wide range of salinity conditions in southern Queensland estuaries. In the Brisbane River it was found from just inside the mouth of the estuary (where the salinity is usually 30–34‰) to at least as far up-estuary as Goodna (67 km from the mouth, where the salinity is virtually nil yet conditions still tidal). During flood conditions, freshwater may be found throughout the estuary. The Fitzroy River specimens were taken at Rockhampton where the salinity was 15‰. The presence of ovigerous females in collections indicates that this species probably can reproduce in salinities at least as low as 5‰.

A. estuarius was very abundant throughout most of the Brisbane estuary, and had a peak abundance (6,000–8,000/m²) in salinities of 10–20‰. It is restricted to the very fine sediments near and below low tidal level and was not found at all on the bottoms without considerable silt-clay content, characteristic of the estuary channel. In its habitat, *A. estuarius* is easily the numerically most abundant macroorganism and quite likely is ecologically very important. Other animals often found with it were the

amphipod *Grandidierella* sp. and the polychaetes *Notomastus* sp., *Ceratonereis erythraensis* Fauvel, *Boccardia* sp., and *Marphysa sanguinea* (Montagu).

A. estuarius burrows into the sediment, although it forms no permanent burrow, and evidently devours sediment selected by the quite setose mouthparts. The guts of the animals were usually full of dark sediment, clearly visible dorsally.

Whiteleggia stephensoni new species

Fig. 7, 8, 9

Material Examined

Forty males, 39 females (24 ovigerous), 5–6 m, southeast of Southwest Rocks, Peel Island, Moreton Bay, Queensland, June, September, and December 1970, W. Stephenson and S. Cook, collectors.

HOLOTYPE: male, 8.4 mm long, Australian Museum no. P. 18698; allotype female, 6.8 mm, Australian Museum no. P. 18745.

Description of Male

Body depressed, elongate, broad anteriorly, tapering strongly posteriorly; strong middorsal carina extends the length of body, bifurcating on anterior carapace and posterior pleotelson.

CARAPACE: more than one-fifth length of body, as wide as long; anterior margin with triangulate rostrum, the border of which is finely denticulate, and sublateral indentations which receive antennae; eyes distinctly pigmented dark brown, located on lateral margins, separated from anterior margin by brows which form subacute anterolateral corners of carapace, and not borne on demarked lobes; carapace with pair of carinae along each lateral margin, middorsal raised area set off by submedial depressions, and posterolateral surfaces with finely reticulated raised ridges; ventral margins rounded; clypeus unarmed.

PEREON: almost three-fifths body length, lateral margins discontinuous; segment 2 (first free segment) wider than carapace; segment 5 the

longest, segment 7 the shortest; segments 2-4 roughly similar in shape, lateral margins convex, dorsal surface with pair of sublateral carinae and submedial depressions; anterolateral corners of segment 2 with subdorsal projections which bear plumose setae; segments 5-7 constricted anteriorly, expanded posteriorly; segments 2-4 each with one small midventral tooth, segment 7 with pair of submedial sexual pores surrounded by pair of low granulate ridges.

PLEON: more than one-fifth body length, narrower than last pereon segment; pleon segments short and wide, subequal in length, laterally projecting as subquadrate shelflike lobes, with ventral submedial projections enclosing bases of pleopods; pleotelson wider than long, lateral margins concave, terminates in broadly rounded submedial lobes.

ANTENNA 1: subequal to combined length of carapace and pereon segments 2 and 3, strongly geniculate between peduncular articles 1 and 2; peduncular article 1 slightly shorter than rest of antenna, quadrate in cross section, margins denticulate, bears few plumose and simple setae; article 2 short and wide, article 3 longer and narrower, both bear plumose setae, article 3 bears a distal spine; outer flagellum 11 articles, twice length of inner, which has seven articles, both bear sparse setae. **ANTENNA 2:** peduncular article 1 broad and short, with rounded medial lobe, article 2 narrow, lateral and medial borders dentate; article 3 very short; articles 4 and 5 subequal, longer than article 2, bear plumose setae; antennal scale born on peduncular article 2, short, very thin, and cylindrical, with two apical setae; flagellum short, eight articles.

