

## HABERMA NANUM, A NEW GENUS AND NEW SPECIES OF MANGROVE CRAB (CRUSTACEA: DECAPODA: BRACHYURA: SESARMIDAE) FROM SINGAPORE

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**ABSTRACT.** – A new genus and new species of sesarmid crab is described from Singapore mangroves. Superficially similar to species of *Chiromantes*, *Haberma nanum*, new genus, new species, differs most markedly by its subchelate adult male first and second ambulatory legs. It is a very small species, averaging only five to eight millimetres in carapace width, making it one of the smallest sesarmids known outside of the genus *Nanosesarma*.

**KEY WORDS.** – Sesarmidae, taxonomy, new genus, new species.

### INTRODUCTION

In the collections of the Zoological Reference Collection (ZRC) of the Raffles Museum, National University of Singapore, are several lots of specimens which had been identified by the late Raoul Serène as a new species of *Holometopus* H. Milne Edwards, 1853 (= present *Chiromantes* Gistel, 1848, sensu Holthuis, 1977). In recent years, we have collected a number of additional specimens from mangroves in northern Singapore. All the specimens concerned are very small (less than one centimetre in carapace width). Based on their carapace morphology and locomotory habits, they appear to be juveniles of the genus *Episesarma* De Man, 1895. However, a closer examination of these specimens showed that they are already adult and some of the females are even ovigerous. They also possess a number of morphological characters not present in any sesarmid genus known thus far. We describe these specimens as belonging to a new genus and new species, here named *Haberma nanum*.

The abbreviations G1 and G2 are used for the male first and second pleopods, respectively. Measurements provided in millimetres, are of the carapace width and length, respectively. Specimens examined are deposited in the Zoological Reference Collection (ZRC) of the Raffles Museum, Department of Biological Sciences, National University of Singapore, and Senckenberg Museum und Forschungsinstitut (SMF) Frankfurt am Main, Germany.

### TAXONOMY

#### *Haberma*, new genus

**Type species.** – *Haberma nanum*, new species, by present designation.

**Diagnosis.** – Carapace squarish; regions well defined; lateral margins of carapace entire; basal antennular segment swollen, rounded, adjacent to basal segment of antenna, not separated by septum; dorsal margin of male palm without longitudinal pectinated ridges or distinct granulated ridges, inner surface not swollen, without granulated ridge, outer surface of palm without ridge; dorsal margin of dactylus of chela almost smooth, without distinct granules; inner distal margin of cheliped merus not expanded; propodus and dactylus of adult male first and second ambulatory legs forming subchelate structure.

**Etymology.** – The name is derived from the arbitrary combination of the Latin word “habeo” for hold and the name “*Sesarma*”, alluding to the possible grasping function of the subchelate first and second ambulatory legs. The gender of the new genus is neuter.

**Remarks.** – *Haberma*, new genus, shares the carapace and cheliped characters of *Chiromantes* Gistel, 1848, in its entire lateral carapace margin, a palm without pectinated ridges, and the chelipedal dactylus without a row of granules (see Ng & Liu, 1999). However, Ng & Liu (1999) have suggested

that *Chiromantes* may be polyphyletic and we are currently revising the genus, which will eventually be split into several more homogeneous genera. *Haberma nanum* differs remarkably from all known species of *Chiromantes* in the form of its first two pairs of adult male ambulatory legs, with the propodus and dactylus forming a distinct subchelate structure (absent in all known sesarmid species). All known species of *Chiromantes* s. lato also have proportionately much stouter and shorter ambulatory legs.

The general carapace features of *Haberma nanum* are typical of juvenile sesarmids, especially with regards to its small size and disproportionately large eyes and long, slender legs. Of the sesarmids known from Singapore mangroves, *Haberma* bears a striking superficial resemblance to very young *Episesarma*, especially with regards to the squarish carapace and long ambulatory legs. Immature *Episesarma* specimens (less than 10 mm carapace width), however, can still be distinguished from *Haberma* in having the lateral carapace margins distinctly straighter (rather than gently sinuous), the external orbital tooth more prominently developed, the dactylus of the chela not having stridulatory granules, and the ambulatory meri being proportionately longer, with the dorsal and ventral margins lacking the characteristic long stiff setae. Larger adult specimens of *Episesarma* have a small epibranchial tooth, which further serves to distinguish them from *Haberma*. Male specimens of *Episesarma* also differ in not having the subchelate first and second ambulatory legs. In any case, young *Episesarma* less than a cm in carapace width are clearly immature, with the gonopods and/or pleopods not at all discernible.

