

REVISION OF THE *CLORIDA LATREILLEI* SPECIES COMPLEX WITH DESCRIPTION OF A NEW SPECIES (STOMATOPODA: SQUILLIDAE)

Shane T. Ahyong

Department of Marine Invertebrates, Australian Museum, 6 College St., Sydney, New South Wales 2010, Australia

Phaibul Naiyanetr

Department of Biology, Faculty of Science, Chulalongkorn University, Bangkok, Thailand

ABSTRACT. - The *Clorida latreillei* species complex is revised based on type material. The identity of *Clorida latreillei* is fixed by neotype selection, and *C. javanica* and *C. japonica* are removed from the synonymy. *Clorida albolitura*, previously identified with *C. latreillei*, is described as a new species. *Clorida latreillei* ranges from the western Indian Ocean to the Gulf of Thailand and Indonesia. *Clorida albolitura* ranges from the Gulf of Suez to Australia and Japan. *Clorida javanica* and *C. japonica* are known only from Indonesia and Japan respectively. Species groups in *Clorida* are briefly discussed and a key to the species of the *Clorida latreillei* species complex is given.

KEY WORDS. - *Clorida latreillei*, *albolitura*, Squillidae, Stomatopoda, taxonomy

INTRODUCTION

The squillid taxon *Clorida* Eydoux & Souleyet, 1842, has been considered to be a complex and difficult genus greatly in need of revision (Manning, 1991, 1995). Many of the difficulties posed by species of *Clorida* stems from apparent variability in characters that have been considered diagnostic (Makarov, 1979; Manning, 1991, 1995). Manning (1995) initiated major revision of *Clorida* by a subdivision of the genus. Ongoing revisionary study of *Clorida* [sensu stricto] by the first author using a larger suite of characters than previous workers has revealed that many apparently variable species are actually composed of several taxa. Certainly, some structures in species of *Clorida* show a greater degree of variation than in most other squillids, but some of the assumed variability is also based on poor or erroneous type descriptions. Naturally, re-examination of type material has proven invaluable in clarifying species concepts in *Clorida*. Hence, revision of *Clorida* is continued in this work through revision of the type species, *C. latreillei* Eydoux & Souleyet, 1842.

Clorida latreillei has been reported from numerous

localities in the Indo-West Pacific, including the western Indian Ocean to India, and throughout Indo-Malaya to Japan (Kemp, 1913; Manning, 1991, 1995; Moosa, 2000), suggesting that it is the most widely distributed species of the genus. However, study of specimens from various localities in the Indian and Pacific Oceans identifiable with *C. latreillei* according to published accounts (e.g., Eydoux & Souleyet, 1842; Kemp, 1913; and Manning, 1995), shows that a complex of species is involved. Two nominal species, *Clorida javanica* Moosa, 1974, and *C. japonica* Manning, 1978, were synonymised with *C. latreillei* (see Manning, 1991, 1995) because of unjustified assumptions of variability in certain morphological structures, such as the presence or absence of submedian carinae of the abdomen, and the presence or absence of a postanal carina. Restudy of the type material of *C. javanica* and *C. japonica* shows them to be distinct. Moreover, two distinct forms, neither of which are identifiable with *C. javanica* and *C. japonica*, have been included in material reported as *C. latreillei*. Thus, at least four species are currently included in the *C. latreillei* complex. The term, 'complex', is used here loosely for the four species associated taxonomically with *C. latreillei*, and does not necessarily imply that all are closely related. Hence, *Clorida javanica*

resembles *C. depressa* more closely than *C. latreillei*.

Unfortunately, identification of *C. latreillei* [sensu stricto], and subsequent identification of the other species in the complex, has been hampered by the poor account of Eydoux & Souleyet (1842) and the unavailability of type material. The holotype of *C. latreillei* is untraceable and considered lost based on independent examination of the collections held in the Museum National d'Histoire Naturelle, Paris, by R. B. Manning, S. Ahyong, and D. Guinot, where Eydoux & Souleyet's material ought to be. Additionally, fixation of the identity of *C. latreillei* is important not only to facilitate discrimination of similar species, but also because it is the type species of the genus.

Two known forms most closely approach Eydoux & Souleyet's (1842) account of the species, both of which have been referred to *C. latreillei*: one, first reported from the Gulf of Suez by Dollfus (1938), and the other, which is the species most frequently identified with and illustrated as *C. latreillei* (e.g. Wood-Mason, 1895; Kemp, 1913; Manning, 1991). Unfortunately, specimens of *C. latreillei*-like species (sensu the above authors) from the original type locality, Singapore, are unavailable. Examination of the large stomatopod collection from Singapore, revealed only two species of *Clorida*, *C. depressa* (Miers, 1880), and *C. rotundicauda* (Miers, 1880). Whereas *C. depressa* agrees in many respects with the type description and figure, Eydoux & Souleyet (1842) indicated that the type of *C. latreillei* bears submedian carinae on the abdomen (absent in *C. depressa*) and the lateral process of TS5 (as figured by them) is more spiniform than is usual in *C. depressa*. As such, a neotype selection for *C. latreillei* based on the Singapore specimen of *C. depressa* would, in our opinion, cause unnecessary nomenclatural instability.

Both *C. latreillei*-like species occur on both sides of Peninsular Malaysia and presumably off Singapore, but may now be absent or uncommon owing to local environmental degradation. Therefore, a neotype for *C. latreillei*, identifiable with that illustrated by Kemp (1913), is selected from material collected at Pattani, southern Thailand. Whilst selection of a neotype from other than the type locality is not ideal, we believe that this course of action is justified in the interests of nomenclatural stability. In any case, Pattani, is relatively close to Singapore and is in the same general area (southern part of the South China Sea). Thus, *C. latreillei* is redescribed below based on a

neotype; *Clorida javanica* and *C. japonica* are removed from synonymy and redescribed; and *C. albolitura* is newly described.

MATERIALS AND METHODS

All measurements are in millimetres (mm). Terminology and size descriptors generally follow Ahyong (1998) and Manning (1969b). Total length (TL) is measured along the midline from the apex of the rostral plate to the apices of the submedian teeth of the telson. Carapace length (CL) is measured along the midline and excludes the rostral plate. Other abbreviations: antennule (A1), antenna (A2), abdominal somite (AS), median (MD), intermediate (IM), lateral (LT), marginal (MG), submedian (SM), thoracic somite (TS), pleopod (PLP).

Specimens are deposited in the Australian Museum, Sydney (AM); Chulalongkorn University Museum of Zoology (CUMZ); Lembaga Oseanologi Nasional, Jakarta, Indonesia (LIPI); Phuket Marine Biological Centre (PMBC); National Taiwan Ocean University (NTOU); Zoological Reference Collection of the Raffles Museum, National University of Singapore (ZRC); Zoologishes Institut und Zoologisches Museum, Hamburg (ZMH).

SYSTEMATIC ACCOUNT

SQUILLOIDEA LATREILLE, 1802

SQUILLIDAE LATREILLE, 1802

Clorida Eydoux & Souleyet, 1842

Clorida latreillei Eydoux & Souleyet, 1842 (Fig. 1)

Clorida Latreillii Eydoux & Souleyet, 1842: 265, pl. 5: figs 2-5.

Squilla latreillei. - Wood-Mason, 1895: 6, pl. 4: figs 6-13. - Kemp, 1913: 24-27, pl. 1: figs 1-4.