UPPER LIP: broad, scarcely emarginate, devoid of setae. **LOWER LIP:** bilobed, lobes bordered with dense fine hairs, and tipped with two thin spines. **MANDIBLE:** with long slender triarticulate palp; incisor process with four coalesced teeth; lacina mobilis present on left mandible, with four teeth; six accessory spines of variously branching forms arise from short columnar process; molar process long, bears circlet of blunt marginal denticles, without triturrative ridges; palp articles 1 and 2 subequal

in length, more than twice length of article 3; article 2 with short subdistal pectinate setae; article 3 with marginal doubly pectinate setae and two long thick apical setae which are pectinate plumose.

MAXILLA 1: outer lobe with 11 thick apical spines and fine setae along lateral border; inner lobe with seven curved spines all of which bear fine hairs, and with fine setae along medial margin; palp geniculate, article 2 longer than article 1, bears four long hairy filaments apically. **MAXILLA 2:** coxa with margin densely fringed with thick setae; inner lobe apically armed with forked and simple spines; outer lobe bears curved, simple, thick setae. **MAXILLIPED:** with short coxa, basis with endite, four-articulate palp, and epipodite; basis longer than wide; endite narrow, elongate, bears short plumose setae on medial margin, short simple spines and flattened, toothed spine apically, and prominent coupling hooks; palp article 2 three times length of article 1, distally expanded, bears simple setae along medial submargin; article 3 one-half length of article 2; article 4 shorter and narrower than article 3, both bear long setae most of which have single row of hairs.

CHELIPED (PEREOPOD 1): short and stout, barely exceeding anterior margin of carapace, consists of five articles, geniculate between basis (basi-ischium) and merus, bears no trace of exopod; basis thick and greatly inflated, subcircular in shape, bears a few plumose setae on anterior margin; merus small, underriding carpus; carpus shorter than basis or chela, distally expanded; propodus thick and greatly inflated; hand nearly three times length of thin immovable finger, with reticulated pigmentation on lateral surface and sparse posterior setae; immovable finger with long subapical setae and subterminal tooth upon which the dactylus is closed; dactylus subequal in length to hand, sharply curved, with large blunt tooth and clump of setae along cutting edge.

PEREOPOD 2: fossorial, as long as carapace plus pereon segments 2-5, without epipod; article 1 rudimentary; article 2 as long as succeeding three articles, distally expanded,

