

Six species of Axiidea and Gebiidea from the Indo-West Pacific (Crustacea, Decapoda)

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ABSTRACT

Collections held by the Muséum national d'Histoire naturelle until now unstudied contain six species of Axiidea de Saint Laurent, 1979 and Gebiidea de Saint Laurent, 1979 from the Indo-west Pacific. Three species of Callianassidae Dana, 1852 are new: *Calliax tulearensis* n. sp., and *Calliaxina thomassini* n. sp. from Madagascar and *Callianassa coriolisae* n. sp. from the Philippines. *Neocallichirus audax* (de Man, 1911), *Axianassa ngochoae* Anker, 2010 and *Gebiacantha richeri* Ngoc-Ho, 1989 are reported for the first time from Vietnam. The new species are described and morphological variabilites in the others are discussed.

RÉSUMÉ

Six espèces d'Axiidea et de Gebiidea de l'Indo Pacifique Ouest (Crustacea, Decapoda). Du matériel non identifié dans les collections du Muséum national d'Histoire naturelle contient six espèces d'Axiidea de Saint Laurent, 1979 et de Gebiidea de Saint Laurent, 1979 de l'Indo-Ouest Pacifique. Trois espèces de Callianassidae Dana, 1852 sont nouvelles : *Calliax tulearensis* n. sp. et *Calliaxina thomassini* n. sp. de Madagascar et *Callianassa coriolisae* n. sp. des Philippines. *Neocallichirus audax* (de Man, 1911), *Axianassa ngochoae* Anker, 2010 et *Gebiacantha richeri* Ngoc-Ho, 1989 sont signalées pour la première fois du Vietnam. Les espèces nouvelles sont décrites et les variations morphologiques chez les autres espèces sont discutées.

KEY WORDS

Indo-west Pacific,
Callianassidae,
Axianassidae,
Upogebiidae,
new species,
new records.

MOTS CLÉS

Indo-Ouest Pacifique,
Callianassidae,
Axianassidae,
Upogebiidae,
espèces nouvelles,
nouveaux signalements.

INTRODUCTION

Mud shrimps or mud lobsters, owing to their common lifestyle as mud burrowers, formerly Thalassinidea Latreille, 1831 are now classified in two infraorders: Axiidea de Saint Laurent, 1979 and Gebiidea de Saint Laurent, 1979 (Robles *et al.* 2009; Dworschak *et al.* 2012) This taxonomy is adopted in the present work.

In this work, three new species are described and three others newly recorded from previously unstudied collections in the MNHN made in Madagascar, the Philippines and Vietnam.

MATERIAL AND METHODS

If not otherwise stated, the rostrum, the anterior part of the carapace, the telson, the uropods are figured in dorsal view and appendages in lateral view.

ABBREVIATIONS

| | |
|------|---|
| cl | carapace length, measured dorsally from the tip of the rostrum to the posterior border of the carapace; |
| MNHN | Muséum national d'Histoire naturelle, Paris; |
| tl | total length, measured from the tip of the rostrum to the posterior border of the telson. |

SYSTEMATICS

Infraorder AXIIDEA de Saint Laurent, 1979
Family CALLIANASSIDAE Dana, 1852

Subfamily EUCALLIACINAE
Manning & Felder, 1991

REMARKS

Ngoc-Ho (2003: 487) considers the presence of an exopod on the maxilliped 3 an important taxonomic character, and proposes, in the subfamily Eucalliicinae, to separate species having or lacking an exopod on the maxilliped 3. The genera *Calliax* de Saint Laurent, 1973 and *Eucalliix* Manning & Felder, 1991 include species having no exopod on the maxilliped 3, e.g., *Calliax lobata* de Gaillande & Lagardère, 1966, type species or *Calliax tulearensis*

n. sp. Species provided with an exopod on the maxilliped 3 are placed either in the genus *Paraglypturus* Türkay & Sakai, 1995, e.g., *Paraglypturus calderus* Türkay & Sakai, 1995, type species or *Calliaxina* Ngoc-Ho, 2003, e.g., *Calliaxina punica* de Saint Laurent & Manning, 1982, type species and *Calliaxina thomassini* n. sp. Both new species *Calliax tulearensis* n. sp. and *Calliaxina thomassini* n. sp. are treated in this work.

Genus *Calliax* de Saint Laurent, 1973
Calliax tulearensis n. sp.
(Fig. 1)

MATERIAL EXAMINED. — Madagascar. Tuléar, in detritus, Galenon collected 1965/66: holotype, ♀ (MNHN Th 1620), cl 4.5 mm, tl 20 mm.

OTHER MATERIAL EXAMINED. — Nosy Bé, Crosnier coll. 1958, ovigerous ♀, cl 7 mm, broken into three pieces (MNHN Th 859).

DIAGNOSIS. — Rostrum broadly triangular with obtuse tip. Eyestalk approximately 1.6 times as long as wide at base, with slightly pointed tip. Telson 1.5–2 times as wide as long, lateral borders rounded, posterior border slightly convex. Antennular peduncle shorter than antennal peduncle. Pereopods 1 unequal and dissimilar; major pereopod 1 chelate, ischium and merus with eight and five lower spinules, minor pereopod 1 subchelate, ischium with seven lower spinules, pereopod 3 with small proximal heel on propodus. Uropod exopod twice as long as telson, no notch on lateral border.

ETYMOLOGY. — The new taxon is named after its type locality.

DESCRIPTION

Carapace (Fig. 1A–C) lacking dorsal oval, slightly shorter than pleomeres 1 and 2 combined; broadly triangular short rostrum with blunt tip in frontal margin. Cervical groove and *linea thalassinica* distinct, sutures absent. Eyestalks dorsally flattened, about 1.5 times as long as wide at base in holotype (Fig. 1C), slightly wider at base in specimen MNHN Th 859 (Fig. 1B), corneas retracted and non pigmented in holotype, round and subterminal in specimen MNHN Th 859.

Telson about 1.2 times as broad as long in holotype (Fig. 1J), twice as broad as long in specimen

