462

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PRELIMINARY DESCRIPTIONS OF NINE NEW STOMATOPOD CRUSTACEANS FROM CORAL REEF HABITATS IN INDONESIA AND AUSTRALIA

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ABSTRACT. - Preliminary accounts are presented of nine new species of stomatopods representing three families. Gonodactylidae: three species of *Gonodactylellus*; one of *Gonodactylopsis*, the third species of the genus; and one of *Hoplosquilla*, the second species of the genus. Protosquillidae: one species of *Chorisquilla* and two of *Haptosquilla*. Nannosquillidae: one of *Nannosquilla*, the first species of the genus to be recorded from outside the Americas. All of these species are very small, none exceeding 30 mm in total length as adults.

KEYWORDS. - Stomatopoda, taxonomy, new species, Indonesia, Australia.

INTRODUCTION

We take this opportunity to describe the species collected here by the senior author during a six year study of the ecology and distribution of Indonesian reef-associated stomatopod assemblages. A much more detailed report on the 50 species taken during the survey is in preparation (Erdmann, Manning & Moosa, in prep.), but completion of that manuscript has been delayed.

The five new species of Gonodactylidae are *Gonodactylellus annularis*, *G. caldwelli*, and *G. rubriguttatus*; *Gonodactylopsis komodoensis*; and *Hoplosquilla said*. The three new species of Protosquillidae are *Chorisquilla mehtae*; and *Haptosquilla moosai* and *H. togianensis*. The single new member of the Nannosquillidae is *N. indonesica*. The new taxa are arranged alphabetically in the descriptive accounts.

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Abbreviations used below include AM, Australian Museum, Sydney, Australia; leg., collector or collected by; LON, Lembaga Oseanologi Nasional (National Institute of Oceanography), Jakarta, Indonesia; TL, total length, measured on the midline; UCB, University of California, Berkeley, CA, U.S.A.; USNM, National Museum of Natural History, Smithsonian Institution, Washington, DC, U.S.A.

Chorisquilla mehtae, new species
(Fig. 1a)

Material examined. - Holotype - Gili Lawa Darat, Komodo, 1 female, 16 mm (USNM).

Paratypes - Hoga, Tukang Besi, 2 males, 14 mm, 2 females, 12-15 mm (LON); 3 males, 11-14 mm (USNM). - Taipi, Togians, 1 female, 17mm (USNM); 1 male, 12.5 mm (UCB). - Gili Lawa Darat, Komodo, 1 male, 13 mm (UCB).

Diagnosis. - Size very small, TL of adults less than 20 mm. Cornea broadened, eyes bright pink in life. Ocular scales narrow, width together about half width of rostral plate, sloping posteriorly (not laterally produced). Rostral plate sharply trispinous, median apical spine reaching to base of corneas in juveniles, to distal tip of corneas in adults. Mandibular palp present. Proximal movable spine on propodus of claw. Lateral margins of 6th and 7th thoracic somites subtruncate and rounded, subequal in width. Posterolateral spines on 5th and 6th abdominal somites, less pronounced posterolateral spine on 4th abdominal somite of largest specimens. Fifth abdominal somite with dorsal median surface smooth, lateral margin corrugated with 3 pairs of lateral ridges, the most marginal pair strongly pronounced. Single lateral ridge on 4th abdominal somite in larger specimens. Sixth abdominal somite with 6 longitudinal bosses, entire surface of somite covered with low, stout spinules, posterior margin of somite concave medially.

Telson broader than long, dorsal surface with 3 large bosses. Median surfaces of bosses smooth, lateral surfaces covered with low, stout spinules, as is remaining dorsal surface of telson. Median boss pyriform, extending almost to apex of median excavation of posterior margin of telson, submedian bosses extending posteriorly to base of submedian marginal teeth. Deep, relatively wide excavation between submedian and median bosses, fissure packed with low, stout spinules. Telson with 3 pairs of marginal teeth, submedian and intermediate teeth well-defined, submedian teeth with movable apices arising submarginally and 6-10 submedian denticles, 2 intermediate denticles. Lateral marginal teeth slightly set off from outline of telson, but still distinguishable from the 6-10 sharp spines on lateral margin of telson.

Proximal segment of uropodal exopod with 8-10 (usually 9) movable spines on outer margin of proximal segment and scattered setae on inner margin. Uropodal endopod slender and elongate, with normal complement of setae, basal prolongation of uropod with inner spine shorter and slenderer. Two (often 3) sharp spinules in a line across base of uropod at articulation with 6th abdominal somite, increasing in length from anterior to posterior.

