Synopsis of the family Callianassidae, with keys to subfamilies, genera and species, and the description of new taxa (Crustacea: Decapoda: Thalassinidea)

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A synopsis of the family Callianassidae is presented. Defenitions are given of the subfamilies and genera. Keys to the sufamilies, genera, as well as seperate keys to the species occurring in certain biogeographical areas are provided. At least the synonymy, type-locality, and distribution of the species are listed. The following new taxa are described: Calliapaguropinae subfamily nov., *Podocallichirus* genus nov., *Callianassa whitei* spec. nov., *Callianassa gruneri* spec. nov., *Callianassa ngochoae* spec. nov., *Neocallichirus kempi* spec. nov. and *Calliax doerjesti* spec. nov.

Contents

Introduction

The present work started with the primary object of producing the callianassid part of a database of the decapod Crustacea of the Indo-West Pacific region. Initially it took the form of a checklist but as the work progressed it was decided that it would

be more useful to zoologists examining callianassid material, when synonyms and other particularities of the species were given. Fossil species are not included in this synopsis.

Abbreviations used: A1 (antennule or antenna 1); A2 (antenna or antenna 2); CL (carapace length); m (meter); Mxp3 (maxilliped 3); P (pereiopod); Plp (pleopod); TL (total length from the tip of carapace to the end of telson, measured by attaching a thread), BLT (Biological Laboratory, Shikoku University, Tokushima, Japan).

Major contributions to the systematics of the Thalassinidea have been made by Borradaile (1903), De Man (1928b), De Saint Laurent (1973, 1979) and Felder et al. (after 1973).

The Ctenochelidae was separated from the Callianassidae by Manning & Felder (1991). The Ctenochelidae is here regarded paraphyletic as mentioned by Poore (1994). The genus *Anacalliax*, included in the Ctenochelidae by Manning and Felder (1991), was removed from this family and transferred to the Callianassidae by Poore (1994: 103). In the Ctenochelidae the male Plp2 has an appendix masculina as in *Glypturus* and *Paraglypturus*, and similarly, the merus of Mxp3 bears a distal spine as in *Callianassa propinqua, C. praedatrix, C. modesta* and *C. longicauda.*

Under the present family concept four subfamilies are recognized in the Callianassidae: Calliapaguropinae subfamily nov., Callianassinae Dana, 1852, Eucalliacinae Manning & Felder, 1991, and Anacalliacinae Manning & Felder, 1991. The Calliapaguropinae is based on the type species, *Calliapagurops charcoti*, which is characterized by the possession of elongated eyestalks and the Mxp3 merus bearing three distal spines. The Callianassinae is restricted to a group which have a dorsal oval on the carapace and the Mxp3 with a slender, digitiform dactylus. The Eucalliacinae has the carapace lacking the dorsal oval and the Mxp3 with an ovate dactylus. The Anacalliacinae has a dorsal oval and a rostral carina, and the Mxp3 dactylus slender. In the Callianassinae, *Podocallichirus* gen. nov. is established with *P. madagassus* as type species. It is characterized by the slender shape and parallel margins of the Mxp3 ischium-merus, and the subquadrate form of the Mxp3 propodus.

The status of the family, subfamilies, genera and species is confirmed by the examination of many specimens preserved in museums. The subfamily Eucalliacinae Manning & Felder, 1991, based on *Eucalliax* Manning & Felder, 1991, is only amended in the present taxa, because the type species of *Eucalliax*, *Callianassa quadracuta* Biffar, 1970, is defined as *Calliax* De Saint Laurent, 1973. *Scallasis* was included in Cheraminae Manning & Felder, 1991, however it is considered here to be a junior synonym of *Callianassa*. *Callianassa celebica* De Haan, 1844 is known only by the figure of its mouth parts, so it is difficult to determine to which genus in the Callianassidae it belongs using only the shape of Mxp3; and *Callianassa* sp. (Fourmanoir, 1955) from Anjouan, Comoros, W Indian Ocean, is placed into the Callianideidae. The records of *Callianassa* spp. from Molle Islands, Whitsunday Passage, Queensland (Haswell, 1882), from Honolulu, Hawaii (Rathbun, 1906), from off Dongala, Palos Bay, Celebes (= Sulawesi), Indonesia, 36 m (De Man, 1928b), from around Tsushima I, Japan, 110 m (Sakai, 1970a), and from the NW Gulf of Mexico (Rabalais, Holt & Flint, 1981) are not considered in the present discussion. In addition it is confirmed by Dworschak that *Callianassa* ? *abdominalis* White, 1847 and *C.* ? *carinaedorsis* White, 1847, are species of *Scytoleptes*, Axiidae (pers. comm.).

The present taxa are based on the following characters:

1) Carapace, rostrum, pair of anterolateral projections or spines, dorsal oval, rostral carina, cardiac prominence, cardiac transverse line, linea thalassinica, and linea anomurica. The carapace bears a dorsal oval in the Callianassinae and the Anacalliacinae. In the Eucalliacinae including *Calliax lobata, Paraglypturus caldera* and their related species it does not bear the dorsal oval, but is flattened dorsally. In *Calliax aequimana* and *Paraglypturus novaebritanniae* there are two cervical grooves dorsally. In the subfamily Anacalliacinae the rostral carina and the cardiac prominence are present. The linea thalassinica is characteristic in the Callianassidae. In *Paraglypturus novaebritanniae* the linea anomurica is distinctive. In *Poti gaucho* it was thought that the linea thalassinica was incompletely developed, however my examination of the holotype of *P. gaucho* shows it to be complete. The genus *Poti* is therefor synonymised with *Callianassa*. In *Lepidophthalmus* the rostrum may, or may not, be well developed; in *L. turneranus, L. sinuensis, L. tridentatus* and *L. grandieri,* the rostrum is trispinose. The frontal margin of carapace is provided with or without a pair of anterolateral spines above the antennal peduncle. In *Glypturus,* the anterolateral spine is always present and marked by a noncalcified membrane basally.

2) A1-2 peduncles. A1 peduncle is usually shorter than A2 peduncle in *Callianassa,* except for *C. australiensis, C. californiensis, C. setimanus, C. amboinensis* and *C. oblonga,* in which it is longer. In *Podocallichirus, Callichirus* and *Lepidophthalmus* the A1 peduncle is longer than the A2 peduncle, while in *Glypturus, Neocallichirus, Calliax* and *Paraglypturus, the* A1 peduncle is shorter than the A2 peduncle.