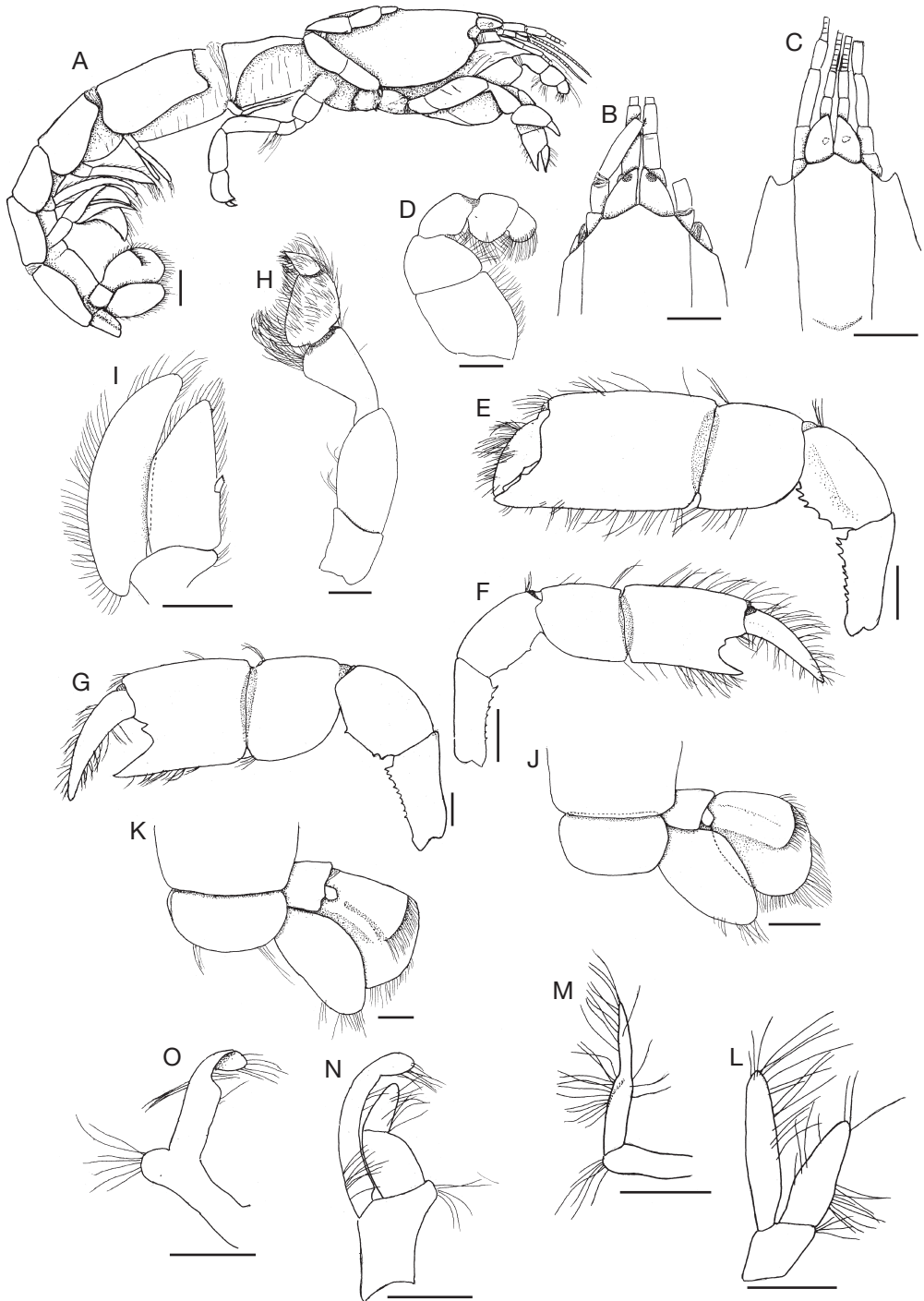


FIG. 1. — *Calliax tulearensis* n. sp.: A, C, E, F, I, J, L, M, holotype, ♀, tl 20 mm (MNHN Th 1620); B, D, G, H, K, N, O, non type, ♀, broken cl 7 mm (MNHN Th 859). A, lateral view; B, C, carapace; D, maxilliped 3; E, major pereopod 1; F, G, minor pereopod 1; H, pereopod 2; I, pleopod 3; J, K, telson and uropod; L, N, pleopod 2; M, O, pleopod 1. Scale bars: 1 mm.

MNHN Th 589 (Fig. 1K); lateral borders rounded, posterior border slightly convex.

Antennular peduncle (Fig. 1C) shorter than that of antenna, reaching approximately base of last article of the latter (last article of antennal peduncle broken in specimen MNHN Th 859).

Maxilliped 3 (Fig. 1D) exopod absent. Endopod with approximately quadrate ischium, merus about 0.8 time as long as broad, carpus with convex lower border, propodus as long as broad, lower border strongly flexed, dactylus with broad rounded terminal border bearing close-set serrated setae.

Pereopods 1 unequal and dissimilar. Major P1 (Fig. 1E) (missing in specimen MNHN Th 859), chelate; ischium and merus with eight and five spinules respectively on lower border; carpus and propodus unarmed; fixed finger as long as dactylus, with obtuse tip and small tooth at midlength of cutting edge; dactylus with curved tip.

Minor P1 on the right in holotype (Fig. 1F), on the left in specimen MNHN Th 589 (Fig. 1G); ischium with seven or eight spinules on lower border; merus with convex lower border bearing two denticles in holotype, three larger spinules in specimen MNHN Th 859; carpus, propodus and dactylus unarmed, fixed finger with pointed tip, about half as long as dactylus and separated from it by a wide gap bearing an obtuse tooth at base, larger in specimen MNHN Th 589 (Fig. 1G); dactylus with pointed tip.

Pereopod 3 (Fig. 1H), pereopod 4, pereopod 5 all unarmed, small proximal heel on pereopod 3 propodus, pereopod 5 subchelate.

Female pleopod 1 (Fig. 1M, O) uniramous, biarticulated; female pleopod 2 (Fig. 1L, N) biramous, both pleopods lacking *appendix interna*.

Pleopods 3-5 (Fig. 1I) biramous, foliaceous with finger-like *appendix interna*.

Uropods (Fig. 1J, K) longer than telson, exopod nearly three times as long as telson in the young holotype, two and a half times as long as telson in the larger ovigerous MNHN Th 859; distal dorsal plate present, no notch on lateral border.

REMARKS

Manning & Felder (1991) separated the genus *Calliax* from their newly established *Eucalliax* on

the basis of pereopods 1 unequal and dissimilar in the former, equal and similar in the latter. Yet Sakai (1999: 109; 2005: 196) synonymised the two taxa on the basis of both having maxilliped 3 without exopod and separated it from *Paraglypturus* Turkey & Sakai, 1995 possessing a maxillipedal exopod. *Eucalliax* is recognised by most later authors.

Ngoc-Ho (2003) gave characters defining *Calliax* and *Eucalliax* and recognised only two species for *Calliax*: *C. lobata* (de Gaillande & Lagardère, 1966), type species, from the vicinity of Toulon, France and *C. doerjesti* Sakai, 1999 from Georgia, USA. Sakai (2011a) recognised the genus, including the same two species and added three new eucalliace genera.

The present new species from Madagascar is the third species of *Calliax*. It agrees with the others (see Ngoc-Ho 2003: 489) in: 1) rostrum short, with blunt tip, rostral spine absent; 2) antennular peduncle shorter than that of antenna; 3) pereopods 1 unequal, dissimilar, minor with fixed finger shorter than dactylus and separated from it by a wide gap with a proximal tooth on the cutting edge; 4) pereopod 3 with small proximal heel on propodus; and 5) female pleopod 1 uniramous, female pleopod 2 biramous, all lacking *appendix interna*; pleopods 3-5 foliaceous, with finger-like *appendix interna*.

The new taxon resembles *C. doerjesti* by having no lateral notch on the uropod exopod (notch present in *C. lobata*). It differs from *C. lobata* and *C. doerjesti* by: 1) the shape of telson which is 1.2-2 times as broad as long, vs about as long as broad in *C. lobata*; "two-thirds length of its breadth" (Sakai 1999: 112) in *C. doerjesti*; and 2) uropods longer than telson, exopod 2.5-3 times longer than telson, slightly longer than telson in *C. lobata* and *C. doerjesti*.

Both specimens studied are from Madagascar on the Mozambique side and they are likely to be of the same species. MNHN Th 859 agrees with the holotype in many characters e.g., the rostrum, the antennular peduncle shorter than that of the antenna, the maxilliped 3, the minor pereopod 1, the pereopod 3, the pleopods etc. that are figured. It differs from the holotype mainly in the shape of the telson (twice as long vs 1.2 times as

broad as long in the holotype). It is also damaged and broken into three pieces, therefore is not regarded as a paratype in this work.

Genus *Calliaxina* Ngoc-Ho, 2003

Calliaxina thomassini n. sp.

(Fig. 2)

MATERIAL EXAMINED. — **Madagascar.** All specimens small and damaged with most appendages lost except for holotype.

Holotype. Toliara (Tuléar) region (South-western Malagasy) Songoritelô fringing reef, 15 km northward of Toliara town, in seagrass beds on inner reef flats, coarse limestone sand, J. Picard coll. 3.VIII.1962: ♂, cl 5 mm, tl approx. 21 mm, specimen broken into three parts, all pereopods present, broken off, maxilliped 3 endopod lost, exopod present (MNHN Th 1621) (figured).

Paratypes. ♀, same data as holotype, cl 5.5 mm, tl 20.5 mm, most appendages lost except for right pereopod 1, 2 and 3. (MNHN Th 1622) (figured); Toliara Great Barrier Reef, 10 m, clean coral sands, B. A. Thomassin coll. 19.IX.1969: 2 ♂, both pereopods 1 present, cl 5 mm, tl 17 mm (MNHN Th 1623a), cl 4 mm, tl 15.5 mm (figured) (MNHN Th 1623b); Nosy Bé Island (north-western Malagasy), Antafian-ambitry fringing reef, inner flats back of inner marine seagrass beds, sandy sediments, Mireille Pichon-Carles coll. 21.X.1964: 2 ♀, cl 5.5 mm, tl 19 mm (MNHN Th 1624a), cl approx. 4 mm, dissected (MNHN Th 1624b).

