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A new species of ingolfiellid amphipod (Crustacea: Amphipoda) from Western Australia

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Abstract – A third species, *Ingolfiella quokka* sp. nov., is added to the Australian fauna, the first from Western Australia. The new species is from an intertidal sandy beach environment; previously described Australian species inhabit the marine shelf of south-eastern Australia.

INTRODUCTION

The ingolfiellidean amphipods are a small group of about 30 species included in two families, the monotypic Metaingolfiellidae, and Ingolfiellidae. Their distribution ranges from the deep sea through shallow marine sediments and intertidal sands to freshwater springs and caves. The presence of an "eye-lobe" distinguishes the suborder Ingolfiellidea from other suborders of the order Amphipoda. While it is probable that the group is monophyletic their phylogenetic isolation from Gammaridea in particular is questionable (Lowry and Poore, 1989; Dahl, 1977). Stock (1979; 1977; 1976), Dojiri and Sieg (1987), and Ruffo and Taglianti (1989) have studied the systematics and zoogeography of the group. Stock (1976) divided the family Ingolfiellidae into three genera, and the largest genus, *Ingolfiella*, into subgenera. The question of subgenera was addressed again by Ruffo and Taglianti (1989). Lowry and Poore (1989) had difficulty placing their two south-eastern Australian species unambiguously in any subgenus and questioned their usefulness. We do not add further to this debate, especially as the Ingolfiellidea as a whole are subject to a phylogenetically based reclassification (R. Vonk and F. Schram, personal communication, 2002).

A new species of ingolfiellids was discovered in samples taken on a sandy beach on Rottnest Island, Western Australia, and is here described. The material comprises 16 individuals, 2 males and 14 females. The description is a composite derived after dissection of several individuals. Types are lodged in the Western Australian Museum, Perth (WAM), and Museum Victoria, Melbourne (NMV). Abbreviations are as follows: A1, A2, antennae 1, 2; G1, G2, gnathopods 1, 2; MX1, MX2, maxillae 1, 2; MD, mandible; MP, maxilliped; P3–P7, pereopods 3–7; PL1–PL3, pleopods 1–3; r, right; l, left; UR1–UR3, uropods 1–3.

Ingolfiellidae Hansen, 1903

Ingolfiella quokka sp. nov.

Figures 1–3

Holotype

Female, 1.08 mm (WAM C33548 on 3 slides), City of York Bay (32°00'S, 115°36'E), Rottnest Island, Western Australia, sandy beach, S. Griffin, July 1991.

Paratypes

Female, 1.54 mm (WAM C33549); male, 1.25 mm (WAM C33550); female, 1.48 mm (WAM C33551, with 2 slides); female, 1.27 mm (WAM C33552); female, 1.08 mm (WAM C33553, with 1 slide); male, 1.06 mm (WAM C33554, with 2 slides); female, 0.87 mm (WAM C33555); female, 1.34 mm (WAM C33556); female, 1.38 mm (WAM C33557); female, 1.31 mm (WAM C33558); female, 0.91 mm (WAM C33559); female, 1.06 mm (WAM C33560); female, 1.26 mm (NMV J52442); female, 1.22 mm (NMV J52443); female, 0.78 mm (WAM C33561). All collected with holotype.

Description

Female (based on holotype, 1.08 mm, and paratype female, 1.48 mm). Body segments laterally compressed. Head, anterodorsal margin rounded, without rostrum; "eye-lobe" semicircular. Pereonite 1 about half as long as head; posteroventral margin oblique; deeper anteriorly than posteriorly such that pereonites 1 and 2 only weakly separated. Pereonites 2–7 increasing in depth posteriorly. Pleonites 1–3 with posteriorly rounded epimera. Urosomites 1 and 2 not markedly differentiated from pleonites, of similar length; urosomite 3 with lateral plates enclosing base of telson and uropod 3.