Remarks. - This species is similar to *C. brooksii* (De Man) and *C. spinosissima* (Pfeffer) (and distinguished from the other species in this genus) in having the dorsal surface of the telson and 6th abdominal somite covered with spinules (Fig. 1a), and in having spinules produced on the dorsal surface of the base of the uropods. It differs from those species in having much smaller ocular scales which are not produced laterally, in the strong posterior

slope of the anterior margin of the carapace, and in having much larger telson bosses covered with much shorter spinules and three pairs of marginal teeth on the telson. The only other species of *Chorisquilla* with three pairs of marginal teeth as an adult is *C. trigibbosus* (Hansen), which is easily separated from *C. mehtae* in having the telson and 6th abdominal somite densely covered with long, fine setae (often covered with sand in live specimens in a "velcro-like" fashion - Caldwell, pers. comm.) and in lacking lateral spines on the telson and lacking dorsal spinules at the base of the uropods. The marginal telson teeth are more distinct in *C. trigibbosus* as well.

Etymology. - This species is named after Arnaz Mehta, the first author's tireless and invaluable field assistant for almost three years, who spent numerous hours underwater assisting in the tedious and often frustrating process of extracting this species from its cavities. It seems most appropriate to honor her with this species, with its unusual pink eyes and beautiful body coloration.

Gonodactylellus annularis, new species
(Fig. 1b)

Gonodactylus botti. - Moosa & Erdmann, 1994: 76, 77 [not *G. botti* Manning].

Material examined. - Holotype - Kapoposang, Spermonde, 1 male, 19 mm (USNM).

Paratypes - Kapoposang, Spermonde, 1 male, 19 mm (LON); Langkai, Spermonde, 1 female, 19 mm (LON).

Diagnosis. - Size very small to small, TL of adults less than 25 mm. Corneas subcylindrical. Ocular scales narrow, about as high as wide. Rostral plate as long as broad, anterolateral corners of basal part acute and slightly rounded, with anterior margin of basal part slightly concave in adult specimens. Mandibular palp present. Lateral margins of 6th thoracic somite truncate, much wider than rounded lateral margin of 7th. Thoracic somites 5-8 slightly constricted, giving tapered appearance overall. Sixth abdominal somite with normal complement of carinae, each armed posteriorly with short spinule (spinules often lost in larger specimens). Telson wider than long, lacking dorsal spines or spinules on telson. Accessory median carinae short, indistinct, lacking posterior spines and fused posteriorly with median carina, often obliterated altogether in larger adults. Median carina hugely inflated in adults, especially males, with single, upturned posterior spinule in all but largest males, where it is sometimes lost. Anterior submedian carinae inflated slightly, unarmed posteriorly. Inflation of telson bosses resulting in telson height 2/3 length in adults.

Submedian teeth of telson short, with a rounded emargination between teeth, movable apices and 10-12 submedian denticles, usually 12. Carinae of submedian teeth indistinct in adults, unarmed. Intermediate teeth of telson distinct, extending posteriorly slightly behind intermediate denticles. Emargination between submedian and intermediate teeth approaching a right angle, with 2 intermediate denticles. Lateral marginal tooth of telson appressed to intermediate tooth, lateral margin of telson very rounded. Ventral surface of telson lacking longitudinal carinae.

Proximal segment of uropodal exopod with fixed distal spine ventrally, inner margin of exopod setose, outer margin with 8-9, usually 9, movable spines. Uropodal endopod slender, inner margin completely setose, setae arranged in a single row.

Remarks. - Other than the very distinctive coloration of this species, with three broad, white bands across the body, the telson morphology immediately separates it from the other members of *Gonodactylellus*. The telson is very wide and rounded, with short submedian and intermediate marginal teeth (Fig. 1b). *G. annularis* is another species in the group of *Gonodactylellus* with the lateral margin of the sixth thoracic somite much wider than that of the seventh, including *G. affinis* (De Man), *G. espinosus* (Borradaile), *G. incipiens* (Lanchester), and *G. micronesicus* (Manning). It is easily separated from *G. affinis* and *G. micronesicus* with its much shorter accessory median carinae, and from *G. incipiens* by having a relatively wider and more rounded telson with hugely inflated carinae, and in its much sharper anterolateral angles on the basal part of the rostral plate.