Non type. Thomassin coll., data lost: ♀, cl 6.5 mm, tl approx. 23.5 mm, specimen much damaged, broken (MNHN Th 1625).

DIAGNOSIS. — Rostrum slightly pointed or absent. Eyestalks about 1.25 times as long as broad at base, corneas rounded, subterminal. Telson approximately 1.60-1.70 times as broad as long, lateral borders rounded, posterior border slightly convex, a transverse carina in large specimens. Maxilliped 3 exopod present, articulated, overreaching ischium of endopod. Pereopod 1 subequal, slightly dissimilar, not sexually dimorphic. Pereopod 1 with faint longitudinal keel on upper border of propodus; fixed finger with pointed tip, cutting edge either with a small triangular median tooth along with two or three tufts of setae or unarmed with a longitudinal depression and row of long setae near the edge. Uropods longer than telson; exopod with rounded posterior border, dorsal plate and large pointed proximal spine.

ETYMOLOGY. — The species is named for Bernard A. Thomassin who collected and donated the studied material to the MNHN.

DESCRIPTION

Carapace lacking dorsal oval, frontal margin with small pointed rostrum (Fig. 2A) or flat (Fig. 2B). *Linea thalassinica* distinct, cervical groove and one transverse suture present, very faint. Eyestalks dorsally flattened, about 1.25 times as long as broad at base, corneas rounded, pigmented, subterminal.

Telson (Fig. 2C, P, Q) approximately 1.60-1.70 times as broad as long, broader in larger specimen (MNHN Th 1625, ♀ of tl 23.5 mm, Fig. 2P), lateral borders rounded, posterior border slightly convex, a transverse carina interrupted medially bearing a few setae in large specimens, carina absent in small specimens (Fig. 2Q).

Antennule and antenna unbroken in one specimen (MNHN Th 1624a); antennular peduncle shorter than antennal peduncle, reaching approximately $\frac{2}{3}$ distal of last article.

Maxilliped 1 (Fig. 2H) endopod absent or broken, epipod large with pointed anterior lobe.

Maxilliped 2 (Fig. 2I) epipod present, slightly overreaching ischium of endopod.

Maxilliped 3 (Fig. 2J, K) exopod present, articulated, overreaching ischium of endopod. Ischium of endopod slightly longer than broad, *crista dentata* on inner surface, holding 12 teeth in holotype; merus about 0.8 time as long as broad, carpus with convex lower border; propodus as long as broad; dactylus with rounded terminal border bearing close-set stiff setae.

Pereopod 1 subequal, slightly dissimilar, not sexually dimorphic. Ischium (Fig. 2D, E) approximately 2.5 times as long as broad at mid-length; lower border with two or three spinules followed by two or three denticles; merus about 0.8 times as long as broad, carpus as long as broad, both merus and carpus with convex lower and upper border, unarmed. Propodus about 1.2 times as long as broad in holotype (Fig. 2D), approximately as long as broad in other pereopods 1 examined (Fig. 2E); upper border with a longitudinal keel, very faint in holotype and paratypes, better defined in a larger specimen (Fig. 2E); fixed finger with pointed tip, cutting edge varies slightly in morphology: either carrying a small triangular tooth medially along with two or three tufts of setae on the side (Fig. 2D, E); or unarmed with a longitudinal depression and row

of long setae near the edge (Fig. 2F, G); this shape occurs equally on right or left pereopod 1, more often on the right. Dactylus with pointed curved tip, unarmed.

Pereopods 2-5 (Fig. 2L-O) as figured. Pereopod 2 chelate; pereopod 3 with small postero-proximal lobe on propodus; pereopod 4 propodus slender; pereopod 5 subchelate.

Male pleopod 1, very small in holotype (Fig. 2S) uniramous, 2-articulated, distal article slender, with pointed tip; male pleopod 2 (Fig. 2T) biramous, exopod shorter than endopod, latter with spinule and outline of *appendix interna*.

Female pleopod 1 (Fig. 2U) in specimen MNHN Th 1625 (tl 23 mm) uniramous, bi-articulated, first article making a stout angle, distal article slender with a few setae; female pleopod 2 (Fig. 2V) biramous, exopod longer and slender than endopod, no visible *appendix interna*.

Pleopod 3-5 (Fig. 2R) biramous, foliaceous endopod bearing finger-like *appendix interna*.

Uropods (Fig. 2C, P, Q) exopod and endopod oblong, longer than telson, exopod with rounded posterior border, dorsal plate and large pointed proximal spine.

REMARKS

The genus *Calliaxina* was established by Ngoc-Ho (2003) with *Calliax punica* de Saint Laurent & Manning, 1982 as type species and including two others: *C. novaebritanniae* (Borradaile, 1899) and *C. sakaii* (de Saint Laurent & LeLoeuff, 1979). The genus mainly differs from *Calliax* by having an exopod on the maxilliped 3.

This taxon has been disputed by Sakai. Sakai (2005: 197) stated that *Calliaxina* "is not accepted" and *Calliaxina* as well as *Eucalliax* were considered synonymous with *Calliax*. Sakai (1999) ignored *Calliaxina* all together. Sakai's stance was criticized by Dworschak (2007: 159). Later, Sakai (2011a: 494) recognised *Calliax*, *Eucalliax* and *Calliaxina* as valid; nevertheless, he argued that the presence of an exopod on the maxilliped 3 was not "of vital importance" in the classification of the genera, in contrast, the presence of a sulcus was considered. According to his concept, *Calliaxina* was expanded to include eight species.

The cardiac sulcus is an uncalcified suture running across the carapace between the cervical groove and the posterior border. It is faint, much more indistinct than the *linea thalassinica* and is also variable. In the material of the new taxon studied, it is present only in the holotype and a specimen of cl > 4 mm (tl > approx. 15 mm) while the maxilliped 3 exopod is present in all. Similarly, in *Calliaxina punica* (de Saint Laurent & Manning, 1982), type species of the genus, the cardiac sulcus is present but hardly visible in a ♂ of tl 26 mm (de Saint Laurent & Manning 1982: fig. 1a) belonging to the paratype lot MNHN Th 565 (6 ♂, 4 ♀, of tl 12-26 mm). In the rest of the lot and in the paratypes MNHN Th 563 (2 juveniles of tl 12 mm and 12.5 mm), the cardiac sulcus is absent.

In this work, the classification of *Calliaxina* as defined by Ngoc-Ho (2003) is adopted.

There are a few similarities between *Calliaxina* and *Eucalliax*, e.g., while comparing *Calliaxina thomassini* n. sp. with *Eucalliax panglaoensis* Dworschak, 2006 from Bohol, Philippines. Both species have a suture on the carapace, the pereopod 1 equal and chelate, pereopod 3 with a small proximal lobe on the propodus, telson with a transverse carina (not always present in *Calliaxina thomassini* n. sp.); however the rostrum is much more prominent in *E. panglaoensis* and the telson is broader. Above all, the main difference between the two genera is that *Eucalliax panglaoensis* as all species of *Eucalliax* has no exopod on maxilliped 3, while a large exopod is present on maxilliped 3 of *Calliaxina thomassini* n. sp.

The material examined comprises young specimens of small size. Consequently, a number of characters, especially male and female pleopods 1 and 2, are very small with no visible *appendix interna* or *appendix masculina*. Some other characters do not quite agree with the original diagnosis of *Calliaxina* presented by Ngoc-Ho (2003: 493): the maxilliped 3 is narrower (ischium + merus length about 2.5 times merus width) than in typical species where it is operculiform (ischium + merus length < twice merus width), the telson is about 1.60-1.70 as wide as long, slightly wider than in *Calliaxina punica*, type species of the genus.