Antenna 1, peduncular article 1 as long as head; ratio of articles 1.0:0.4:0.3; flagellum of four articles,

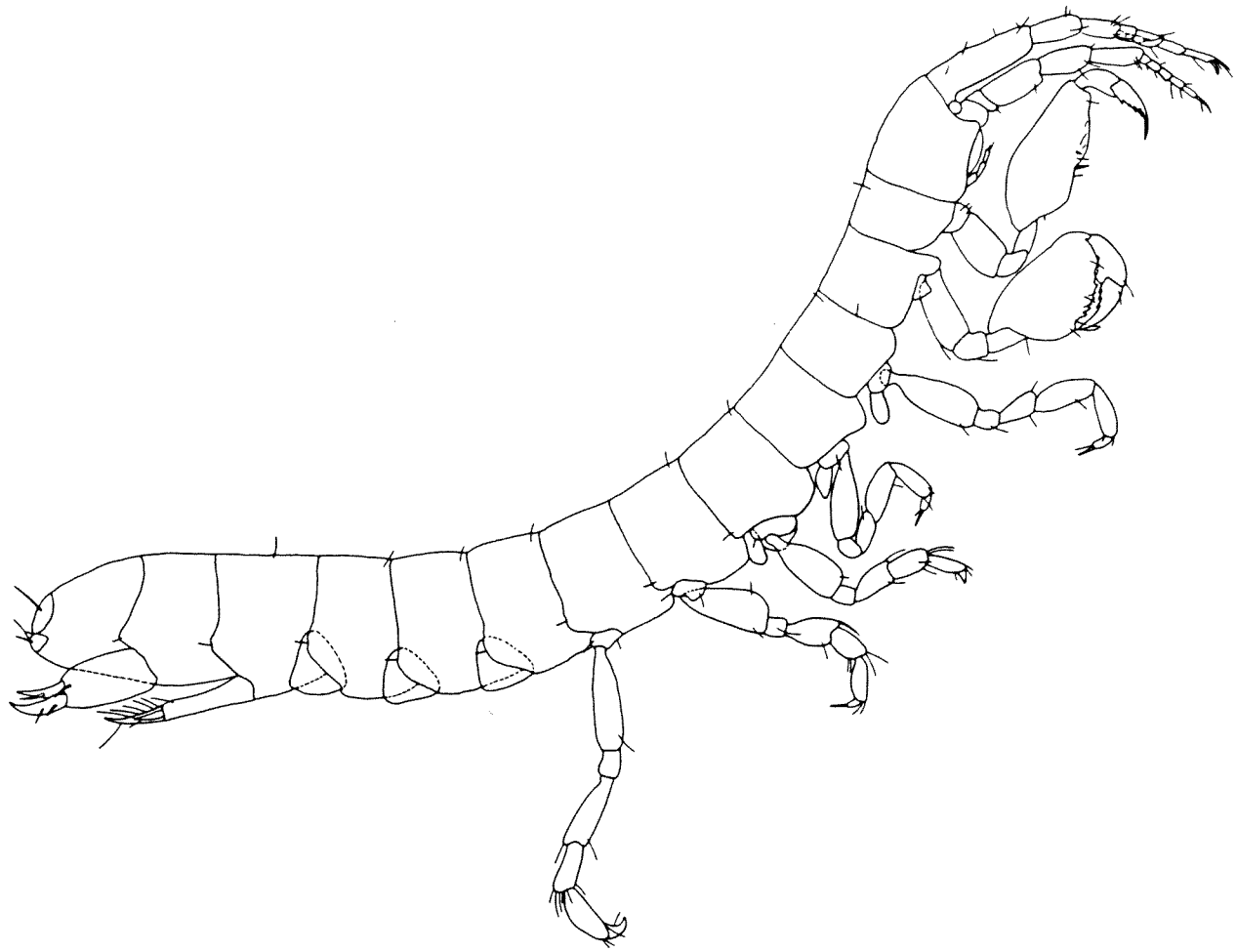

Figure 1 *Ingolfiella quokka* sp. nov., holotype female, WAM C33548; Rottnest Island, Western Australia.

slightly more than half length of peduncle, article 4 with one apical aesthetasc; accessory flagellum of three articles, last minute, reaching end of article 2 of flagellum. Antenna 2, peduncle as long as peduncle of antenna 1; ratio of articles 0.4:0.2:1.0:0.8:0.8; flagellum of five articles, slightly less than half length of peduncle, article 5 with one apical aesthetasc.