Clorida latreillei. - Manning, 1969a: 7-8. - Moosa, 1975: 11. - Manning, 1990: 100; 1991: 9-10, fig. 9. - Naiyanetr, 1980: 19, 20, 21, 42, figs 13a-d. - Tirmizi et al., 1994: 136, fig. 10. - Naiyanetr, 1998: 126.

Type material. - Neotype: ZRC 1999.2195, male (TL 51 mm), Pattani, Gulf of Thailand, 17-20 Feb. 1992.

Other material. - Thailand: ZRC 1999.2196, 9 males (TL 40-57 mm), 7 females (TL 30-45 mm), Pattani, Gulf of

Thailand, 17-20 Feb.1992; CUMZ, 7 males (TL 29-58 mm), 4 females (TL 28-34 mm), Gulf of Thailand, P. Naiyanetr, 19 Oct.1979; AM 59901, 3 males (TL 44-59 mm), 1 female (TL 60 mm), Pattani, Gulf of Thailand, 17-20 Feb.1992.

Indonesia: LIPI S508, 1 female (TL 55 mm), Ancol, Jakarta, 7-8 m, sandy-mud, hand dredge, coll. R. Kasijan, 9 Oct.1964; LIPI S2327, 1 male (TL 39 mm), Jakarta Bay, 06°04'40"S, 106°57'20"E, 5.5 m, beam trawl *RV Samadera*, 25 Nov.1975; LIPI S1803, 1 female (TL 47 mm), Jakarta Bay, beam trawl, *RV Samadera*, 22 Jan.1976.

Diagnosis. - A1 somite dorsal processes with short, triangular apices. Carapace with anterolateral spines. Raptorial claw dactylus with 4-5 teeth; outer, proximal margin with basal notch. Mandibular palp present. TS8 with SM carinae. TS5 lateral process short, triangular, with apex spiniform, slightly inclined anterolaterally; with small ventral spinule or tubercle. TS6-7 lateral processes lacking posterolateral spine. AS1-5 each with SM carinae. Telson with margin of IM and LT teeth usually smooth, occasionally crenulate; dorsolateral surface with widely spaced rows of low, rounded tubercles in males, tubercles coarse in females. Telson ventral surface with short postanal carina, not extending posteriorly to midlength between anal pore and posterior margin.

Description. - Eye small, reaching about to proximal third of A1 peduncle segment 1; outer margin rounded; cornea width about one half eye width. Ophthalmic somite anterior margin triangular. Ocular scales fused, rounded laterally.

A1 peduncle 1.01-1.16CL. A1 somite dorsal processes apices short, triangular directed anterolaterally. A2 scale length 0.41-0.46CL.

Rostral plate broader than long; apex rounded. Carapace with anterolateral spines; anterior width 0.48-0.55CL.

Raptorial claw dactylus with 4-5 teeth, usually 5; outer margin faintly sinuous, proximal margin with basal notch.

Mandibular palp 3-segmented. MXP1-4 with epipod.

TS(7)-8 with SM carinae. TS5 lateral process short, triangular, with spiniform apex, slightly inclined anterolaterally; with small ventral spinule or tubercle. TS6-7 lateral process subtruncate; anterolateral and posterolateral angles rounded. TS8 anterolateral margin triangular; sternal keel rounded.

Endopod of male PLP1 with apex of hook process spiniform, exceeding apex of tube process.

AS1-5 each with distinct, posteriorly divergent SM carinae. AS6 smooth medially, irregular between IM and LT carinae; SM carinae posteriorly convergent; with ventrolateral spine anterior to uropodal articulation; ventrally with low MD carina. Abdominal carinae spined as follows: SM 6, IM 5-6, LT 5-6, MG (3-4)5.

Telson broader than long; prelateral lobe shorter or longer than margin of LT tooth; denticles triangular, each with blunt dorsal tubercle, SM 1-2, IM 5-7, LT 1; margin of IM and LT teeth usually smooth, occasionally crenulate; accessory median carina composed of 4-5 rounded tubercles; dorsolateral surface in adult males with well spaced rows of low, rounded tubercles or nodules; dorsolateral surface in females and juvenile males with tubercles narrow and coarse; tubercles of primary teeth fused and strongly inflated in adults males, slender or coarse in females and juveniles. Telson ventral surface with short postanal carina, occasionally reduced to a low elongate tubercle, not extending posteriorly to midlength between anal pore and posterior margin; ventrolateral carina rudimentary, not extending posteriorly to base of LT tooth.

Uropodal protopod outer margin smooth; inner margin with 5-9 slender spines; with short ventral spine anterior to endopod articulation; protopod terminal spines with lobe on outer margin of inner spine rounded, as broad as or slightly broader than adjacent spine, proximal margin concave.

Uropodal exopod proximal segment unarmed dorsally; inner distal half with round lobe, proximal half straight; outer margin with 7-8 movable spines, distalmost spatulate with sharp apex, not exceeding midlength of distal segment; distal margin with short stout ventral spine. Exopod distal segment longer than proximal segment.

Measurements. - Male ($n = 21$) TL 29-58 mm, female ($n = 14$) TL 28-60 mm. Other measurements of neotype: CL 9.5 mm, anterior carapace width 5.0 mm, A1 peduncle 10.0 mm, A2 scale 4.2 mm.

Colour in life. - Overall dorsal colour pale green, ventral surface translucent white. Carapace with dark-brown outline and grooves; with diffuse, dark brown patch medially. TS6-8 and AS1-6 with black-brown posterior margin. Telson with median carina,

