

REDESCRIPTION OF *EXOEDICEROS FOSSOR* (STIMPSON,  
1856) AN AUSTRALIAN MARINE FOSSORIAL  
AMPHIPOD, THE TYPE-GENUS OF THE  
NEW FAMILY EXOEDICEROTIDAE

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*Abstract.*—The type-species of *Exoediceros*, for which the type material has been lost, is redescribed from fresh Australian material and compared to its junior synonym *Exoediceros arenicola* (Haswell), for which type-material is available. This is compared to *Exoediceros maculosus* Sheard (1936), a sympatriot. A new family, Exoedicerotidae, is described to include *Exoediceros*, *Exoediceropsis*, *Bathyporeiapus*, *Metoediceros*, *Parhalimedon*, and *Patuki*, all southern 2-eyed (or blind) genera with apical spination on the rami of uropods 1-2. These are assumed to be more primitive than the advanced Oedicerotidae which have dominated the northern hemisphere and the deep-seas.

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Several genera formerly identified as Oedicerotidae, *Exoediceros*, *Exoediceropsis*, *Bathyporeiapus*, *Metoediceros*, *Parhalimedon*, and *Patuki*, are now considered to be distinguishable as a new family to stand in a position plesiomorphic to the Oedicerotidae. The type-species of the type-genus, *Exoediceros*, is redescribed herein so as to establish this family.

Legends: Capital letters describe morphological parts; lower case letters to left of capital letters denote specimens cited in figure legends, lower case letters to right of capital letters or in body of drawing are cited in following list: A, antenna; B, body; C, coxa; D, dactyl; E, pleon; F, accessory flagellum; G, gnathopod; H, head; I, inner plate or ramus; J, gill; K, palp; L, labium; M, mandible; N, pleopod; O, outer plate or ramus; P, pereopod; Q, brood plate; R, uropod; S, maxilliped; T, telson; U, prebuccal anterior; X, maxilla; Y, calceolus; Z, aesthetasc; m, medial; r, right; s, setae removed.

Exoedicerotidae, new family

*Diagnosis.*—Amphipoda-like Oedicerotidae but apices of rami on uropods 1-2 spinose; eyes, when present, paired.

*Description.*—Body laterally compressed, scarcely or not processiferous, urosomites 1-3 free. Head not strongly galeate, rostrum medium, thin or weak.

Peduncles of antennae medium to short, flagella usually calceoliferous, calceoli probably of oedicerotid kind 7 (Lincoln and Hurley 1981), accessory flagellum 0-1-articulate.

Labrum weakly excavate or entire, epistome occasionally produced. Mandible strong, incisor toothed, raker row well developed, molar tritulative to obsolescent, palp 0-3-articulate. Inner lobes of lower lip fleshy and separate. Maxillae well developed, inner plates poorly to strongly setose. Maxillipeds well developed, outer plate small to large, palp 4-articulate.

Coxae 1-4 well developed, coxa 4 lobate and excavate or not, coxa 5 generally



only slightly smaller than 4. Gnathopods diverse, ranging from medium, alike and subchelate with spine fields on hands, to feeble, simple and elongate and without spine fields. Pereopods 3–7 fossorial, with powerful and spinose articles, dactyls often vestigial or absent on pereopods 3–6, pereopod 7 very large as in *Oedicerotidae*, article 2 broadly expanded, appendage much longer than pereopods 5–6, dactyl elongate and well armed.

Pleon powerful, pleopods well developed, epimera ordinary, poorly ornamented. Uropods 1–2 with long rami bearing apical spines. Uropod 3 variable, moderately to strongly developed or vestigial. Telson short, entire, laminar.

Gills on coxae 2–7; oostegites narrow to moderately broad.

### *Exoediceros* Stebbing

*Exoediceros* Stebbing, 1899:208 (*Oedicerus fossor* Stimpson, 1856, original designation).

**Diagnosis.**—Body not carinate. Eyes paired, separate. Article 3 of peduncle of antenna 1 half or less as long as article 1. Fully articulate, scale-like accessory flagellum present. Primary flagellum of antenna 1 with similar articles bearing similar armaments. No articles of antenna 2 especially swollen. Mandibular incisor projecting, toothed; molar large, triturative; palp 3-articulate, article 2 straight, article 3 clavate, stubby. Inner lobes of lower lip distinct, separate, fleshy. Outer plate of maxilla 2 lacking thick spine. Plates of maxilla 2 diverse. Coxae poorly setose, coxae 1–4 rounded below, coxa 4 subrectangular, scarcely excavate posteriorly, not lobate. Gnathopods sexually dimorphic, in each sex similar to each other, subchelate, wrists weakly lobate, not guarding hands, palms oblique, hands with dense fields of blunt spines near apex of closed dactyl. Dactyl of pereopods 3–4 obsolescent. Coxal gill 5 minute. Article 2 of pereopod 7 expanded but scarcely lobate. Uropod 2 not reaching far along uropod 3; peduncle of uropod 3 scarcely elongate, with large marginal spines, rami short. Telson entire.