In a preliminary account of this collection, Moosa & Erdmann (1994) erroneously identified this species as a juvenile form of *Gonodactylus botti* Manning. Additional collecting has proven that this is most definitely a new, dwarf species of *Gonodactylellus*.

Etymology. - The species name *annularis* is from the Latin word *anulus* (= ring), referring to the 3 broad white bands characteristic of individuals of this species.

Gonodactylellus caldwelli, new species

(Fig. 1c)

Material examined. - Holotype - Bira, Spermonde, 1 male, 30 mm (USNM).

Paratypes - Sapuka Keeil, Postiljons, 1 male, 18 mm (LON).- Bird Island off Lizard Island, Australia, coll. R.L. Caldwell, 1male, 20 mm, 1 female, 23 mm (AM, USNM).

Diagnosis. - Size small to very small, TL of adults less than 35 mm. Corneas subcylindrical. Ocular scales narrow, slightly higher than broad. Rostral plate as long as broad, anterolateral corners of basal part acute, broadly rounded, not produced anterolaterally, anterior margin of basal part sloping posteriorly. Mandibular palp present. Lateral margins of 6th and 7th thoracic somites rounded, subequal. Fifth abdominal somite with strongly-produced posterolateral spine. Sixth abdominal somite with normal complement of carinae, each armed posteriorly with spinule.

Telson length and width subequal or width greater, lacking dorsal spines or spinules on carinae. Accessory median carinae short, fused posteriorly with median carina to form small anchor. Median carina sharp, terminating in a very sharp, elongate spine. Anterior submedian carinae sharp, terminating in short posterior spine. Submedian teeth with movable apices, intermediate teeth of telson distinct, extending posteriorly well behind intermediate denticles. Margin of telson with 14-17 submedian denticles and 2 intermediate denticles. Carinae of submedian and intermediate teeth sharp. Ventral surface of telson with longitudinal carinae on submedian teeth.

Proximal segment of uropodal exopod with fixed distal spine ventrally, inner margin of exopod setose, outer margin with 11-12 movable spines. Uropodal endopod very long and slender, length 4 times width, inner margin completely setose, setae arranged in single row.

Remarks.- This species is very distinctive and easily separated from the other members of *Gonodactylellus* by the presence of a strong posterolateral spine on the 5th abdominal somite (Fig. 1c).

Etymology. - Named after Roy L. Caldwell, one of the world's leading authorities on the behavior and ecology of stomatopods, especially those in the superfamily Gonodactyloidea. After over 20 years of collecting stomatopods from around the world and contributing greatly to our knowledge of stomatopod behavior and ecology, it seems only fitting to name such an intriguing and beautiful gonodactylid in his honor. Furthermore, Dr. Caldwell is the first scientist known to have collected this species and recognize it as a separate taxon, based upon its unique color pattern. His tutelage and support were invaluable in the completion of the account of this collection by the senior author, and his unpublished field notes have been used extensively throughout this work.

Gonodactylellus rubriguttatus, new species
(Fig. 1d)

Material examined. - Holotype - Tanjung Torosie, Komodo/Rinca, 1 male, 18 mm (USNM).

Paratypes - Bidadari, Tanjung Torosie, Komodo/Rinca, 1 male, 16 mm, 1 female, 22 mm (LON).- Tanjung Torosie, Komodo/Rinca, 1 male, 14 mm; 1 female, 18 mm (USNM).

Diagnosis. - Size very small to small, TL of adults less than 30 mm. Corneas subcylindrical. Ocular scales narrow, higher than wide. Rostral plate as long as broad, anterolateral corners of basal part of rostral plate acute but broadly rounded, anterior margin of basal part transverse or sloping posteriorly. Lateral margins of 6th thoracic somite truncate, much wider than more rounded lateral margins of 7th somite. Posterolateral corner of 5th abdominal somite acute, often sharply so. Sixth abdominal somite with normal complement of carinae, each armed posteriorly with spinule.

Telson length and width subequal or width greater, lacking dorsal spines or spinules on carinae. Accessory median carinae long, extending anteriorly about 1/2 length of median carina, not fused posteriorly with median carina in large specimens, unarmed posteriorly. Median carina with single posterior spinule. Knob absent. Submedian teeth with movable apices, 11-14 submedian denticles (usually 12-13). Intermediate teeth of telson distinct, extending posteriorly well beyond both intermediate denticles. Lateral teeth distinct, set off slightly from general telson outline. Ventral surface of telson lacking longitudinal carinae. Proximal segment of uropodal exopod with fixed distal spine ventrally, mesial margin of exopod setose, outer margin with 9-11 movable spines. Uropodal endopod slender, margin completely setose, arranged in single row.