3) Mxp 3. Considering that members of the Callianassidae are sediment feeders, it seems that the Mxp3 plays an important functional role and consequently is useful for the definition of taxa. The dactylus can be of various shapes: oval in *Calliax* and *Paraglypturus;* digitiform in all the other genera. The propodus is slender, longer than wide in *Callianassa,* subquadrate in *Podocallichirus* gen. nov., *Neocallichirus, Lepidophthalmus, Glypturus, Calliax* and *Paraglypturus.* The proximal part of the ischium-merus is narrow and pediform in *Podocallichirus,* but broadened and subpediform, suboperculiform or operculiform in the other genera. The distal margin of the merus is broadened and truncate in some species of *Callianassa,* but usually convex and unarmed. However, it bears a distinctive spine in *Callianassa propinqua, C. praedatrix, C. modesta* and *C. longicauda* as in the Ctenochelidae, or three spines as in *Calliapagurops charcoti.*

4) Tail-fan. The endopod and exopod are simple in some species of *Callianassa,* while the exopod is broadly expanded with or without a submarginal row of setae, and the endopod is ovoid, strap-like, truncate distally, simply oval or triangular in the other species of *Callianassa, Neocallichirus, Podocallichirus, Glypturus, Lepidophthalmus* and *Paraglypturus. Calliax* sometimes has a characteristic lateral notch on the exopod, and the endopod is oval as in Ctenochelidae.

5) Plp1-2. In *Callianassa candida, C. bouvieri, C. diaphora, C. marchali* and *C. setimanus,* the male Plp1-2 are absent. In *Callianassa acanthura; C. truncata, C. tyrrhena, C. convexa, C. biformis, C. fragilis, C. biffari, C. californiensis, C. gigas, C. rochei, C. uncinata, C. filholi, C. australiensis, C. arenosa, C cristata, C. joculatrix, C. gravieri, C. parva, C. petalura, C. japonica, C. tonkinae, C. maldivensis, C. oblonga, C. marginata, C. parva, C. sibogae, C. pugnatrix, C. lobetobensis,* and *C. intermedia,* only the male Plp2 is absent, while in all the other genera the male and female Plp1-2 present.

Male Plp1. In some species of *Callianassa* the male Plp1 is absent, however in all of the other genera it shows a small, uniramous, one to two-segmented appendage. In *Callianassa profundus* and *Callichirus seilacheri*, the male Plp1 is a vestigial, simple segment. In the species of the other genera the male Plp1 is composed of two segments. In *Callianassa* and *Callichirus*, the appendage is tipped by a simple rounded margin, or exceptionally in *Calliax lobata* the distal segment is pointed distally, while in *Podocallichirus, Neocallichirus, Lepidophthalmus, Glypturus* and *Paraglypturus*, it is bilobed or chelate distally.

Male Plp2. In *Callianassa* the male Plp2 usually is a uniramous appendage, or biramous as in the type species of *Callianassa, C. subterranea*. However, in some species the male Plp2 is absent as in *Callianassa diaphora, Callianassa marchali,* and *Callianassa bouvieri*. In *Podocallichirus balssi,* the male Plp2 is an uniramous, single appendage, while in *Callichirus major* and *Callichirus islagrande* it is biramous, but devoid of an appendix masculina and an appendix interna. In *Callichirus kraussi,* the male Plp2 endopod is distally fused with both appendix masculina, and appendix interna bearing hooks. In *Podocallichirus madagassus* the Plp2 endopod bears a distal appendix masculina with setae attached to an appendix interna with hooks. This type of the male Plp2 is also found in *Lepidophthalmus rosae, L. tridentatus, L. boucourti, L. lousianensis, Neocallichirus mirim, N. trilobatus, N. moluccensis* and *N. calmani*. In *Calliax quadracuta* the male Plp2 endopod is distally beset with an elongated appendix masculina with setae, and with a small appendix interna without hooks.

Female Plp1. This appendage is uniramous, usually consisting of 2-3 segments in all of the species of Callianassidae. In *Calliax* the distal segment is strongly bent in shape.

Female Plp2. This appendage is usually biramous, except for *Podocallichirus foresti* in which it is uniramous. In *Callianassa* and *Podocallichirus* the endopod is usually slender in shape. In *Calliax* it is blade-shaped, one or two-segmented, without an appendix interna. In *Callichirus, Glypturus, Neocallichirus,* and *Paraglypturus* it is usually blade-shaped. In *Paraglypturus* it is foliaceous, bearing a finger-like appendix interna with hooks.

Under the present new classification the family Callianassidae consists of four subfamilies: Callianassinae, Calliapaguropinae subfamily nov., Eucalliacinae, and Anacalliacinae; 10 genera: *Calliapagurops* De Saint Laurent, 1973, *Callianassa* Leach, 1814, *Podocallichirus* gen. nov., *Callichirus* Stimpson, 1888, *Lepidophthalmus* Holmes, 1904, *Glypturus* Stimpson, 1866, *Neocallichirus* Sakai, 1988, *Calliax* De Saint Laurent, 1973, *Paraglypturus* Türkay & Sakai, 1995, and *Anacalliax* De Saint Laurent, 1973; and 144 species including five new ones: *Callianassa whitei* spec. nov., *C. gruneri* spec. nov., *C. ngochoae* spec. nov., *Neocallichirus kempi* spec. nov., and *Calliax doerjesti* spec. nov. The Eastern Atlantic-Mediterranean species are 24 in number, the Western Atlantic species 36, the Eastern Pacific species 9, and the Indo-West Pacific species 75. The following genera are synonymized in the present text: *Poti* Rodrigues & Manning, 1994, *Trypaea* Dana, 1852, *Neotrypaea* Manning & Felder, 1991, *Scallasis* Bate, 1888, *Cheramus* Bate, 1888, *Corallianassa* Manning, 1971, *Biffarius* Manning & Felder, 1991, *Notiax* Manning & Felder, 1991, *Gilvossius* Manning & Felder, 1992, *Corallichirus* Manning, 1992, *Sergio* Manning & Lemaitre, 1994, and *Eucalliax*, Manning & Felder, 1991.