**Relationship.**—The apparent closest relative of this genus is *Metoediceros* Schellenberg (1931) which has similar gnathopods bearing spine fields. *Metoediceros* differs from *Exoediceros* in the reduction of uropod 3 to a small vestige, the lack of an accessory flagellum, the lack of a mandibular palp and the poorly setose inner plate of maxilla 1.

*Exoediceropsis* Schellenberg (1931) differs from *Exoediceros* in: (1) the feeble molar; (2) the feeble, mitten-shaped gnathopods; (3) the lobate coxa 4; (4) the nonsetose inner plate of maxilla 1; and (5) the small outer plate of the maxilliped.

*Bathyporeiapus* Schellenberg (1931) differs from *Exoediceros* in items 1, 2 and 4 as cited above. *Parhalimedes* Chevreux (1906) differs from *Exoediceros* in items 1 and 2 above plus (6) the long uropod 3 with long peduncle; (7) the poorly armed rami of uropod 3; and (8) the absence of eyes.

The male of *Patuki* Cooper and Fincham (1974) is unknown but the uropod 3 of the female is shorter than uropods 1 and 2, with unarmed peduncle; and the eyes are closer together dorsally than those of *Exoediceros*.

### *Exoediceros fossor* (Stimpson)

Figs. 1–5

*Oedicerus fossor* Stimpson, 1856:394.—Bate, 1862:373.—Haswell, 1882:238.

*Oedicerus fossor*.—Della Valle, 1893:556.