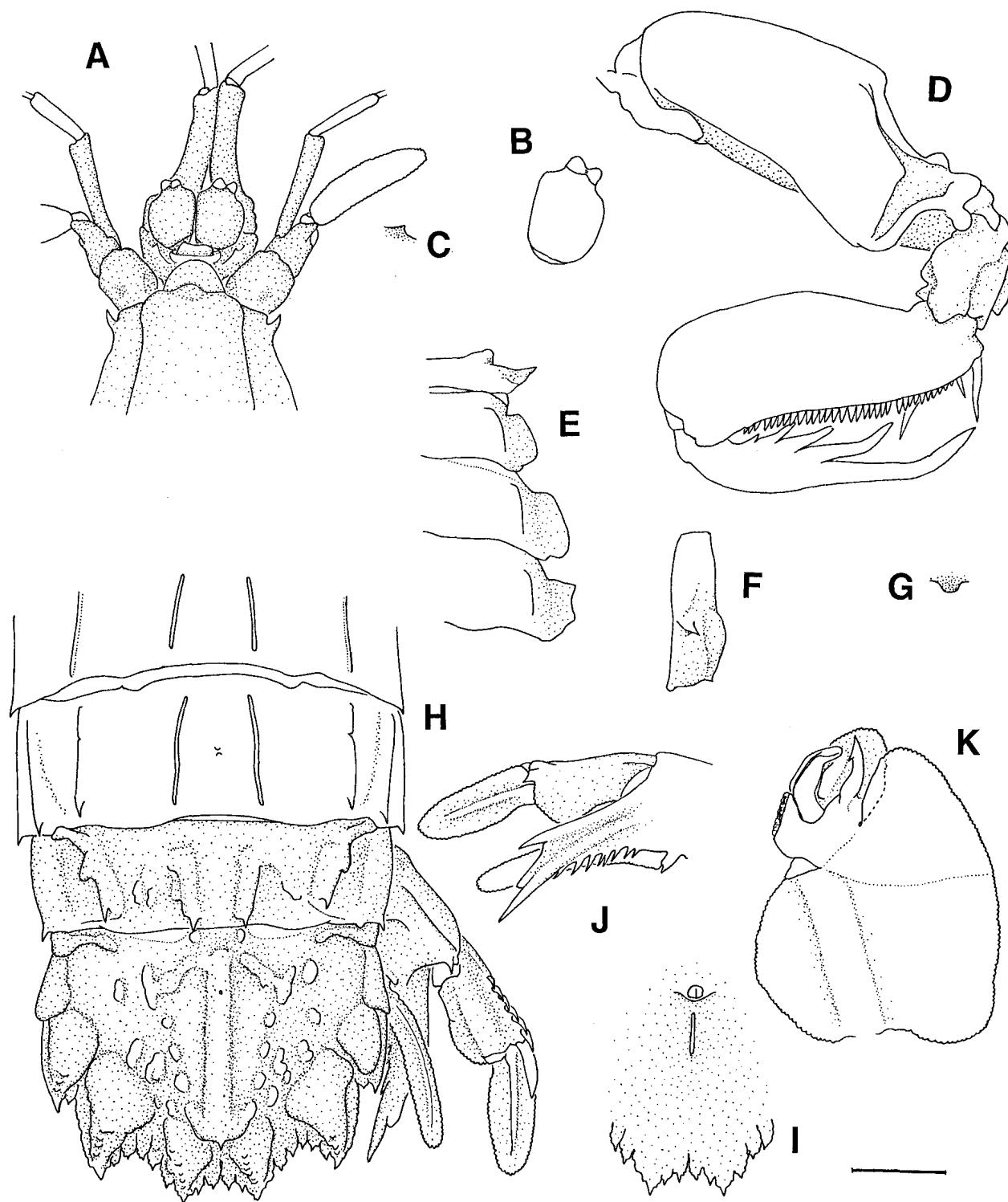


Fig. 1. *Clorida latreillei* Eydoux & Souleyet, male neotype (TL 51 mm). A, anterior cephalon, dorsal. B, eye, right dorsal. C, dorsal process of A1 somite, right lateral. D, raptorial claw, right lateral. E, TS5-8 lateral processes, right dorsal. F, TS5, right lateral. G, TS8 sternal keel, right lateral. H, AS4-6, telson and uropod, dorsal. I, telson, ventral. J, uropod, right ventral. K, PLP1 endopod, right anterior. Scale: A, C-J = 3 mm; B = 2 mm; K = 1.5 mm.

tubercles and posterior blue-green. Uropodal exopod proximal segment with dark-brown patch distally; distal segment with dark diffuse infusion in inner proximal quarter.

Remarks. - *Clorida latreillei* most closely resembles *C. albolitura* in bearing triangular apices of the dorsal processes of the antennular somite, submedian carinae on AS1-5, bearing a ventral spinule or tubercle under the lateral process of TS5, in bearing 5 teeth on the dactylus of the raptorial claw, and in bearing a postanal carina. The differences between *Clorida latreillei* and *C. albolitura* are outlined under the account of the latter.

As in other species of *Clorida*, the carinae and tubercles of the primary teeth of the telson in *C. latreillei* are more strongly inflated in males than in females, and in males exceeding TL 31 mm, the mid-dorsal tubercles are low and blunt instead of coarse or sharp. In male *C. latreillei*, however, the inflation of the carinae of the primary teeth of the telson is considerably more strongly marked than in *C. albolitura* of similar size. Aside from sexual dimorphism, the present specimens show little morphological variation except in the spination of the marginal carinae of AS1-5, armature of the dactylus of the raptorial claw (4 or 5 teeth, usually 5), and the in the distinctness of the ventral spinule on TS5 (often present as an indistinct tubercle). The petasma is well developed in the smallest males examined.

Distribution. - Western Indian Ocean including southern Africa and Madagascar, Pakistan and India, to the Gulf of Thailand and southwestern Indonesia.

***Clorida albolitura*, new species**
(Fig. 2)

Squilla latreillei. - Dollfus, 1938: 190, fig. 4. - Ingle, 1963: 14, figs 2, 33 [not *C. latreillei* Eydoux & Souleyet, 1842].

Clorida latreillei. - Blumstein, 1974: 116, fig. 3. - Makarov, 1979: 47-48. - Manning, 1995: 189-191, fig. 119 [not *C. latreillei* Eydoux & Souleyet, 1842].

Type material (all Gulf of Thailand). - Holotype: AM P59110, 1 male (TL 54 mm), Ang Sila, Chon Buri Province, trawled, fishing port, coll. P. Ng, 29 Sep. 1998.

Paratypes: ZRC 1999.2179, 1 female (TL 50 mm), Ang Sila, Chon Buri Province, trawled, coll. S. Ahyong et al., 11 Nov. 1999; ZRC 1999.2180, 1 female (TL 57 mm), Ang Sila, Chon Buri Province, trawled, coll. S. Ahyong et al., 11 Nov. 1999; ZRC 1999.2302, 1 male (TL 57 mm), 1 female (TL 58 mm), Pattani, trawled.

Other material examined. - Australia: AM P57185, 2 males (TL 40-51 mm), E Gulf of Carpentaria, 13°30.2'S, 140°42.5'E, 55 m, dredged, SS0390 065, coll. T. Wassenberg; AM P41830, 1 female (TL 48 mm), 125 km NNW of Dampier, 19° 28.0-28.9'S, 116°29.0-29.4'E, 110 m, silty bottom, beam trawl, Soela 26-18, coll. B. Jenkins, 26 Oct. 1983. Taiwan: NTOU 1996-8-3, 1 female (TL 33 mm), Taiwan, 3 Aug. 1996; NTOU 1996-8-5, 2 males (TL 71-72 mm), Tungkang, Pingtung County, 5 Aug. 1996; AM P59109, 3 males (TL 60-75 mm), Tungkang, Pingtung County, 5 Aug. 1996. Thailand: ZRC 1999.2194, 1 female (TL 45 mm), Andaman Sea, Phuket, Thai-Danish Expedition; PMBC, 1 female (TL 28 mm), Andaman Sea, Phuket, 9°14.700'N, 97°54.292'E, 61.4 m, Bioshelf B7, coll. 17 Feb. 1998; PMBC, 1 female (TL 13 mm), 20 m, Andaman Sea, Phuket, 6°59.913'N, 99°23.822'E, Bioshelf K, box corer, 6 May 1996. Vietnam: ZRC 1970.10.23.12, 1 female (TL 48 mm), Nhatrang Bay, coll. R. Serène, Nov. 1948. Madagascar: ZMUC CRU 3675, 1 female (TL 57 mm), Bay at Cape Diego, Diego Suarez, Madagascar, 12°15'N, 49°20'E, 6-8 m, sand with mud and stones, Galathea Sta 225, 3 Mar. 1951; SMF, 1 female (TL 35 mm), Madagascar, BA32, coll. R. Plante, 1 Mar. 1968; SMF, 1 female (TL 37 mm), Madagascar, RP15S, coll. R. Plante.