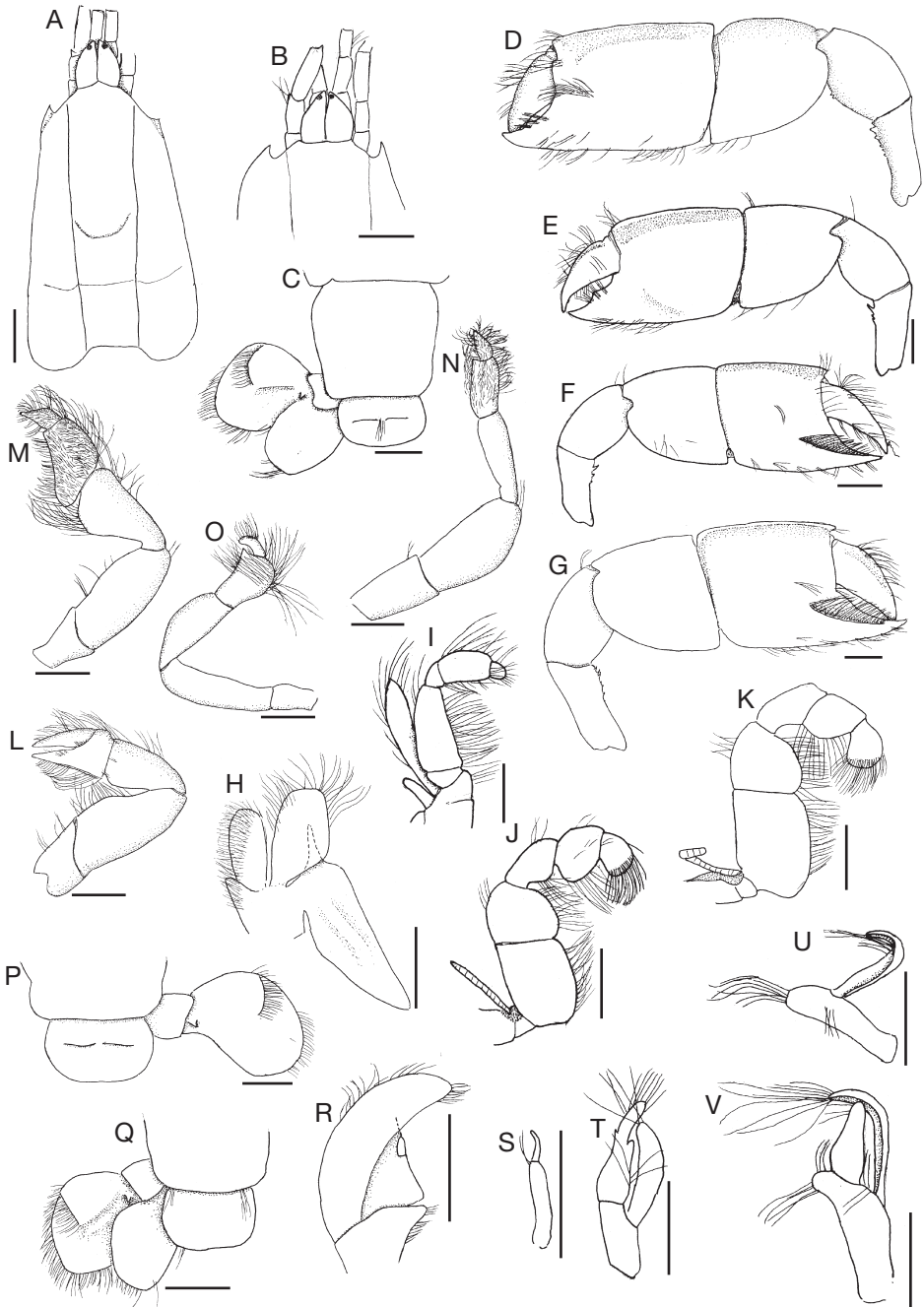


FIG. 2. — *Callixina thomassini* n. sp.: **A, C, D, H-K, R-T**, holotype ♂, tl 21 mm (MNHN Th 1621); **B**, paratype ♀, tl 20.5 mm (MNHN Th 1622); **E, F, L-N**, paratype ♀, diss., cl 4 mm (MNHN Th 1624b); **G, O, P, U, V**, non type ♀, broken, tl 23.5 mm (MNHN Th 1625); **Q**, paratype ♂, tl 15.5 mm (MNHN Th 1623b). **A, B**, anterior part of carapace; **C, P, Q**, telson and uropods; **D-G**, pereopod 1; **H-K**, maxilliped 1-3; **L-O**, pereopod 2-5; **R**, pleopod 3; **S, U**, pleopod 1; **T, V**, pleopod 2. Scale bars: 1 mm.

Of the three *Calliastina* species, the new taxon shows similarities with *C. novaebritanniae*:

1) Small slightly pointed rostrum; 2) maxilliped 3 exopod about as long as ischium; 3) telson broader than long with transverse carina interrupted medially by a tuft of setae; and 4) posterior border of telson straight or slightly convex.

Calliastina thomassini n. sp. differs from *C. novaebritanniae* as well as *C. punica* and *C. sakaii* by: 1) rostrum minute or nearly absent; 2) row of long setae on the edge of the depression on one pereopod 1 fixed finger; and 3) large proximal spine on uropod exopod.

Genus *Callianassa* Leach, 1814

Callianassa coriolisae n. sp.

(Fig. 3)

Callianassa sibogae de Man, 1905: 613. – Ngoc-Ho 1994: 54, fig. 3.

Cheramus sibogae – Ngoc-Ho 2005: 77, fig. 15.

MATERIAL EXAMINED. — **Philippines.** NO “Corioli” MUSORSTOM 3, St. 119, 320-337 m, 3.VI.1985. Holotype. ♂, cl 12 mm, tl 45.5 mm, major pereopod 1 absent (MNHN Th 1228).

Paratypes. 2 ♂, one damaged, cl 11 mm, tl 36 mm, one broken, cl 14 mm, major pereopod 1 present (MNHN Th 1229).

OTHER MATERIAL EXAMINED. — **Indonesia.** Java anchorage, *Callianassa sibogae*, holotype, Siboga Expedition: ♂, tl 22.8 mm (ZMA De 102.439).

Western Australia. *Callianassa sibogae*, Northwest Shelf: ♀, tl 13 mm (MNHN Th 1248).

French Polynesia. *Cheramus sibogae*, Raiatea Is., Society: ♀, tl 23.5 mm (MNHN Th 1434).

DIAGNOSIS. — Rostrum laterally compressed with upturned pointed tip. Antennular peduncle shorter than antennal peduncle. Second pleomere broader than long, with terga expanded laterally. Telson longer than broad at base, posterior border convex with a median spine. Maxilliped 3 subpediform, merus approximately quadrate. Male major pereopod 1 with spinules on lower border of ischium, merus with proximal pointed hook, carpus with typical elongated proximal dorsal “neck”, fixed finger and dactylus slender with incurved tip. Minor pereopod 1 ischium with spinules on lower border; merus with a spine at midlength of lower border; fixed finger and dactylus unarmed with slightly curved tip.

Pereopod 3 propodus slender, not expanded. Uropod exopod and endopod longer than telson. A digitiform *appendix interna* on endopod of pleopods 2-5.

ETYMOLOGY. — The species is named after the oceanographic vessel *Coriolis* that collected the studied material.

DESCRIPTION

Carapace (Fig. 3A, B) with laterally compressed upturned pointed rostrum; eyestalks slightly shorter than first article of antennular peduncle, with obtuse mesiodistal tip, corneas subterminal. First pleomere saddle-shaped, broader posteriorly than anteriorly, narrow in the middle, lateral margins concave; second and sixth segments of about same length. Telson (Fig. 3C) about as long as sixth pleomere, slightly longer than broad at base, posterior border convex with a median spine and two lateral spiniform setae on each lateroposterior angle.

Antennular peduncle (Fig. 3A, B) reaching approximately base of last segment of antennal peduncle. Third maxilliped (Fig. 3D, E) subpediform with ischium-merus length about two or three times merus width; merus approximately quadrate, mesial surface of ischium with *crista dentata* of six or seven large teeth and four or five smaller teeth.

Male major pereopod 1 (Fig. 3F) ischium with spinules on lower border, merus about as long as ischium bearing proximal pointed hook and distal denticles; carpus triangular with typical elongated dorso-proximal “neck”, rounded lower border and lower distal spinule; propodus approximately quadrate, 1.5 times longer than carpus, unarmed except for a distal spine between the bases of dactylus and fixed finger; both of the latter about 0.75 time length of propodus, with incurved tip, fixed finger with a small flat triangular tooth at midlength of cutting edge, cutting edge of dactylus with a round proximal tooth and dentate distally.