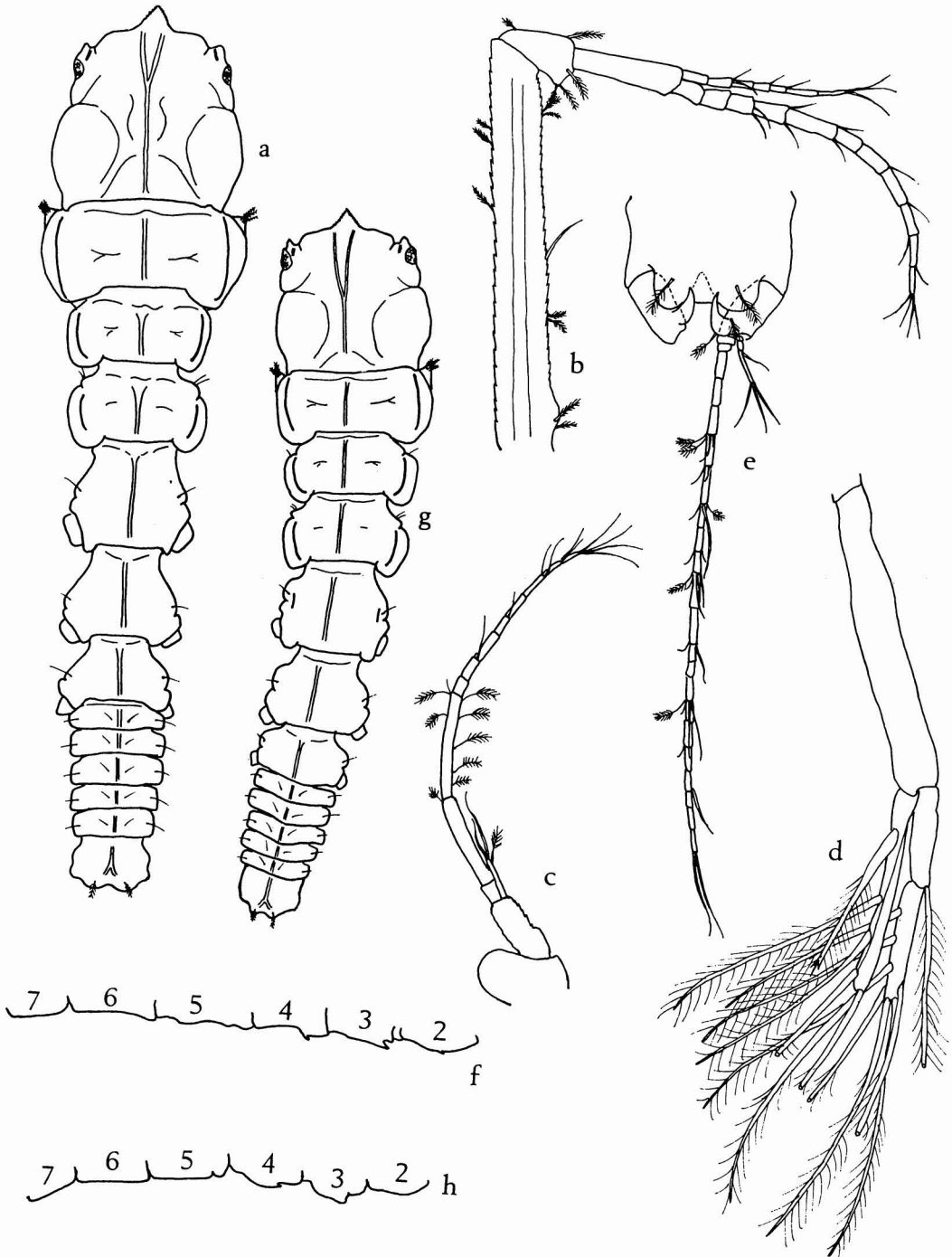


FIG. 7. *Whiteleggia stepbensoni* new species. Holotype male, 8.4 mm: a, dorsal view of body; b, antenna 1; c, antenna 2; d, pleopod 1; e, pleotelson and uropod; f, midventral margin of free pereon segments. Female, 6.8 m: g, dorsal view of body; h, midventral margin.