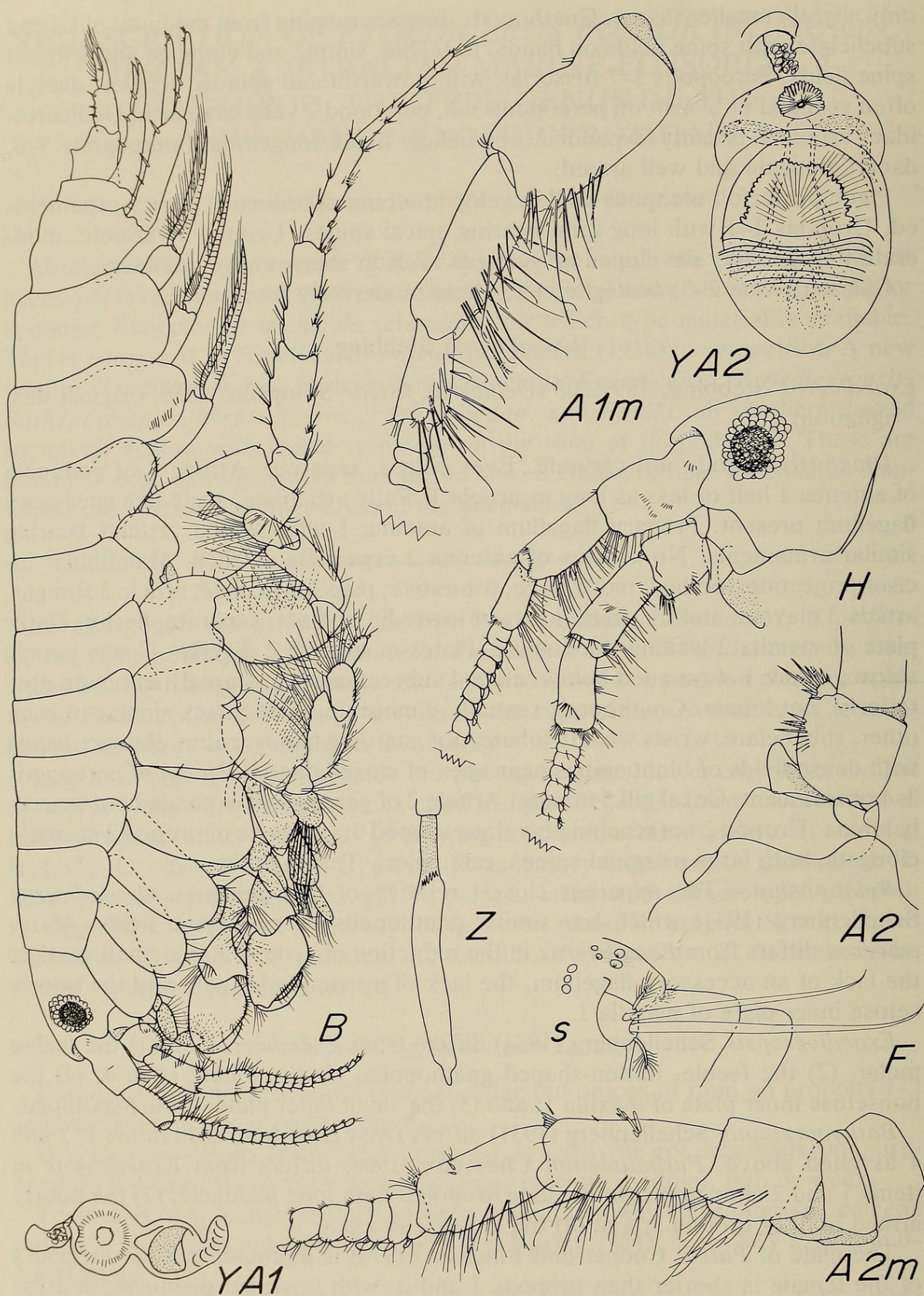


Fig. 1. *Exoediceros fossor*, male "p" 8.01 mm.



*Exoedicerus fossor*.—Stebbing, 1906:239; 1910:638.

*Oedicerus arenicola* Haswell, 1879:325, pl. 24, fig. 3; 1882:239–240.—Della Valle, 1893:556.

*Diagnosis*.—Rostrum short, not reaching beyond middle of article 1 of antenna 1. Plates of maxilla 2 broad. Coxa 1 narrow and tapering distally. In life body said to lack chromatophores (Sheard 1936).

*Description of male “p”*.—Each eye heavily pigmented. Ommatidia clear apically. Lateral cephalic lobes small, mammilliform.

Antennae short, extending subequally, articles of flagella short, bead-like, proliferate, on antenna 1 basal articles with 1 large calceolus of oedicerotid kind 7 (Lincoln and Hurley 1981), each basal article also with small aesthetasc of same but rudimentary kind situated on outer face of article obliquely proximal to main calceolus then towards apex each article tending to bear 2–3 small versions of calceoli, all articles also with 2 aesthetascs each; formula of calceoli (L = large, s = small) on flagellum of antenna 1 = 0,s,2s,sL,LL,Lss,Lss,Lss,Lss,Lss,ss,sss,sss,sss,sss,ss,ss,s . . . broken (probably only final article missing); formula on antenna 2 = s,LL,LLs,LL,LL,LL,LLs,Lss,Lss,Lss,sss,sss,s,0; no clavate aesthetascs on antenna 2.

Upper lip with tiny ventral notch. Incisors toothed; right lacinia mobilis 3-pronged, prongs serrate; left lacinia mobilis with 5 teeth; rakers stout, right and left about 9 each; molar stout, cuboid but moderately triturative; palp stout, article 1 short, article 2 expanded and strongly setose, article 3 clavate, setae = ABDE. Inner plate of maxilla 1 fully setose medially; outer plate with 11 spines (not all shown on illustration); palp strongly setose, 2-articulate. Plates of maxilla 2 broad, inner with full oblique facial row of setae. Inner plates of maxilliped with medial margins appressed and bent orally, setose, apices each with 2 small medial spines and numerous widely spread setae; outer plates not larger than inner, medially spinose; dactyl unguiform, with small apical nail and several setules on inner margin.

Coxa 5 scarcely shorter than coxa 4. Gnathopod 2 slightly larger than 1, both weakly twisted in death. Dactyls of pereopods 3–4 extremely minute, each bearing ordinary setule itself remaining normally large and thereby dwarfing dactyl. Pereopods 5–6 bearing small dactyls with largely absorbed apical nail and large setule. Gills present on coxae 2–7, flat, unpleated, with transverse capillaries, gills of coxae 2–3 ovate, sac-like, of coxa 4 adz-shaped, of coxa 5 very small, tear-drop shaped and pediculate, of coxa 6 larger, ovate, of coxa 7 larger than 5, like dried leaf with base twisted into brood space.

Pleopods relatively similar, peduncles elongate, each with 2 feeble retinacula, each outer ramus with posterior tooth or boss on article 1, outer and inner rami about 1.5 and 1.3 times respectively as long as peduncles, outer and inner rami with about 19 and 15 articles respectively. Epimera 1–3 each with several anteroventral marginal setae, epimeron 1 with distinct facial ridge bearing several spinules, ridge of epimeron 2 with spinule row disjunct above and epimeron 3 with facial ridge but no spines; posteroventral corners of epimera 1–3 rounded.

