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Revision of the Indo-West Pacific Coral Reef Mantis Shrimp Genus, *Gonodactylopsis* Manning, 1969 (Crustacea: Stomatopoda: Gonodactylidae)

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Abstract. The Indo-West Pacific coral reef mantis shrimp genus genus, *Gonodactylopsis* Manning, 1969, was established for two Indo-West Pacific species: *Gonodactylus herdmani* Tattersall, 1906 (type species) described from the Gulf of Mannar, India; and *Gonodactylus drepanophorus* de Man, 1902, from Indonesia. A third species, *Gonodactylopsis komodoensis* Erdmann & Manning, 1998, was described from Komodo, Indonesia. *Gonodactylopsis* is revised herein based on type and other material of the three known species, and two new species are described based on recent collections from coral reefs: one from Macclesfield Bank, South China Sea, and the other from Fiji and Papua New Guinea. Reconsideration of all species of *Gonodactylopsis* revealed a probable synapomorphy of the genus that is unique in the Stomatopoda: the presence of membranous, partially de-chitinized posterior surfaces of the uropodal endopod and exopod distal article. All species of *Gonodactylopsis* are described and figured, and an identification key is provided.

Introduction

Manning (1969) proposed the genus *Gonodactylopsis* to accommodate two species of mantis shrimp formerly placed in *Gonodactylus* Group II of Kemp (1913) (recognized as *Mesacturus* Miers, 1880 by Holthuis, 1967), characterized by the combination of a trispinous rostral plate, anteriorly produced lateral plates of the carapace, presence of a mandibular palp, subterminal articulation of the uropodal exopod segments, and weakly curved, movable distal outer spines on the proximal article of the uropodal exopod. More recently, it was recognized that the upraised conical spine or boss at the base of the submedian and intermediate teeth of the telson links *Gonodactylopis* with *Hoplosquilla* Holthuis, 1964 and a group of species within *Gonodactylellus* Manning, 1995 (Barber & Erdmann, 2000; Ahyong, 2001; Ahyong & Erdmann, 2007).

Prior to the present study, three species of *Gonodactylopsis*, all from Indo-West Pacific coral reefs were recognized: *G. herdmani* (Tattersall, 1906) (type species, Gulf of Mannar), *G. drepanophora* (de Man, 1902) (type locality: Ternate, Indonesia) and *G. komodoensis* Erdmann & Manning, 1998 (type locality: Komodo, Indonesia). The few published reports of *Gonodactylopsis* are based on only a few specimens in collections worldwide. In the present study, the known species of *Gonodactylopsis* are redescribed based on type and other material, and two new species are described based on expeditionary materials from various Indo-West Pacific localities collected since the 1980s.

Keywords: Mantis shrimp; Indo-West Pacific; Gonodactyloidea; *Gonodactylopsis*; coral reef
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Materials and methods

Morphological terminology follows Ahyong (2001) and Ahyong (2012). Total length (TL) is measured along the dorsal midline from the tip of the rostral plate to the apices of the submedian teeth of the telson. Carapace length (CL) is measured along the dorsal midline of the carapace and excludes the rostral plate. The abdominal-width carapace-length index (AWCLI) is given as 1000 × (width of abdominal somite 5)/CL. Specimens are deposited in the collections of: the Australian Museum, Sydney (AM); Muséum national d'Histoire naturelle, Paris (MNHN); Museum Zoologicum Bogoriense, Cibinong, Indonesia (MZB); Senckenberg Museum Forschunginstitut, Frankfurt, Germany (SMF); National Museum of Natural History, Smithsonian Institution, Washington D.C. (USNM); National Taiwan Ocean University, Keelung (NTOU); the Natural History Museum, London (NHM); and the Western Australian Museum, Perth (WAM). The distribution map (Fig. 1) was prepared using QGIS 3.4.

All species of *Gonodactylopsis* have the outer margins of both the uropodal exopod and endopod lined with plumose setae; these setae are shown in Fig. 2H for the type species, *G. herdmani,* but omitted in figures of other species.

Systematics

Stomatopoda
Gonodactyloidea Giesbrecht, 1910
Gonodactylidae Giesbrecht, 1910

Gonodactylopsis Manning, 1969

Gonodactylopsis Manning, 1969: 149.

Type species. *Gonodactylus herdmani* Tattersall, 1906, by original designation.

Diagnosis. Eye subcylindrical, cornea subglobular. Ocular scales low, separate, not wider than basal width of median spine of rostral plate. Rostral plate trispinous, with slender median spine and shorter, wider lateral spines. Carapace anterolateral margins convex, extending anteriorly beyond base of rostral plate. Mandibular palp present. Raptorial claw propodus with proximal movable spine. Telson with submedian, intermediate and lateral primary teeth; mid-dorsal surface with median, accessory median, anterior submedian and anterior intermediate carinae, each posteriorly armed; submedian and intermediate primary teeth with 1 or more upright basal spines or bosses; carina of intermediate tooth without accessory carina on mesial margin; anus located ventrally. Uropodal protopod without lobes between terminal spines; exopod inner margin glabrous, distal article outer margin setose; endopod inner margin glabrous, outer margin distal half setose; distal exopod article and endopod with soft, membranous, glabrous mesial surface.

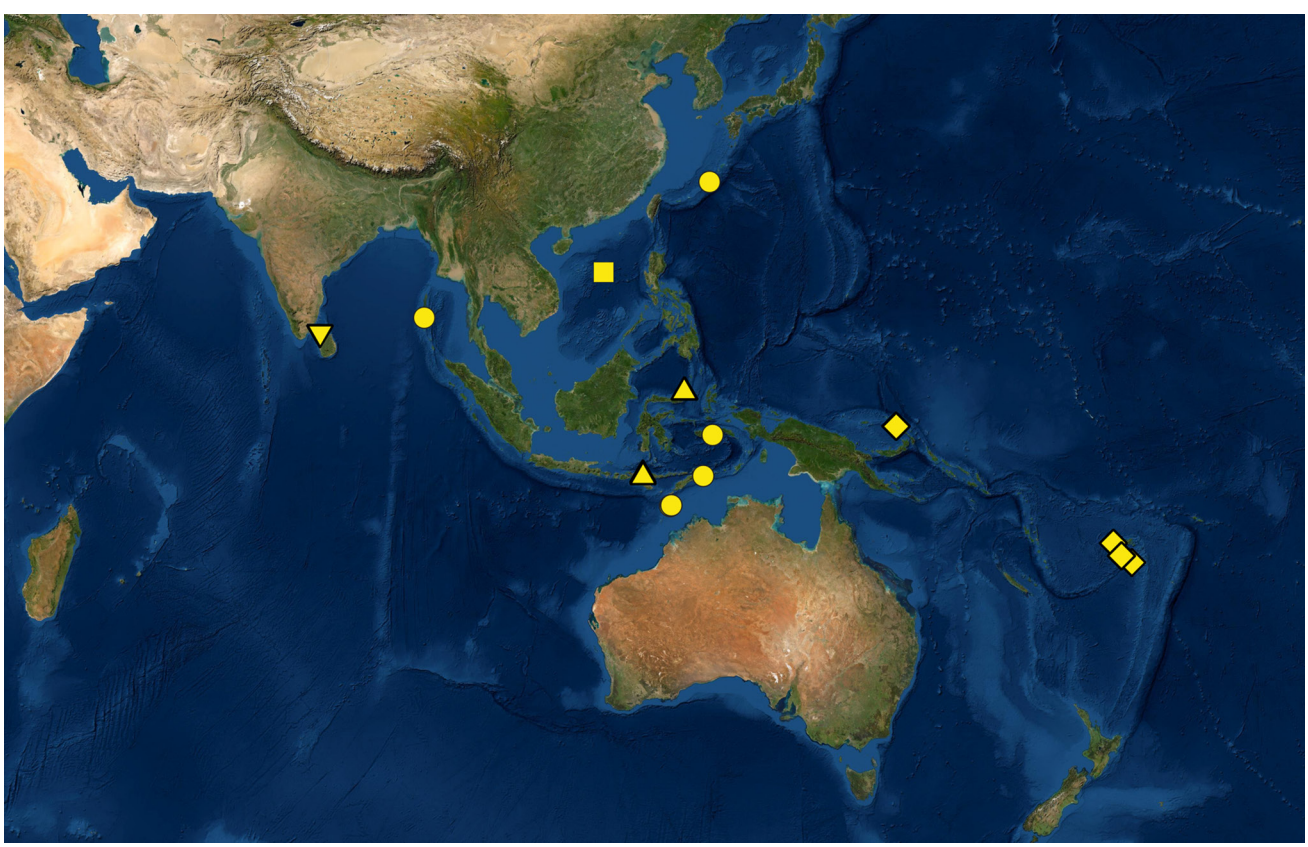

Figure 1. Distribution of species of *Gonodactylopsis*: *G. herdmani* (Tattersall, 1906) (▼),*G. drepanophora* (De Man, 1902) (●), *G. komodoensis* Erdmann & Manning, 1998 (▲), *G. lata* sp. nov. (◆), *G. maqqaba* sp. nov. (■).

Key to species of *Gonodactylopsis* Manning, 1969

1	Telson submedian denticles absent; intermediate tooth stout, wider than long; lateral tooth low, convex not projecting posteriorly ..... *G. herdmani*
——	Telson submedian denticles present; intermediate tooth longer than wide; lateral tooth prominent, projecting posteriorly 2
2	Telson accessory median and anterior submedian carina each with small posterior spine, otherwise smooth. Uropod protopod primary spines without ventral longitudinal carina ..... *G. komodoensis*
——	Telson accessory median and anterior submedian carina each with 2 or more spines. Uropod protopod primary spines each with ventral longitudinal carina 3
3	Telson intermediate and lateral teeth lamellate, apices rounded or bluntly angular ..... *G. lata*
——	Telson intermediate and lateral teeth slender, apices acutely pointed 4
4	Uropodal endopod crescentic, posterior margin concave, strongly so in adults; articulation with protopod posterior to anterior end ..... *G. drepanophora*
——	Uropodal endopod linear, spatulate, posterior margin straight; articulation with protopod at anterior end ..... *G. maqqaba*

Composition. *Gonodactylopsis drepanophora* (de Man, 1902), *G. herdmani* (Tattersall, 1906), *G. komodoensis* Erdmann & Manning, 1998, *G. lata* sp. nov., *G. maqqaba* sp. nov.