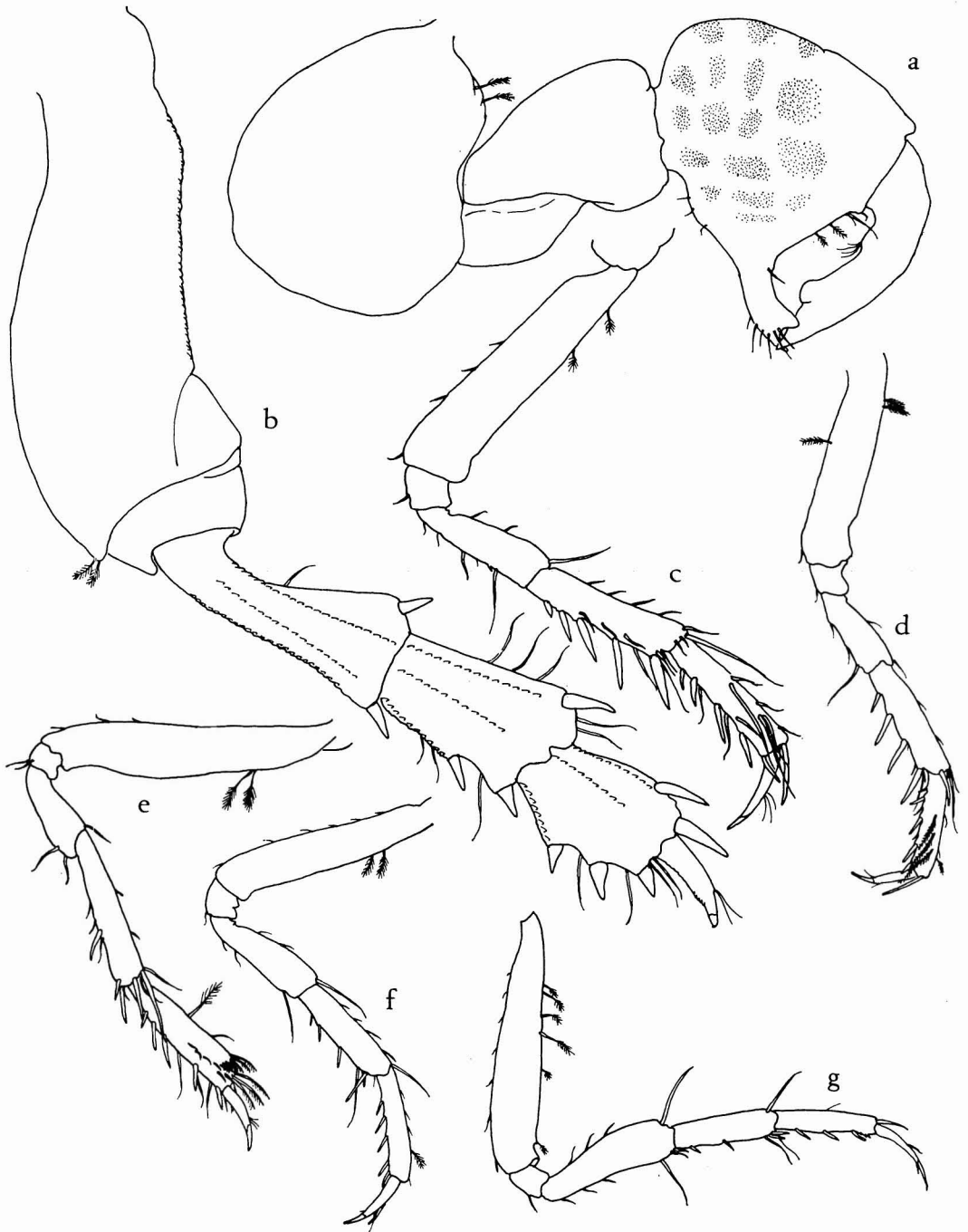


FIG. 8. *Whiteleggia stephensoni* new species. Holotype male: a, cheliped (pereopod 1); b, c, d, e, f, g, pereopods 2, 3, 4, 5, 6, 7.