The features of *Haberma* suggests that it could have evolved through paedomorphosis (sensu Gould, 1977), although in the unusual form of its legs and its other characters, it is very difficult to relate this species to any taxon presently known from the region.

***Haberma nanum*, new species**

(Figs. 1-4)

**Material examined.** – Holotype - male (7.1 by 6.6 mm) (ZRC 2002.217), Mandai mangrove, Singapore, coll. C. D. Schubart, 29 Dec.1999.

Paratypes – 1 ovigerous female (8.1 by 7.5 mm) (ZRC 2002.218), 1 female (8.1 by 7.4 mm) (SMF 28100), Mandai mangrove, Singapore, coll. C. D. Schubart, 29 Dec.1999; 2 males (7.0 by 6.9 mm, 6.0 by 5.5 mm) (larger male photographic voucher) (ZRC 2002.219), Mandai mangroves, Singapore, coll. D. Yeo, 16 Jan.2002; 4 males (largest 6.5 by 6.5 mm, smallest 4.5 by 4.5 mm), 2 females (5.7 by 5.8 mm, 5.1 by 4.9 mm) (ZRC 2000.1956), Mandai mangrove, Singapore, coll. C.D. Schubart, 15 Oct.1999; 1 male (5.0 by 4.9 mm) (ZRC 1971.11.5.6), Johor Strait, Singapore, coll. C. L. Soh, 9 Dec.1966; 1 male (6.2 by 5.8 mm) (ZRC 1971.11.5.7), Johor Strait, Singapore, coll. C. L. Soh, 26 Dec.1966; 1 completely dismembered male (7.2 by 7.5 mm) (ZRC 1971.11.5.8), Ama Keng River, Singapore, coll. C. L. Soh, 28 Nov.1965; 1 ovigerous female (8.8 by 8.3 mm) (ZRC 1968.4.22.5), Johor Straits, Singapore, coll. C. L. Soh, 26 Dec.1966; 2 females (5.2 by 5.2 mm, 3.3 by 3.1 mm) (ZRC 1968.4.22.2-3), Sungai

Melayu, Singapore, coll. C. L. Soh, 24 Jan.1966; 3 ovigerous females (4.5 by 4.1 mm, 4.2 by 4.1 mm, 3.7 by 3.7 mm) (ZRC 1968.4.22.6-8), Johor Straits, Singapore, coll. C. L. Soh, 26 Dec.1966; 1 ovigerous female (7.2 by 6.9 mm) (ZRC 1968.4.22.9), Mak Wai River, Singapore, coll. C. L. Soh, 28 Dec.1966.

**Diagnosis.** – Carapace squarish, lateral carapace surfaces lined with oblique striae; postfrontal cristae discernible, weakly separated into 4 lobes; lateral carapace margin gently sinuous; outer surface of male chela almost smooth to gently rugose; ambulatory legs long; abdomen relatively broad, male telson semicircular, subequal in length to segment 6; G1 gently curving outwards; distal chitinous part almost straight.

**Description of male holotype.** – Carapace squarish, slightly wider than long; regions well defined, with grooves separating them; lateral carapace surfaces lined with strong, oblique striae; frontal and lateral regions with tufts of setae which do not obscure margins or surface; front relatively narrow; postfrontal cristae low but distinct, not sharp, weakly separated into 4 lobes by short grooves. Front deflexed downwards, margin distinctly bilobed from dorsal view, each lobe broadly convex, separated by very broad median concavity. Supraorbital margin gently convex, entire. External orbital tooth triangular, directed slightly obliquely outwards and representing point of greatest width; fused with entire lateral carapace margin; antero- and posterolateral margins not demarcated, without trace of tooth or indentation, lateral carapace margin gently sinuous, subparallel along most of length before curving to join almost straight to gently convex posterior carapace margin. Ischium of third