Urosomite 1 with 2 weak dorsal humps, urosomites 2–3 each with sharp posterodorsal edge, urosomite 3 so high as to obscure most of telson from lateral view. Peduncle of uropod 1 with basofacial row of setules and spinule, dorsolat-



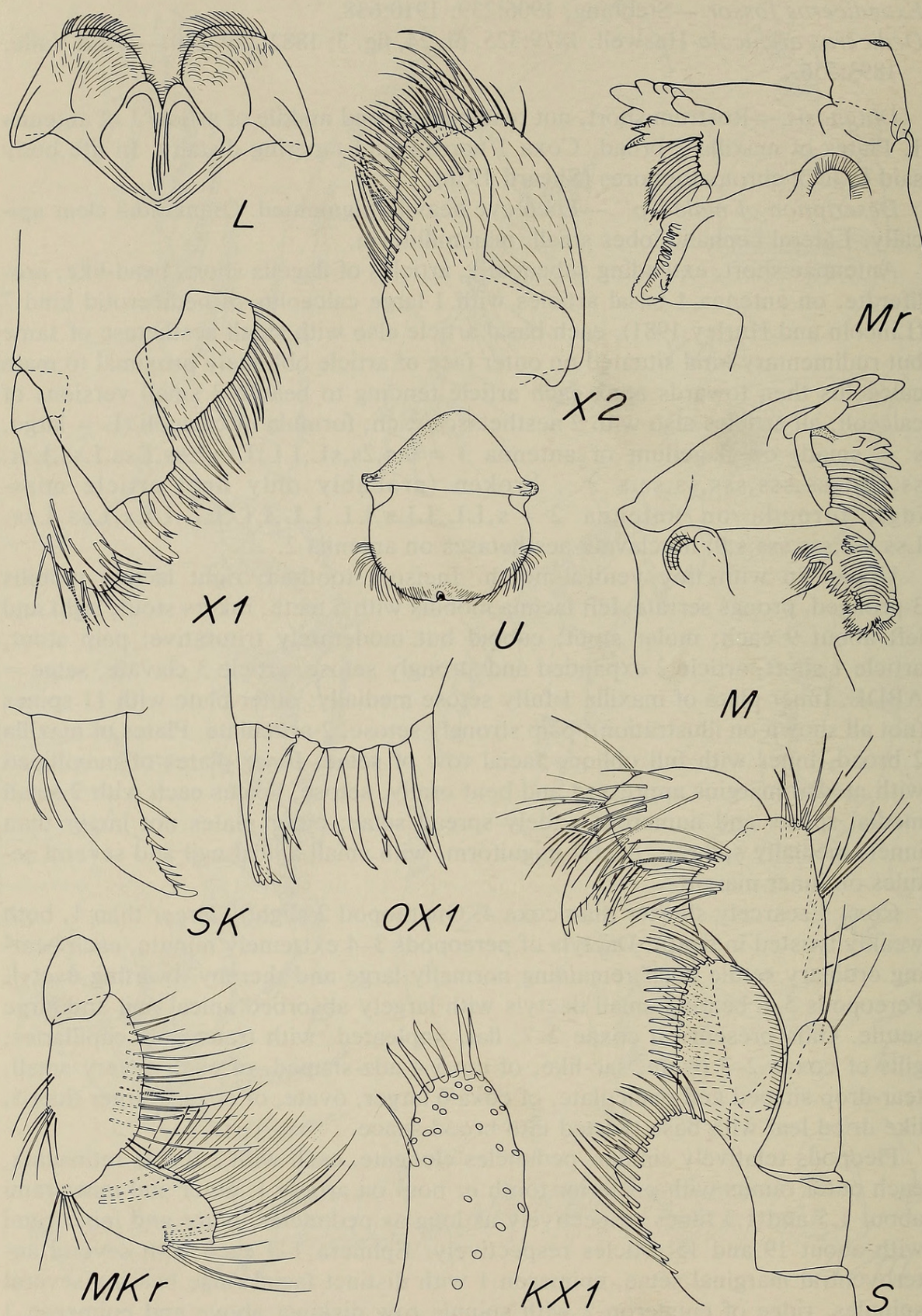


Fig. 2. *Exoediceros fossor*, male "p" 8.01 mm.



eral margin naked except for several basal setules, medial margin with 4 medium spines in widely disjunct tandem, peduncle of uropod 2 with 2 widely spread dorsal spines, 1 apicomedial spine; rami of uropods 1–2 all with 2 apical nails and 2 minute subapical accessory nails, but accessory nail on inner ramus of uropod 2 vestigial; inner rami otherwise naked on dorsal margins, outer rami of uropods 1–2 with 2 and 1 dorsal spines respectively. Peduncle of uropod 3 with 3 dorso-lateral spines, 2 dorsomedial spines and 2 spines and 2 setules in tandem, rami shorter than peduncle, weakly foliate, apically and medially setose, outer ramus with subbasal ridge bearing terminal spine, inner ramus with subbasal medial spine. Telson very short, apex rounded, subtruncate, each dorsolateral face with 2 pairs of pencillate setules from about M. 50 to M. 80. Cuticle very minutely punctate.

*Male "n".*—Spine count on epimeron 2 = 8-4-2; dorsolateral margin of peduncle on uropod 2 with 3 spines.