Diagnosis. - A1 somite dorsal processes with short, triangular apices. Carapace with anterolateral spines. Raptorial claw dactylus with 5 teeth; outer proximal margin with basal notch. Mandibular palp present. TS6-8 each lacking SM carinae. TS5 lateral process a short slender spine, slightly inclined anterolaterally; with small ventral spine. TS6-7 lateral processes rounded posterolaterally. AS(1)2-5 each with SM carinae. Telson with margin of IM teeth usually crenulate to distinctly tuberculate in adults; dorsolateral surface with 3-4 rows of coarse tubercles. Telson ventral surface with long postanal carina, extending beyond half distance to posterior margin; lacking supplementary carinae or tubercles lateral to postanal carina.

Description. - Eye small, not reaching midlength of A1 peduncle segment 1; outer margin rounded; cornea width about 0.5-0.6 eye width. Ophthalmic somite anterior margin triangular. Ocular scales fused, rounded laterally.

A1 peduncle 1.13-1.21CL. A1 somite dorsal processes with short, triangular apices. A2 scale length 0.41-0.48CL.

Rostral plate broader than long; apex rounded. Carapace with anterolateral spines; anterior width 0.51-0.56CL.

Raptorial claw dactylus with 5 teeth; outer margin broadly curved, proximal margin with basal notch.

Mandibular palp 2-3-segmented. MXP1-4 with epipod.

TS6-8 each lacking SM carinae. TS5 lateral process a short slender spine, slightly inclined anterolaterally; with small ventral spine. TS6 lateral process broadly rounded to subtruncate. TS7 lateral process subtruncate; anterolateral angle obtusely rounded to bluntly angular, often slightly deflected dorsally producing shallow emargination laterally; posterolateral angles obtusely rounded. TS8 anterolateral margin triangular; sternal keel rounded.

Endopod of male PLP1 with apex of hook process spiniform, exceeding apex of tube process.

AS(1)2-5 (usually 1-5) each with low, divergent SM carinae. AS6 smooth medially, irregular between IM and LT carinae; with ventrolateral spine anterior to uropodal articulation; ventrally with low MD carina. Abdominal carinae spined as follows: SM 6, IM 5-6, LT 5-6, MG (3-4)5.

Telson broader than long; prelateral lobe shorter or longer than margin of LT tooth; SM teeth with movable apices becoming fused in larger male specimens; denticles triangular, each with blunt dorsal tubercle, SM 1-3, IM 6-8, LT 1; margin of IM teeth usually crenulate to distinctly tuberculate (smooth in specimens smaller than 30-40 mm); accessory median carina composed of 5-6 coarse tubercles; dorsolateral surface with 3-4 rows of coarse tubercles, occasionally fused into irregular carinae; dorsal tubercles of primary teeth inflated and fused in adults males, uninflated and distinct in females and juveniles. Telson ventral surface with long postanal carina, extending beyond half distance to posterior margin; ventrolateral carina rudimentary, not extending posteriorly to base of LT tooth.

Uropodal protopod outer margin smooth; inner margin with 5-10 slender spines; with short ventral spine anterior to endopod articulation; protopod terminal spines with rounded lobe on outer margin of inner spine, broader than adjacent spine, proximal margin concave.

Uropodal exopod proximal segment unarmed dorsally; inner distal half with round lobe, proximal half straight; outer margin with 7-8 movable spines, distalmost spatulate with sharp apex, not exceeding midlength of distal segment; distal margin with short, triangular, ventral spine. Exopod proximal segment with dark-brown patch distally; distal segment longer

than proximal segment.

Colour in life. - Overall dorsal colour tan brown, ventral surface translucent white. Carapace with dark-brown outline and grooves; with diffuse, dark brown patch medially. TS6-8 and AS1-6 with black-brown posterior margin. AS1-5 with pale trianguloid area anteromedially. Telson median carina with large white patch medially; with white posterior margin. Uropodal exopod proximal segment with dark-brown patch distally; distal segment white.

Measurements. - Male (n = 9) TL 40-75 mm, female (n = 12) TL 13-58 mm. Other measurements of holotype: CL 10.3 mm, A1 peduncle 11.7 mm, A2 scale 4.8 mm.

Etymology. - Named *albolitura*, 'white mark' for the distinctive white patch on the median carina of the telson in living specimens.

Remarks. - The most distinctive feature of *C. albolitura* new species, is the presence of a large, white patch on the median carina of the telson in life. Otherwise, *Clorida albolitura* differs from other species of the genus by the combination of having triangular dorsal processes on the antennular somite, a spiniform lateral process on TS5, submedian carinae on AS(1)2-5, and in bearing a long postanal carina on the telson. *Clorida albolitura* most closely resembles *C. latreillei* but aside from coloration, differs in having more strongly pyriform eyes, lacking submedian carinae on TS6-8, in having less distinct submedian carinae on AS1-5, in having a slender and spiniform instead of a slightly broader, more triangular lateral process of TS5, the dorsal ornamentation on the telson in males (expressed as rows of coarse tubercles or irregular carinae instead of low blunt nodules), the margin of the intermediate telson teeth are usually tuberculate instead of smooth or crenulate in adults, and the postanal carina extends beyond half the distance between the anal pore and the posterior margin of the telson. Additionally, sexual dimorphism in the degree of telson carinal inflation is markedly less pronounced in *C. albolitura* than in *C. latreillei*, a feature recognised by Blumstein (1974) for specimens from Vietnam (as *C. latreillei*). Several large specimens (ZRC 1999.2179, ZMUC CRU 3675, NTOU 1996-8-5, AM P59109) bear fixed apices of the submedian teeth on the telson as in some specimens of *C. bombayensis* reported by Manning (1995). In most specimens, the marginal abdominal carinae are armed on AS(3)4-5, but in specimens less than TL 35 mm, the marginal