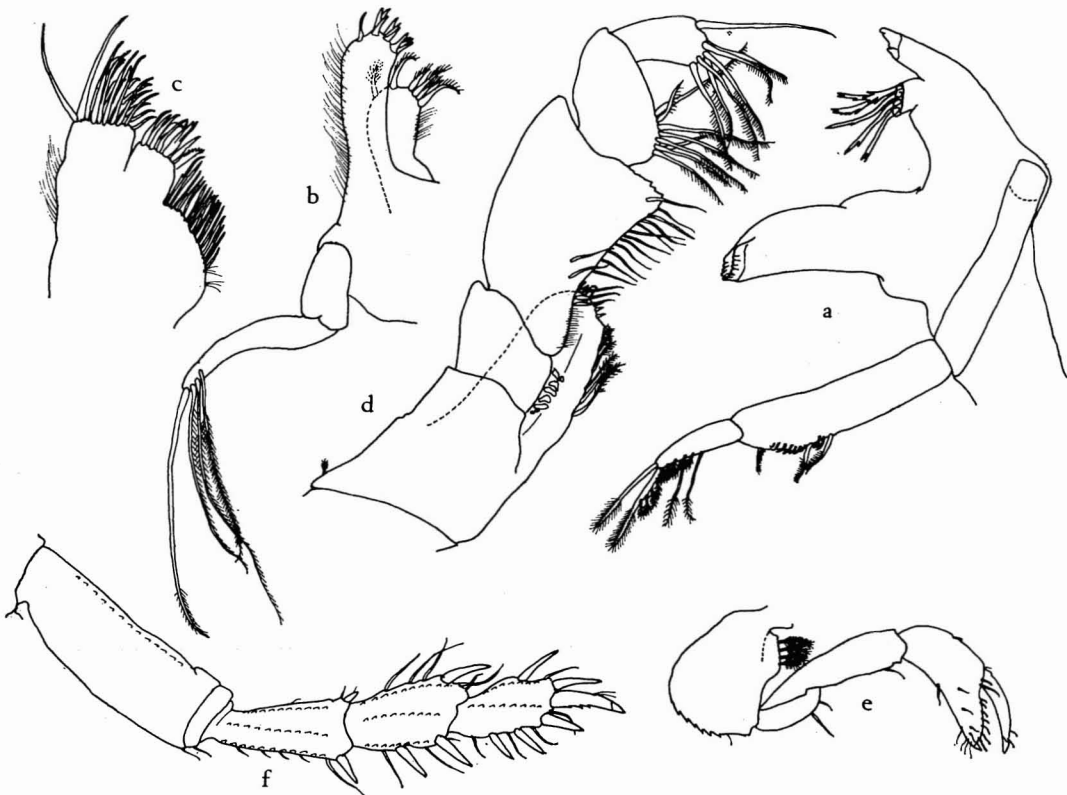


FIG. 9. *Whiteleggia stephensoni* new species. Holotype male: *a*, mandible (right); *b*, maxilla 1; *c*, maxilla 2; *d*, maxilliped. Female: *e*, cheliped; *f*, pereopod 2.

with granulate ridge near anterior margin, anterodistal groove, and few plumose setae at posterodistal corner; article 3 short and socket-like; article 4 longer than article 5 which is longer than article 6, these three articles bear three longitudinal granulate ridges on lateral surface; article 4 distally expanded, distal corners bear stout spines; article 5 slightly expanded distally, with stout spines on distal corners, another spine on posterior margin and marginal setae; article 6 distally expanded, with three posterior marginal and two anterior marginal stout spines; article 7 simply pointed, with posterior marginal denticulations, anterior marginal setae, and apical unguis.

PEREPODS 3-7: ambulatory, unequal in length, $3 > 5 > 7 > 6 > 4$. **PEREPOD 3:** article 1 very short; article 2 long and narrow, subequal to combined length of articles 3-5, posterior margin with few simple setae, anterior

margin with plumose setae; article 3 short, with posterior marginal seta; article 4 three times length of article 3, bears sparse marginal setae; article 5 longer than article 4, with five stout posterior marginal spines, increasing in length distally, margins sparsely setose; article 6 subequal to article 5, with five posterior marginal spines, spine at anterodistal corner, and setae along margins and on lateral surface; article 7, three-fourths length of article 6, bears few setae and apical unguis. **PEREPOD 4:** article 1 longer than in pereopod 3; article 2 shorter than combined length of following three articles, bears two anterior and one posterior marginal plumose setae; articles 3 and 4 as in pereopod 3; article 5 longer than article 4, with four posterior marginal spines, one spine on lateral distal margin, and sparse marginal setae; article 6 as in pereopod 3 except that some setae are plumose; article 7 two-thirds length of article 6, slightly geniculate, with acute unguis.

PEREPOD 5: article 1 with coxal plate; article 2 slender, longer than succeeding three articles, with two anterior marginal plumose setae and few posterior marginal simple setae; articles 3 and 4 as in pereopods 3 and 4; article 5 almost twice length of article 4, with spine on mid-posterior margin, four spines along terminal margin, and sparse marginal setae; article 6 shorter than article 5, with five spines interspersed with setae along posterior margin, one long plumose seta near midanterior margin, and double oblique rows of pectinate setae at the anterodistal corner; article 7 one-half length of article 6; bears few setae and acute unguis. PEREPOD 6: articles 1-4 as in pereopod 5; article 5 subequal in length to article 4, with five thin posterior marginal spines, sparse anterior marginal setae, and long medial terminal spine; article 7 two-thirds length of article 6, otherwise as in pereopod 5. PEREPOD 7: articles 1-5 as in pereopod 6 except that article 2 bears more plumose setae and article 4 longer than article 5; article 6 subequal in length to article 5, posterior margin bears three spines and few denticles distally, anterodistal corner with one spine; article 7 slightly shorter than article 6, with very acute unguis.

PLEPODS: five pairs, biramous, long and thin, becoming gradually shorter posteriorly; peduncle biarticulate, article 1 short, article 2 very long and thin; rami subequal, more than seven times longer than wide, each with few long thick plumose setae; outer ramus biarticulate.

UROPOD: filiform, subequal to combined length of pleon and pereon segments 6 and 7; peduncle shorter than pleotelson, bears large dorsally recurved cusp distally and few plumose setae; outer ramus short, less than one-seventh length of inner, triarticulate, bears few simple setae; inner ramus about 22 articles, with simple and plumose setae.

Description of Female

Body similar to male but smaller, with pereon segments 5-7 not so constricted anteriorly and having enhanced anterolateral lobes.