*Male "c", smallest available male.*—Like adult but flagellum of antenna 1 with calceolus formula of 0-1-2-2-2-2-2-2-1 (broken), aesthetasc formula = 1-1-1-2-2-2-2-2-1, calceolus formula of flagellum on antenna 2 = 0-1-2-2-3-3-3-2 (broken), all calceoli small on both pairs of antennae. Gnathopods lacking medial fields of spines on faces of hands, gnathopod 1 with defining spine on each side of hand followed behind by 2 spines in tandem on each side, gnathopod 2 with same scheme but 3 following spines on each side. Facial formula of setae on epimeron 2 = 2-1-1. Peduncle of uropod 1 with 2 basofacial spines, 1 dorsolateral spine on outer ramus; peduncle of uropod 2 with 2 dorsal spines, neither ramus with dorsal spine; peduncle of uropod 3 with 1 dorsal spinule, 1 apical blunt spine. Cuticle grossly scalloped.

*Female "i".*—Differing from male in presence of more small calceoli on antennal flagella but absence of the large variety; formula of small calceoli on flagellum of antenna 1 = 0,1,2,1,3,4,4,4,5,4,4,4,5,5,4,3 . . . (broken, probably only last article missing), only 1 aesthetasc per article; formula of small calceoli on flagellum of antenna 2 = 0,1,2,3,4,4,4,4,5,5,5,5,5,5,5 . . . (broken, probably only last article missing), no aesthetascs present.

Gnathopods, especially hands, much smaller than in male, lobes of wrists much broader, hands more evenly ovate, palms weakly convex, no spine fields present.

Brood plates thin, strongly setose (one illustrated), pair of coxa 5 half as long as other 3 pairs but as broad.

Uropod 3 and telson as in male.

Other minor differences not sexually related: spine count on face of epimeron 2 = 5-2-2-1; setae on inner ramus of uropod 3 = 11–12, outer = 12; left inner ramus also with 2 spines (not 1 as in male), peduncles of right and left sides with 2 and 3 spines each.

*Juvenile "j" 2.16 mm.*—Flagellum of antenna 1 with 5 articles, calceolus formula = 0-0-1-0-0, aesthetasc formula = 0-2-1-1-0; calceolus formula on flagellum of antenna 2 = 0-0-1-0, all calceoli small. Dactyl of pereopods 3–4 no larger than in adults relative to appendages. Formula of setae on epimeron 2 = 2-0-0. Peduncle of uropod 1 with 1 apicolateral long thin spinule, rami lacking dorsal spines, apex of outer ramus with 2 spines and 2 large subapical spines, inner with 2 apical, 1 subapical large and 1 tiny subapical spinule. Peduncle of uropod 2 with 1 spine on each apicodorsal corner, rami lacking dorsal spines, apex of outer