Remarks. *Gonodactylopsis*, *Hoplosquilla* and the *Gonodactyllelus molyneux* group form a discrete group within Gonodactylidae, united by the presence of one or more upright spines or prominent tubercles at the base of the submedian and intermediate telson teeth in addition to the usually glabrous mesial margins of the uropodal endopod and exopod (Ahyong, 2001; Ahyong & Erdmann, 2007). All are small (TL c. 40 mm or less) Indo-West Pacific coral reef species (Fig. 1). Phylogenetic analysis unites *Gonodactylopsis*, *Hoplosquilla* and the *Gonodactyllelus molyneux* group in a well-supported clade (Barber & Erdmann, 2000) indicating that these shared features are synapomorphic.

Present reconsideration of all species of *Gonodactylopsis* revealed a likely synapomorphy supporting monophyly of the genus: all species have membranous, partially de-chitinized posterior surfaces of the uropodal endopod and exopod distal article, these features being best developed in adults, although still evident in juveniles (Figs 2H,J, 3E,H,I, 4F,H, 5H,J, 6H,J, 9H,K). In all other stomatopods, the articles of the uropod are fully chitinized. Species of *Gonodactylopsis* usually also have more elaborately developed, sharply cristate dorsal uropodal carinae (except *G. komodoensis*), which instead are less pronounced in other gonodactylids. Preliminary phylogenetic analysis (Barber & Erdmann, 2000) suggests that *Gonodactylopsis* is most closely related to *Hoplosquilla* but the two genera are readily separated by the presence of the absence of the mandibular palp in the latter (in addition to the aforementioned uropodal differences). *Gonodactylopsis* is readily distinguished from the *Gonodactyllelus molyneux* group in the trispinous rostral plate, which, in species of *Gonodactyllelus*, has rounded or angular, rather than spinous anterolateral margins of the basal portion. The speciose genus *Gonodactylellus* is not monophyletic and the *G. molyneux* group is currently under evaluation to determine whether it warrants separate generic status or inclusion within a redefined *Gonodactylopsis* and *Hoplosquilla*.

Gonodactylopsis herdmani (Tattersall, 1906)

Figs 1, 2

Gonodactylus herdmani Tattersall, 1906: 169–170, pl. 1 figs 8–10.—Borradaile, 1907: 210.—Kemp, 1913: 4, 11, 146, 148, 171–173, 174, 176, 199, pl. 10 fig. 114, 114a.—Manning, 1969: 149.—Manning, 1995: 20.—Schram, 2010: 52.

Gonodactylus Herdmanni.—Hansen, 1926: 31.

Mesacturus herdmani.—Manning, 1967: 2.—Shanbhogue, 1975: 524, 539.—Manning & Serène, 1968: 114.

Gonodactylopsis herdmani.—Manning, 1969: 149, fig. 1.—Chhapgar & Sane, 1977: 32.—Erdmann & Manning, 1998: 621.—Ahyong & Harling, 2000: 635.—Schram & Müller, 2004: 45.

Type material. **Lectotype**: NHM 1906.10.27.1, female (TL 26 mm), Gulf of Mannar, Ceylon, coral reefs, coll. W. Herdman & J. Hornell, pre 1906. **Paralectotype**: NHM 1906.10.27.2, 1 female (TL 28 mm), Gulf of Mannar, Ceylon, coral reefs, coll. W. Herdman & J. Hornell, pre 1906.

Description. Eyes elongate; cornea subconical, reaching anteriorly slightly beyond antennular article 2. Ocular scales low, subtruncate.

Antennular peduncle length 0.5–0.6CL. Antennal protopod with fixed, laterally flattened mesiodorsal spine, short anteroventral tooth; antennal scale length 0.4CL.

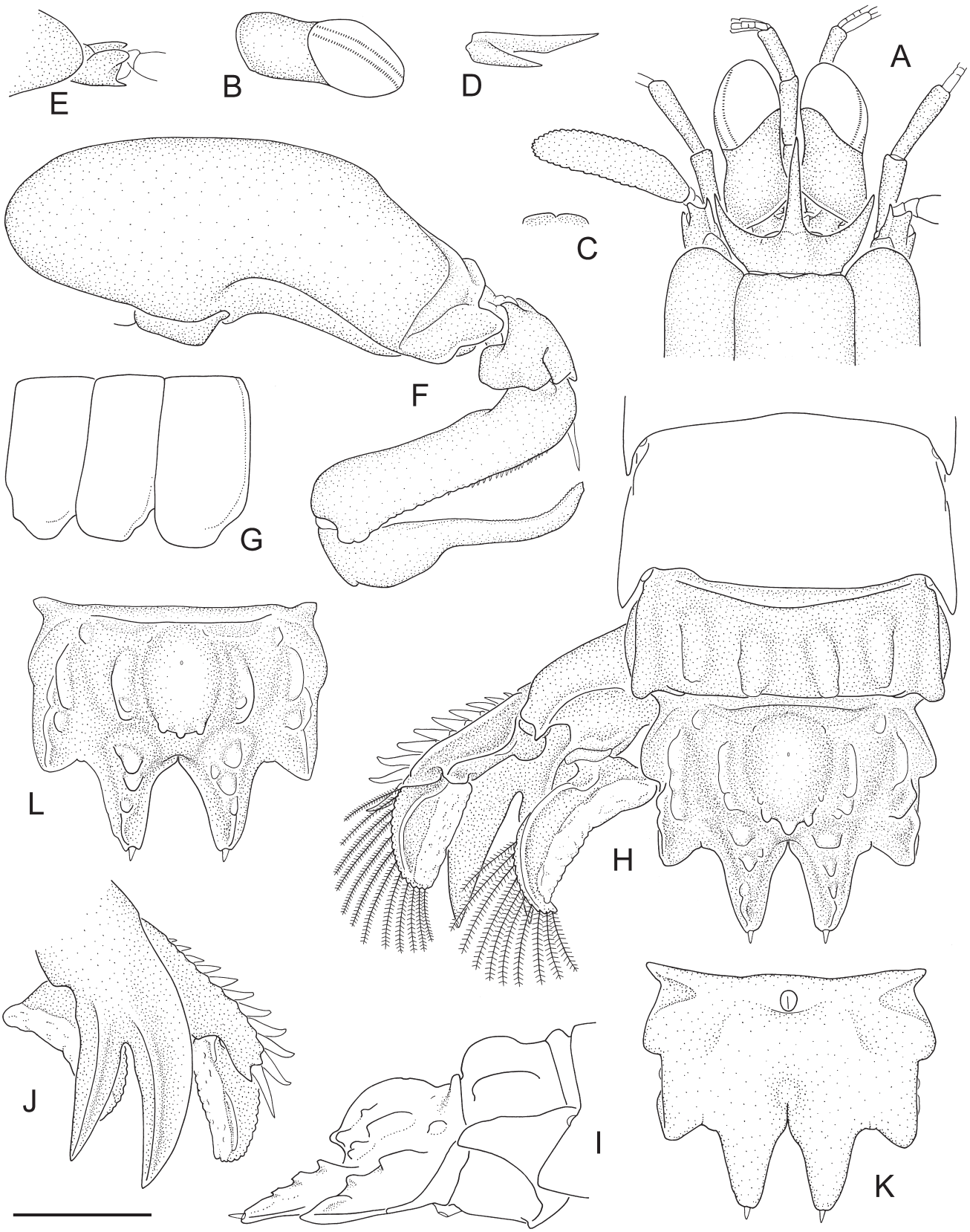

Figure 2. *Gonodactylopsis herdmani* (Tattersall, 1906): *A–K*, lectotype female, TL 26 mm, Ceylon, NHM 1906.10.27.1; *L*, paralectotype female, TL 28 mm, Ceylon, NHM 1906.10.27.1. (*A*) anterior cephalothorax, dorsal view; (*B*) right eye, lateral view; (*C*) ocular scales; (*D*) rostral plate, lateral view; (*E*) right antenna, lateral view; (*F*) right raptorial claw, lateral view; (*G*) thoracic somites 6–8, right lateral view; (*H*) abdominal somite 5 and 6, telson and left uropod; (*I*) abdominal somites 5, 6 and telson, lateral view; (*J*) right uropod, ventral view; (*K*) telson, ventral view; (*L*) telson, dorsal view. Scale = 2.0 mm.

Rostral plate slightly wider than long; median spine twice length of basal portion (medially), laterally compressed, with obtusely angular ventral keel; lateral spines divergent with arcuate margins.

Raptorial claw dactylus with proximal notch on outer margin; propodus with proximal movable spine, opposable margin sparsely pectinate proximally.

Mandibular palp 3-segmented. Maxillipeds 1–5 each with epipod.

Thoracic somites 6 and 7 lateral processes subequal, lower margins subtruncate. Thoracic somite 8 anterolateral margin rounded; sternal keel obsolete.

Abdominal somites 1–5 posterolateral angles unarmed. AWCLI 740–747. Abdominal somite 6 with submedian, intermediate and lateral bosses unarmed.

Telson wider than long; submedian, intermediate and lateral denticles absent; submedian and intermediate teeth stout, blunt; submedian teeth subparallel; intermediate teeth wider than long, extending posteriorly to about proximal one-third of submedian teeth; lateral tooth low, convex not projecting posteriorly. Median carina inflated, tumid, with blunt posterior spine; accessory median carina with 1 or 2 blunt spines; anterior submedian carina with 2 or 3 blunt lobes; submedian tooth with large blunt basal spine followed by 2 or 3 smaller conical spines or tubercles and cristae carina extending to end of tooth; anterior intermediate carina irregular, sometimes partially subdivided, upright; intermediate tooth with blunt basal tubercle (occasionally fused with anterior intermediate carina), flanked laterally by irregular, upright carina; knob absent; submedian and intermediate teeth without ventral carinae.