Systematics

Family **Callianassidae** Dana, 1852

Callianassidae Dana, 1852a: 12, 14; Dana, 1852b: 508; Bate, 1888: 27; Ortmann, 1891: 48; Stebbing, 1893: 183; Ortmann, 1899: 1142; Alcock, 1901: 197; Borradaile, 1903: 541; Pesta, 1918: 196; Schmitt, 1921: 114; Stevens, 1928: 318; De Man, 1928b: 18; Melin, 1939: 4; Balss, 1957: 1581; Williams, 1965: 100; De Saint Laurent, 1973: 513; De Saint Laurent, 1979: 1395; De Saint Laurent & Le Loeuff, 1979: 46; Poore & Griffin, 1979: 245; Sakai, 1987a: 303; Sakai, 1988: 51; Poore, 1994: 101; Manning & Felder, 1991: 766; Holthuis, 1991: 239; Dworschak, 1992: 190; Hendrickx, 1995: 398, figs.

Definition.— Rostrum more or less developed, almost always unarmed laterally. Carapace with or without dorsal oval, cervical groove and linea thalassinica complete, linea anomurica and transverse cardiac line rarely present, and with or without rostral carina, and cardiac prominence. Orbit present or not. Abdominal somites 1-2 morphologically different from abdominal somites 3-5. Eyestalks usually flattened dorsoventrally and contiguous (except in Calliapaguropinae). Antennal scale reduced (except in Calliapaguropinae). Mxp3 ischium-merus narrow and pediform, or broadened and subpediform, or suboperculiform; propodus slender, or broadened and subquadrate; dactylus narrow and digitiform, or oval, exopod often absent. P1 chelate, unequal or subequal, P2 chelate, P3 simple, propodus often enlarged, P4 simple or subchelate, and P5 subchelate or chelate. Plp1-2 present or absent , if present, smaller than Plp3-5 in shape; male Plp2 biramous, endopod with or without appendix interna and appendix masculina, and female Plp2 biramous, endopod with or without appendix interna, Plp3-5 biramous, and foliaceous, endopod with appendices internae in both sexes. Tail-fan simple or characteristically diversified in shape. Pleurobranchiae absent.

Type genus.— *Callianassa* Leach, 1814.

Key to subfamilies of the family Callianassidae

1. Eyestalks elongated, set apart, and without orbit. Mxp3 dactylus digitiform, and P1 unequal ..... **Calliapaguropinae** subfam. nov.
- Eyestalks triangular, set close, and with or without orbit. Mxp3 dactylus digitiform or oval, and P1 unequal or subequal 2
2. Carapace with dorsal oval; Mxp3 dactylus digitiform; and P1 subequal or unequal 3
- Carapace lacking dorsal oval; Mxp3 dactylus digitiform or oval; and P1 subequal or equal ..... **Eucalliacinae**
3. Carapace lacking rostral carina. Uropodal exopod with or without distinct dorsal plate ..... **Callianassinae**
- Carapace with rostral carina. Uropodal exopod without distinct dorsal plate ..... **Anacalliacinae**

Subfamily **Calliapaguropinae** subfam. nov.

Definition.— Carapace with dorsal oval, linea thalassinica complete, lacking cardiac prominence and rostral carina. Orbit absent, pair of eyestalks cylindrical and set

apart. Mxp3 ischium-merus broadened and suboperculiform, propodus slightly broadened, dactylus digitiform. P1 unequal, carpus hardly broader than merus.

Remarks.— This subfamily is based on the incomplete holotype specimen of *Calliapagurops charcoti* De Saint Laurent, 1973, in which the abdomen is missing. This species is to be included in the family Callianassidae, because a complete linea thalassinica is present, the dorsal oval is complete as in the subfamilies Callianassinae and Anacalliacinae The rostral carina and the cardiac protuberance are lacking as in the subfamily Callianassinae, the Mxp3 ischium and merus are suboperculiform, and the P3 propodus is expanded. However, it is exceptional because no orbits are present as in the Axiidae, the eyestalks are elongated as in the family Paguridae, the Mxp3 merus bears three distal spines, and the P1 carpus is broadened distally, showing an oval proximal angle. In the Callianassidae the eyestalks are usually triangular; the Mxp3 merus has no spines on the distal margin, or occasionally one distal spine as in some species of the genus *Callianassa* or in the family Ctenochelidae, and the P1 carpus, usually when of larger size, is expanded in the proximal angle. De Saint Laurent described the dorsal oval of the carapace as being present on this species. However, I found that it is not as distinctive as it is in Callianassid species. As long as the form of the Plp2 remains uncertain, this new subfamily is with doubt included in the family Callianassidae, and not in the family Ctenochelidae.

Genus *Calliapagurops* De Saint Laurent, 1973

Calliapagurops De Saint Laurent, 1973: 515; Poore, 1994: 101.

Definition.— Carapace with dorsal oval, without rostral carina or cardiac protuberance; linea thalassinica complete. Rostrum and pair of anterolateral spines sharp, bearing noncalcified area proximally. Eyestalks cylindrical, with terminal cornea. A1 peduncle short, failing to reach middle of A2 penultimate segment. Antennal scale distinctive, bilobed distally. Mxp1 epipod with elongated anterior lobe. Mxp3 ischium and merus suboperculiform; merus with 3-4 spines on distal margin, exopod rudimentary. P1 very unequal, lengthly fusionform with palm; exopod rudimentary. P3 propodus broadened proximally (revised after De Saint Laurent, 1973: 515).

Type species.— *Calliapagurops charcoti* De Saint Laurent, 1973, by original designation and monotypy. Gender masculine.

Remarks.— This genus is characterized by the cylindrical eyestalks set apart, overreaching A1 penultimate segment; and Mxp3 ischium and merus suboperculiform with the merus bearing three sharp spines distally, and P1 carpi divergent distally with oval proximal angle. Abdomen unknown. In the original definiton, De Saint Laurent wrote that Mxp3 is without exopod. Reexamination of the holotype showed a rudimentary exopod to be present.

East Atlantic species

Calliapagurops charcoti De Saint Laurent, 1973
(fig. 1a-e)

Calliapagurops charcoti De Saint Laurent, 1973: 515

Material examined.— MNHNP 355, 1 ♂, holotype, 1 fragment without abdomen and tail fan, carapace 9.5 mm, Azores Islands, 39°33'N 31°17'W, 190-230 m depth, shelly sand, Expedition "Biaçores"-1971, R.V. *"Jean Charcot"*.