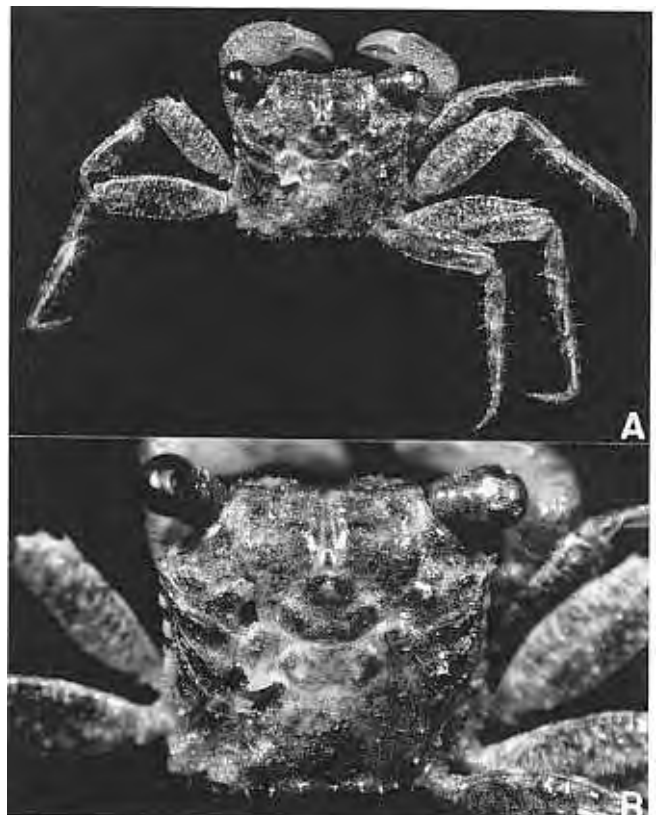


Fig. 1. *Haberma nanum*, new genus, new species. Paratype male (7.0 by 6.9 mm) (ZRC 2002.219). A, overall view; B, carapace.

maxilliped with shallow submedian sulcus; merus longitudinally ovate with distinct median ridge; exopod relatively slender, tip reaching to two-thirds length of outer margin of merus, flagellum long. Antennal and antennular basal segments adjacent, not separated by septum; basal antennular segment very swollen, almost round. Eyes and orbits relatively large; eye longer than orbit, too large to fit into orbit, tip of cornea extending beyond edge of external orbital tooth.

Chelipeds homochelous; outer and inner surfaces of chela almost smooth to gently rugose; subdorsal surface with several short uneven ridges lined with very small rounded granules, not pectinated. Fingers gently curved, shorter than palm, forming only small gape when closed; dorsal margin of dactylus almost smooth or with scattered very small granules; cutting edges with 6-8 teeth and denticles, distalmost part pectinated with inner surface hooved, spoon-like. Carpus longer than broad; outer surface rugose; inner distal angle unarmed. Merus with dorsal margin serrated, with prominent subdistal tooth with serrated margins; inner ventral margin weakly serrated with low subdistal tooth. Ambulatory legs long and slender, third pair longest. Outer surfaces of merus, carpus, and propodus gently rugose. Merus with dorsal margin weakly serrated; dorsal and ventral margins with prominent long stiff setae, subdistal dorsal angle with sharp spine. Carpus with 2 subparallel ridges on outer surface. Propodus of first and second legs with ventro-distal margin sharply tapering to distal; dorsal and ventral margins with prominent long stiff setae; disto-ventral margin with brush-like setae, with 2 long, stiff setae bracketing start of brush; dactyli of first and second legs styliform, narrow, proximal half with short brush-like setae along ventral margin; dactylus folding against tapered part of propodus when flexed, brush-like setae of each appendage appressing tightly against each other, forming distinct subchelate

structure. Propodus and dactylus of third and fourth legs normal, not subchelate; dactylus distinctly shorter than propodus, slender, gently curved.

Surface of thoracic sternites 1-3 setose, sternites completely fused. Sternites 3 and 4 separated by low ridge, densely lined with long setae. Abdominal cavity reaching to beyond three-quarters longitudinal length of sternite 4.