Remarks. - This species is overall very similar to the co-occurring *G. affinis*, with the most obvious way to separate these species in the field being the color of the meral spots, bright red in *G. rubriguttatus*, flesh colored in *G. affinis*. Reaka & Manning (1987) state that in general, the color of the meral spot is one of the most reliable characteristics for identifying species; unfortunately, the characteristic red spot of *G. rubriguttatus* tends to fade rapidly in preservation. Other characters which distinguish this species from *G. affinis* include the slope of the anterior margin of the basal part of rostral plate (transverse or even sloping slightly anteriorly in large *G. affinis*, sloping posteriorly in large *G. rubriguttatus*) and the lack of posterior spinules on the accessory median carinae of telson in *G. rubriguttatus*.

Of the other *Gonodactylellus* species which are grouped according to their common character of having the lateral margins of the 6th thoracic somite much wider than those of the 7th, only one is co-occurring, the newly-described *G. annularis*. These two species are easily

separated by the greater inflation of the median carina and the much shorter length of the accessory median carinae in *G. annularis*. The latter character also separates *G. rubriguttatus* from *G. incipiens*. *G. rubriguttatus* differs from the Enewetak endemic *G. micronesicus* (and *G. caldwelli* as well)by having an upturned posterior spinule (Fig. 1d), as opposed to a posteriorly-projeeted spine, on the median carina of the telson. It also can be distinguished from *G. micronesicus* by having ocular scales forming a V-shaped plate rather than being separate and transverse.

Etymology. - The species name is derived from the Latin *ruber* (= red) and *guttatus* (= spot, spotted), in reference to the characteristic red meral spot.

Gonodactylopsis komodoensis, new species

(Fig. 1e)

Material examined. - Holotype - Tatawa Kecil, Komodo, 1 female, 22 mm (USNM).

Paratypes - Tatawa Kecil, Komodo, 1 male, 16 mm, 1 female, 19 mm (LON); 1 male, 20 mm (USNM).- Tanjung Toronado, Komodo, 1 male, 11.5 mm, 1 female, 10 mm (USNM).

Diagnosis. - Size very small to small, TL of adults less than 25 mm. Cornea subcylindrical; ocular scales flattened dorsally, almost as wide as high. Mandibular palp present. Rostral plate trispinous, broader than long. Anterolateral corners of basal part of plate acute, produced anterolaterally in adults over 16 mm TL. Lateral margins of sixth and seventh thoracic somites subtruncate or rounded, subequal in width. Posterolateral corner of sixth abdominal somite strongly produced into a posteriorly-directed spine.

Telson width and length subequal or, in some larger specimens, longer than wide owing to very elongate submedian teeth. Telson with dorsal spinules on carinae. Aceessory median carinae short but distinct, not fused with median carina and not extending as far posteriorly as median carina; median, accessory median and submedian carinae with single posterior spinule. Submedian carinae sharp, distinctly set off from median.

Submedian teeth with movable apices and 10-11 submedian denticles in juveniles, reduced to 7-8 denticles in larger specimens. In the largest specimens, the submedian teeth are very elongate, appearing almost parallel. Intermediate teeth of telson distinct, extending posteriorly well behind intermediate denticles; juveniles with 2 intermediate denticles which are gradually lost in larger specimens. Lateral teeth of telson also distinct; lacking denticles.

Distinctly raised, conical boss at the base of each submedian telson tooth, terminating in a spinule. Similar boss produced at the base of each intermediate tooth; this boss develops into a short, oblique carina in larger adults.

Ventral surface of telson lacking longitudinal carinae. Proximal segment of uropodal exopod with fixed distal spine ventrally, inner margin of exopod completely devoid of setae. Outer margin of exopod with 10-11 movable spines, with the 3 distalmost spines strongly recurved. Distal segment of uropodal exopod produced to an acute point posterolaterally; inner margin of segment devoid of setae. Uropodal endopod slender (length about 3 times width), produced at a distinct posteriorly-swept angle from the base. Inner margin of uropodal endopod lacking setae, outer margin with setae on distal third only, arranged in single row. Basal prolongation of uropod with inner spine slightly longer than outer, inner spine noticeably curved upwards.