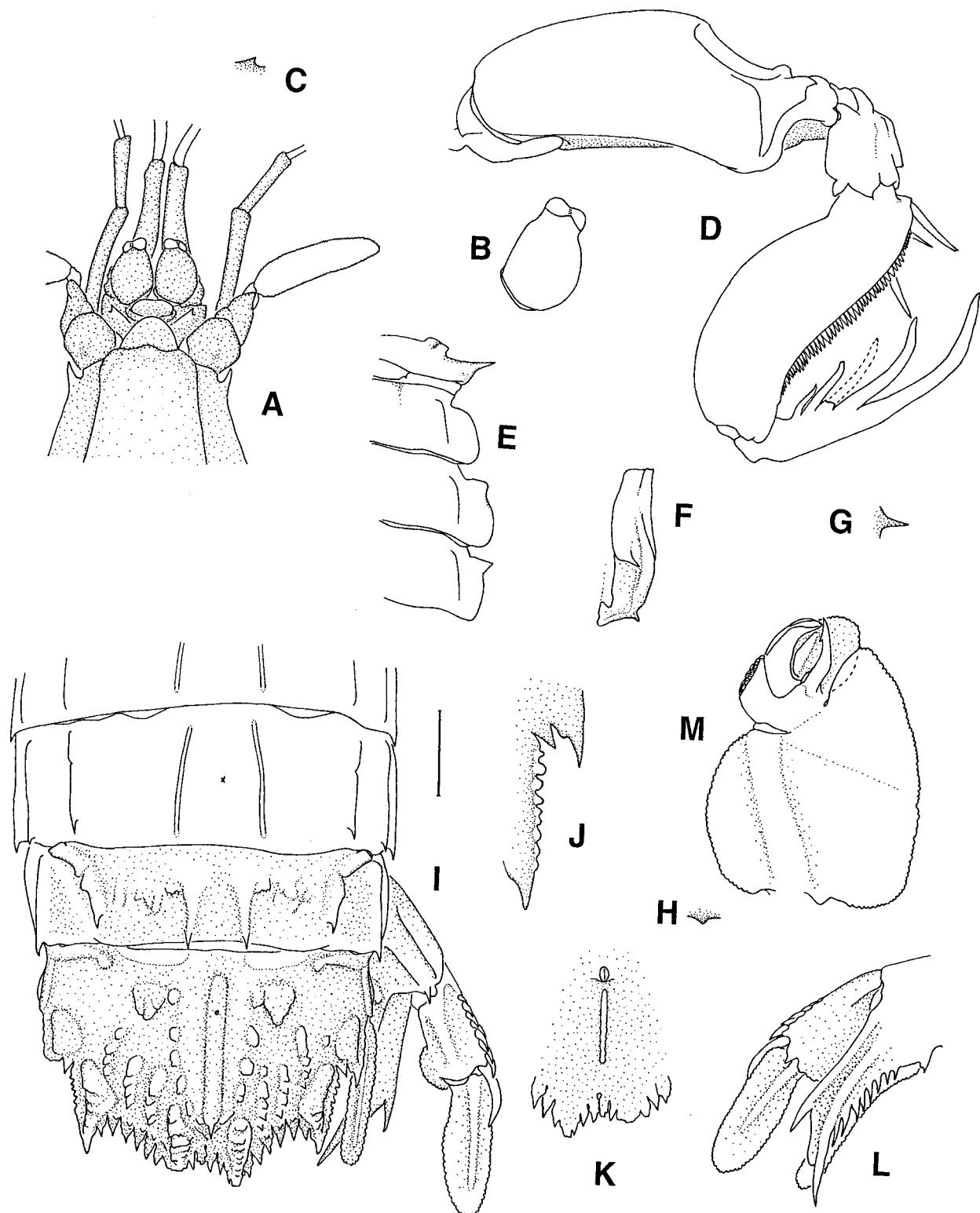


Fig. 2. *Clorida albolutura* new species, male holotype (TL 54 mm). A, anterior cephalon, dorsal. B, eye, right dorsal. C, dorsal process of A1 somite, right lateral. D, raptorial claw, right lateral. E, TS5-8 lateral processes, right dorsal. F, TS5, right lateral. G, TS5 lateral process, right posterior. H, TS8 sternal keel, right lateral. I, AS4-6, telson and uropod, dorsal. J, margin of intermediate tooth of telson, right dorsal. K, telson, ventral. L, uropod, right ventral. M, PLP1 endopod, right anterior. Scale: A, C-I, K, L = 3 mm; B = 1.7 mm; J, M = 1.5 mm.

carina of AS5 only is armed.

Most records of *C. latreillei* from east of Peninsular Malaysia are based on *C. albolutura*. The specimen from Madagascar reported as *C. latreillei* by Manning (1991) is referable to *C. albolutura*. Previous reports of *C. latreillei* from the Red Sea area, each based on the same specimen from the Gulf of Suez (Dollfus, 1938; Ingle, 1963) are also likely to be *C. albolutura*. Figures of the telson (Dollfus, 1938: fig. 4), and anterior cephalon and lateral process of TS5 (Ingle, 1963: figs 2, 33) closely resemble *C. albolutura*.

Distribution. - Gulf of Suez (?), Madagascar, Andaman Sea, the Gulf of Thailand, Vietnam, Taiwan, and Australia.

***Clorida japonica* Manning, 1978**

(Fig. 3)

Clorida japonica Manning, 1978: 25-26, fig. 12.

Type material. - Holotype: ZMH K7353, male (TL 44 mm), Sanuki, Shikoku, Japan, coll. Lenz, 13 Mar. 1897.

Diagnosis. - A1 somite dorsal processes with short, spiniform apices. Carapace with anterolateral spines. Raptorial claw dactylus with 5 teeth; outer proximal margin angular, at most with shallow basal notch. Mandibular palp present. TS6-8 each lacking SM carinae. TS5 lateral process a short, blunt triangular lobe, directed laterally; lacking ventral spine. TS6-7 lateral processes lacking posterolateral spine. AS1-4 lacking SM carinae. AS5 with indistinct SM carinae. Telson with margin of IM tooth slightly crenulate; dorsolateral surface with 3-4 rows of angular tubercles. Telson ventral surface with short, low postanal carina; lacking supplementary carinae or tubercles.

Description. - Eye small, not exceeding midlength of A1 peduncle segment 1; outer margin rounded; cornea width about one half eye width. Ophthalmic somite anterior margin triangular. Ocular scales fused, medially emarginate, rounded laterally.

A1 peduncle 0.92CL. A1 somite dorsal processes with short, spiniform apices. A2 scale length 0.45CL.

Rostral plate broader than long; apex rounded. Carapace with anterolateral spines; anterior width 0.48CL.

Raptorial claw dactylus with 5 teeth, proximal tooth minute; outer margin broadly curved, proximal

margin blunt.

Mandibular palp 3-segmented. MXP1-4 with epipod. TS6-8 each lacking SM carinae. TS5 lateral process a short, blunt triangular lobe, directed laterally; lacking ventral spine. TS6-7 lateral process broadly rounded. TS8 anterolateral margin trianguloid, apex rounded; sternal keel rounded.

Endopod of male PLP 1 with apex of hook process spiniform, exceeding apex of tube process.

AS1-4 lacking SM carinae. AS5 with indistinct SM carinae. AS6 smooth medially, slightly irregular between IM and LT carinae; with ventrolateral spine anterior to uropodal articulation; ventrally with low MD elevation. Abdominal carinae spined as follows: SM 6, IM 5-6, LT 5-6, MG 5.

Telson broader than long; prelateral lobe longer than margin of LT tooth; denticles triangular, lacking dorsal tubercle, SM 3-4, IM 7, LT 1; margin of IM tooth slightly crenulate; accessory MD carina composed of 3-4 blunt tubercles; accessory median carina composed of 3-5 tubercles; dorsolateral surface with 3-4 rows of angular tubercles; dorsal carinae of primary teeth inflated, irregular. Telson ventral surface with short, low postanal carina, not extending beyond midway between anal pore and median posterior margin; ventrolateral carina rudimentary, not extending posteriorly to base of LT tooth.

Uropodal protopod outer margin smooth; inner margin with 7-8 slender spines; with tubercle anterior to endopod articulation; protopod terminal spines with rounded lobe on outer margin of inner spine, as broad as adjacent spine, proximal margin concave.

Uropodal exopod proximal segment unarmed dorsally; inner distal half with round lobe, proximal half straight; outer margin with 6-7 movable spines, distalmost spatulate with sharp apex, not exceeding midlength of distal segment; distal ventral margin with short, blunt triangular projection. Exopod distal segment longer than proximal segment.

Colour in alcohol. - Almost completely faded. Thoracic and abdominal somites with dark posterior margin.

Measurements. - Holotype: TL 44 mm, CL 8.3 mm, anterior carapace width 4.0 mm, A1 peduncle 7.6 mm, A2 scale 3.8 mm.