Uropodal protopod terminal spines with outer slightly longer than inner, each with prominent ventral carina, inner with dorsal carina; upper proximal surface smooth behind dorsal carina, without obtuse swelling; stout spine above exopod articulation. Exopod proximal article dorsal surface with sharp, sinuous longitudinal carina and short carina mesioproximally; outer margin with 10 or 11 movable spines, distalmost reaching distal one-third of distal article; inner margin smooth, glabrous; distal margin with small ventral spine. Exopod distal article with outer distal margin setose, inner margin smooth, glabrous; dorsal and ventral surfaces with inner one-third membranous, soft, wrinkled, clearly demarcated from chitinized outer portion; outer chitinized portion with sharp, curved carina dorsally, ventrally with interrupted longitudinal carina adjacent to margin of membranous portion. Endopod length 2.8–3.2× width, crescentic, articulation with protopod posterior to anterior end; outer margin strongly convex, setose along distal half, inner margin weakly, irregularly concave, glabrous; dorsally with sharp, sinuous carina adjacent to outer margin; dorsal and ventral surfaces with inner half membranous, soft, wrinkled, clearly demarcated from chitinized outer half.

Colouration. According to Kemp (1913: 172): "Living specimens are quite pale in colour with dull yellow marbling, darkest at the antero-lateral corners of the abdominal somites and tending to a more reddish tone on the sixth somite and telson. The ridges and tubercles of these last two segments are pure white. The propodus of the raptorial claw has a red-brown patch at the extreme distal end, and near the apex of each of the rostral spines, there is a transverse red band".

Measurements. Female (n = 2) TL 26–28 mm. Other measurements of lectotype: CL 6.2 mm, antennular peduncle length 3.5 mm, antennal scale length 2.3 mm, abdominal somite 5 width 4.6 mm.

Remarks. *Gonodactylopsis herdmani* is unique in the genus for lacking submedian denticles on the telson, having short, stout intermediate telson teeth, and possessing low, convex lateral telson teeth that do not project posteriorly. The species remains known only from the type material and specimens reported by Kemp (1913), collected from the pearl banks in the Gulf of Mannar, Sri Lanka.

The two specimens of *G. herdmani* examined agree well in most respects (Fig. 2), differing in minor aspects of telson tubercle arrangement, the number of spines on the accessory median carina (1 or 2), the more prominent lateral telson tooth in the TL 26 mm specimen, and in the segmentation of the mandibular palp. Three mandibular palp articles are clearly demarcated in the TL 28 mm specimen whereas the two distal articles (articles 2 and 3) are indistinctly differentiated in the TL 26 mm specimen. Kemp (1913: 171) also reported a "rather indistinct" division between mandibular palp articles in his material of *G. herdmani*, but between the two proximal articles rather than the distal two as observed here; Kemp's (1913) reference to the proximal palp articles is probably a lapsus given that the proximal article typically differentiates in advance of the distal articles in stomatopods. The TL 26 mm female (NHM 1906.10.27.1), being in more complete condition than the TL 28 mm specimen, is herein selected as the lectotype to fix the identity of the species.

Distribution. Central Indian Ocean, presently known only from the Gulf of Mannar, Sri Lanka.

Gonodactylopsis drepanophora (de Man, 1902)

Figs 1, 3, 4

Gonodactylus drepanophorus de Man, 1902: 914–919, pl. 27 fig. 68.—Borradaile, 1907: 210.—Kemp, 1913: 4, 11, 146, 148, 173, 174.—Hansen, 1926: 30–31, pl. 2 fig. 1a.
Mesacturus drepanophorus.—Manning, 1967: 2.—Manning & Serène, 1968: 114.—Shanbhogue, 1975: 524, 539.
Gonodactylopsis drepanophora.—Manning, 1969: 150.—Moosa, 1974: 73–76, fig. 1.—Chhapgar & Sane, 1977: 32.—Manning, 1995: 20.—Wang & Liu, 1998: 141, tab. 2.—Erdmann & Manning, 1998: 621.—Barber *et al*., 2012: tab. 1.—Huffard *et al*., 2012: tab. 1.—Padate *et al*., 2021: 558–561, figs 1A, 2, 3.
Gonodactylopsis drepanophorus.—Schram & Müller, 2004: 44.

Type material. **Holotype**: SMF 5773, female (TL 19 mm), Ternate, Indonesia, coll. W. Kükenthal, 1894.

Other material examined. **Indonesia**: USNM 155707, 1 female (TL 18 mm), Ambon, 13–20 m, coll. Kurnaen, 24 February 1973; MZB LIPI S.562, 1 female (TL 14 mm), Ambon Bay, 80 m, mud and rubble, RV *Samudera*, 26 September 1970. **Japan**: USNM 307225, 1 female (TL 22 mm), Horseshoe Cliffs, 1 km WNW of Onna Village, Okinawa, 26°30'N 127°50.88'E, 58 m, on scuba, RFB 0872, coll. R.F. Bolland, 4 July 1981. **Australia**: WAM C54190,

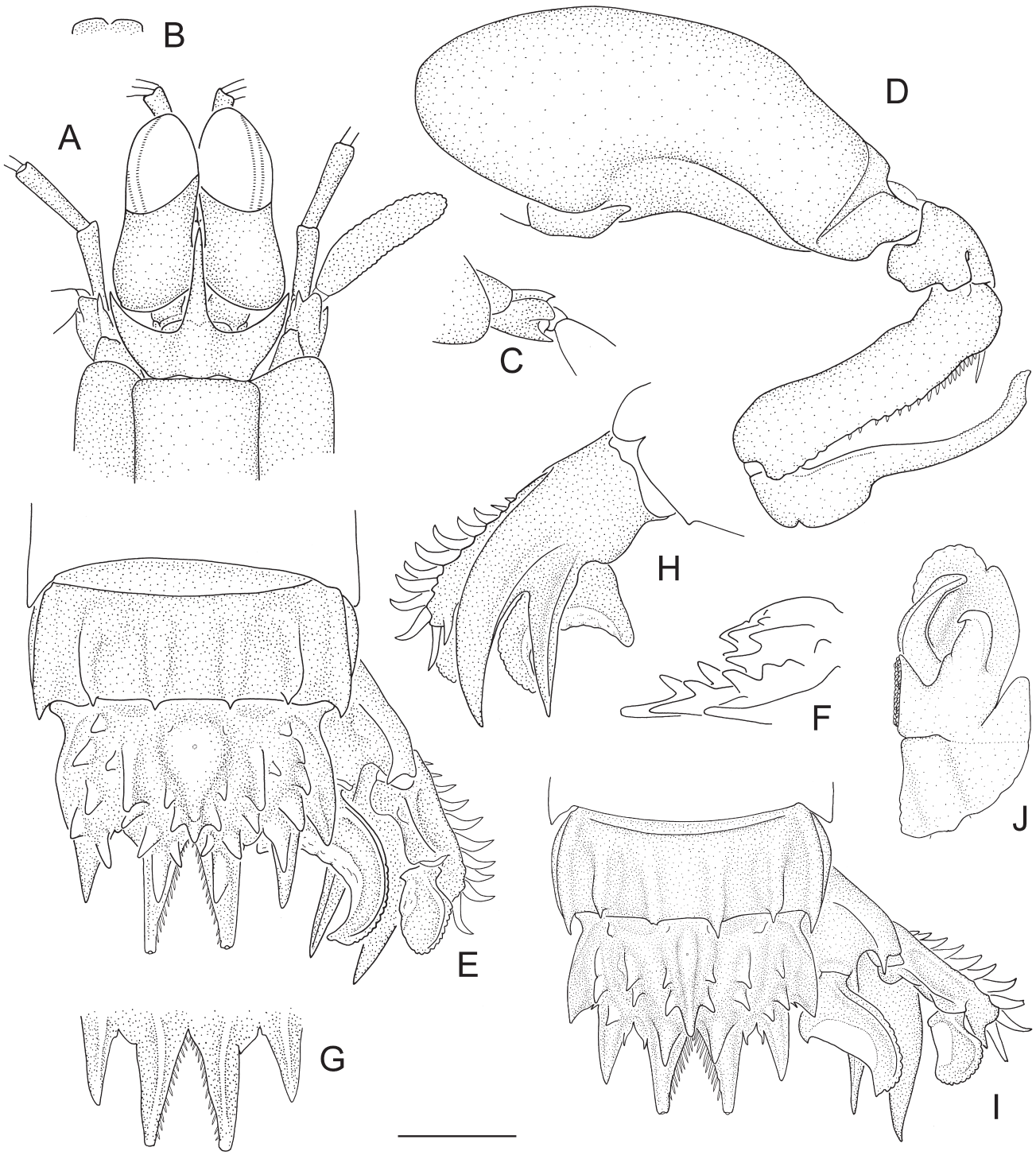

Figure 3. *Gonodactylopsis drepanophora* (De Man, 1902): *A–H*, holotype female, TL 19 mm, Ternate, Indonesia, SMF 5773; *I–J*, male, TL 12 mm, E Ashmore Reef, WAM C54274. (*A*) anterior cephalothorax, dorsal view; (*B*) ocular scales; (*C*) right antenna, lateral view; (*D*) right raptorial claw, lateral view; (*E, I*) abdominal somite 6, telson and right uropod; (*F*) telson, lateral view; (*G*) telson submedian and intermediate teeth, ventral view; (*H*) right uropod, ventral view; (*J*) right pleopod 1 endopod, anterior view. Scale: A–H = 1.0 mm, I = 0.8 mm, J = 0.4 mm.