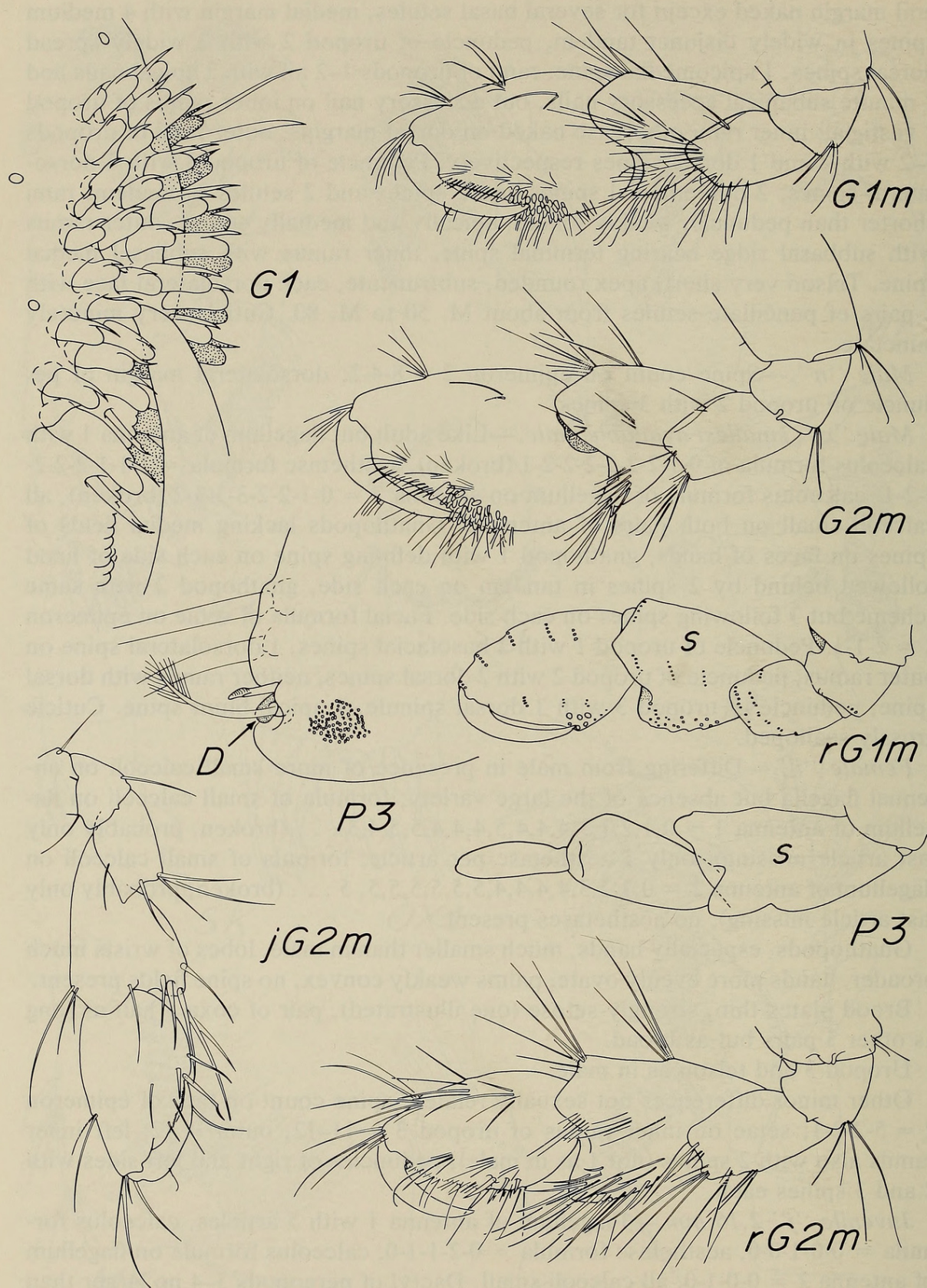


Fig. 3. *Exoediceros fossor*, unattributed figures = male "p" 8.01 mm; r to left = female "r" 7.09 mm; j to left = juvenile "j" 2.16 mm.