Description of male holotype.— Dorsal oval of carapace (fig. 1a) smooth; cardiac region soft and less calcified; cervical groove deeply defined at posterior fourth of dorsal surface. Linea thalassinica present; rostral carina and cardiac protuberance absent. Rostrum and pair of anterolateral spines protruded, spiniform, bearing coloured, calcified proximal area; rostrum longer than anterolateral spines, reaching about proximal third of elongate eyestalks. Abdomen and tail-fan missing.

Eyestalks stout, cylindrical, set apart; cornea terminal, overreaching base of antennal penultimate segment. Antennular peduncle distinctly longer than eyestalks, reaching mid-length of antennal penultimate segment; flagellae short, reaching distal end of antennal peduncle. Antennal peduncle with terminal segment about half length of penultimate segment; antennal scale distinct, bilobed distally.

Mxp3 ischium-merus oval and 1.5 times as long as broad, merus with row of three spines on distal margin; propodus about as long as carpus, swollen proximally on ventral margin; dactylus digitiform; exopod rudimentary (fig. 1b).

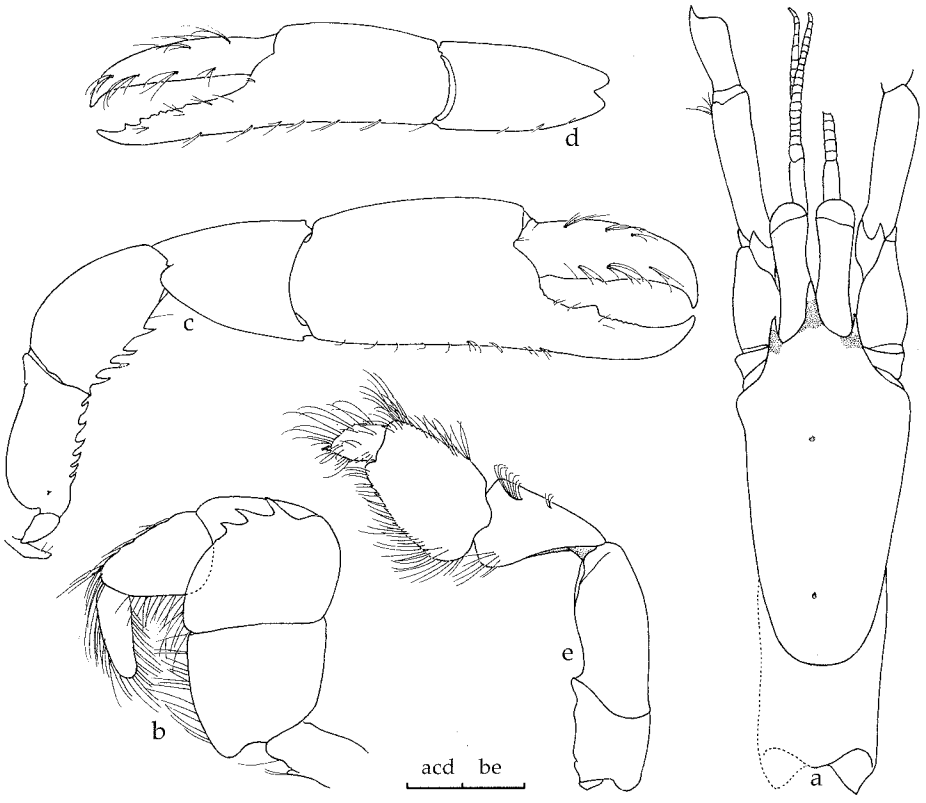

Fig. 1. *Calliapagurops charcoti* de Saint Laurent, 1973, MNHNP 355, 1 ♂, holotype, Azores Islands. a, Carapace, eyestalks and A1-2 peduncles; b, Mxp3, lateral view; c, male larger cheliped, lateral view; d, male smaller cheliped, lateral view; e, P3 in lateral view. Scale = 1 mm.

P1 unequal in size and shape; exopod rudimentary (fig. 1c-d). Larger cheliped with ischium about twice as long as broad, armed with row of six spines on ventral margin, unarmed on dorsal margin; merus about as long as ischium, dorsal margin smooth, largely convex, ventral margin straight with row of four spines; carpus about as long as merus, divergent distally with oval proximal angle; chela about 2.5 times as long as carpus; palm about 1.5 times as long as broad; cutting edge of fixed finger distally incurved, armed with triangular tooth at proximal third, slightly denticulate distal to proximal tooth; dactylus incurved distally, cutting edge bearing low tooth in middle. Smaller cheliped with ischium and merus missing, carpus divergent distally with oval proximal angle, chela about twice as long as carpus, cutting edge of fixed finger serrated in distal half, this serration becoming stronger distally.

P3 ischium broadened, longer than broad on ventral margin, unarmed; merus about twice as long as ischium along mid-line, unarmed; carpus divergent distally triangular in form, about three fourths length of merus; propodus about as long as carpus, subsquare in form, though swollen proximally on ventral margin; dactylus with transparent spine at tip (fig. 1e). P4-5 missing.

Remarks.— The holotype (MNHNP 355) was examined by the courtesy of Drs M. De Saint Laurent and N. Ngoc Ho.

Type locality.— Off the Azores, near Flores Islands, 39°33'N 31°17'W, depth 230-190 m.

Subfamily **Callianassinae** Dana, 1852

Callianassinae Balss, 1957: 1582; De Saint Laurent, 1973: 514; De Saint Laurent, 1979: 1395.
Callichirinae Manning & Felder, 1991: 775.
Cheraminae Manning & Felder, 1991: 780.

Definition.— Carapace with dorsal oval, rostrum developed or not, and with or without pair of anterolateral spines; rostral carina and cardiac prominence not present; linea thalassinica complete. A1 peduncle longer than, or shorter than A2 peduncle. Mxp3 ischium-merus pediform, subpediform, or suboperculiform; propodus longer or shorter than wide; dactylus digitiform. P1 unequal or subequal; merus of larger cheliped with or without ventral hook. Tail-fan simple or characteristically diversified in shape.

Type genus.— *Callianassa* Leach, 1814.