Male minor pereopod 1 (Fig. 3G) ischium with spinules on lower border; merus as long as ischium unarmed except for a spine at midlength of lower border; carpus 1.5 times as long as merus, unarmed; palm slightly shorter than fixed finger, latter and dactylus unarmed with slightly curved tip.

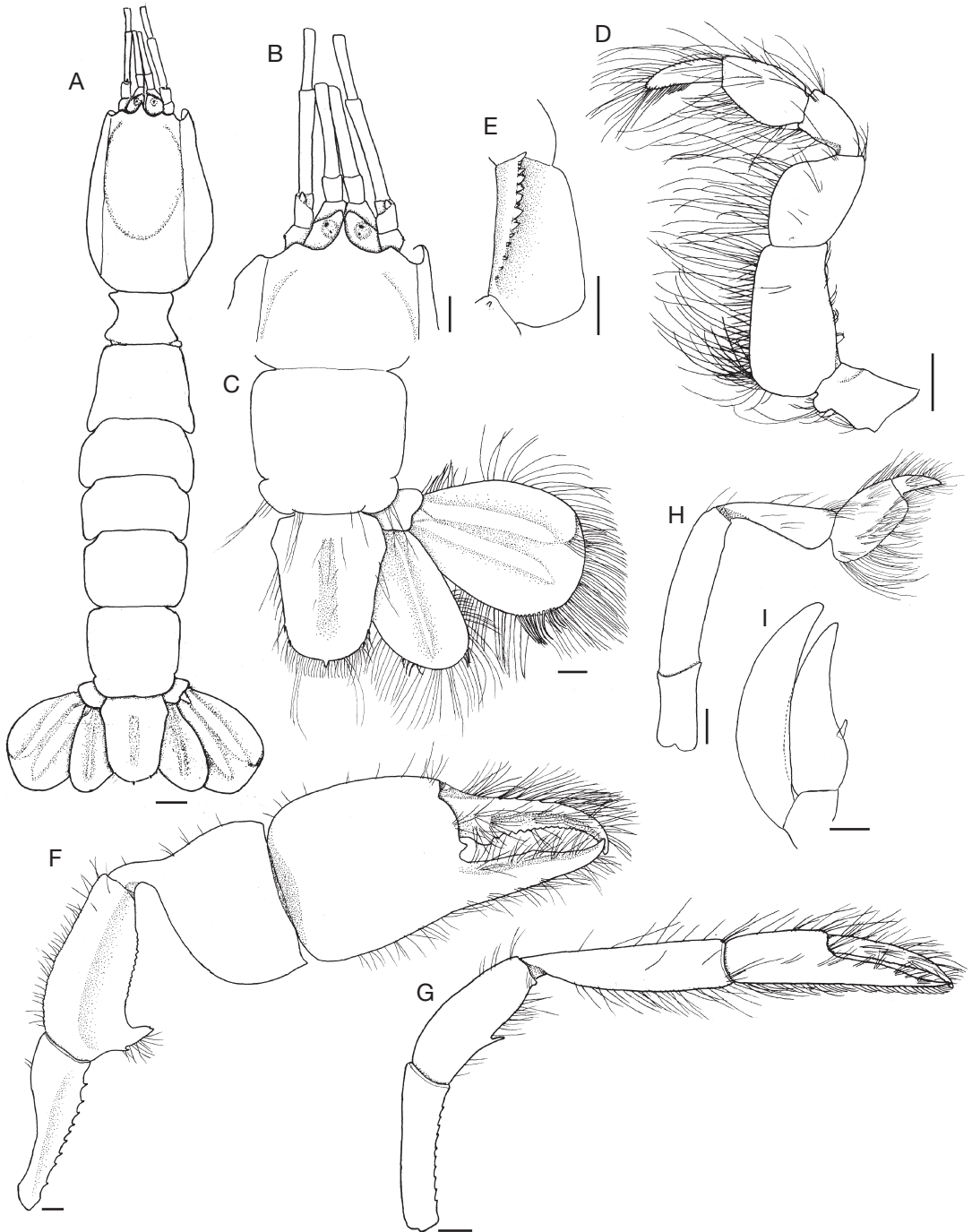


FIG. 3. — *Callianassa coriolisae* n. sp.: **A-E, G, H**, holotype ♂, tl 42.5 mm (MNHN Th 2228); **F, I**, paratype ♂, broken, cl 14 mm (MNHN Th 1229). **A**, whole specimen; **B**, anterior part of carapace; **C**, telson and uropods; **D, E**, maxilliped 3 and inner view of ischium; **F**, pereopod 1; **G, H**, pereopod 2 and 3; **I**, pleopod 3. Scale bars: 1 mm.

Pereopod 3 (Fig. 3H) propodus slender, not expanded ventrally.

Pleopod 3 (Fig. 3I) biramous, both endopod and exopod slender, endopod bearing small finger-like *appendix interna*.

Uropods (Fig. 3C) both exopod and endopod longer than telson, with rounded posterior border, small dorsal setose lobe on exopod.

REMARKS

This material was firstly assigned to *C. sibogae* de Man, 1905 to which it is similar in: 1) the laterally compressed pointed upturned rostrum; 2) the antennular peduncle shorter than that of the antennae; 3) the morphology of the second pleomere; and 4) the morphology of the telson (de Man 1928: 124-126, pl. XI, fig. 17-17e).

Nevertheless, Poore (personal communication) pointed out the differences between the two species: 1) *C. sibogae* rostrum appears with a sharp upper edge (de Man 1928: fig. 17) that is absent in the new taxon; 2) *C. sibogae* maxilliped 3 merus shows an accused squarish distomesial corner which it is weak in *C. coriolisae* n. sp.; 3) the posterior border of the telson is unarmed in *C. sibogae*, bearing a median spinule in *C. coriolisae* n. sp.; and 4) the uropod.

Exopod is slender about 1.8 time as long as wide in *C. sibogae*, 1.4 times as long as wide in *C. coriolisae* n. sp.

The materials previously assigned to *Callianassa sibogae* from Western Australia, Northwest Shelf, (MNHN Th 1248), and *Cheramus sibogae* from French Polynesia, Raiatea Is. Society (MNHN Th 1434) are likely to belong to this new taxon.

Callianassa sibogae was established by de Man (1905) on a much damaged male of the Siboga Expedition of tl 22.8 mm without pereopods 1, 3 and 4. No large male of this species or those closely related has been subsequently studied and the morphology of major pereopod 1 reported in *C. coriolisae* n. sp. with a dorso-proximal “neck” in the carpus is unique.

The species *sibogae* is placed by Tudge *et al.* (2000) and WORMS (World Register of Marine Species) (Poore 2013) in the genus *Cheramus* Bate, 1888 due to the presence of a rostral spine, and finger-like

appendix interna on pleopods among other characteristics. Nevertheless, considering the definition of the genus *Cheramus* as given by Manning & Felder (1991), a few discrepancies can be noted: male pereopod 1 bears a meral hook instead of being without; uropods are moderately elongated instead of “extremely elongate”.

Poore (personal communication) considers that *Cheramus sibogae* (and the new taxon) is within a group of a dozen or more species that are similar and diverse, and that probably should not be called *Cheramus*. Pending another revision of the group, the new taxon is here placed in the classic genus *Callianassa*.

Genus *Neocallichirus* Sakai, 1988

Neocallichirus audax (de Man, 1911)

(Fig. 4)

Callianassa audax de Man, 1911: 223. — Dworschak 1992: 190, fig. 1a-d. — Tudge *et al.* 2000: 138, 143.

Callianassa (Callichirus) audax – de Man 1928: 1, 28, 113, 179, pl. 20, fig. 31-31i. — Rao & Kartha 1967: 279, figs 1, 2. — Timizi 1967: 151-154, figs 1, 2.

Callichirus audax – de Saint Laurent & LeLoeuff 1979: 97.