Remarks. - *Gonodactylopsis komodoensis* clearly belongs in this genus, based upon the shape of the rostral plate, the posteriorly-swept (curved inward) uropodal endopods, and the unusual setation on the uropodal endopods. The third species of the genus to be recognized, it differs from *G. herdmani* (Tattersall) in having submedian denticles on the telson (Fig. 1e) and posterior spinules on the telson carinae, and from *G. drepanophora* (De Man) in lacking long, sharp dorsal spinules on the telson. It differs from both species in having a rostral plate which is trispinous but not sharply so, in having the inner spine of the basal prolongation of the uropod longer than the outer (Fig. 1e), and in having strongly recurved distal spines on the outer surface of uropodal exopod.

Etymology. - Named for the type locality of the species in Komodo, Indonesia. This area is endowed with both amazingly diverse coral reef habitats and extremely strong tidal currents; it seems likely that this species is morphologically adapted to life in these strong currents.

Haptosquilla moosai, new species
(Fig. 1f)

Material examined. - Holotype - Lancang Besar, Pulau Seribu, 1 female, 26 mm (USNM).

Paratype - Lancang Besar, Pulau Seribu, 1 female, 25 mm (LON).

Diagnosis. - Size small, TL of adults less than 30 mm. Cornea subglobular, set obliquely on stalk. Ocular scales well-developed, produced into triangular lobes laterally, extending nearly to lateral rostral spine. Rostral plate sharply trispinous, median spine longer than laterals, extending nearly to base of corneas, median and lateral spines slender. Anterior margins of carapace slightly concave and strongly sloped posteriorly, anterolateral angles rounded, not strongly produced. Posterolateral angles of carapace extremely rounded. Mandibular palp 2-segmented. Inflated part of outer margin of dactylus notched. Propodus lacking proximal movable spines on inner margin.

Anterior 3 abdominal somites smooth, unarmed, not carinate dorsally. Fourth abdominal somite smooth medially, with 2 low, longitudinal carinae just above lateral margin, separated by a groove. Fifth somite corrugated medially, with 3 longitudinal carinae just above lateral margin, separated by deep grooves. Sixth abdominal somite with 6 carinae, unarmed posteriorly, submedians rounded and close together, intermediates and marginals elongate and irregular in shape, corrugated laterally. Deep depression between intermediate and marginal carinae.

Telson broader than long, with 3 pairs of marginal teeth, submedians with movable apices arising submarginally. Dorsal surface of telson with 3 bosses, median smallest, pyriform, extending posteriorly to apex of median fissure, submedians longer, joined anteriorly with median boss and extending posteriorly to apex of submedian teeth. All 3 bosses smooth, with corrugated lateral margins, submedians with distinctly curved outer margins. Lateral edges of telson thick, inflated and smooth, with a deep fissure between lateral edges and submedian bosses. Inner margins of submedian marginal teeth with 7-9 denticles, intermediate and lateral teeth each with single fixed mesial denticle.

Uropods stout, proximal segment of exopod with 8 movable spines on outer margin and an accessory dorsal spine distally, inner margin with setae. Inner spine of basal prolongation of uropod very short, but with small proximal lobe.

Remarks. - The telson of this species bears a striking resemblance to that of *Chorisquilla excavata* (Miers), differing primarily in lacking a median V-shaped emargination. Beyond this difference, the similarities are uncanny and suggestive of almost identical underlying developmental mechanisms.

Within *Haptosquilla*, this species differs from all but three species, *H. glabra* (Lenz), *H. glyptocercus* (Wood-Mason), and *H. tanensis* (Fukuda), by having only three pairs of marginal teeth. It is easily distinguished from the latter three species by a number of unique characteristics, including an accessory dorsal spine on the proximal segment of uropodal exopod (Fig. 1f), the *C. excavata*-like telson bosses, and the deep depression between the intermediate and marginal carinae of the 6th abdominal somite.

Etymology. - Named after Dr. Mohammed Kasim Moosa, a world-renowned expert on the taxonomy of Indo-Pacific stomatopods. Dr. Moosa has acted as both sponsor and mentor for the senior author over six years of field research in Indonesia. It is fitting to honor him with this cryptic species from the Pulau Seribu archipelago, where he has conducted exhaustive stomatopod research himself.

Haptosquilla togianensis, new species
(Fig. 1g)

Material examined. - Holotype - Batudaka channel island, Togian Islands, 1 female, 16 mm (USNM).

Paratypes - Taipi, Togians Islands, 1 male, 11 mm, 2 females, 12-13 mm (LON); 1 female, 15 mm (USNM).- Taupun, Togians Islands, 1 male, 12 mm (USNM).