Abdomen relatively broad. Telson semicircular, subequal in length to segment 6, lateral margins convex, tip rounded. Segment 6 broader than long, lateral margins convex. Segments 3-5 progressively more trapezoidal; lateral margins of segments 5 and 6 straight or gently concave; lateral margins of segment 3 gently convex. Segments 1 and 2 very narrow longitudinally. G1 gently curving outwards; distal chitinous part almost straight. G2 very short.

**Paratypes.** – The chelae of females are proportionately more slender. In females, the propodus and dactylus of the first and second ambulatory legs are also not clearly subchelate, with the ventro-distal margin of the propodus not prominently tapering distally. In small females, the segments appear normal. The dense brush-like setae present on the ventral margins of the propodus and dactylus of these two legs (part of the subchelate structure in males) are also absent in females.

**Etymology.** – The name alludes to the small adult size of the species.

**Colour in life.** – Dorsal surface of carapace marbled dark reddish-brown, with cardiac and mesogastric regions lighter. Merus of ambulatory legs dark brown, distal part lighter; carpus and propodus with dark and light banding, dactylus dull orangish-brown. Chelae orange, palm paler with small reddish-brown dots; fingers uniformly bright orange; most intense in mature males.

**Ecology.** – The new species is so far only known from mangroves along the northern coast of Singapore. It prefers relatively open, habitats with hard dried mud, with no leaf cover. The spooned inner surface of the fingers of the chelae (Fig. 4G) suggest a grazing feeding mode. In the Mandai mangroves, *Haberma nanum* was most conspicuous in disturbed areas, like soil-covered man-made debris around a ruined building. The species moves very rapidly, hiding in crevices, but without retreating into burrows. From its behaviour and morphology it is very unlikely that this species builds burrows.

**Remarks.** – In the ZRC are two bottles of specimens which had been labeled as types of “*Holometopus makwaiensis*, manuscript name” by the late Raoul Serène. The names were listed by Yang (1979: 48) in her catalogue of the ZRC material but the name is a nomen nudum as they were not formally published and Yang’s publication did not contain any descriptions. These specimens are here included among the types of *H. nanum*. One of the reasons why we have decided against using Serène’s name “*makwaiensis*” is that



Fig. 2. *Haberma nanum*, new genus, new species. Paratype male (7.0 by 6.9 mm) (ZRC 2002.219). A, frontal view; B, ventral surface and chelipeds.