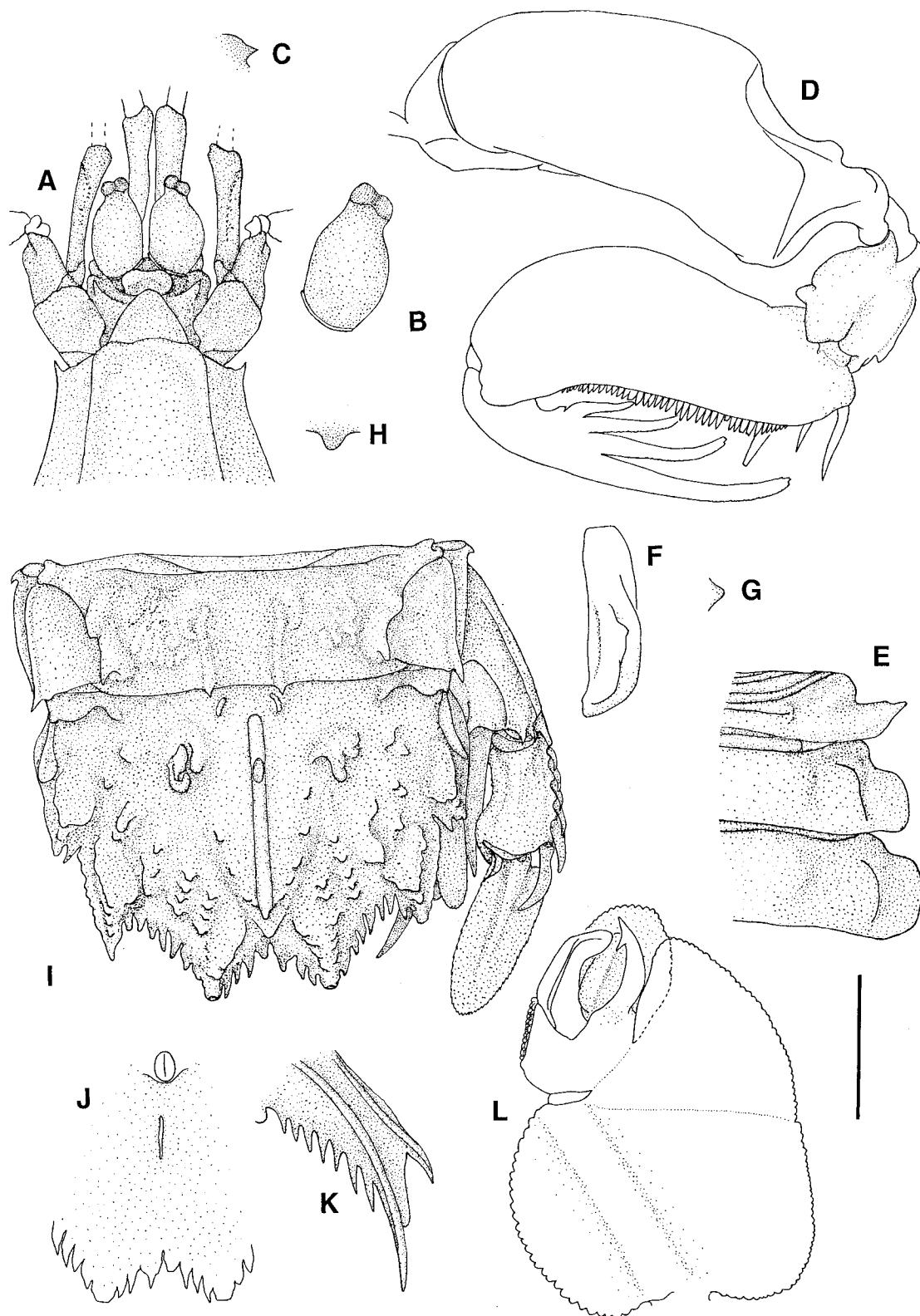


Fig. 3. *Clorida japonica* Manning, male holotype (TL 44 mm). A, anterior cephalon, dorsal. B, eye, right dorsal. C, dorsal process of A1 somite, right lateral. D, raptorial claw, right lateral. E, TS5-7 lateral processes, right dorsal. F, TS5, right lateral. G, TS5 lateral process, right posterior. H, TS8 sternal keel, right lateral. I, AS6, telson and uropod, dorsal. J, telson, ventral. K, uropodal protopod, left ventral. L, PLP1 endopod, right anterior. Scale: A, B, D-K = 3 mm; B = 2 mm; L = 1.5 mm. A, C, E, I, K from Manning (1978).

Remarks. - Although Manning (1995) synonymised *C. japonica* with *C. latreillei*, restudy of the holotype of the former shows that it is a distinct species. *Clorida japonica* differs from *C. latreillei* in lacking submedian carinae on AS1-5, and in having a short lateral process on TS5. The original account of *C. japonica* attributed a long instead of short postanal carina to the species; the inconsistency likely stems from cuticular discoloration present on the ventral midline of the telson.

Distribution. - Known only from Japan.

***Clorida javanica* Moosa, 1974**
(Fig. 4)

Clorida javanica Moosa, 1974: 76-77, figs 2, 3.

Type material. - Holotype: LIPI S034, male (TL 35 mm), Java Sea, N of central Java, 20 m, mud, trawled, coll. M. K. Moosa, 28 May 1965. Paratype: LIPI S035, female (TL 54 mm), type locality.

Diagnosis. - A1 somite dorsal processes with low, rounded apices. Carapace with anterolateral spines. Raptorial claw dactylus with 4 teeth; outer proximal margin with basal notch. Mandibular palp present. TS6-8 each with SM carinae. TS5 lateral process a blunt, angular lobe; lacking ventral spine. TS6-7 lateral processes lacking posterolateral spine. AS1-5 each with low SM carinae. Telson with margin of IM teeth slightly crenulate; dorsolateral surface with 3-4 widely spaced rows of low, elongate tubercles or short carinae. Telson ventral surface lacking postanal carina; lacking supplementary carinae or tubercles.

Description. - Eye small, not reaching midlength of A1 peduncle segment 1; outer margin obtusely angled; cornea width about one third eye width. Ophthalmic somite anterior margin triangular. Ocular scales fused, rounded laterally.

A1 peduncle 1.01-1.14CL. A1 somite dorsal processes with low, rounded apices. A2 scale length 0.42-0.52CL.

Rostral plate broader than long; apex rounded. Carapace with anterolateral spines; anterior width 0.43-0.45CL.

Raptorial claw dactylus with 4 teeth; outer margin broadly curved, proximal margin with basal notch.

Mandibular palp 3-segmented. MXP1-4 with epipod.

TS6-8 each with SM carinae. TS5 lateral process a blunt, angular lobe; lacking ventral spine. TS6 lateral process broadly rounded. TS7 lateral process subtruncate; anterolateral and posterolateral angles rounded. TS8 anterolateral margin triangular; sternal keel rounded.

Endopod of male PLP1 with apex of hook process spiniform, exceeding apex of tube process.

AS1-5 each with low, divergent SM carinae. AS6 smooth medially, irregular between IM and LT carinae; with small ventrolateral spine anterior to uropodal articulation; ventrally with low MD carina. Abdominal carinae spined as follows: SM 6, IM 5-6, LT 5-6, MG 5.

Telson broader than long; prelateral lobe shorter than margin of LT tooth; denticles triangular, each lacking dorsal tubercle, SM 1-2, IM 6-7, LT 1; margin of IM teeth slightly crenulate; accessory median carina composed of 2-3 low tubercles; dorsolateral surface with 3-4 widely spaced rows of low, elongate tubercles or short carinae; dorsal tubercles of primary teeth inflated and fused in adults males, uninflated and distinct in females and juveniles. Telson ventral surface lacking postanal carina; ventrolateral carina rudimentary, not extending posteriorly to base of LT tooth.