Neocallichirus audax – Sakai 1999: 95, fig. 21d, f, 2005:17. — Fatima & Kazmi 2008: 123-124, pl. 1.

MATERIAL EXAMINED. — Vietnam. Can-Gio, HochiMinh ville, 9-10 km off the coast, 10-15 m, entangling net, sandy bottom, coll. and don. Nguyen-van-Xuân 2000, 1 ♂, cl 32 mm, tl 113 mm, broken, 1 ♀, cl 16 mm, tl 54 mm, distal part of both pereopods 1 broken (MNHN Th 1618).

DISTRIBUTION. — Strait of Malacca (de Man 1911; Dworschak 1992), West Pakistan (Tirmizi 1967) Malabar coast, south west India (Rao & Kartha 1967), East coast of India (Dworschak 1992).

DESCRIPTION

Carapace with cervical groove and *linea thalassinica* well defined; anterior border (Fig. 4A) with three small prominences, median prominence making short obtusely angular rostrum. Eyestalks about twice as long as broad, with slightly pointed tip, overreaching base of first antennular article; cornea

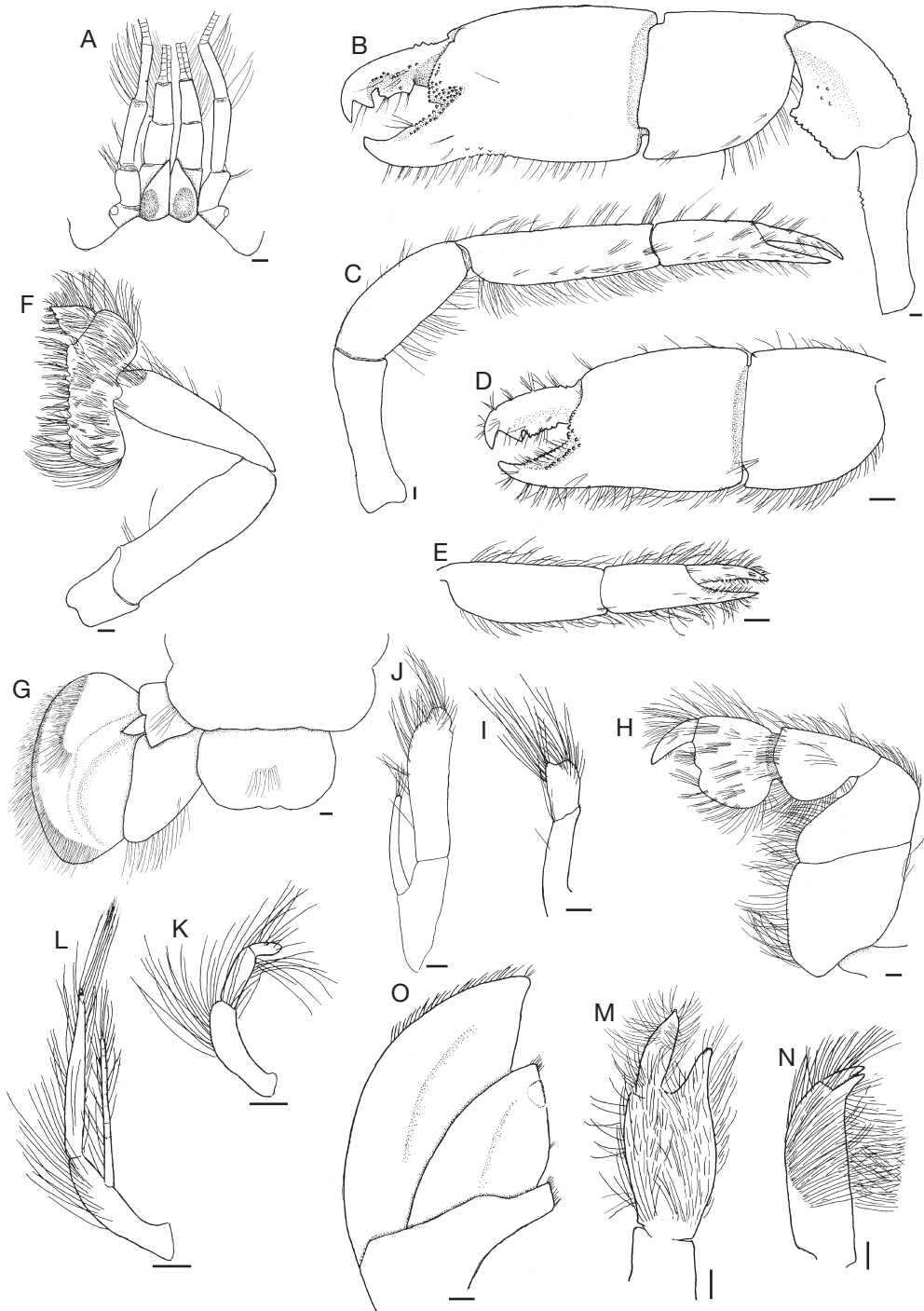


FIG. 4. — *Neocallichirus audax* (de Man, 1911) (MNHN Th 1618): **A-C, F-J, N, O**, ♂, tl 113 mm; **D, E, K, L, M**, ♀, tl 54 mm. **A**, anterior part of carapace; **B, D**, major pereopod 1; **C, E**, minor pereopod 1; **F**, pereopod 3; **G**, telson and uropod; **H**, maxilliped 3; **I, K, L, M, N, O**, pleopod 1; **J, L**, pleopod 2; **M, N**, distal part of pereopods 4 and 5. Scale bars: 1 mm.

rounded, large in male, smaller in female, dark brown, situated dorso-laterally in proximal half of eyestalks. Telson (Fig. 4G) nearly half as long as broad, posterior border slightly undulated, postero-lateral borders rounded, with few setae.

Antennular peduncle (Fig. 4A) reaching about half length of last article of antennal peduncle.

Other mouth appendages not differing from those described in previous accounts of the species (de Man 1928; Tirmizi 1967; Rao & Kartha 1967); maxilliped 3 (Fig. 4H) without exopod; endopod ischium-merus length less than twice merus width, propodus approximately quadrate, distal border feebly arcuate.

Major pereopod 1 massive (Fig. 4B, D) on the left in male as in female. Ischium slender, lower border with a few denticles; merus with a few proximal upper denticles and a toothed blade on lower border; carpus about as long as merus but broader with curved lower border; propodus 1.4 times longer than carpus, bearing fine tubercles distally and a dentate distal border; fixed finger slightly curved, with round tubercles proximally and on proximal half of cutting edge; dactylus slightly longer than fixed finger with curved tip, cutting edge with a strong triangular tooth pointing below and a flat broad tooth behind it that is more prominent in the male.

Minor pereopod 1 (Fig. 4C, E) slender, mainly unarmed, with carpus over 1.6 times longer than propodus, fixed finger and dactylus nearly as long as propodus.

Pereopod 3 (Fig. 4F) propodus with an elongated posterior lobe.

Pereopod 4 (Fig. 4M) subchelate and pereopod 5 (Fig. 4N) chelate, distal articles of both bearing numerous setae.

Male pleopod 1 (Fig. 4I) two-segmented, last segment with a shallow distal depression and bearing long setae. Male pleopod 2 (Fig. 4J) biramous; outer ramus slender and shorter than inner, latter with a distal constriction, both ramus with long setae distally.

Female pleopod 1 (Fig. 4K) three-segmented, last segment finger-like and about half as long as second segment, all segments bearing long setae. Female pleopod 2 (Fig. 4L) biramous, outer ramus faintly segmented and nearly as long as inner; in-

ner ramus with a distal minute knob as reported by Rao & Kartha (1967: 284, fig. 2H) and Sakai (1999: fig. 21f), both ramus carrying long setae. Third to fifth pleopods (Fig. 4O) biramous, foliaceous, both ramus lanceolate, *appendix interna* present, very faint on inner ramus.

Uropods (Fig. 4G) exopod with rounded outline and antero-dorsal plate; endopod slightly shorter than exopod, triangular, with largest width proximally, subacute tip turned postero-laterally.