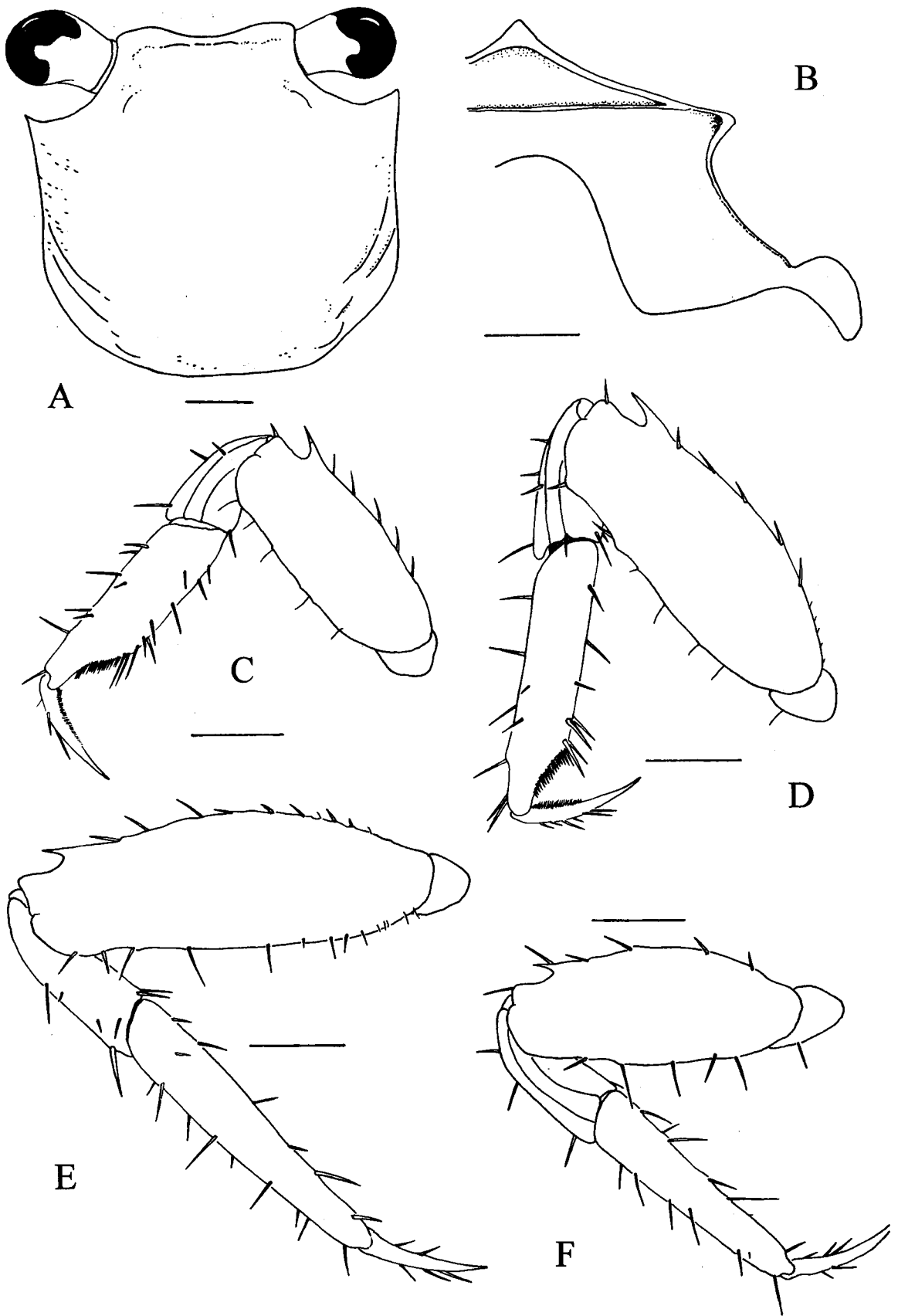


Fig. 3. *Haberma nanum*, new genus, new species. Paratype male (5.0 by 4.9 mm) (ZRC 1971.11.5.6). A, carapace (schematic: regions, striae and setae not drawn), eyes drawn slightly at an angle; B, anterior thoracic sternum (setae not drawn); C, left first ambulatory leg; D, left second ambulatory leg; E, left third ambulatory leg; F, left fourth ambulatory leg. Scales: A, C-F = 1.0 mm, B = 0.5 mm.