Key to the genera of the subfamily Callianassinae:

1. Mxp3 propodus slender, being longer than wide ..... ***Callianassa***
- Mxp3 propodus broadened and subquadrate, being wider than long 2
2. A1 peduncle longer than A2 peduncle 3
- A1 peduncle shorter than A2 peduncle 5
3. Mxp3 ischium-merus elongated, with margins parallel .... ***Podocallichirus*** gen. nov.
- Mxp3 ischium-merus broadened, subpediform, or suboperculiform 4
4. Abdominal somites 3-5 dorsally ornamented. Uropodal endopod strap-shaped, or lanceolate ..... ***Callichirus***

- Abdominal somites 3-5 without dorsal ornamentation. Uropodal endopod rhombic shaped ..... ***Lepidophthalmus***

5 Anterolateral spines of carapace proximally with non-calcified membrane; uropodal endopod slender, tapering distally ..... ***Glypturus***

- Anterolateral spines of carapace present or not, if present, proximally calcified; uropodal endopod broadened distally or slender, tapering distally ... ***Neocallichirus***

Genus *Callianassa* Leach, 1814

Callianassa Leach, 1814: 386, 400. H. Milne Edwards, 1837a: 319. H. Milne Edwards, 1837b: 130; H. Milne Edwards, 1938: 386; Nicolet, 1849: 206; Bell, 1853: 217; Heller, 1863: 201; Stalio, 1877: 105; Boas, 1880: 84; Ortmann, 1899: 1142, pl. 73 fig. 5; Alcock, 1901: 197; Borradaile, 1903: 544; Selbie, 1914: 100; Balss, 1914: 91; Kemp, 1915: 252; Bouvier, 1915: 100; Balss, 1916: 33; Pesta, 1918: 201; Schmitt, 1921: 116; De Man, 1928b: 91; Stevens, 1928: 324; Edmondson, 1944: 44; Barnard, 1950: 505; Holthuis, 1954b: 334; Hemming, 1958: 142; Williams, 1965: 100; Biffar, 1971a: 648, figs. 1, 2; De Saint Laurent, 1973: 514; Le Loeuff & Intès, 1974: 32; De Saint Laurent & Le Loeuff, 1979: 48; Sakai, 1987a: 303; Sakai, 1988: 57; Manning & Felder, 1991: 767, figs. 1, 3, 4, 6, 8; Holthuis, 1991: 239; Poore, 1994: 102.

Trypaea Dana, 1852a: 14; Gurney, 1944: 83; Manning & Felder, 1991: 774, figs. 1, 3, 12.

Cheramus Bate, 1888: 30; Borradaile, 1903: 545; De Man, 1928b: 95; Gurney, 1944: 83; Manning & Felder, 1991: 780, figs. 2, 4-6, 14; Poore, 1994: 101.

Scallasis Bate, 1888: 34; Gurney, 1944: 83; Manning & Felder, 1991: 780.

Trypaea s. str. Borradaile, 1903: 546; De Man, 1928b: 96; Poore, 1994: 102.

Biffarius Manning & Felder, 1991: 769, fig. 9; Poore, 1994: 102.

Neotrypaea Manning & Felder, 1991: 771, fig. 10; Poore, 1994: 102.

Notiax Manning & Felder, 1991: 772, figs. 6, 11; Poore, 1994: 102.

Poti Rodrigues & Manning, 1992b: 9; Poore, 1994: 102.

Gilvossius Manning & Felder, 1992: 558.

Definition.— Carapace with dorsal oval; rostral spine present or not. Eyestalks usually flattened dorsoventrally, contiguous; cornea dorsal, subterminal, disc-shaped or flattened. A1 peduncle longer and stronger than A2 peduncle, or vice versa. Mxp3 ischium-merus broadened and subpediform, suboperculiform; merus convex or truncate distally, sometimes with spine; propodus narrow; dactylus narrow, digitiform; exopod often absent. P1 unequal; male larger cheliped with or without meral hook; carpus very expanded compared with merus. Male Plp1 present or absent, if present, uniramous, two-segmented. Male Plp2 present or absent, if present, vestigial, biramous, lacking appendix interna. Female Plp1 present or absent, if present, uniramous, two or three-segmented. Female Plp2 present or absent, if present, biramous, without appendix interna. Plp3-5 biramous, foliaceous, bearing appendices internae. Uropodal endopod not much longer than telson, truncate or rounded distally.

Type species.— *Cancer Astacus subterraneus* Montagu, 1808, by monotypy. Gender feminine.

Remarks.— After a careful examination of the male Plp2 in the type species, *Callianassa subterranea*, it is confirmed that the exopod and endopod show an unusual vestigial form, and the forms of Plp1-2 are variable, and not always related with other characters.

In the Eastern Atlantic-Mediterranean region 10 species including one new

species are recorded, in the western Atlantic region eight, in the Eastern Pacific region six, in the Indo-West Pacific region 34 including two new species.

The genus *Trypaea* Dana, 1852, is treated as a synonym of *Callianassa*, because there are no distinctive characteristics separating it from *Callianassa* except for the forms of Plp1-2. The type species, *Trypaea australiensis*, shows that the male Plp1 is uniramous, consisting of two segments, and the male Plp2 is absent, while the type species of *Callianassa*, *C. subterranea*, has the male Plp1 the same as in *T. australiensis*, but Plp2 is biramous, consisting of both exopod and endopod. Type species: *Trypaea australiensis* Dana, 1852, by monotypy. Gender feminine.

Manning & Felder (1991: 780) included *Scallasis amboina* Bate, 1888, in the Cheraminae, within the monotypic genus *Scallasis* Bate, 1888, because of its lack of an orbit, and the Mxp3 bearing an exopod. However, after examining the type specimen (NHML 1888: 22), I found that this species does in fact have an orbit and no Mxp3 exopod, even though it was described as lacking an orbit, and having the eyestalks separated (Bates, 1888: fig. 3a), and therefore should be considered a valid species of *Callianassa*. Type species: *Scallasis amboinae* Bate, 1888, by monotypy.