REMARKS

Callianassa audax was established by de Man (1911) on two females from the Straits of Malacca and a full description was presented in 1928 along with the Decapoda of the Siboga Expedition. Two subsequent accounts of the species were by Tirmizi (1967) on a male from West Pakistan and Rao & Kartha (1967) on five specimens, four females and one male from the Malabar coast, southwest of India.

The specimens from Vietnam agree with materials of *Neocallichirus audax* previously studied, especially with the specimen from West Pakistan (Tirmizi 1967: fig. 2B) in the shape of the pereopod 3 propodus with a long posterior lobe (Fig. 4F), longer than in the type (de Man 1928: fig. 31f). The discrepancy is considered here as a variation.

Other discrepancies can be found in the account by Rao & Kartha (1967), e.g., the shape of the telson, of the uropods, of maxilliped 3, which are probably due to the poor quality of the figures.

Infraorder GEBIIDEA de Saint Laurent, 1979

Family AXIANASSIDAE Schmitt, 1924

Genus *Axianassa* Schmitt, 1924

Axianassa ngochoae Anker, 2010

(Fig. 5)

MATERIAL EXAMINED. — Vietnam. Cần gio, Hochi Minh city, 4-7 m, Nguyễn van Xuân coll., III.1998: 1 ♂, cl 7 mm, tl 20 mm (MNHN Th 1571).

DESCRIPTION

Carapace (Fig. 5A) rounded dorsally, with *linea thalassinica* well defined but cervical groove faint.

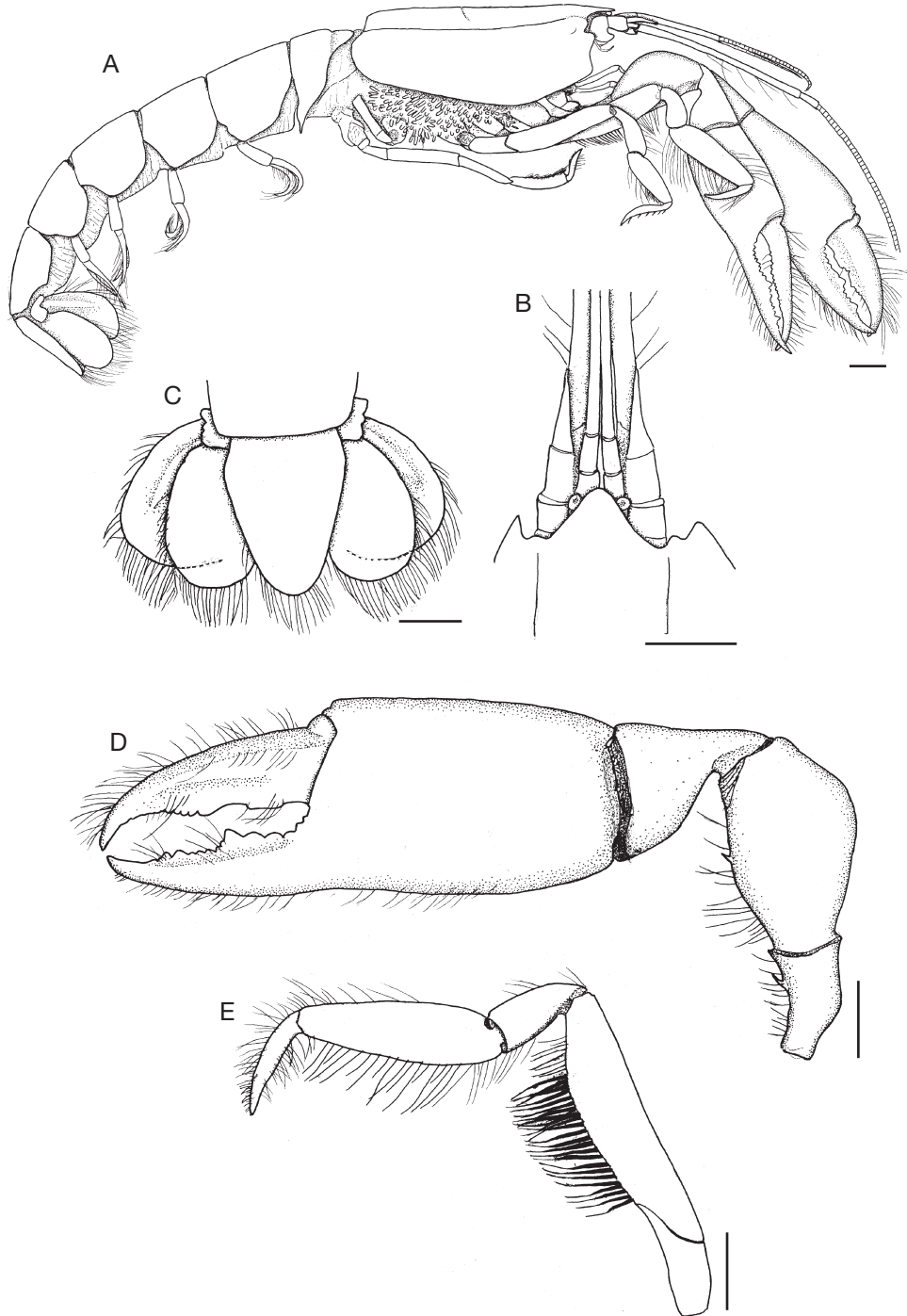


FIG. 5. — *Axianassa ngochoae* Anker, 2010, ♂, tl 20 mm (MNHN Th1571): **A**, lateral view; **B**, anterior part of carapace; **C**, telson and uropod; **D**, **E**, pereopod 1 and 2. Scale bars: 1 mm.

Rostrum (Fig. 5B) unarmed, anteriorly rounded, slightly surpassing cornea of eyes.

Pleomere 1 (Fig. 5A) about half dorsal length of somite 2, pleuron tapering ventrally to a spiniform process; pleomeeres 2 and 3 subequal in length, pleomeres 4-6 shorter, pleura poorly defined in all, unarmed. Telson (Fig. 5C) with greatest width about one-third of middorsal length, posterior margin rounded not clearly separated from lateral margins.

Cornea terminal, pigmentation partly lost after preservation. Antennular peduncle (Fig. 5A) about half length of antennal peduncle; antennular articles 1 and 2 about $\frac{1}{3}$ length of article 3, latter slender, elongate-cylindrical, lower flagellum with faintly differentiated articles, superior flagellum of about 30 articles, just reaching distal margin of antennal article 4. Antennal acicle (Fig. 5B) elongate with pointed tip, antennal article 4 elongate, cylindrical, flagellum about twice as long as peduncle.

Pereopod 1 (Fig. 5A, D) asymmetrical but similar in spinulation; both ischium and merus with one spine near anterior third of lower border; carpus and palm unarmed, fixed finger about as long as palm in minor pereopod 1, three-thirds as long as palm in major pereopod 1, cutting edge with small rounded teeth and a larger one near mid-length. Dactylus about as long as fixed finger, with curved tip, a flat tooth on proximal third, a large round tooth near midlength and four or five smaller round teeth distally. Pereopod 2 (Fig. 5A, E) ischium unarmed, merus bearing about 22-24 stout setae on lower border, carpus and propodus with stiff setae on lower border and fine setae on upper border; dactylus about half as long as propodus, slender with fine setae on upper and lower border. Pereopod 3 (Fig. 5A) with setae on lower border of propodus, dactylus with pointed tip with five or six corneous spinules on upper border. Pereopods 4, both right and left missing. Pereopod 5 (Fig. 1A) flexed distally with lower border of propodus becoming dorsal bearing numerous setae; numerous short setae on lower border of dactylus.

Pleopod 1 absent. Pleopods 2-5 (Fig. 5A) biramous, rami lanceolate. Uropods with both exopod and endopod (Fig. 5C) ovate, unarmed.

REMARKS

The specimen studied is a young male with no pleopod 1 and small gonopores on the coxae of pereopod 5.

Nine species of *Axianassa* are known to date with six of them originating from the vicinity of the American continent: *A. arenaria* Kensley & Heard, 1990 (Gulf of Mexico), *A. canalis* Kensley & Heard, 1990 (Panama canal), *A. intermedia* Schmitt, 1924 (Curaçao), *A. jamaicensis* Kensley & Heard, 1990 (Jamaica), *A. mineri* Boone, 1931 (Bay of Panama), *A. australis* Rodrigues & Shimizu, 1992 (Brazil). Except for *A. mineri*, the other species are from western Atlantic. The first five species were either established or redescribed by Kensley & Heard (1990).