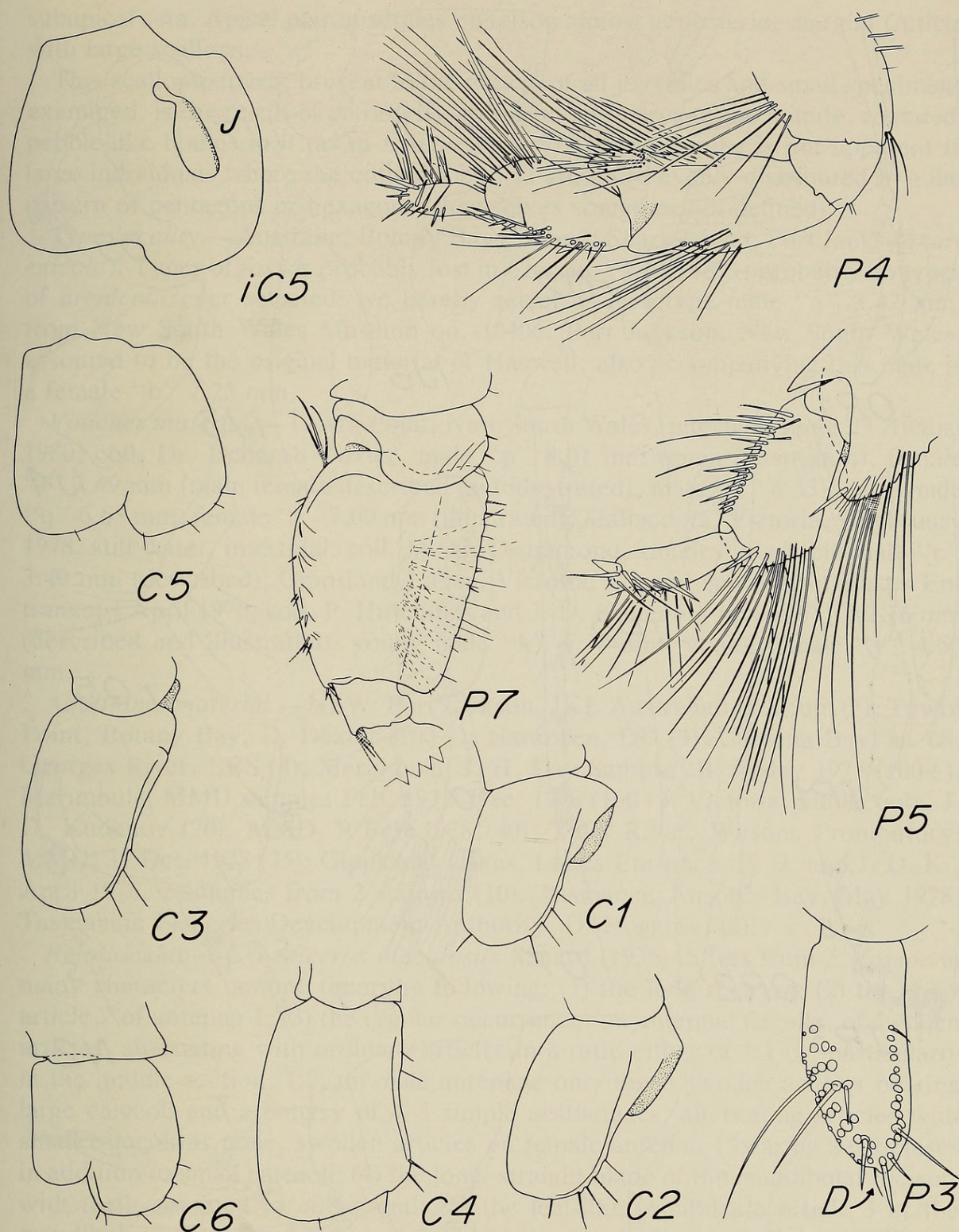


Fig. 4. *Exoediceros fossor*, unattributed figures = male "p" 8.01 mm; i to left = female "i" 7.49 mm.

ramus with 2 large spines, 1 large and 1 tiny subapical spines, inner ramus with 2 large apical, 1 large and no other subapical spine. Peduncle of uropod 3 with 1 spine on each apicodorsal corner, inner ramus with 1 thin dorsomarginal spine and 2 apical setae, outer ramus without spine, with 3 apical and 0-1 (right or left)



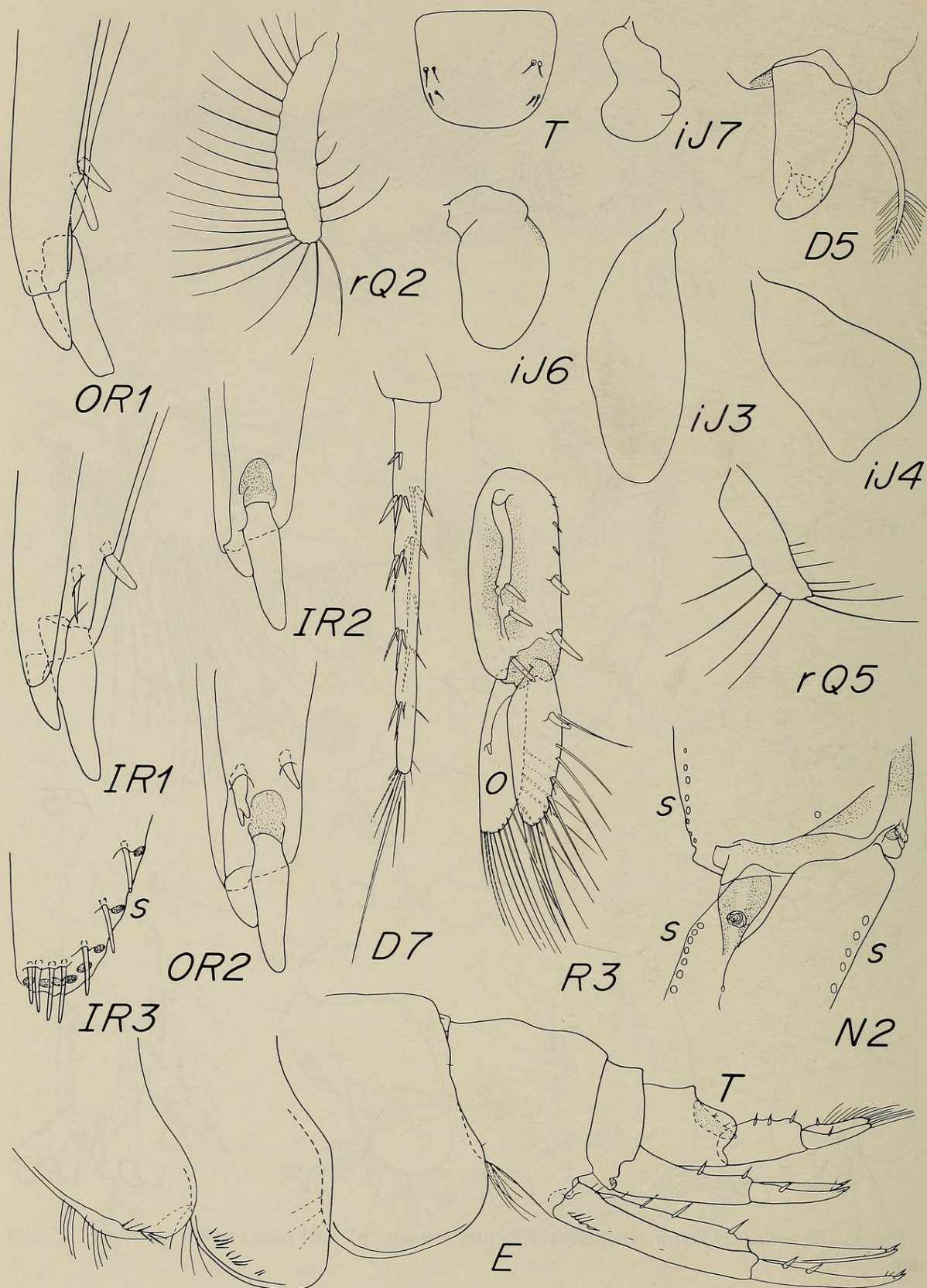


Fig. 5. *Exoediceros fossor*, unattributed figures = male "p" 8.01 mm; i to left = female "i" 7.49 mm; r to left = female "r" 7.09 mm.