Diagnosis. - Size very small, TL of adults less than 20 mm. Cornea subglobular, set obliquely on stalk. Ocular scales well-developed, produced into triangular lobes laterally. Rostral plate sharply trispinous, median spine more slender and longer than laterals, upturned distally, with ventral angular projection, extending at least to the middle of the eyestalks. Basal portion of rostral plate very short and broad, length less than one-quarter of breadth. Anterior margins of lateral plates of carapace slightly concave, sloping strongly posteriorly towards the anterolateral angles, which are acute and slightly produced anterolaterally. Mandibular palp absent. Inflated part of outer margin of dactylus notched. Propodus with single, elongate movable spine proximally on inner margin.

Lateral margins of exposed thoracic somites rounded. Anterior 4 abdominal somites smooth, unarmed, not carinate dorsally. Fifth abdominal somite smooth medially, with 2 low, longitudinal carinae laterally above lateral margin, separated by a groove. Sixth abdominal somite with normal complement of 6 carinae, unarmed posteriorly.

Telson broader than long, with 4 pairs of marginal teeth, submedians with movable apices arising submarginally. Dorsal surface of telson with 3 bosses, subequal in size or with median slightly larger. All 3 bosses small, raised ovals, widely separated from each other, with the median boss not extending posteriorly to anterior margin of submedian bosses. Telson excavated and pitted, lacking setae. Lateral margins of telson diverging slightly posteriorly, curving in distally. Submedian teeth with 10-16 submedian denticles mesially, 3-6 of which line the inner margin of the median fissure. Intermediate, lateral, and marginal teeth each with single fixed mesial denticle. Intermediate teeth noticeably more slender and sharp than the other 3 pairs of marginal teeth, often shorter as well.

Uropods stout, proximal segment of exopod with 8-9 movable spines, distalmost extending beyond mid-length of distal segment, and with fixed distal spine ventrally. Inner margin of uropodal exopod setose, uropodal endopod with normal complement of setae. Inner spine of basal prolongation of uropod well developed but much shorter than outer.

Remarks. - *Haptosquilla togianensis* is clearly a sister species to *H. proxima*. Ecologically, color-wise, and especially, morphologically, these two species are extremely similar. Taking into account size-related variation, the differences between the two species are almost entirely in telson morphology. The two species are most readily separated by the relative size and spacing of the median and submedian bosses on the telson. *Haptosquilla proxima* displays a pyriform median boss and two smaller submedian bosses in the form of elongate ovals, with the median boss extending posteriorly such that it is even with the anterior margins of the submedian bosses, whereas *H. togianensis* has three smaller bosses on the telson, all raised, elongate ovals subequal in size (Fig. 1g), with the bosses more widely spaced than in *H. proxima*, such that the submedian boss does not extend posteriorly to the anterior margins of the submedian bosses.

Etymology. - The species name refers to the type locality in the Togian Islands.

Hoplosquilla said, new species
(Fig. 1h)

Material examined. - Holotype - Ruebas Kecil, Biak/Padaido, 1 female, 10 mm (USNM).

Paratypes - Ruebas Kecil, Biak/Padaido, 1 male, 6.5 mm, 2 females, 6-9 mm, 1 postlarva, 5 mm, (USNM); 2 females, 8-9 mm (LON).- Dayangdayangan, Spermonde, 1 male, 9 mm (LON).

Diagnosis. - Size very small, TL of adults less than 12 mm. Eyes subcylindrical, thicker at base of stalk, with a slight constriction at cornea. Cornea set obliquely on stalk, tapering to a blunt point. Ocular scales narrow, higher than wide, rounded dorsally. Mandibular palp absent. Dactylus swollen at base, with a pronounced notch at base. Rostral plate trispinous, anterior margin of basal part concave, with an angular ventral projection on apical spine. Anterior margin of lateral plates of carapace convex, extending well beyond base of rostral plate, anterolateral corners of carapace acute but rounded. Lateral margins of 6th and 7th thoracic somites rounded, subequal in width.