The type species of the genus *Cheramus*, *C. profunda*, appears to be fundamentally different from that of the genus *Callianassa*, *C. subterranea*; in *C. profunda*, P3 propodus is narrow, without the posterior lobe, Mxp3 merus is truncate distally, while in *C. subterranea*, P3 propodus is hammer-shaped with a rounded posterior lobe, and Mxp3 merus is convex distally. However, intermediate characters can be found on Mxp3 merus and P3 propodus. In *Callianassa oblonga*, *C. amboinae*, *C. tonkinae*, and *C. fragilis*, Mxp3 merus is broadened distally in a straight line; in *C. amboinae* it is truncate with a concave distal margin; in *C. oblonga* the P3 propodus is short, but broadened distally; while in *C. amboinae*, *C. tonkinae* and *C. fragilis*, it bears a short posterior lobe. Type species: *Cheramus occidentalis* Bate, 1888, a preoccupied name replaced by *Callianassa profunda* Biffar, 1973. Selected by Manning & Felder, 1991: 780.

Manning & Felder (1991) stated that *Biffarius* differed from *Trypaea* and *Neotrypaea* by the Mxp3 merus not clearly projecting beyond the articulation with the carpus, and the A1 peduncle not longer than the A2 peduncle. However, intermediate forms exist, and most of the other characters that they gave are not characteristic for the type species of *Trypaea* and *Neotrypaea*, *T. australiensis* and *N. californiensis*. As already discussed, I consider *Trypaea* congeneric with *Callianassa*. *Biffarius deliculatus* Rodrigues & Manning, 1992a is quite similar to *Callianassa biformis* in morphology, though it differs in having no male Plp2. As a result, *Biffarius* is here treated as a junior synonym of *Callianassa*. Type species: *Biffarius biformis* Biffar, 1971, by original designation

Manning & Felder (1991: 771-2) noted that *Neotrypaea* differs from other American genera, in that it has an operculous Mxp3 ischium-merus, A1 peduncle both longer and stouter than the A2 peduncle, as well as Mxp3 merus projecting beyond its articulation with the carpus. The type species of *Neotrypaea*, *N. californiensis* Dana shares the same characteristically shaped Mxp3 merus with the type species of *Trypaea*, *T. australiensis*. In addition *Callianassa lewtonae* from Queensland also has its Mxp3 merus largely convex distally, and the A1 peduncle is longer than A2 peduncle. However, in *Callianassa gigas*, *C. acanthura* and *C. biformis* the form of Mxp3 merus is intermediate, with the merus noticeably projecting beyond the articulation with the carpus (not the case in other species of *Callianassa*), and in *C. gigas* the A1 peduncle is not

longer than the A2 peduncle. The type species of the two genera, *Neotrypaea californiensis* and *Trypaea australiensis*, have the same form of Plp-2 in both sexes, that is, male Plp1 uniramous and two-segmented, and male Plp2 absent; female Plp1 uniramous, and female Plp2 biramous. However, these are not always correlated with the form of the Mxp3 merus. As cited above, Mxp3 merus is rather swollen on the distal margin in *C. acanthura, C. bouvieri, and C. lewtonae*, but the male Plp1-2 are absent in *Callianassa bouvieri* as in *Callianassa setimana*. As a result, *Neotrypaea* is treated as congeneric with both *Callianassa* and *Trypaea*. Type species: *Callianassa californiensis* Dana, 1854, by original designation.

The type species of the genus *Notiax*, *N. brachyophthalma* is fundamentally different from the type species of the genus *Callianassa, C subterranea*, in the structure of male Plp2. In *N. brachyophthalma* the male Plp2 is an uniramous, two-segmented appendage, while in *C. subterranea* it is biramous, though its exopod is reduced. However, the relative lengths of A1-2 peduncles, the form of Mxp3, P1, P3, and the tail-fan are not differentiated. The reason for the establishment of *Notiax* is not shown (Manning and Felder, 1991: 773), so it is very difficult to separate the members of *Notiax* from those of *Callianassa* only by the characteristics of Plp1-2. *Notiax* is treated here as a junior synonym of *Callianassa*. Type species: *Callianassa brachyophthalma* A. Milne Edwards, 1870. By original designation and monotypy.

Poti gaucho Rodrigues & Manning, 1992 was described as a species bearing an indistinct linea thalassinica on the posterior margin of carapace, however this is not correct, because the linea thalassinica occurs as a narrow ditch. In consequence *Poti* is here treated as a junior synonym of *Callianassa*. Type species: *Poti gaucho* Rodrigues & Manning, 1992, by original designation and monotypy.

Manning & Felder (1992: 559) mentioned that *Gilvossius* resembles *Callichirus* Stimpson (1866) and *Lepidophthalmus* Holmes (1904), and differs from all the other recognized genera of Callianassids in the western Atlantic Ocean. However, the type species of the genus *Gilvossius, G. setimanus*, shares with the type species of *Trypaea, T. australiensis*, an A1 peduncle that is very much longer than the A2 peduncle. *Callichirus* and *Lepidophthalmus* are very different in the subquadrate form of the Mxp3 propodus. *Gilvossius* is distinctive in having no Plp 1-2 in the male (as in *Callianassa fragilis, C. marchali*, and *C. tyrrhena*), but no other characters can be found to separate it, so *Gilvossius* is here considered a junior synonym of *Callianassa*. DeKay's figure of *Callianassa setimana* must be based on a female specimen, because it bears Plp1-2 (see Manning, 1987, fig. 1). Type species: *Gonodactylus setimanus* DeKay, 1844, by original designation and monotypy.

Borradaile (1903: 545) established the subgenus *Calliactites*, however, it is regarded a synonym of *Callianidea* H. Milne Edwards, 1837a, family Callianideidae De Man, 1928.

Eastern Atlantic and Mediterranean species

Key to the species of the genus *Callianassa* in the eastern Atlantic and Mediterranean:

1. Rostrum sharply pointed; Mxp3 merus truncate distally ..... ***C. oblonga***
- Rostrum poorly developed; Mxp3 merus convex distally 2