1 female (TL 20 mm), S end Ashmore Reef, 12°17.76'S 123°01.632'E, 12 m, Woodside Kimberley Survey 2013 stn 134/K13, coll. L. Avery, 30 September 2013; WAM C54164, 1 female (TL 20 mm), SW Ashmore Reef, 12°16.488'S 122°58.878'E, 12 m, Woodside Kimberley Survey 2013 stn 133/K13-T1, coll. A. Hosie, 30 September 2013; WAM C61240, 1 female (TL 16 mm), E Ashmore Reef, 12°11.574'S 123°07.734'E, intertidal, Woodside Kimberley Survey 2013 stn 131/K13-T2, coll. A. Hosie, 29 September 2013; WAM C54274, 1 male (TL 12 mm), E Ashmore Reef, 12°12.468'S 123°08.736'E, 12 m, Woodside Kimberley Survey 2013 stn 140/K13-T1, coll. A. Hosie, 3 October 2013.

Description. Eyes elongate; cornea subconical, reaching anteriorly almost to end of antennular article 3. Ocular scales low, rounded.

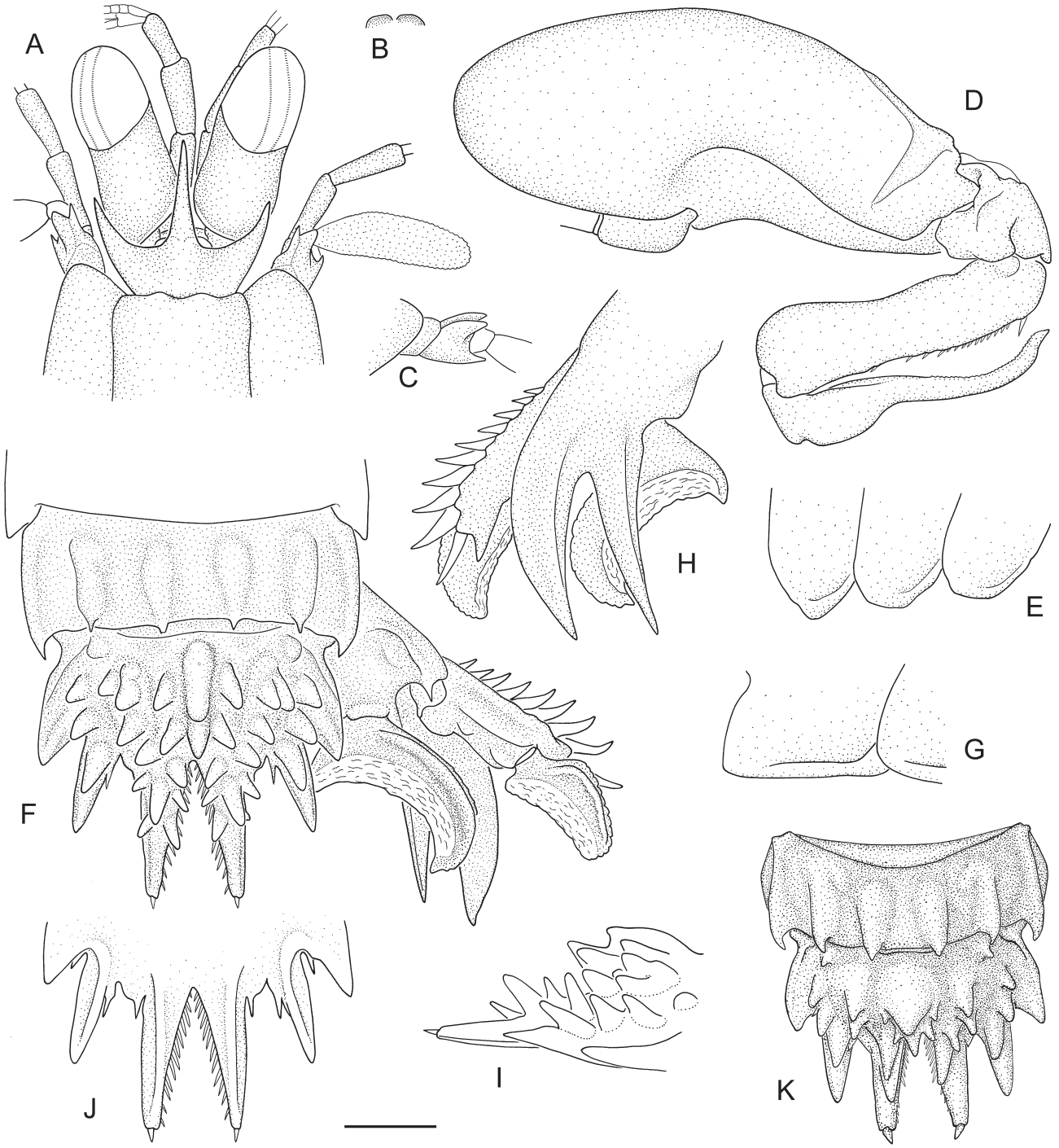

Figure 4. *Gonodactylopsis drepanophora* (De Man, 1902): *A–J*, female, TL 22 mm, Okinawa, Japan, USNM 307225; *K*, female, TL 18 mm, Ambon, Indonesia, USNM 155707. (*A*) anterior cephalothorax, dorsal view; (*B*) ocular scales; (*C*) right antenna, lateral view; (*D*) right raptorial claw, lateral view; (*E*) thoracic somites 6–8, lower right lateral view; (*F*) abdominal somite 6, telson and right uropod; (*G*) abdominal somites 4 and 5 posterolateral margin, lateral view; (*H*) right uropod, ventral view; (*I*) telson, right lateral view; (*J*) telson, ventral view; (*K*) telson, dorsal view. Scale = 1.0 mm.

Antennular peduncle length 0.5–0.7CL. Antennal protopod with fixed, laterally flattened mesiodorsal spine, short anteroventral tooth; antennal scale length 0.3–0.4CL.

Rostral plate slightly wider than long; median spine about twice length of basal portion (medially), laterally compressed, with obtusely angular ventral keel; lateral spines divergent with arcuate margins.

Raptorial claw dactylus with proximal notch on outer margin; propodus with proximal movable spine, opposable margin sparsely pectinate proximally.

Mandibular palp 2- or 3-segmented. Maxillipeds 1–5 each with epipod.

Thoracic somites 6 and 7 lateral processes subequal, lower margins subtruncate. Thoracic somite 8 anterolateral margin rounded; sternal keel obsolete.

Pleopod 1 endopod with lateral lobe on posterior "endite".

Abdominal somites 1–5 posterolateral angles unarmed. AWCLI 671–822. Abdominal somite 6 with submedian, intermediate and lateral bosses posteriorly armed.

Telson wider than long; 10–14 submedian denticles arising from inner margin of submedian teeth; 2 intermediate and 1 lateral denticles usually distinct; submedian and intermediate teeth slender, sharp; submedian teeth subparallel to slightly divergent; intermediate teeth length at least twice width, extending posteriorly to slightly beyond midlength of submedian teeth; lateral teeth stout, triangular, apex acute, directed posteriorly. Median carina inflated, more so in males than females, with posterior spine; accessory median with 2 (rarely 3) spines; anterior submedian carina composed of 2–4 spines in longitudinal row or cluster; submedian tooth with anterior cluster and irregular row of 1–7 dorsal spines (number increasing with body size), not extending beyond anterior half; anterior intermediate carina composed of 2–4 spines; intermediate tooth with 1–4 dorsal spines; knob absent; submedian and intermediate teeth with distinct ventral carina.

Uropodal protopod terminal spines with outer slightly longer than inner, each with ventral carina, inner with dorsal carina; upper proximal surface with obtuse swelling behind dorsal carina in specimens > TL 14 mm; slender spine above exopod articulation. Exopod proximal article dorsal surface with sharp, straight longitudinal carina and two short subequal carinae mesial to main carina; outer margin with 10–12 movable spines, distalmost reaching distal one-third of distal article; inner margin smooth, glabrous; distal margin with small ventral spine. Exopod distal article with outer distal margin setose, inner margin glabrous; dorsal and ventral surfaces with inner quarter to half membranous, soft, wrinkled, clearly demarcated from chitinized outer portion; outer chitinized portion with prominent, curved carina dorsally, ventrally smooth. Endopod length 2.1–3.1× width, crescentic, articulation with protopod posterior to anterior end; outer margin strongly convex, setose along distal half, inner margin strongly, irregularly concave, glabrous; dorsally with sharp, curved carina adjacent to outer margin; dorsal and ventral surfaces with inner half membranous, soft, wrinkled, clearly demarcated from chitinized outer half.

Colouration in preservative. Largely faded to pale yellow-brown. Carapace with scattered chromatophores, mottling and pair of small spots across cervical region. Thoracic somite 6 and abdominal somite 1 with rectangular field of small irregular chromatophores and larger median black spot. Abdominal somites 2–5 with transverse row of 2 or 3 small rounded spots.

Measurements. Male (n = 1) TL 12 mm; female (n = 7) TL 14–22 mm. Other measurements of holotype: CL 4.1 mm, antennular peduncle length 2.2 mm, antennal scale length 1.3 mm, abdominal somite 5 width 2.8 mm.

Remarks. *Gonodactylopsis drepanophora* is distinguished by the combination of a crescentic uropodal endopod and a telson having slender, pointed primary teeth and a multispinose dorsal surface. Of the known species of the genus, *G. drepanophora* most closely resembles *G. maqqaba* from the South China Sea, differing chiefly in the crescentic rather than linear uropodal endopod; other distinguishing features are discussed under the account of the latter. *Gonodactylopsis drepanophora* was described from Ternate, Indonesia, and subsequently recorded from Timor Leste (Hansen, 1926), Ambon, Indonesia (Moosa, 1974) and the Andaman Sea (Padate *et al*., 2021). The present records of *G. drepanophora* from Japan and northwestern Australia are the first for these localities.

The specimens of *G. drepanophora* accord well, particularly those from Japan, Indonesia, and northwestern Australia. The holotype, however, exhibits an abnormality in the absence of the left lateral primary tooth of the telson (Fig. 3E), possibly the result of injury during moulting. The record from the Andaman Sea represents the largest known specimen of the species (TL 24 mm; Padate *et al*., 2021: figs 1A, 2, 3), and differs subtly from the smaller specimens in having a 2- rather than 3-articled mandibular palp, slightly more divergent submedian telson teeth, and a cluster of 3 or 4 spines, rather than a single spine, at the base of the intermediate telson teeth. These differences, for which the significance is not clear, are presently regarded as intraspecific variation.