Mandible molar processes acute; spine row of two club-like spines; lacinia mobilis about two-thirds width of incisor process on left, half on right, each obscurely toothed; incisor process with five blunt teeth on left and right. Maxilla 1, inner plate blunt, with one seta; outer plate with four cuspidate setae, with three, two, three, five cusps respectively; palp of two articles, with two unequal apical setae. Maxilla 2, inner and outer plates each with four terminal setae. Maxilliped basal endite with two apical setae; palp articles 1–4 with three, one, one and one mesial setae respectively, article 5 with long falcate unguis, seta at midlength and at base of unguis.

Gnathopod 1 coxa at anterior of pereonite; carpus 2.4 times as long as wide, palm with three proximal spiniform setae, three pairs of pinnate setae at mid-palm, palm without teeth; dactylus with four teeth. Gnathopod 2 palm at 45° to longitudinal axis; carpus 1.7 times as long as wide; palm defined proximally by an obtuse angle bearing two spiniform setae (proximal one longer and more curved than other), three triangular teeth along palm, three flagellate spiniform setae and five simple setae; dactylus as long as palm, with four teeth on inner margin.

Pereopods 3 and 4, propodus with three distal setae; dactylus with two distal setae and cylindrical trifid unguis. Pereopods 5 and 6, merus with spiniform seta and simple seta; carpus with two distal long stout setae, two short stout and two slender setae; propodus with five distal setae on pereopod 6, and three setae on pereopod 5; dactylus with cylindrical bifid unguis. Pereopod 7, merus with one distal stout seta and two slender setae; carpus with one distal short stout seta, three long stout setae and three slender setae; propodus with three distal setae; dactylus stout, curved with one subtriangular spike at midlength, unguis not defined. Coxal gills ovate, small, on pereonites 3, 4, and 5. No oostegites.

Pleopods 1–3 subtriangular, without distal setae.