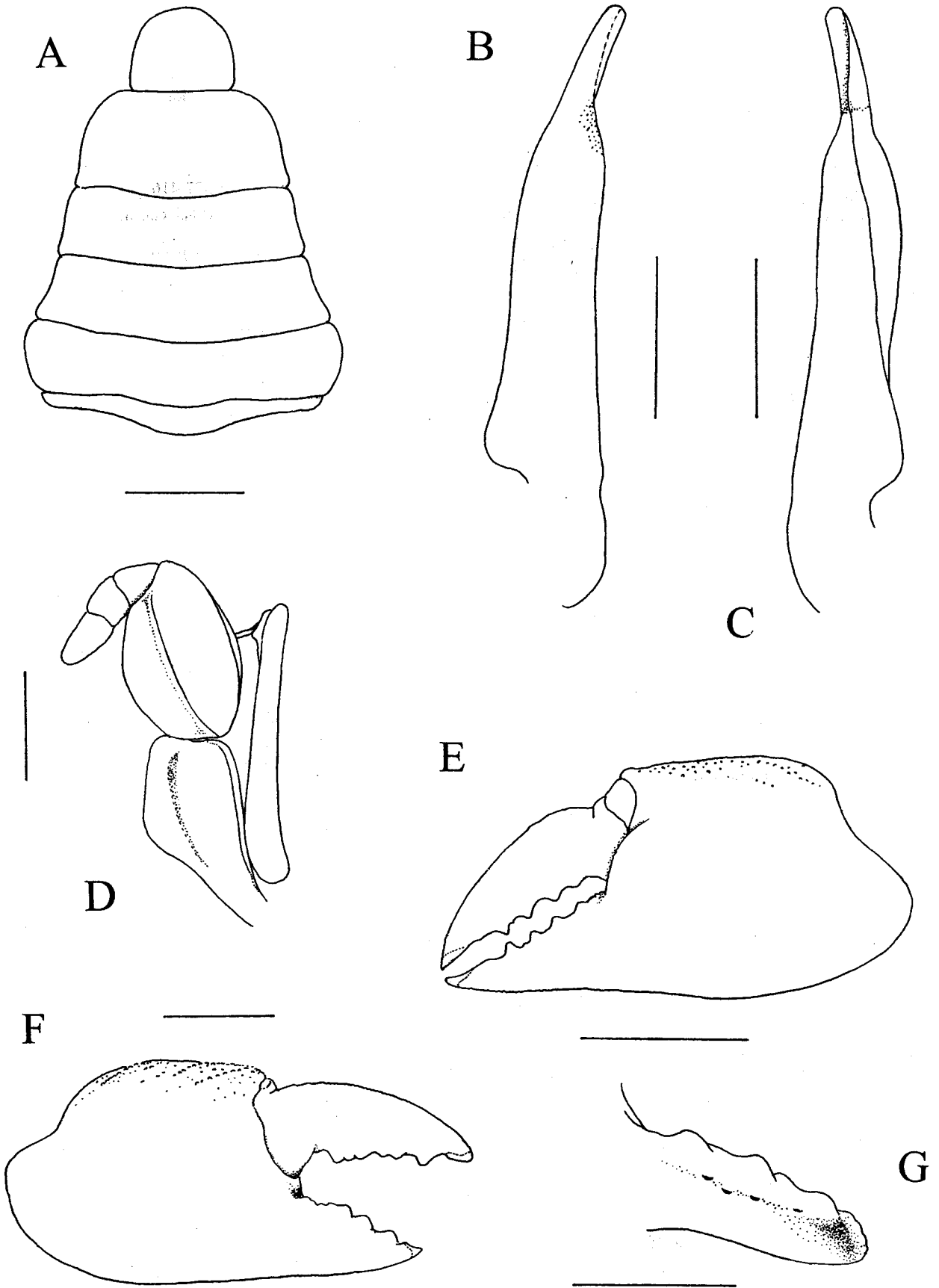


Fig. 4. *Haberma nanum*, new genus, new species. A, F, G, paratype male (6.5 by 6.5 mm) (ZRC 2000.1956); B-E, paratype male (5.0 by 4.9 mm) (ZRC 1971.11.5.6). A, abdominal segments 2-6 and telson; B, C, left G1 (setae not drawn); D, left third maxilliped (setae not drawn); E, left chela; F, right chela; G, inner view of pollex of right chela. Scales: A, E-G = 2.0 mm, B-D = 0.5 mm.

this name is derived from that of an old stream in Singapore which is no longer extant.

The function of the subchelate male first and second ambulatory legs is not known. As noted above, it is very poorly developed in females (sometimes almost undiscernible); and it is thus a sexually dimorphic character. Immature males, however, do not have well developed subchelate first and second ambulatory legs. Ng (1987) noted that the last two pairs of subchelate ambulatory legs of the dorippid *Neodorippe callida*, normally used to carry leaves for camouflage, can also be used to grasp the female during mating. The same function could be carried out by the first two subchelate ambulatory legs in male *H. nanum* (see also Guinot et al., 1995).

The eggs of *Haberma nanum* are small, and typical of sesarmids. The first zoeal stage of this species was obtained and is currently under study by J. A. Cuesta. The first zoea appears normal and there are no indications that its development is abbreviated to any degree. Furthermore, a 560 base pair region of the 16S mtDNA of *Haberma nanum* has been sequenced to establish the phylogenetic position of this species within the Sesarmidae. It confirms the classification of this genus outside *Chiromantes*, with no evident sister taxon relationship to any of the other sesarmid species sequenced so far (Ng & Schubart, in preparation).

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