Allometric variation in *G. drepanophora* follows a similar trajectory to that observed for *G. lata* in the increasing slenderness and elongation of the primary telson teeth, increasing density of dorsal telson spination, and more pronounced curvature of the uropodal endopod with increasing body size (Hansen, 1926: pl. 2 fig. 1a; Figs 3E,H, 4F,K). The dorsal tubercle on the uropodal protopod is present in all except the smallest specimen (juvenile male, TL 12 mm, WAM C54274; Fig. 3I). As with *G. lata*, the lateral lobe on the posterior "endite" of pleopod 1 in the juvenile male is yet to be fully developed (Fig. 3J). Notably, the proportionally shorter primary telson teeth of the juvenile male of *G. drepanophora* (Fig. 3I) closely resemble those of adults of members of the *G. molyneux* group, such as *G. barberi* Ahyong & Erdmann, 2007 and *G. snidvongsi* (Naiyanetr, 1987) (Ahyong & Erdmann, 2007: fig. 4; Ahyong, 2008: fig. 2), suggesting these and allied species could be paedomorphic.

Distribution. Western Pacific to eastern Indian Ocean, from Japan to Timor Leste, Indonesia, Ashmore Reef and the Andaman Islands; 13–80 m.

Gonodactylopsis komodoensis Erdmann & Manning, 1998

Figs 1, 5

Gonodactylopsis komodoensis Erdmann & Manning, 1998: 620–621, fig. 1e.—Barber & Erdmann, 2000: 33, figs 3–5, tab. 1, 2.—Schram & Müller, 2004: 45.—Barber & Boyce, 2006: fig. 1.—Clark & Schram, 2009: 448.—Barber *et al.,* 2012: tab. 1.

Gonodactylopsis sp. A.—Cronin *et al.,* 2000: fig. 2.—Barber *et al.,* 2012: 18, tab. 1.—Huffard *et al.,* 2012: tab. 1.

Gonodactylopsis spongicola Cronin *et al.,* 2002: 180, 182, 183, tab. 3.—Cronin & Caldwell, 2002: 188, 190, 192, 194, 195, figs 3–5, tab. 1–4.—Marshall *et al.,* 2003: 363.—Marshall *et al.,* 2007: tab. 1.—Cronin *et al.,* 2014: 6, figs 5, 6. [Nomen nudum]

Type material. **Holotype**: USNM 260914, female (TL 22 mm), Tatawa Kecil, Komodo, Indonesia, 8°31.90'S 119°38.10'E, coll. M. Erdmann, pre 1997. **Paratypes**: USNM 260915, 1 male (TL 20 mm), Tatawa Kecil, Komodo, Indonesia, 8°31.90'S 119°38.10'E, coll. M. Erdmann; USNM 260916, 1 male (TL 12 mm), Tanjung Toronado, Komodo,

Figure 5. *Gonodactylopsis komodoensis* sp. nov.: *A–L*, male, TL 16 mm, Bunaken, Indonesia, AM P105857; *M*, male, TL 11 mm, Siladen Island, Indonesia, AM P105856; *N*, holotype female, TL 22 mm, Komodo, Indonesia, USNM 260914. (*A*) anterior cephalothorax, dorsal view; (*B*) right eye, lateral view; (*C*) ocular scales; (*D*) rostral plate, lateral view; (*E*) right antenna, lateral view; (*F*) right raptorial claw, lateral view; (*G*) thoracic somites 6–8, right lateral view; (*H*) abdominal somite 6, telson and right uropod; (*I*) abdominal somites 5, 6 and telson, lateral view; (*J*) right uropod, ventral view; (*K*) telson, ventral view; (*L*) right pleopod 1 endopod, anterior view; (*M, N*) telson, dorsal outline. Scale: A–K, M, N = 2.0 mm; L = 1.0 mm.

Indonesia, 8°44.70'S 119°39.50'E, coll. M. Erdmann, pre 1997; USNM 260917, 1 female (TL 10 mm), Tanjung Toronado, Komodo, Indonesia, 8°44.70'S 119°39.50'E, coll. M. Erdmann, pre 1997.

Other material examined. **Indonesia**: AM P105856, 3 males (11–15 mm), 6 females (TL 14–17 mm), Siladen Island, N Sulawesi, 1°37.9'N 124°48.2'E, 11–17 m, burrows in old *Lithophaga* holes in sponges, coll. M. Erdmann, 5 November 1998; AM P105857, 2 males (TL 15, 16 mm), 5 females (TL 13–18 mm), Bunaken, N Sulawesi, 1°38.92'N 124°43.80'E, 10 m, in petrosid sponges, coll. Erdmann, 22 April 2000.

Description. Eyes elongate; cornea subconical, reaching anteriorly beyond midlength of antennular article 3. Ocular scales low, subtruncate.

Antennular peduncle length 0.6–0.8CL. Antennal protopod with fixed, laterally flattened mesiodorsal spine, short anteroventral tooth; antennal scale length 0.4CL.

Rostral plate slightly wider than long; median spine about twice length of basal portion (medially), laterally compressed, with obtusely angular ventral keel; lateral spines divergent with weakly arcuate margins.

Raptorial claw dactylus with proximal notch on outer margin; propodus with proximal movable spine, opposable margin sparsely pectinate proximally.

Mandibular palp 2-segmented. Maxillipeds 1–5 each with epipod.

Thoracic somites 6 and 7 lateral processes subequal, lower margins subtruncate. Thoracic somite 8 anterolateral margin rounded; sternal keel obsolete.

Pleopod 1 endopod with lateral lobe on posterior "endite".

Abdominal somites 1–5 posterolateral angles unarmed. AWCLI 795–914. Abdominal somite 6 with submedian, intermediate bosses usually unarmed, lateral bosses with posterior spine.

Telson wider than long to as long as wide; 6–14 (usually 10 or 11) submedian denticles arising from inner margin of submedian teeth; 2 intermediate and 1 lateral denticles usually present; submedian and intermediate teeth slender, sharp; submedian teeth subparallel; intermediate teeth length at least twice width, gently incurved, extending posteriorly beyond midlength of submedian teeth; lateral teeth stout, triangular, apex acute, directed posteriorly. Median carina inflated, tumid, more so in males than females, with posterior spine; accessory median carina with small posterior spine; anterior submedian carina arcuate, smooth, with small posterior spine; submedian and intermediate teeth each with rounded basal tubercle terminating in minute spinule; anterior intermediate carina low, inconspicuous; knob absent; submedian and intermediate teeth without ventral carina.

Uropodal protopod terminal spines with outer slightly longer than inner, smooth ventrally, neither with longitudinal carina, inner with low dorsal carina; upper proximal surface without obtuse swelling behind dorsal carina; slender spine above exopod articulation. Exopod proximal article dorsal surface with 2 longitudinal carinae, one submedially and one adjacent to inner margin; outer margin with 9–11 movable spines, distalmost reaching almost to end of distal article; inner margin smooth, glabrous; distal margin with small ventral spine. Exopod distal article with outer distal margin setose, inner margin glabrous; dorsal and ventral surfaces with inner one-fourth to one-fifth thickened, smooth, membranous but firm, diffusely demarcated from chitinized outer portion; outer chitinized portion dorsally and ventrally unadorned. Endopod length 2.7–3.3× width, spatulate, linear, spatulate, articulation with protopod at anterior end; outer margin gently convex, setose along distal half, inner margin almost straight glabrous; dorsally with curved carina adjacent to outer margin; dorsal inner quarter and ventral inner half or slightly less membranous but firm, diffusely demarcated from chitinized outer portion.

Colouration in preservative. Completely faded to pale yellow-brown.

Measurements. Male (n = 7) TL 11–20 mm; female (n = 13) TL 13–22 mm. Other measurements of holotype: CL 4.3 mm, antennular peduncle length 2.6 mm, antennal scale length 1.5 mm, abdominal somite 5 width 3.9 mm.

Remarks. *Gonodactylopsis komodoensis* is the least ornamented species of the genus, lacking the numerous tubercles or spines on the dorsal telson carinae that are present in other congeners, and in fewer and lower uropodal carinae (rather than sharply cristate) as in other gonodactylids. Instead, the dorsal telson carinae of *G. komodoensis* are unarmed apart from the tiny posterior spinule on the carinae and basal tubercles of the submedian and intermediate teeth. Similarly, the primary spines of the uropodal protopod of *G. komodoensis* lack the ventral longitudinal carina that is present in congeners. Additionally, the de-chitinized membranous posterior surfaces of the uropodal endopod and exopod distal article are comparatively less pronounced in *G. komodoensis* than in congeners, lacking wrinkling, and with a diffuse rather than distinct line of demarcation from the chitinized cuticle. In other species of *Gonodactylopsis*, the soft, membranous portion of the uropodal cuticle is irregularly wrinkled and sharply demarcated from the adjacent chitinized surface but in *G. komodoensis*, the membranous surface is smooth, and although swollen, it is diffusely demarcated from the adjacent chitinized cuticle. Additionally, the membranous portion in *G. komodoensis* is more extensive ventrally than dorsally, rather than similar on both sides in congeners. As such, *G. komodoensis* presents uropod features that could be transitional between other species of *Gonodactylopsis* and members of the *Gonodactylellus molyneux* group and *Hoplosquilla*, which have fully chitinized uropod articles.