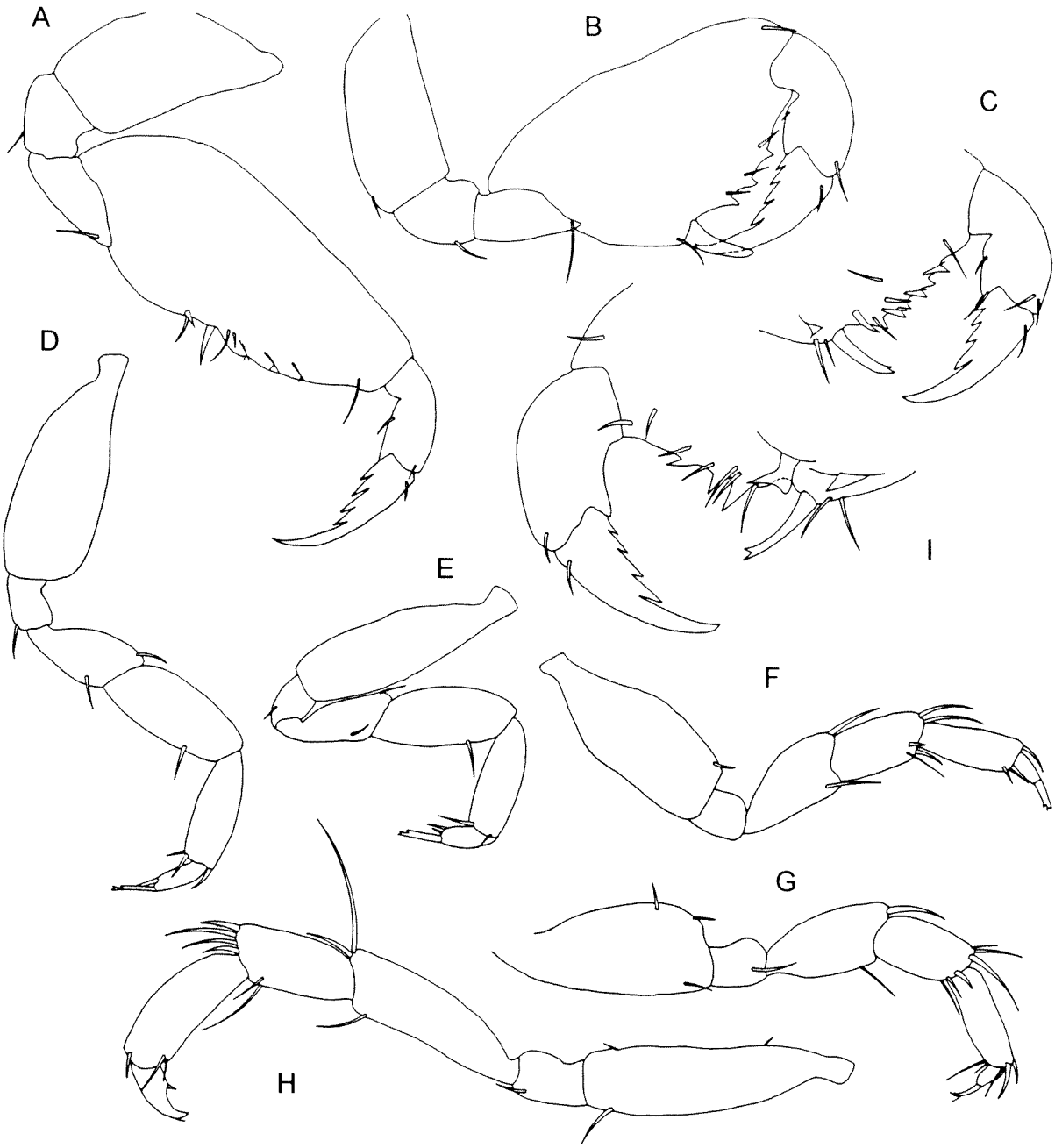

Figure 2 *Ingolfiella quokka* sp. nov. Paratype female, WAM C33551: **A**, left gnathopod 1; **B**, right gnathopod 2, lateral; **C**, left gnathopod 2 palm and dactylus, mesial; **D**, pereopod 3; **E**, pereopod 4; **F**, pereopod 5; **G**, pereopod 6; **H**, pereopod 7. Paratype male, WAM C33554: **I**, right gnathopod 2, palm and dactylus, mesial.

Uropod 1 peduncle with two distal setae, without a long reversed seta on lower margin; inner ramus 0.9 times length of peduncle, with lateral row of eight long setae, edges of apex finely denticulate; outer ramus half as long as inner ramus, with one subdistal seta. Uropod 2 peduncle with three obliquely transverse rows of (proximal to distal) nine, seven, nine complex setae; rami uniarticulate, outer 0.7 times length of peduncle, inner ramus 0.9 times length of outer ramus; outer ramus with three setae; inner ramus with two setae. Uropod 3 with one ramus; peduncle with three lateral setae, ramus short, broad, with long distal seta. Telson subsemicircular, with pair of long dorsal setae.

Male (based on paratype, 1.06 mm). As female except in the following. Gnathopod 2 carpus palm defined proximally by an obtuse angle bearing one long curved spiniform seta and more distally on inner surface one strong flaring tooth-like seta; palm with three subtriangular teeth and nine simple setae. Pleopods slightly narrower than in female; pleopod 1 only with two short distal setae. Uropod 2 peduncle with a short curved seta hooked distally