2. A1 peduncle subequal to or distinctly longer than A2 peduncle 3
- A1 peduncle distinctly shorter than A2 peduncle 6
3. A1 peduncle much longer than A2 peduncle. Eyestalks prolonged distomesially 4
- A1 peduncle subequal to A2 peduncle. Eyestalks not prolonged distomesially. Uropodal endopod elongated, bearing distinctive median carina, and uropodal exopod with submarginal setal row apart from lateral margin ..... ***C. candida***
4. Uropodal endopod rounded distally 5
- Uropodal endopod elongated, bearing distinctive median dorsal carina, and uropodal exopod with submarginal setal row apart from lateral margin ..... ***C. whitei*** spec. nov.
5. Uropodal endopod bearing distinctive median carina, and uropodal exopod with submarginal setal row near lateral margin ..... ***C. tyrrhena***
- Uropodal endopod bearing faint median dorsal carina, and uropodal exopod with submarginal setal row apart from lateral margin ..... ***C. convexa***
6. Mxp3 ischium-merus operculiform; uropodal endopod with distolateral spine ... 7
- Mxp3 ischium-merus subpediform; uropodal endopod without distolateral spine 8
7. Telon with lateral spine ..... ***C. acanthura***
- Telson without lateral spine ..... ***C. truncata***
8. Uropodal exopod with submarginal setal row apart from lateral margin ..... ***C. diaphora***
- Uropodal exopod with submarginal setal row closely near to lateral margin 9
9. P3 propodus rounded on posterior lobe ..... ***C. subterranea***
- P3 propodus truncate on posterior lobe ..... ***C. marchali***

Callianassa acanthura Caroli, 1946

Callianassa acanthura Caroli, 1946: 66, figs. 1a, 2; Holthuis, 1953a, fig. 3; De Saint Laurent & Bozic, 1976: 21, figs. 3, 11, 19, 25, 30; Türkay, 1982: 225.
Callianassa (Trypaea) acanthura; Zariquiey Alvarez, 1968: 229.

Material examined.—SMF 8821, 1 ♂, Ornoma Peristeri, (39°10.000'N 23°58.000'E), Peristera, Northern Sporades, Greece, littoral, 11.vii.1978, leg. M. Türkay.

Remarks.— The male specimen examined shows a uniramous, two-segmented Plp1, but no Plp2.

Type locality.— Bay of Naples.

Distribution.— Bay of Naples; Aegean Sea.

Callianassa candida (Olivi, 1792)
(figs. 2a-d)

Cancer candidus Olivi, 1792: 51, pl. 3 fig. 3.
Callianassa tyrrhena; Risso, 1827: 54 (part); Forest & Guinot, 1956: 31; Forest, 1967: 6 (part). [Not *Callianassa tyrrhena* (Petagna, 1792)].

Callianassa subterranea; Czerniavsky, 1868: 122; Giard & Bonnier, 1890: 362, figs. 1-3. [Not *Callianassa subterranea* (Montagu, 1808)].

Callianassa subterranea forma *pontica* Czerniavsky, 1884: 81 (part). [Type-locality: Black Sea].

Callianassa (*Callichirus*) *laticauda*; Pesta, 1918: 204; Bouvier, 1940: 103 (part). [Not *Callianassa laticauda* Otto, 1821].

Callianassa (*Callichirus*) *Pestae* De Man, 1928a: 34, pl. 9 figs. 16-16^{e}; De Man, 1928b: 29, 111. [Type locality: Mediterranean].

Callianassa pestae; Lutze, 1937: 6, figs. 10-21; Lutze, 1938: 167, figs. 10-21; Manning & Stevcic, 1982: 295; Froglia & Grippa, 1986: 261.

Callianassa pestai; Lutze, 1937: 6 (part), figs. 10-21 (= *C. subterranea*); Holthuis, 1953a: 95, fig. 3; Kobjakova & Dolgopolskaia, 1969, 1969: 286, pl. 5 fig. 1a-c; Dolgopolskaia, 1969: 316, pls. 32-34.

Callianassa algerica Lutze, 1938: 168, figs. 22-26, 26a-b, 27. [Type-locality: Castiglione near Algiers].

Callianassa (*Callichirus*) *pontica*; Makarov, 1938: 73, 297, figs. 27-28; Bacescu, 1967: 231, fig. 105.

Callianassa candida; Giordani Soika, 1943: 83; Giordani Soika, 1945: 994; Lewinsohn & Holthuis, 1986: 20; Koukouras et al, 1992: 223; Dworschak, 1992: 194 (part).

Callianassa pontica; Caroli, 1946: 71; Caroli, 1950: 190; Dolgopolskaia, 1954: 179; De Saint Laurent & Bozic, 1976: 24, figs. 5, 13, 21, 32; Beaubrun, 1979: 84, figs 58, 59, 68, 69, and 70; Garcia Raso, 1983: 323, fig. 3.

Callianassa (*Callichirus*) *pestae*; Zariquiey Alvarez, 1968: 230.