As observed by Erdmann & Manning (1998), allometric changes are evident in the proportional elongation of the primary telson teeth (particularly the submedians) and reduction in the number of submedian denticles. The primary telson teeth are stoutest and proportionally shortest in the smallest specimens in which the submedian teeth are distinctly shorter than the length of the remaining telson (Fig. 5M), are almost as long as the remaining telson by TL 14–20 mm (Fig. 5H,K), and longer than the remaining telson by TL 22 mm (Fig. 5N). The submedian denticles being most numerous in the smallest specimens (10–14 at TL 10–11 mm), occupy most of the mesial margin of the submedian teeth (Fig. 5M). Specimens of TL 13–18 mm have 9–12 submedian denticles distributed along approximately the anterior half or more of the mesial margin of the submedian teeth (Fig. 5H,K); by TL 20 mm, 8 or 9 submedian denticles are present and restricted to the proximal half of the submedian teeth margin, and by TL 22 mm, 7 or 8 denticles

are present and restricted to the anterior one-quarter of the mesial margin of the submedian teeth (Fig. 5N). Other size-related changes include a proportionally smaller posterior spinule on the telson carinae in larger specimens, and a tendency to lose the posterior spinule on the submedian bosses of abdominal somite 6 with increasing body size. The somite 6 submedian bosses are posteriorly armed in specimens to TL 15 mm, usually unarmed in specimens TL 16–18 mm, and always unarmed above this size. A minute intermediate telson denticle is usually present in specimens to TL 17 mm, but is lost in larger specimens.

The male pleopod 1 endopod is fully modified and penes well developed in the smallest males examined (TL 11 mm). The mandibular palp is clearly 2-articled except in one female (TL 14 mm, Siladen Island) in which the palp articles on one side appear to be undifferentiated.

Barber *et al*. (2012) and Huffard *et al*. (2012) listed three unidentified species of *Gonodactylopsis* from Indonesia and New Guinea, referred to as *Gonodactylopsis* sp. A–C. *Gonodactylopsis* sp. A, from central-east Indonesia and New Guinea, exhibited a strong genetic break between more westerly populations (Sulawesi to Bali area) and those further east (New Guinea) (Barber *et al*., 2012). *Gonodactylopsis* sp. A, at least the Sulawesi–Bali population (material of which is represented in the present study), corresponds to *G. komodoensis* but further taxonomic scrutiny of New Guinean populations is warranted. The identities of *Gonodactylopsis* sp. B (western Sumatra, southern Java) and sp. C (Halmahera, western New Guinea) remain to be determined when specimens become available for study; they could be undescribed or belong to named species, such as *G. drepanophora* and *G. lata*, which also occur in the region.

The spectral properties of the compound eyes of *G. komodoensis* have been analysed in detail under the names *G.* sp. A. by Cronin *et al*. (2000) and *G. spongicola* by Cronin *et al*. (2002), Cronin & Caldwell (2002), Marshall *et al*. (2003), Marshall *et al*. (2007) and Cronin *et al*. (2014). The name *G. spongicola* has never been formally proposed nor accompanied by a description, and is therefore a nomen nudum.

Habitat. Exposed vertical rock faces and reefs subject to strong tidal flow and currents; in cavities or burrows in coral, coralline algae, or barrel and petrosid sponges.

Distribution. Indonesia, from Komodo to North Sulawesi; 1.5–50 m.

Gonodactylopsis lata sp. nov.

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Figs 1, 6–8

Holotype: USNM 307139, female (TL 22 mm), S of passage, W side Totoya Island, Fiji, 18°58'57"S 179°52'12"E, 13.5 m, barrier reef, with cuts & caves, rubble, VGS 82-9, V. Springer *et al*., 27 April 1982. **Paratypes**: USNM 307184, 1 female (TL 19 mm), Yasawa Group, Fiji, 16°43.2'S 177°34.8'E, 10.7 m, WE 83-67, poison, A. Emery *et al*., 28 April 1983; MNHN IU-2021-3553, 9 males (15–19 mm), 4 females (18–21 mm), S of Viti Levu, Fiji, 18°11.9'S 178°34.5'E, 80–86 m, MUSORSTOM 10 stn CP1364, 15 August 1998; MNHN IU-2021-3553, 2 females (16–19 mm), Rewa roads, Viti Levu, 18°12'S 178°35'E, 100–122 m, SUVA 4 stn 04, 23 September 1999.

Other material examined. **Papua New Guinea, New Ireland, Kavieng**: MNHN IU-2014-187, 1 female (TL 15 mm), E of North Cape, 2°33.2'S 150°48.2'E, 13 m, bottom of reef slope, KAVIENG 2014 stn KB08, 5 June 2014; MNHN IU-2014-213, 1 female (TL 21 mm), E of North Cape, 2°33.2'S 150°48.2'E, 13 m, bottom of reef slope, KAVIENG 2014 stn KB08, 5 June 2014; AM P105858, 1 male (TL 16 mm), E of North Cape, 2°33.5'S 150°48.8'E, 19 m, rubble on sand, KAVIENG 2014 stn KB64, 24 June 2014; MNHN IU-2014-965, 1 female (TL 13 mm), E of North Cape, 2°33.5'S 150°48.8'E, 19 m, rubble on sand, KAVIENG 2014 stn KB64, 24 June 2014; MNHN IU-2014-966, 1 male (TL 10 mm), E of North Cape, 2°33.5'S 150°48.8'E, 19 m, rubble on sand, KAVIENG 2014 stn KB64, 24 June 2014; MNHN IU-2014-967, 1 male (TL 13 mm), 1 female (TL 9 mm), E of North Cape, 2°33.5'S 150°48.8'E, 19 m, rubble on sand, KAVIENG 2014 stn KB64, 24 June 2014; MNHN IU-2014-1008, 1 male (TL 15 mm), E of North Cape, 2°35.2'S 150°50.3'E, 17 m, sand and rubble, KAVIENG 2014 stn KB66, 24 June 2014.

Description. Eyes elongate; cornea subconical, reaching anteriorly almost to end of antennular article 3. Ocular scales low, subtruncate.

Antennular peduncle length 0.5–0.7CL. Antennal protopod with fixed, laterally flattened mesiodorsal spine, short anteroventral tooth; antennal scale length 0.3–0.4CL.

Rostral plate slightly wider than long; median spine twice length or less of basal portion (medially), laterally compressed, with obtusely angular ventral keel; lateral spines divergent with arcuate to almost straight margins.

Raptorial claw dactylus with proximal notch on outer margin; propodus with proximal movable spine, opposable margin sparsely pectinate proximally.

Mandibular palp 2- or 3-segmented. Maxillipeds 1–5 each with epipod.

Thoracic somites 6 lateral process slightly wider than that of somite 7, both with lower margins subtruncate. Thoracic somite 8 anterolateral margin rounded; sternal keel obsolete.

Pleopod 1 endopod with lateral lobe on posterior "endite".

Abdominal somites 1–5 posterolateral angles unarmed. AWCLI 762–839. Abdominal somite 6 with submedian, intermediate and lateral bosses usually posteriorly armed, intermediates sometines posteriorly blunt.

Telson wider than long; 9–14 submedian denticles, arising from inner margin in juveniles, migrating dorsally in adults; 2 intermediate usually evident, lateral denticles absent; submedian, intermediate and lateral teeth lamellate, blunt; submedian teeth subparallel; intermediate teeth longer than wide, extending posteriorly slightly beyond midlength of submedian teeth; lateral teeth stout, lamellar, apex rounded to bluntly angular, directed posteriorly. Median carina weakly inflated in females, tumid in males, with 1 posterior spine; accessory median with 1–3 (usually 3) spines; anterior submedian carina composed of 1–4 (usually 2) spines in longitudinal row or cluster; submedian tooth with 1 (rarely 2) dorsal spines basally; anterior intermediate carina composed of 1–4 (usually 2) spines; intermediate tooth with 1 or 2 (usually 2) dorsal spines basally; knob absent; submedian and intermediate teeth without ventral carina.

Uropodal protopod terminal spines with outer slightly longer than inner, each with ventral carina, inner with dorsal carina; upper proximal surface with obtuse swelling behind