Three species recently described are from southwestern Pacific: *A. sinica* W. Liu & R. L. Liu, 2010 from South China Sea, *A. ngochoae* Anker, 2010 from Polynesia, *Axianassa heardi* Anker, 2011 from off Queensland, Australia.

Of these last three species, *A. sinica* has a pointed rostrum (see Liu & Liu 2010: fig. 2A) while in *A. ngochoae* and *A. heardi*, the rostrum is obtuse (Anker 2010: fig. 1C, D; 2011: fig. 9B, E). It is unarmed in *A. ngochoae* but bears teeth on lateral margins in *A. heardi*.

The specimen from Vietnam agrees with the type except for the pereopod 2 (Fig. 5E) that is provided with stout setae on the lower border of the merus.

Family UPOGEBIIDAE Borradaile, 1903

Genus *Gebiacantha* Ngoc-Ho, 1989

Gebiacantha richeri Ngoc-Ho, 1989

(Fig. 6)

Gebiacantha richeri Ngoc-Ho, 1989: 137, fig. 8.

MATERIAL EXAMINED. — **Vietnam.** Can-gio, HochiMinh ville, Nguyen thi Du coll., 1996: 1 ovig. ♀, cl 13.5 mm, tl 30.5 mm, both pereopod 1, both pereopods 5, left pereopod 3 present; 1 ♂, cl 5.5 mm, tl 12.5 mm, left pereopod 2, left pereopod 3 present, both specimens in poor conditions with thin carapace (MNHN Th 1619).

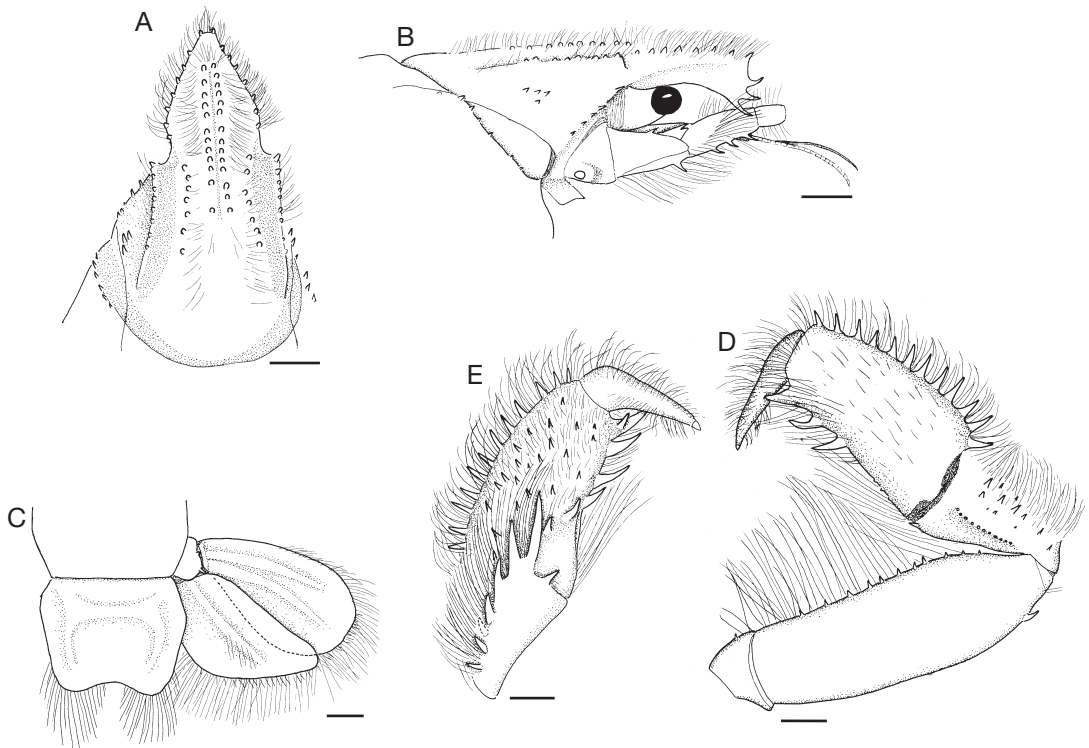


FIG. 6. — *Gebiicantha richeri* Ngoc-Ho, 1989, ♀, tl 30.5 mm (MNHN Th 1619): **A, B**, anterior part of carapace in dorsal and lateral views; **C**, telson and uropod; **D**, pereopod 1; **E**, distal part of pereopod 1 in mesial view. Scale bars: 1 mm.

OTHER MATERIAL EXAMINED. — **New Caledonia**. Lagon Est, Richer – ORSTOM col. 12.VIII.1986, holotype: ♂, tl 28 mm (MNHN Th 957).

DISTRIBUTION. — New Caledonia, Vietnam.

DESCRIPTION

Rostrum (Fig. 6A) slightly longer than broad at base in female specimen, longer in the male, bearing three large infra-rostral spines (two in the male) strongly projecting forward; lateral border with eight spiniform teeth, fine and faint median longitudinal groove bordered with small rounded tubercles. Lateral groove of carapace moderately broad bordered with tubercles; lateral ridge with six to eight small teeth. Antero-lateral border of carapace (Fig. 6B) with five spinules; antero-lateral region of carapace (between antero-lateral border and cervical groove) with three or four spinules. Cervical groove deep with five or six spinules on either side. Telson (Fig. 6C) about

1.3 times as broad as long, with faint inverted U-shaped carina dorsally, lateral border convex in proximal third, posterolateral angle rounded, posterior border concave medially.

Antennule with large lower spine on first peduncular article.

Antenna (Fig. 6B) second article with small upper spine; third article with lower subdistal spine; fourth article with three large lower spines, antennal scale small terminating in two spinules.

Pereopod 1 (Fig. 6D, E) subcheliform. Ischium with lower spine. Merus about three times as long as broad, with upper subdistal spine and 11 lower spines. Carpus with lower distal spine; lateral surface with light longitudinal crest on lower third bearing small tubercles, dorsal surface with several spinules covered with dense setae; mesial surface (Fig. 6E) with upper row of six large spines increasing in size distally and a median distal spine. Propodus slightly

twisted, as in *G. lagonensis* Ngoc-Ho, 1989 (Ngoc-Ho 1989: fig. 7), with main part of mesial surface turned upwards, densely setose and bearing several spinules, 12 large upper spines, oblique row of six spines on lower third, larger distally, fixed finger with one or two denticles. Dactylus with corneous tip.

Uropods (Fig. 6C) exopod about 1.5 times as long as telson, posterior border rounded; endopod approximately elongated triangular; protopod with spinule and tubercle

REMARKS

The genus *Gebiacantha* was established by Ngoc-Ho in 1989 and redefined in 2001. Sakai (2006: 13; 2011b: 1130) synonymised it with *Upogebia* Leach, 1814, arguing that it was created based on the presence of infrarostral spines “that are not considered so significant a character to distinguish one genus from another” (Sakai 2011b: 1130).

Gebiacantha was actually established not upon one character but a set of characters including those of mouth appendages; only specimens possessing all of these were assigned to the genus. The question is discussed in Ngoc-Ho (2008: 158) and Poore (2008: 422).

The present specimen from Vietnam agrees with the type in the morphology of the infrarostral spines that are strongly projecting forward, and also in the morphology and spinulation of the appendages. The first pereopod especially has the mesial surface of the propodus slightly twisted with dense setae and several spinules.

There are difference in the length of the rostrum which is shorter in the female specimen from Vietnam (Fig. 6A) than in the type (Ngoc-Ho 1989: fig. 8A), a male from New Caledonia. It can be noted that the male specimen from Vietnam examined is smaller with a difference in tl of 12.5 mm, but has a longer rostrum than in the female, similar to that of the type.

The telson bears a faint inverted U-shaped carina, as in the type but the transverse branch is simple (double in the type).

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