subapical seta. Apical pair of setules on telson almost at posterior margin. Cuticle with large scallops.

This scallop pattern, present in the cuticle of all juveniles and small specimens examined, is the result of an orderly arrangement in arcs of the minute, rounded, pebble-like bodies in it (as in *E. maculosus*). This scalloping is not apparent in large individuals where the cuticular bodies are more evenly distributed in a flat pattern of pentagons or hexagons (themselves sometimes ill defined).

*Type-locality*.—Australia, Botany Bay (*fossor*); Shark Island, Port Jackson (*arenicola*). Types of *fossor* probably lost in Chicago Fire of 1871; probably no types of *arenicola* ever selected: we hereby select as lectotype male “a” 8.42 mm, from New South Wales Museum no. 10406, Port Jackson, New South Wales, assumed to be the original material of Haswell; also accompanying this male is a female “b” 7.25 mm.

*Voucher material*.—Towra Point, New South Wales, intertidal sand, 23 August 1980, coll. Dr. Deborah Dexter, male “p” 8.01 mm (main illustration), female “i” 7.49 mm (main female described and illustrated), male “n” 6.55 mm, female “q” 6.63 mm, female “r” 7.09 mm (illustrated); Mallacoota, Victoria, 9 February 1978, still water, intertidal, coll. M. M. Drummond, smallest available male “c” 3.40 mm (described); Gippsland Lakes, Victoria, at sand spit east of Lakes Entrance, 1 April 1976, coll. P. Hutchings and J. D. Kudenov, juvenile “j” 2.16 mm (described and illustrated), young male “k” 5.71 mm, young female “y” 4.50 mm.

*Additional material*.—NSW: Port Jackson, JKL Australian Museum (3); Towra Point, Botany Bay, D. Dexter (100+); Narabeen, DD (3); Careena Bay, st. 68, Georges River, EBS (4); Merimbula, J. H. Day Sample 2B, 9 May 1975 (100+); Merimbula, MMD samples Feb. 1972–Dec. 1978 (100+). Victoria: Mallacoota, J. D. Kudenov (20), MMD, 9 Feb 1978 (40); Tidal River, Wilsons Promontory, MMD, 31 Oct. 1978 (35); Gippsland Lakes, Lakes Entrance, P. H. and J. D. K., April 1976, 2 samples from 2 stations (10). Tasmania: Anson’s Bay, May 1978, Tasmanian Fisheries Development Authority, D. Hoggins (12).

*Relationship*.—*Exoedicerus maculosus* Sheard (1936) differs from *E. fossor* in many characters, among them the following: (1) the long rostrum; (2) the short article 2 of antenna 1; (3) the regular occurrence, on antennal flagella, of swollen articles, alternating with ordinary articles in a ratio either of 1:1 or, particularly in the middle section, 1:2, on male antennae only these swollen articles bearing large calceoli and a battery of 4–5 simple aesthetascs, alternating articles with small calceoli or none, swollen articles on female antenna 1 bearing aesthetascs in addition to small calceoli; (4) the long, straight blade of the mandibular incisor, with teeth confined to either end; (5) the leaf-like semifalcate article 3 of the mandibular palp, longer than article 2; (6) the 4-cusped right lacinia mobilis; (7) the lack of strong distinction between male and female gnathopods, those of the male bearing no medial spine fields but 3 more or less, seriate ranks of spines; (8) the short gnathopodal article 5 in both sexes; (9) the rudimentary dactyl on pereopods 3 and 4; (10) the regular and even setation on epimeron 1 in females; (11) the regular and even facial spination (not setation) on epimeron 2; this epimeron with midvertical facial ridge; (12) regular facial spination of epimeron 3; (13) regular, even spination of peduncle and rami on uropods 1 and 2; (14) shortened outer ramus of uropod 2; (15) relatively short peduncle of uropod 3 (shorter than rami); (16) the apically 2-notched telson.



A separate paper on *Exoedicerus maculosus* will be published elsewhere. Probably *Oedicerus latrans* Haswell (1879) is a senior synonym of *E. maculosus*.

*Distribution*.—Port Jackson, New South Wales to southeastern Victoria, and Tasmania, protected beaches, intertidal or shallow sands.

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