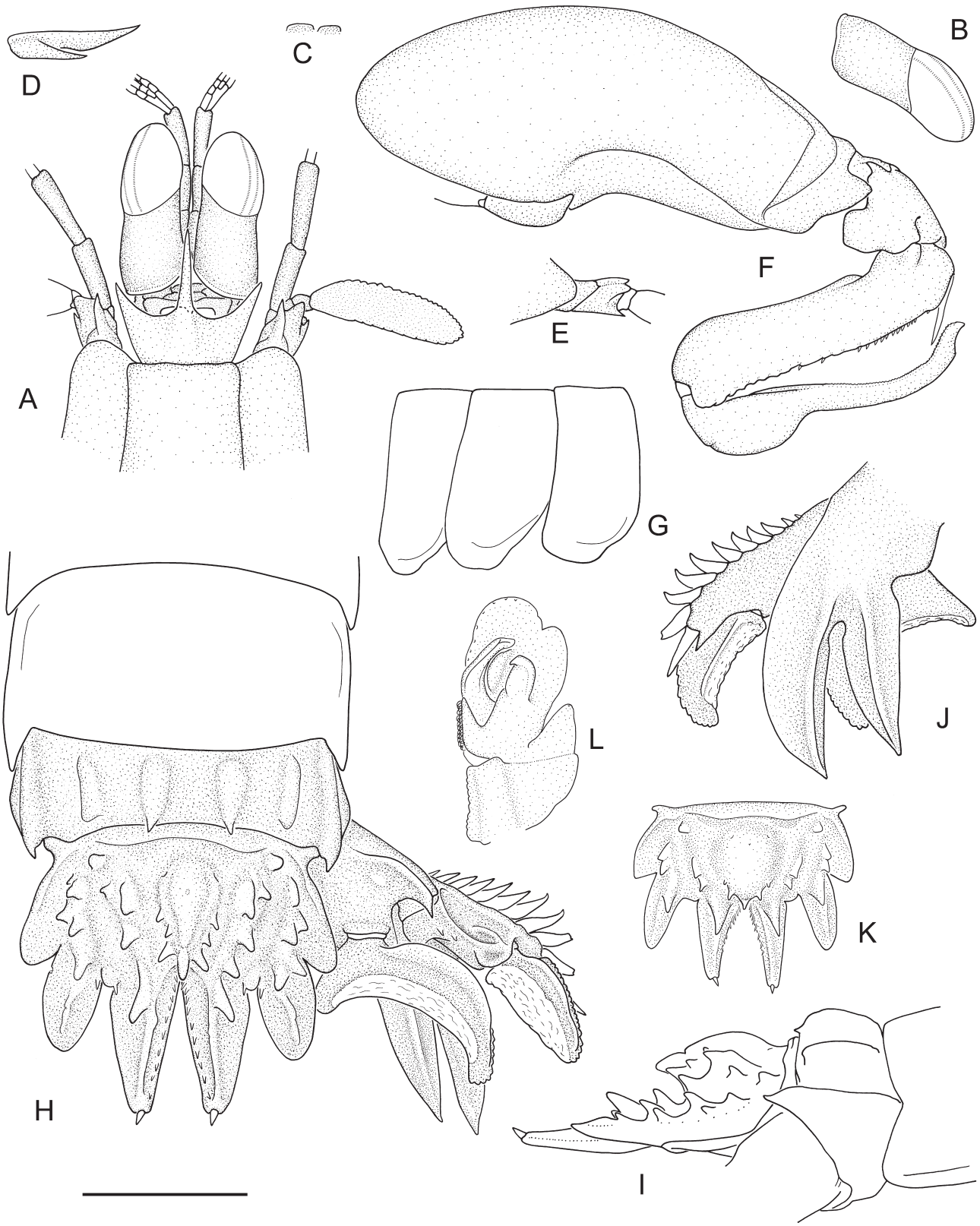

Figure 6. *Gonodactylopsis lata* sp. nov.: *A–J*, holotype female, TL 22 mm, Fiji, VGS 82-9, USNM 307139; *K–L*, paratype male, TL 17 mm, Fiji, MUSORSTOM 10 CP1364, MNHN. (*A*) anterior cephalothorax, dorsal view; (*B*) right eye, lateral view; (*C*) ocular scales; (*D*) rostral plate, lateral view; (*E*) right antenna, lateral view; (*F*) right raptorial claw, lateral view; (*G*) thoracic somites 6–8, right lateral view; (*H*) abdominal somites 5 and 6, telson and right uropod; (*I*) abdominal somites 5, 6 and telson, lateral view; (*J*) right uropod, ventral view; (*K*) telson, dorsal view; (*L*) right pleopod 1 endopod, anterior view. Scale: A–K = 2.0 mm; L = 1.0 mm.

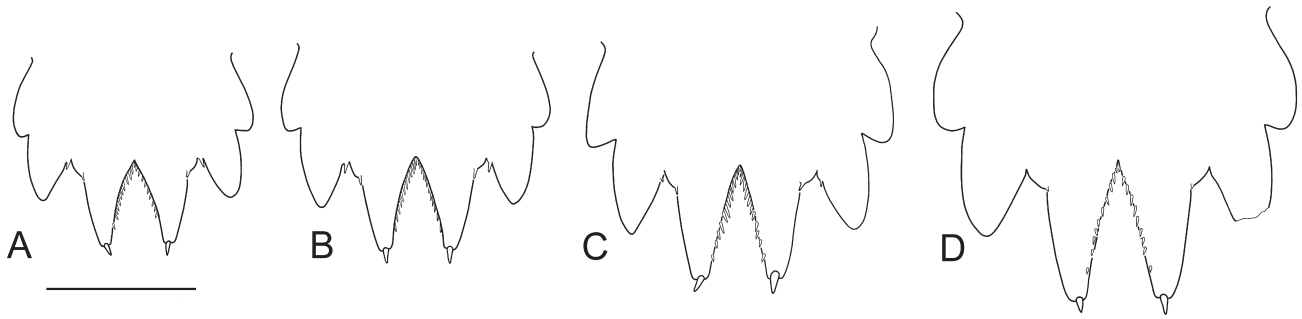

Figure 7. *Gonodactylopsis lata* sp. nov., telson outline, Papua New Guinea: (*A*) male, TL 10 mm, MNHN IU-2014-966; (*B*) female, TL 13 mm, MNHN IU-2014-965; (*C*) female, TL 15 mm, MNHN IU-2014-187; (*D*) male, TL 16 mm, AM P105858. Scale = 1.0 mm.

cristate dorsal carina in specimens > TL 20 mm; slender spine above exopod articulation. Exopod proximal article dorsal surface with sharp, curved carina, distally flanked on either side two short subequal carinae, proximally flanked mesially with 0–2 small spines; outer margin with 9–12 movable spines, distalmost reaching distal one-third of distal article; inner margin smooth, glabrous; distal margin with small ventral spine. Exopod distal article with outer distal margin setose, inner margin glabrous; dorsal and ventral surfaces with inner half dorsal membranous, soft, wrinkled, clearly demarcated from chitinized outer portion; outer chitinized portion with prominent, curved carina dorsally, ventrally with longitudinal carina. Endopod length 2.5–3.2× width, crescentic, articulation with protopod posterior to anterior end; outer margin strongly convex, setose along distal half, inner margin strongly, irregularly concave, glabrous; dorsally with sharp, cristate, curved carina adjacent to outer margin; dorsal and ventral surfaces with inner dorsal half membranous, soft, wrinkled, clearly demarcated from chitinized outer half.

Colour in life. (Fig. 8) Overall translucent with light green and white mottling or speckling and scattered black-brown and orange chromatophores; with 2 narrow, irregular, with white transverse bands, one across carapace at position of cervical groove, and a second across posterior quarter of abdominal somite 6, continuing onto uropodal protopod and anterior half of telson. Rostral plate with white spines, median with red apex. Carapace with white transverse band followed by irregular green patch with pair of small iridescent blue spots and scattered black chromatophores. Iridescent blue spot medially on thoracic somite 6 and abdominal somites 1, 3, 4, somite 1 also with rectangular green and black speckled patch; 3 blue iridescent spots in transverse row on abdominal somite 5. Pair of dark spots across anterior margin of telson. Antennae and antennules transparent with few scattered white and dark spots. Raptorial claw dactylus white, propodus translucent with small distal orange-brown spot at dactyl articulation; carpus and merus translucent with scattered white speckling or mottling; meral spot colourless. Pereopods 1–3 transparent with pale articulations. Uropodal protopod white proximally; primary spines transparent proximally, white with few scattered orange-brown spots distally; exopod proximal article transparent with pale orange-brown highlights; exopod distal article diffuse white; endopod white with irregular patch clear at outer midlength, marginal setae clear.

Figure 8. *Gonodactylopsis lata* sp. nov., colour in life, female, TL 21 mm, Papua New Guinea, MNHN IU-2014-213. Photo: T.-Y. Chan.

Measurements. Male (n = 13) TL 10–20 mm; female (n = 12) TL 9–22 mm. Other measurements of holotype: CL 5.3 mm, antennular peduncle length 2.5 mm, antennal scale length 1.9 mm, abdominal somite 5 width 4.0 mm.

Etymology. Named *lata*, Latin for wide, alluding to the comparatively broad submedian and intermediate teeth of the telson.

Remarks. *Gonodactylopsis lata* sp. nov. is unique in the genus for the broad, lamellate, distally rounded intermediate and lateral teeth and dorsally placed submedian denticles of the telson in adults. In other species of the genus, the intermediate and lateral telson teeth are distally pointed or angular rather than rounded and marginally lamellate. The submedian denticles of the telson line the mesial margins of the submedian telson teeth in *G. drepanophora*, *G. maqqaba* and *G. komodoensis* (Figs 3E,G, 4F,J,K, 5H,K,M,N, 9H,L) or are absent, as in *G. herdmani* (Fig. 2H,K). In *G. lata*, the submedian denticles are present along the mesial margins of the submedian telson teeth in juveniles but migrate mesiodorsally with increasing body size (Figs 6H,K, 7, 8).

Gonodactylopsis lata most closely resembles *G. drepanophora* and *G. maqqaba*, sharing similar mid-dorsal telson ornamentation composed of multiple prominent conical spines. Apart from the lamellate primary telson teeth and dorsally placed submedian denticles, *G. lata* is further distinguished from *G. drepanophora* and *G. maqqaba* in lacking the longitudinal carina on the ventral surface of the submedian and intermediate telson teeth. *Gonodactylopsis lata* and *G. drepanophora* further differ from *G. maqqaba* in the strongly crescentic rather than linear shape of the uropodal endopod.

The primary variation observed in *G. lata* is allometric change in increasing prominence of the telson primary teeth and dorsal ornamentation, namely the increasing density and prominence of dorsal spination, the increasingly lamellate primary teeth, migration of the submedian denticles from marginal to dorsal position (Figs 6H,K, 7, 8), as well as more pronounced curvature of the uropodal endopod. The main structures of the petasma are developed in all of the males examined, although the lateral lobe of the posterior "endite" is rudimentary in the smallest male examined (TL 10 mm, MNHN IU-2014-966), but fully developed by TL 13 mm (MNHN IU-2014-967). The mandibular palp is 2- or 3-articled; two articles are evident in smaller specimens, with the third article typically becoming differentiated by TL 15–21 mm. The dorsal tubercle on the uropodal protopod becomes evident in specimens above about TL 20 mm.

Small specimens of *G. lata* in which the submedian telson denticles are yet to reach dorsal position may superficially resemble *G. drepanophora* and *G. maqqaba.* Nevertheless, at any given size, the intermediate and lateral telson teeth of *G. lata* (Figs 6H,K, 7, 8) are proportionally wider and blunter than in *G. drepanophora* (Figs 3E,G,I, 4F,J,K) and *G. maqqaba* (Fig. 9H,L); the new species can also be distinguished from *G. drepanophora* and *G. maqqaba* by the absence of the longitudinal carina on the ventral surface of the submedian and intermediate telson teeth, present as a long, well defined ridge in the latter two species (Figs 3G, 4J, 9L).

Distribution. Southwestern Pacific, from Fiji and Papua New Guinea; 10.7–122 m.

Gonodactylopsis maqqaba sp. nov.