Uropodal protopod outer margin smooth; inner margin with 5-7 slender spines; with short ventral spine anterior to endopod articulation; protopod terminal spines with rounded lobe on outer margin of inner spine, slightly broader than adjacent spine, proximal margin concave.

Uropodal exopod proximal segment unarmed dorsally; inner distal half with round lobe, proximal half straight; outer margin with 6-7 movable spines, distalmost spatulate with sharp apex, exceeding midlength of distal segment; distal margin with short, triangular, ventral spine. Exopod distal segment longer than proximal segment.

Colour in alcohol. - Completely faded.

Measurements. - Male ($n = 1$) TL 35 mm, female ($n = 1$) TL 54 mm. Other measurements of holotype: CL 5.8 mm, A1 peduncle 6.6 mm, A2 scale 3.0 mm.

Remarks. - *Clorida javanica* closely resembles *C. depressa* and will key out to the former according to

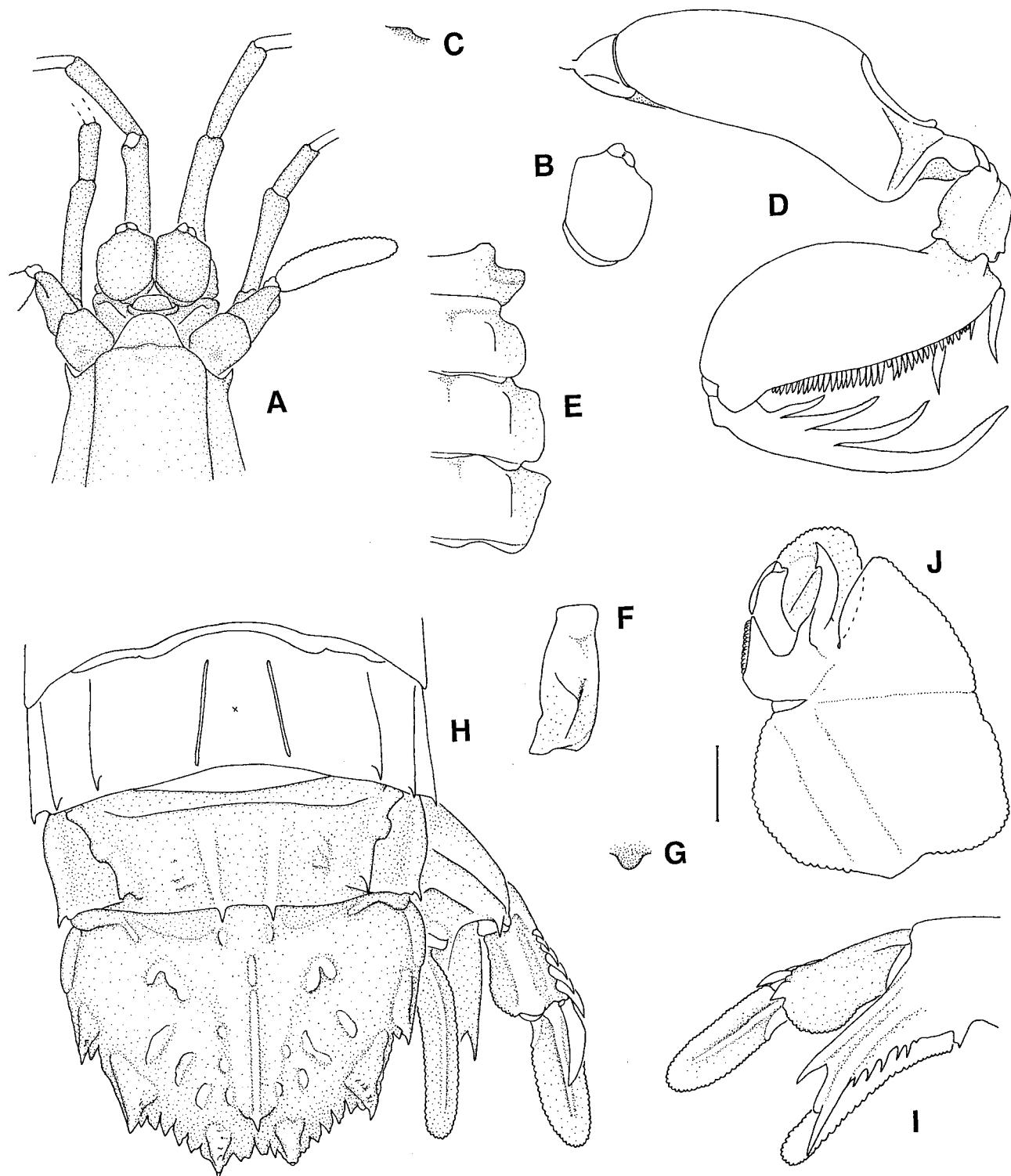


Fig. 4. *Clorida javanica* Moosa, male holotype (TL 35 mm). A, anterior cephalon, dorsal. B, eye. C, dorsal process of A1 somite, right lateral. D, raptorial claw, right lateral. E, TS5-8 lateral processes, right dorsal. F, TS5, right lateral. G, TS8 sternal keel, right lateral. H, AS4-6, telson and uropod, dorsal. I, uropod, right ventral. J, PLP1 endopod, right anterior. Scale: A, C-I = 3mm; B = 2 mm; J = 1.5 mm.

Manning (1995). *Clorida javanica* differs from *C. depressa*, however, in having the inner margin of the eyes more strongly appressed, the outer margin of the eyes is obtusely angled instead of rounded, the cornea is relatively narrower, the apex of the TS5 lateral process is blunt instead sharp, and submedian carinae are present on AS1-5. *Clorida javanica* differs from *C. albolitura* and *C. latreillei* in having blunt instead of acute dorsal processes on the antennular somite, in having a blunt instead of sharp lateral process on TS5, and in lacking a postanal carina.

In the original account of *C. javanica*, Moosa (1974) described the species as having 3-4 teeth on the dactylus of the raptorial claw and noted that the female paratype lacked a mandibular palp. On one of the raptorial claws of the female paratype, the dactylus is deformed such that two of the teeth are fused. Therefore, *C. javanica* is herein characterised as bearing 4 teeth on the dactylus of the raptorial claws. The mandibular palps in the female paratype are absent, apparently owing to damage, for insertions are present on both mandibles. Although the type description of *C. javanica* notes that AS6 lacks a ventrolateral spine anterior to the uropodal protopod, a small spine is in fact present in both specimens as in other species of *Clorida*.

Distribution. - Java Sea, Indonesia.

DISCUSSION

Eleven species are presently recognised in *Clorida*. Most species of *Clorida* fall into one of two groups based on presence or absence of the mandibular palp. The species of the first group (*C. denticauda* (Chhapgar & Sane, 1967) *C. granti* (Stephenson, 1953)), lack the palp, the submedian carinae are never present on AS1-5, TS5 bears at most a blunt tubercle instead of a spine under the lateral process, there are 4 teeth on the dactylus of the raptorial claw and the outer margin of the dactylus lacks a proximal notch. Species of the second group (*C. albolitura* new species, *C. bombayensis* (Chhapgar & Sane, 1967), *C. decorata* (Wood-Mason, 1875), *C. gailliardi* Moosa, 1986, *C. latreillei* Eydoux & Souleyet, 1842) bear a mandibular palp, usually have submedian carinae of AS1-5, TS5 bears a small but distinct spine under the lateral process, there are 4 or 5 (usually 5) teeth on the dactylus of the raptorial claw and the outer margin of the dactylus is proximally notched. *Clorida depressa*, *C. japonica*, *C. javanica*, and

C. rotundicauda (Miers, 1880), each with a mandibular palp, share traits of both groups. *Clorida depressa*, *C. japonica*, and *C. rotundicauda* resemble species of the first group in lacking any trace of submedian carinae on AS1-4 and in having at most an indistinct tubercle under the lateral process of TS5 and in lacking the notch on the outer proximal margin of the dactylus. They resemble those species of the second group in bearing a mandibular palp. The key below replaces the final couplet in Manning's (1995) key to *Clorida* and distinguishes *C. depressa* from those species previously identified with *C. latreillei*.