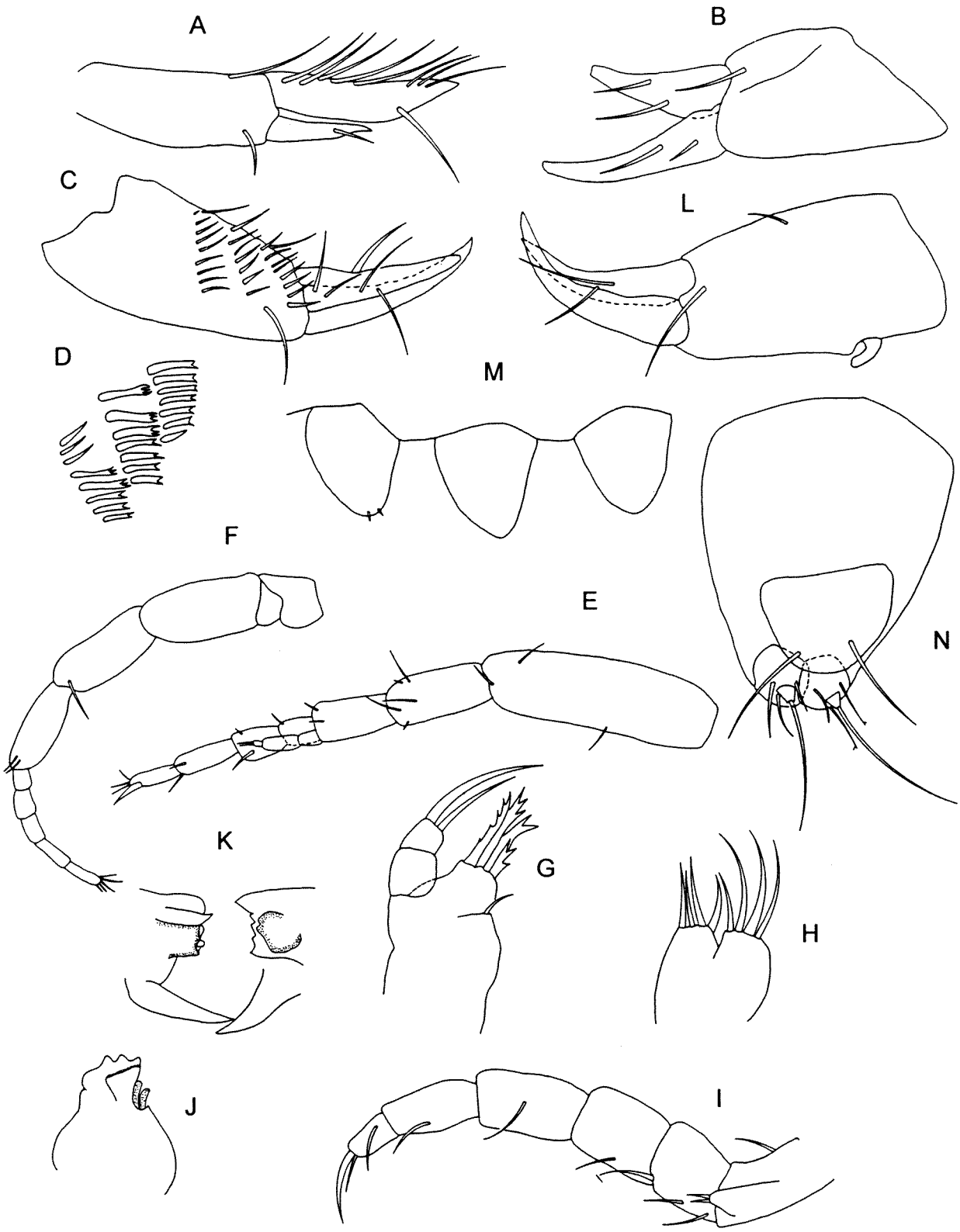

Figure 3 *Ingolfiella quokka* sp. nov. Paratype female, WAM C33551: **A**, uropod 1; **B**, right uropod 2, lateral; **C**, right uropod 2, mesial; **D**, detail complex setae on mesial face of uropod 2; **E**, antenna 1; **F**, antenna 2; **G**, maxilla 1; **H**, maxilla 2; **I**, maxilliped; **J**, mandible; **K**, ventral view of mandibles, anterior at top, lacinia mobilis on left and right stippled. Paratype male, WAM C33554: **L**, right uropod 2; **M**, pleopods 1–3; **N**, urosomite 3, dorsal view with telson and uropods 3.

to meet a broad triangular marginal projection of the lower margin.

Etymology

For the Quokka (*Setonix brachyurus*), a species of wallaby living on Rottnest Island in Western Australia and after which the island was named by Willem de Vlamingh in 1696.