Telson much wider than long, telson height more than half length. Telson with greatly inflated median carina, narrowing posteriorly to a bulbous knob; submedian carinae smaller but also swollen, with smaller, appressed accessory submedian carinae in adults, median, submedians and accessory submedians unarmed posteriorly. Submedian teeth of telson with movable apices, 8-10 very thin, elongate denticles. Intermediate teeth of telson distinct, elongate, extending posteriorly well beyond intermediate denticles, which number 2. Lateral teeth of telson distinct, elongate, but with blunt apices and single lateral denticle, lateral margin of telson rounded. High rounded boss at base of each submedian and intermediate tooth, terminating in dorsal spinule on submedian bosses in adult specimens. Anus ventral; ventral surface of telson lacking longitudinal carinae.

Proximal segment of uropodal exopod with inner margin devoid of setae and with fixed distal spine ventrally, 8-9 movable teeth on outer margin. Inner margin of distal segment of uropodal exopod devoid of setae but with 1-3 (usually 2) irregularly-spaced, sharp teeth.

Inner margin of uropodal endopod devoid of setae, but with 3-5 (usually 3) irregularly-spaced sharp teeth. Basal prolongation of uropod with inner and outer spines subequal in length, inner more slender.

Remarks. - While this species displays all of the morphological features characteristic of *Hoplosquilla*, it is easily distinguished from the only other member of the genus, *H. acanthurus* (Tattersall), in lacking dorsal spines on the telson and by the presence of conical, rounded bosses at the bases of the submedian and intermediate telson teeth (Fig. 1h).

Etymology. - This species is named in honor of M. Said, the first author's boatman and research assistant, whose efforts and enthusiasm during almost four years' worth of collecting are greatly appreciated. This study would not have been possible without his extreme competence in all things mechanical and practical and his unerring good judgement on the water. One of Said's greatest attributes is his sharp eye for detail, so it is fitting to lend his namesake to such a diminutive but highly ornate species as this one. The name is a noun in apposition.

Nannosquilla indonesica, new species
(Fig. 1i)

Material examined. - Holotype - Barrang Lompo, Spermonde, 1 male, 21 mm (LON).

Diagnosis. - Size small, TL of adults less than 25 mm. Eyes small, not extending beyond antennular peduncle. Cornea set obliquely on stalk, slightly expanded laterally. Ocular scales fused along midline; apices rounded. Antennular processes visible as anteriorly directed spines projecting beyond sides of rostral plate, apices overreaching anterolateral corners of plate. Antennal protopod lacking papillae. Antennal scales short, but extending beyond first segment of antennal peduncle.

Rostral plate subrectangular, length 0.6 width, overreaching bases of eyestalks. Lateral margins of plate subparallel, slightly convex, not divergent anteriorly. Anterolateral corners subacute but rounded, anterior margins concave, median apical spine not produced far anterior of anterolateral corners of plate.

Mandibular palp absent, 4 epipods present. Dactylus of claw with 14 teeth; proximal notch on outer margin flanked by subacute proximal lobe and obtuse distal lobe. Carpus with blunt tooth at distal end of upper margin. Basal segment of each pereiopod lacking posterior spine.

Sixth abdominal somite constricted anteriorly, with posterolateral corners produced into spines. Strong, ventrally curved process anterior to each uropod, not visible from dorsal view (covered by broad basal segment of uropod).

Telson short, length 0.55 width, dorsum smooth. Median projection of false eave broad, barely produced, apex flattened. Submedian depressions extremely shallow, short, sloping laterally to obtusely angled, slightly produced submedian projections. Marginal armature of telson on each side of midline consisting of 9 submedian denticles, entire row forming broad, inverted V in posterior view. One movable submedian tooth originating only slightly anterior and lateral to outermost submedian denticle (well posterior to anus). Three fixed lateral

teeth; outermost on false cave, inner 2 below eave.

Basal segment of uropod very broad, with ventral, proximal tubercle; dorsal spine of basal segment slender, sharp, not overreaching basal fourth of endopod. Inner spine of basal prolongation of uropod distinctly longer than outer. Proximal segment of uropodal exopod with 2-3 stiff setae on inner distal corner and graded series of 4 spatulate spines on outer margin, apices of 3 distalmost spines blunt and rounded.