8. Telson lacking postanal carina.....	9
- Telson with postanal carina.....	10
9. AS1-4 with SM carinae.....	<i>C. japonica</i>
- AS1-4 lacking SM carinae.....	<i>C. depressa</i>
10. AS1-4 with SM carinae.....	11
- AS1-4 lacking SM carinae.....	<i>C. japonica</i>
11. Telson with short postanal carina, not exceeding half distance between anal pore and posterior margin. TS5 lateral process produced to an acute triangular spine. Telson MD carina lacking large white median patch in life.....	<i>C. latreillei</i>
- Telson with long postanal carina, exceeding half distance between anal pore and posterior margin. TS5 lateral process produced to a slender spine. Telson MD carina with large white median patch in life.....	<i>C. albolitura</i>

ACKNOWLEDGMENTS

Thanks are due to Prof. Dr. Angelika Brandt (ZMH) for the loan of the holotype of *C. japonica*, to Dr M. Kasim Moosa (LIPI) for hospitality in Jakarta and access to his stomatopod collections, and to the late Dr Raymond B. Manning (Smithsonian Institution) and Dr Danièle Guinot (Muséum National d'Histoire Naturelle, Paris) for advice regarding the status of the type of *C. latreillei*. Support and travel funding for this project was generously provided by a grant from the Raffles Museum, National University of Singapore, through Prof. Peter Ng, who also kindly reviewed a draft of the manuscript.

LITERATURE CITED

Ahyong, S. T., 1998. Review of *Neoanchisquilla* Moosa, 1991 and *Neclorida* Manning, 1995

(Crustacea: Stomatopoda: Squilloidea), with descriptions of two new species of *Neoanchisquilla* from the Indian Ocean. *Rec. Aust. Mus.*, **50**(2): 217-229.

Blumstein, R., 1974. Stomatopod crustaceans from the Gulf of Tonkin with the description of new species. *Crustaceana*, **26**(2): 112-126.

Chhapgar, B. F. & S. R. Sane, 1967. Two new species of *Squilla* (Stomatopoda) from Bombay. *Crustaceana*, **12**(1): 1-8.

Dollfus, R. Ph., 1938. Stomatopoda (II). Catalogue synonymique des espèces jusqu' à présent récoltées dans la Mer Rouge, y compris la partie sud du Canal de Suez et le Golfe d'Aden. In: Mission Robert Ph. Dollfus en Égypte, X. - *Mémoires de l'Institut d'Égypte*, **37**: 185-236.

Eydoux, F., & L. F. A. Souleyet, 1842. *Crustacés. Voyage autour du Monde exécuté pendant les années 1836 et 1837 sur la Corvette La Bonite Commandée par M. Vaillant, Capitaine de Vaisseau, Zoologie* **1**: 219-272, pl.5. Arthus Bertrand, Paris.

Ingle, R. W., 1963. Crustacea Stomatopoda from the Red Sea and Gulf of Aden (Contributions to knowledge of the Red Sea, Number 26). *Bull. Sea Fish. Res. Stat. (Haifa)*, **33**: 1-69.

Kemp, S., 1913. An account of the Crustacea Stomatopoda of the Indo-Pacific region, based on the collection in the Indian Museum. *Mem. Ind. Mus.*, **4**: 1-217, figs 1-10, pls. 1-10.

Makarov, R. R., 1979. A collection of stomatopod crustaceans of the genus *Clorida* Eydoux & Souleyet, 1842, from Tonkin Bay, Vietnam. *Crustaceana*, **37**(1): 39-56.

Manning, R. B., 1969a. Notes on the stomatopod Crustacea from southern Africa. *Smiths. Contr. Zool.*, **1**: 1-17.

Manning, R. B., 1969b. Stomatopod Crustacea of the western Atlantic. *Stud. Trop. Ocean.*, **8**: viii + 380pp.

Manning, R. B., 1978. New and rare stomatopod Crustacea from the Indo-West Pacific region. *Smiths. Contr. Zool.*, **264**: 1-36.

Manning, R. B., 1990. Stomatopod Crustacea from the Persian Gulf, with the description of a new *Manningia*. *Steenstrupia*, **16**(6): 93-108.

Manning, R. B., 1991. Stomatopod Crustacea collected by the Galathea Expedition, 1950-1952, with a list of Stomatopoda known from depths below 400 meters. *Smiths. Contr. Zool.*, **521**: 1-18.

Manning, R. B., 1995. Stomatopod Crustacea of Vietnam: the legacy of Raoul Seréne. *Crust. Res. Spec. No. 4*: 1-339. The Carcinological Society of Japan. Shimoda Printing, Kumamoto, Japan.

Miers, E. J., 1880. On the Squillidae. *Ann. Mag. Nat. Hist.*, **5**: 1-30, 108-127.

Moosa, M. K., 1974. On a new and rare species of Stomatopoda (Crustacea) from Indonesian waters. *Treubia*, **28**(3): 73-82.

Moosa, M. K., 1975. Notes on stomatopod Crustacea from Seribu Islands and adjacent waters with a description of a new species. *Mar. Res. Indonesia*, **15**: 1-20.

Moosa, M. K., 1986. [for 1985] Stomatopod Crustacea. Résultats du Campagnes MUSORSTOM I & II Philippines, 2. *Mém. Mus. Nat. d'Hist. Nat., Paris, series A, Zool.* **133**: 367-414.

Moosa, M. K., 2000. Marine biodiversity of the South China Sea: a checklist of stomatopod Crustacea. *Raff. Bull. Zool. Supp.*, **8**: 405-457.

Naiyanetr, P., 1980. *Stomatopoda of Thailand*. Chulalongkorn University, Bangkok. 95 pp., 35 pls.

Naiyanetr, P., 1998. *Checklist of Crustacean Fauna in Thailand (Decapoda and Stomatopoda)*. OEPP Biodiversity Series vol. 5. Pp. 1-161.

Stephenson, W., 1953b. Three new Stomatopoda (Crustacea) from eastern Australia. *Aust. J. Mar. Fresh. Res.*, **4**(1): 201-218.

Tirmizi, N. M., Q. B. Kazmi & R. B. Manning, 1994. An illustrated key to the Malacostraca (Crustacea) of the northern Arabian Sea Part II: Stomatopoda. *Pak. J. Mar. Sci.*, **3**(2): 125-169.

Wood-Mason, J., 1875. [On some new species of stomatopod Crustacea]. *Proc. Asiatic Soc. Bengal*, **1875**: 231-232 [untitled].

Wood-Mason, J., 1895. *Figures and descriptions of nine species of Squillidae from the collection in the Indian Museum*. Calcutta. Pp.1-11.