DISCUSSION

Ingolfiella quokka is most similar to species that have been assigned to the subgenus *Antilleella* sharing characters such as a reduced or absent ocular lobe, subtriangular pleopod 1 modified in males with two apical setae, and similar pereopods 3–7. Of the species placed in this subgenus by Ruffo and Taglianti (1989) it is similar to *I. putealis, I. fontinalis, I. tabularis, I. margaritae, I. similis, I. unguiculata* and *I. beatricis* as follows: (1) possession of small ocular lobe (reduced or vestigial in most species of the subgenus, except for *I. similis* where it is absent and *I. beatricis* where it is developed); (2) antenna 1 flagellum of four articles and with three-articled accessory flagellum; (3) serrated palmar margin of gnathopod 2 (variously eight teeth in *I. similis*, smooth margin in *I. beatricis*); (4) gnathopod 2 sexually dimorphic; (5) gnathopods 1 and 2 dissimilar; (6) basofacial hook on peduncle uropod 2 in males; (7) subtriangular pleopods present (subtrapezoidal in *I. beatricis* and *I. unguiculata*), modified in males with two distal setae; and (8) uropod 2 with three obliquely transverse rows of spines (except for *I. putealis* with four rows and *I. fontinalis* with two rows).

Ingolfiella quokka differs from most species of the subgenus *Antilleella* in: (1) absence of a reversed modified seta in male gnathopod 2; (2) females without oostegites (except for *I. unguiculata* and *I. beatricis*) – unless supposed females of our and these species are not mature; (3) pereopods 3 and 4 unlike pereopods 5–7, that is, dactyli of pereopods 3 and 4 with long apically bifid unguis, dactyli of pereopods 5 and 6 with stronger bifid unguis, and pereopod 7 lacks unguis; (4) absence of a sharp inner spur distally on the basal part of dactyli; and (5) dactylus of gnathopods 1 and 2 with four serrations instead of three (except for *I. beatricis*).

The new species differs from *I. bassiana*, the only Australian species which could be placed in subgenus *Antilleella*. The complexity of the palmar spines on the male gnathopod 2, the plumose seta on the peduncle of uropod 1, and the two setae of the pleopod 2 in males sets *I. bassiana* apart from *I. quokka*.

Ingolfiella quokka has also some characters similar to *I. fuscina* Dojiri and Sieg, 1987, a species more akin to the subgenus *Tethydiella* Ruffo and Taglianti, 1989. These are: (1) gnathopod 1 carpus palm bearing Y-shaped setae; (2) gnathopod 1 dactylus with four teeth; (3) pereopods 3–4 unlike pereopods 5–7 (diagnostic of *Tethydiella*); (4) pereopods 3 and 4 dactyli with trifid unguis (unlike *Antilleella*, where the unguis is bifid); (5) absence of a sharp inner spur distally on the basal part of in pereopods 3–7 dactyli; and (6) the complex nature of the mesial spines on uropod 2. However, the new species can be distinguished from *I. fuscina* by: (1) absence of unguis in pereopod 7; (2) female probably devoid of oostegites (always present in *Tethydiella*); (3) sexual dimorphism in gnathopod 2; (4) subtriangular pleopods present in both sexes (lamelliform with one or two apical setae in *I. fuscina*); (5) male pleopod 1 subtriangular with two apical setae (only one in *I. fuscina*); (6) absence of terminal, dorsal, pectinate spine on male uropod 1 (uropod 1 sexually dimorphic in *I. fuscina*); and (7) presence of a basofacial hook on the peduncle of uropod 2 in males.

Ingolfiella quokka differs from *I. australiana* Lowry and Poore, 1989, another Australian ingolfiellid. This species shares characters with species belonging to the subgenus *Trianguliella* Stock, 1976. Both species have (1) a small semicircular eyelobe; (2) antenna 2 flagellum of five articles; (3) accessory flagellum of antenna 1 of three articles, the last one minute; (4) dactylus of gnathopod 1 with four serrations; and (5) pleopods 2 and 3 subtriangular in both sexes. However, *I. australiana* is quite different from *I. quokka*: (1) antenna 1 flagellum of five articles; (2) maxilla 2, inner and outer plates with five plumose setae; (3) gnathopod 2 palm with distal triangular tooth and quadrate tooth separated by a notch; (4) pereopods 5 and 6, dactylus with unguis not defined; (5) pleopod 1 digitiform in male with two apical setae, and subtriangular in female with one seta: (6) uropod 1 has a ventral peduncular row of stout setae (not reported in any other ingolfiellidean); and (7) uropod 2 without basofacial hook on peduncle, and with five obliquely transverse rows of setae (not complex setae).

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