Antenna 1 shorter than in male, not longer than carapace plus pereon segment 2; pedun-

cular article 1 much shorter than remainder of antenna. Antenna 2 and mouthparts as in male. Cheliped not exceeding anterior margin of carapace, much feebler; basis posteriorly expanded, slightly longer than wide and quite thick, with subquadrate anterior projection bearing denticulations and plumose setae; posterodistal margin denticulate; merus short, rounded, underriding carpus; carpus subequal in length to chela and longer than basis, five times longer than wide; propodus long and slender, with thick immovable finger which bears spinules along cutting edge and apical unguis; dactyl thin, slightly curved, with apical unguis and few short setae. PEREPOD 2: much smaller than in male, relative lengths of articles 2 and 4 shorter, spination, setation, and surface granulation as in male except spines relatively longer. Remaining pereopods, pleopods, and uropods much as in male. Oostegites rudimentary, borne on pereopods 1-5.

Size

Male specimens ranged from 4.6 to 9.0 mm in length. The holotype male (8.4 mm long) had a carapace width of 1.8 mm and a pereopod 2 4.6 mm long. Females ranged in length from 5.1 to 7.4 mm. The allotype, 6.8 mm long, had a carapace width of 1.5 mm. The smallest ovigerous female was 6.0 mm long.

Coloration

Specimens in alcohol for 1 year were pale beige; the reticulated pattern on the male chela was a very faint red.

Relationships

Whiteleggia stephensoni is obviously very closely related to what was the sole member of the genus, *W. multicaarinatus*. The genus *Whiteleggia* was recently established for *Apsendes multicaarinatus* Haswell (1882a) and placed in the new family Leiopidae by Lang (1970). Leiopids are separable from apseudids by the possession of a flattened, leaflike spine on the inner distal surface of the endite of the maxilliped. *Whiteleggia stephensoni* agrees with Lang's diagnosis of the genus except for two minor details: (1) the outer lobe of maxilla 1 has 11 rather than

12 spines apically, and (2) article 2 (basis) of the pereopods is not notched or toothed along its anterior margin. *W. stephensoni* is further distinguishable from *W. multicarinatus* by (1) the lack of submedian carinae in addition to the median carina on the dorsum of pereon and pleon segments, (2) subquadrate, as opposed to subacute, margins of the pleon segments, and (3) the completely different appearance of the male chela—the dactylus is bent downward in *W. stephensoni* and nearly straight in *W. multicarinatus*.

Both of these species are similar to another eastern Australian species, *Pseudowhiteleggia typica* Lang (1970). In *Whiteleggia* the female carapace is noticeably longer than the combined length of pereon segments 2 and 3, whereas in *Pseudowhiteleggia* the lengths are subequal. *Pseudowhiteleggia* also has a less conspicuous rostrum which is not edged by teeth and in the male has a grossly swollen article 1 of the first antenna. *P. typica* and the two *Whiteleggia* species are easily separable from other Australian tanaids by their well-calcified, heavily carinate bodies and lack of exopods on pereopods 1 and 2.

Ecology

W. stephensoni was present throughout the year at the type locality, where it was found in sediment consisting of silts and fine sands (S. Cook, personal communication). Peak abundance was in September, when 59 individuals were taken from 1 square meter of bottom at one station in 1970. The fossorial condition of pereopod 2 and the generally poor setation of mouthparts suggests a burrowing, deposit-feeding existence.

Remarks

This species is named for Professor W. Stephenson, the collector, who has also contributed significantly to the knowledge of Indo-Pacific Crustacea and of marine ecology in Queensland.

Australian Monokonophorans

In addition to the three species described here and *Whiteleggia multicarinatus* (Haswell,

1882a) and *Pseudowhiteleggia typica* Lang (1970), the known Australian faunule of monokonophoran tanaids is limited to four other species: *Kalliapseudes obtusifrons* (Haswell, 1882b) (Kalliapseudidae), *Apseudes australis* Haswell (1882a) (Apseudidae; see also Hale, 1929), *Pagurapseudes spinipes* Whitelegge (1901) (Pagurapseudidae), and *Synapseudes* sp. (Lang, 1970) (Metapseudidae). Judging from the richness of the known faunules of South Africa (Barnard, 1940; Brown, 1956) and Viet Nam (Shiino, 1963), I believe that further exploration of Australian seas should result in the discovery of a number of additional monokonophorans, particularly apseudids.

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