Remarks. - In Manning's (1972) key to the eastern Pacific species of *Nannosquilla*, *N. indonesica* is most closely allied to *N. chilensis* (Dahl), based upon the subrectangular rostral plate (Fig. 1i) and the spinous posterolateral projections of the sixth abdominal somite. It is further similar to that species in the number of teeth on the dactyl (14 vs. 12-17), the anterior constriction of the sixth abdominal somite, the broad basal segment of the uropods, and the presence of 2-3 stiff setae on the inner distal corner of the proximal segment of the uropodal exopod. However, *N. indonesica* differs from *N. chilensis* in having only four (as opposed to 5-6) spatulate teeth on the outer margin of the uropodal exopod, in having the inner spine of the basal prolongation of the uropod longer than the outer, in having subacute (instead of rounded) anterolateral angles of the rostral plate, and in the marginal armature

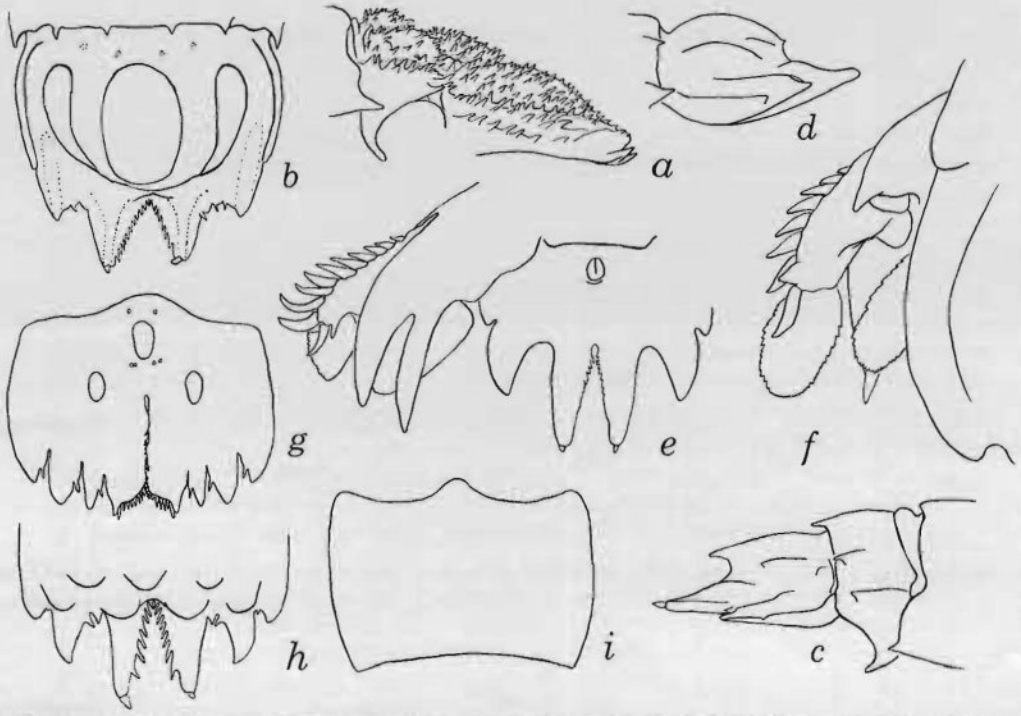

Fig. 1. a, *Chorisquilla melitae*, new species, female holotype, TL 16 mm, lateral view of posterior two abdominal somites and telson; b, *Gonodactylellus annularis*, new species, male holotype, TL 19 mm, dorsal view of telson; c, *Gonodactylellus caldwelli*, new species, male holotype, TL 30 mm, lateral view of posterolateral angle of fifth abdominal somite, sixth abdominal somite; and telson; d, *Gonodactylellus rubriguttatus*, new species, male holotype, TL 18 mm, lateral view of telson; e, *Gonodactylopsis komodoensis*, new species, male paratype, TL 20 mm, ventral view of telson and uropod; f, *Haptosquilla moosai*, new species, female holotype, TL 26 mm, dorsal view of left uropod; g, *Haptosquilla togianensis*, new species, female holotype, TL 16 mm, dorsal view of telson; h, *Hoplosquilla said*, new species, female holotype, TL 10 mm, posterior half of telson, dorsal view; i, *Nannosquilla indonesica*, new species, male holotype, TL 21 mm, rostral plate.

of the telson (3 fixed lateral teeth instead of 6, and a movable submedian tooth not far anterior of outermost submedian denticle). It differs from the only other species with three fixed lateral teeth on the telson, *N. decemspinosa* (Rathbun) and *N. similis* Manning, in having posterolateral spines on the sixth abdominal somite, four instead of 5-6 spatulate spines on outer margin of the uropodal exopod, and 14 instead of 11 or 17 teeth, respectively, on the dactyl.

Etymology. - The species name refers to the type locality country, in recognition of the fact that this is the first recorded occurrence of a species of *Nannosquilla* in the Indo-West Pacific.

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462

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