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Figs 1, 9

Holotype: NTOU S00036, female (TL 16 mm), Macclesfield Bank, South China Sea, 16°10.06'N 114°47.93'E, 30 m, coral reef, inside coral rock, RV "Ocean Researcher 1", ZHONGSHA 2015 cruise, 28 July 2015.

Description. Eyes elongate; cornea subconical, reaching anteriorly almost to end of antennular article 3. Ocular scales low, subtruncate.

Antennular peduncle length 0.5CL. Antennal protopod with fixed, laterally flattened mesiodorsal spine, short anteroventral tooth; antennal scale length 0.4CL.

Rostral plate slightly wider than long; median spine about twice length of basal portion (medially), laterally compressed, with obtusely angular ventral keel; lateral spines divergent with almost straight margins.

Raptorial claw dactylus with proximal notch on outer margin; propodus with proximal movable spine, opposable margin sparsely pectinate proximally.

Mandibular palp 2-segmented. Maxillipeds 1–5 each with epipod.

Thoracic somites 6 and 7 lateral processes subequal, lower margins subtruncate to rounded. Thoracic somite 8 anterolateral margin rounded; sternal keel obsolete.

Abdominal somites 1–5 posterolateral angles unarmed. AWCLI 773. Abdominal somite 6 with submedian, intermediate and lateral bosses posteriorly armed.

Telson wider than long; 12 or 13 submedian denticles arising from inner margin of submedian teeth; 2 intermediate and 1 lateral denticles; submedian and intermediate teeth slender, sharp; submedian teeth slightly divergent; intermediate teeth length at least twice width, extending posteriorly to midlength of submedian teeth; lateral teeth stout, triangular, apex acute, directed posteriorly. Median carina weakly inflated, with 1 large posterior spine and 2 smaller dorsally; accessory median carina with 2 spines; anterior submedian carina composed of 5 or 6 spines in longitudinal cluster; submedian tooth with 6 dorsal spines distributed from base almost to end of tooth; anterior intermediate carina composed of 2 spines; intermediate tooth with 1 dorsal spine; knob absent; submedian and intermediate teeth with distinct ventral carina.

Uropodal protopod terminal spines with outer slightly longer than inner, each with ventral carina, inner with dorsal carina; upper proximal surface with obtuse swelling behind dorsal carina; slender spine above exopod articulation. Exopod proximal article dorsal surface with sharp, curved longitudinal carina and two short carinae mesial to main carina, distal longest; outer margin with 10 or 11 movable spines, distalmost reaching distal one-fifth of distal article; inner margin smooth, glabrous; distal margin with small ventral spine. Exopod distal article with outer distal margin setose, inner margin glabrous; dorsal and ventral surfaces with inner half membranous, soft, wrinkled, clearly demarcated from chitinized outer half; outer chitinized portion with prominent, curved carina dorsally, ventrally smooth. Endopod length 2.4× width, linear, spatulate, articulation with protopod at anterior end; outer margin gently convex, setose along distal half, inner margin almost straight glabrous, with small proximal and distal point;

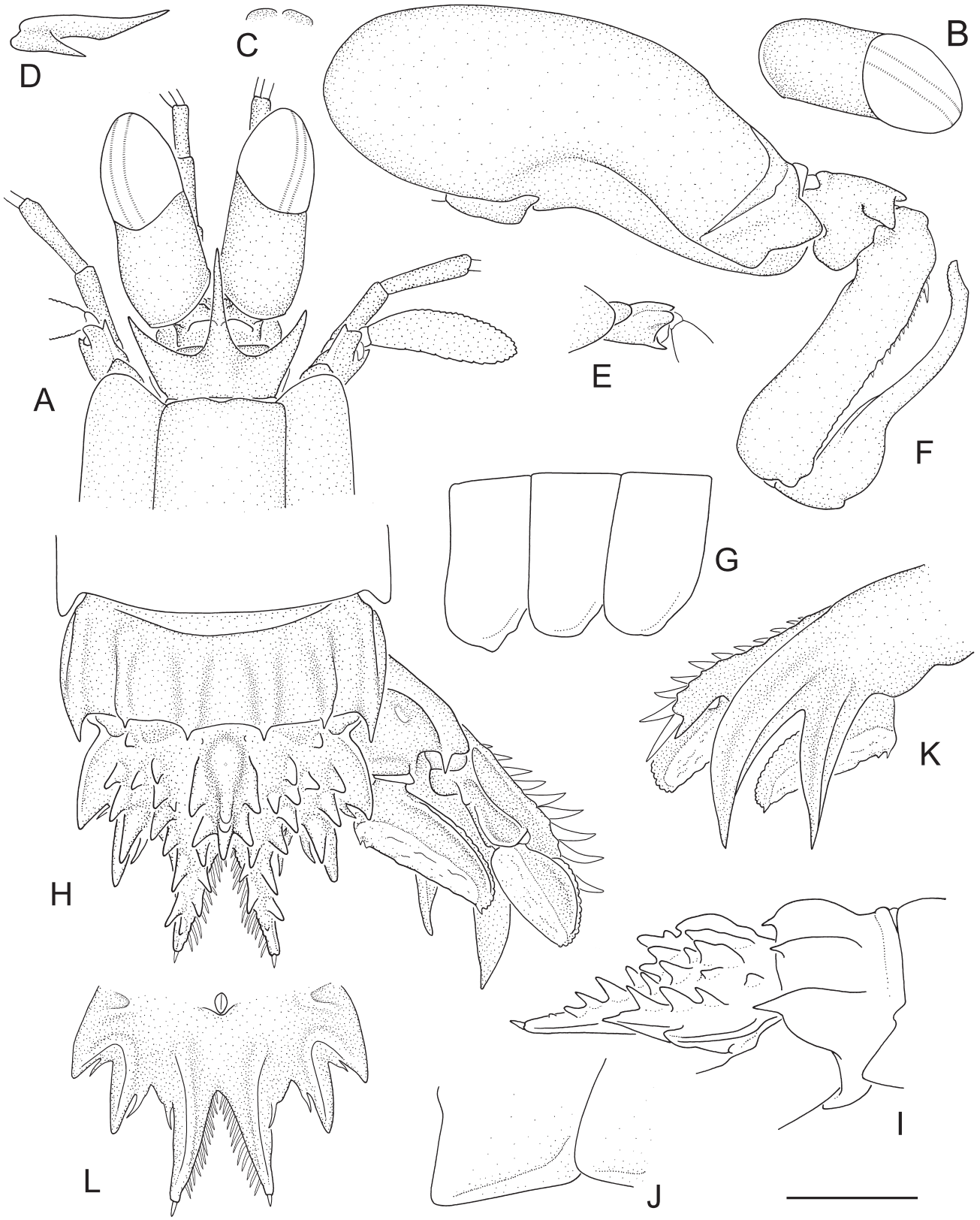

Figure 9. *Gonodactylopsis maqqaba* sp. nov., holotype female, TL 16 mm, Macclesfield Bank, NTOU S00036. (*A*) anterior cephalothorax, dorsal view; (*B*) right eye, lateral view; (*C*) ocular scales; (*D*) rostral plate, lateral view; (*E*) right antenna, lateral view; (*F*) right raptorial claw, lateral view; (*G*) thoracic somites 6–8, right lateral view; (*H*) abdominal somite 6, telson and right uropod; (*I*) abdominal somites 5, 6 and telson, lateral view; (*J*) abdominal somites 4 and 5 posterolateral margin, lateral view; (*K*) right uropod, ventral view; (*L*) telson, ventral view. Scale = 1.0 mm.

dorsally with sharp, curved carina adjacent to outer margin; dorsal and ventral surfaces with inner half membranous, soft, wrinkled, clearly demarcated from chitinized outer half.

Colouration in preservative. Largely faded to pale yellow-brown. Carapace with scattered chromatophores and pair of small spots across cervical region. Thoracic somite 6 and abdominal somite 1 with rectangular field of small irregular chromatophores and larger median black spot. Abdominal somites 2–5 with transverse row of 2 or 3 small rounded spots.

Measurements. TL 16 mm, CL 3.8 mm, antennular peduncle length 1.9 mm, antennal scale length 1.3 mm, abdominal somite 5 width 2.9 mm.

Etymology. The name is derived from *maqqaba*, Aramaic for hammer, alluding to the "smashing" mode of raptorial hunting employed by the species. Used as a noun in apposition.

Remarks. *Gonodactylopsis maqqaba* sp. nov. closely resembles *G. drepanophora* in similar telson ornamentation, in which the mid-dorsal carinae are composed of multiple prominent conical spines, the intermediate primary teeth are slender with a pointed apex, and the lateral primary tooth is prominently triangular with a pointed apex (Figs 3E,I, 4F, 9H). The two species differ chiefly in the shape of the uropodal endopod, being spatulate with a more-or-less straight mesial margin in *G. maqqaba* (versus lunate with a distinctly concave mesial margin in *G. drepanophora*) and in the position of the articulation with the protopod, being at the proximal end in *G. maqqaba* (rather than distal to the anterior end in *G. drepanophora*). In addition, in size-matched specimens the submedian teeth of the telson are dorsally spinose only on the anterior half in *G. drepanophora*, rather than along almost the full length in *G. maqqaba*. The telson armature observed in *G. drepanophora* (as with other spinose gonodactylids; Ahyong, 2001; Ahyong & Erdmann, 2007; Ahyong, 2008) becomes more extensive and prominent with increasing body size. At TL 16 mm, the submedian telson teeth of the holotype of *G. maqqaba* are spinose for almost their full length. The submedian telson teeth in similarly-sized *G. drepanophora*, however, reach a similar degree of spination to that of the holotype of *G. maqqaba* only by TL 24 mm; by TL 16 mm, spination is yet to reach the midlength of the submedian teeth. Thus, the degree of spination of the submedian telson teeth can be useful in separating *G. maqqaba* from *G. drepanophora* provided body size is taken into account.

Distribution. South China Sea, from Macclesfield Bank; 30 m.

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