Material examined.— ZMA-Mus Milano, 2 ♂♂ (TL 29.0, CL 7.0 - TL 75.0, CL 17), 2 ovig. ♀♀ (TL 39.0, CL 8.0 - TL 63 0, CL 14.0), Naples, June 1914, leg. De Man; SMF 4957, 1 ♂, Portofino, Liguria, Italy, harbour, 20.x.1913, leg. L. Nick; SMF 7446, 1 ♀, Stromboli, Sicily, Italy, 20.vii.1974-02.viii.1974, leg. Rausch; SMF 12562, 2 ♂♂ (TL 26.0, CL 5.5 - TL 41.0, CL 10.0), 1 ♀ (TL 39.0, CL 9.0), Vasilikos Ormoz, (39°11.500'N 023°58.350'E), Peristera, Northern Sporades, Greece, 0.2 m, littoral, 08.vii.1978, leg. M. Türkay; SMF 14037, 1 ♂ (TL 47.0, CL 10.5), Villas Rubin, Istria, near Rovinj, Croatia, shallow water, July 1982, leg. U. Pettke; SMF 23570, 1 ♂, Ile de Port-Cros, Iles d'Hyères, Côte d'Azur, France, 1.8 m, dead rhizomes of *Posidonia*, 02.ii.1982, leg. A. Willsie, det. H. Zibrowius; SMF 23571, 1 ♀, Kuvi Bay, Istria, near Rovinj, Croatia, Sta. YU-89/10, sea grass meadow, 18.viii.1989, excursion of Universität Frankfurt; SMF 23572 , 1 ♀ (TL 55.5, CL 12.5), neotype, 1 ♂, Kuvi Bay (Villas Rubin), ca. 2.5 km south of Rovinj, Istria, Croatia, Sta. YU-87/4c, P, 0.3-0.5 m, muddy bottom, 16.ix.1987, excursion of Universität Frankfurt; SMF 23626, 1 ♀, Kuvi Bay, south-east of Rovinj, Istria, Croatia, Sta. Rov-95/6e, P, 1 m, muddy and sandy bottom, 02.ix.1995, excursion of Universität Frankfurt; ZMH-K 27404, 1 ♂, no locality (det. by H. Balss as *Call. tyrrhena*); ZMB 1134, 3 ♂♂, 1 ♀, Genova, Italy, leg. Albers; ZMB 6782, 2 ♂♂, Tangérs, Strait of Gibraltar, leg. O. Kerster; ZMB 17117, 1 ♀, Mediterranean, leg. Schultz; NHMW 6789, 1 ♂, 1 ♀, Strunjan, Slovenia, Adriatic Sea, September 1985, leg. P. Dworschak (Dworschak, 1992: 194); NHMW 313, 2 ♂♂, Piran, Slovenia, Adriatic Sea, 01.iv.1886, don. Lichtenstern (P. Dworschak, 1992: 194); NHMW 314, 1 ovig. ♀, Piran, Slovenia, Adriatic Sea (P. Dworschak, 1992: 194); NHMW 317, 8 ♂♂, 10 ♀♀, Piran, Slovenia, Adriatic Sea (P. Dworschak, 1992: 194); NHMW 315, 1 ♂, Zaure, Italy, 05.iii.1878, leg. Marenzeller (P. Dworschak, 1992: 194).; NHMW 316, 3 specimens, Rovinj, Croatia, 02.iv.1886, don. Lichtenstern (P. Dworschak, 1992: 194); NHMW 318, 1 ♀, Lesina, 01.vi.1888, don. Buccich (P. Dworschak, 1992: 194); NHMW 6788, 2 ♂♂, 1 ovig. ♀, 2 ♀♀, Lido di Staranzano, 09.x.1984, leg. P. Dworschak (P. Dworschak, 1992: 194); HNMW 6791, 1 ♂ (not ♀), Lagoon of Grado, 11.xi.1977, leg. P. Dworschak (P. Dworschak, 1992: 194); NHMW 6761, 3 ♂♂, 2 ♀♀, Punta Sabbioni, Venice lagoon, 25.iii.1989, leg. P. Dworschak (P. Dworschak, 1992: 194); NHML, 1 ♂, Salammbo, Tunisia, sand patches, leg. R.B. Manning & R. Ingle; NHML, 1 ♀, Adriatic Sea, leg. Norman; NHML 1974:214, 1 ♂, Tunisia, Salammbo, leg. R. Ingle & R.B. Manning; NHML-RBM-Tw 294, 1 ♂, Tunisia, Salammbo, leg. R. Ingle & R.B. Manning; NHML 1974:180, 1 ♂, N. Punic Port, Salammbo, Tunisia, leg. R.B. Manning & R. Ingle; NHML, 1 ♂, Salammbo, Tunisia, sand patches, leg. R.B. Manning & R. Ingle; NHML, 1 ♂, M'Xlakk Bay, Malta, 3 m, rock; SMNH 7491, 1 ♂, Venice, Italy, leg. Prof. Margo.

Diagnosis.— A1 peduncle subequal to A2 peduncle. Uropodal endopod elongated, uropodal exopod with submarginal setal row apart from lateral margin. Telson rounded on posterior margin. Male Plp1-2 absent; female Plp1 simple, two-segmented appendage; female Plp2 biramous.

Description of female neotype.— Dorsal oval distinct, posterior region posterior cervical grove more than one-fifth length of carapace. Rostrum (fig. 2a) broadly triangular. Second abdominal somite twice as long as somite 1, third somite 1.3 times as long as somite 1. Telson about half length of somite 6, about 1.3 times as long as somite 1. Telson (fig. 2b) about half length of somite 6 and about 1.2 times as broad as long, posterior margin largely rounded, bearing three pairs of setal tufts submarginally, median part concave with transverse row of setae.

Eyestalks triangular, bearing no distomedial protrusion. A1 peduncle subequal to A2 peduncle. P1 unequal. Larger cheliped (fig. 2c) merus about as long as ischium, ventral margin beset with triangular proximal ventrally serrated lobe; carpus about as long as merus, about 1.2 times as long as broad; chela slightly shorter and twice as long as carpus, distal margin smooth with small protuberance ventrally; cutting edge of fixed finger serrated in proximal half, medially with low triangular swelling; dactylus two-thirds length of palm, cutting edge concave proximally, distally minutely serrated. Smaller cheliped slender; merus spindle-shaped, about as long as ischium; carpus and dactylus about as long as propodus on dorsal margin.

Plp1 uniramous, two-segmented, distal segment foliaceous in its distal two thirds. Plp2 biramous, narrow, endopod two-segmented.

Uropodal endopod ovoid, about 1.5 times as long as broad, transverse carina medially present. Uropodal exopod larger than endopod.

Larger cheliped of male similar to that of female (fig. 2d). Plp1-2 absent.

Remarks.— This species is similar to *Callianassa whitei* in the form of the uropodal exopod bearing a submarginal setal row apart from the distal margin. However, the two species are clearly distinguishable. In *Callianassa candida* the eyestalks are not produced distomedially, the A1 peduncle is about as long as A2 peduncle, the telson is about 1.2 times as long as broad, and the uropodal endopod is about 1.5 times as long as broad. In *C. whitei*, the eyestalks are distinctly produced distomedially, the A1 peduncle is very much longer than the A2 peduncle, the telson is about 1.5 times as broad as long, and the uropodal endopod is twice as long as broad.

The present specimens agree with the original figures of *Cancer candida* (Olivi, 1792: pl. 3 fig. 3), by having the A1 peduncle about as long as the A2 peduncle, and the merus of the larger cheliped having a sharp ventroproximal lobe, though Olivi's figure is otherwise similar to pagurid species in the carapace and the abdomen.

Callianassa subterranea forma *pontica* (Zerniavsky, 1884) from the type locality in the Black Sea has been treated as a synonym of the present species, though the reasons for this are not clear (Dworschak, 1992: 194). Since no callianassid specimens from the Black Sea appear to be preserved in European Museums and no holotype is believed to exist, it is difficult to define this species. *C. tyrrhena* is the only other known species found in the eastern Mediterranean including Greece, so following the suggestion of Lewinson & Holthuis (1986), a neotype for *C. candida* is here designated (SMF 23572) to prevent further confusion of taxa.

Type locality.— Alupka, 10 m deep, and Suchumi, 2-3 m, Black Sea.

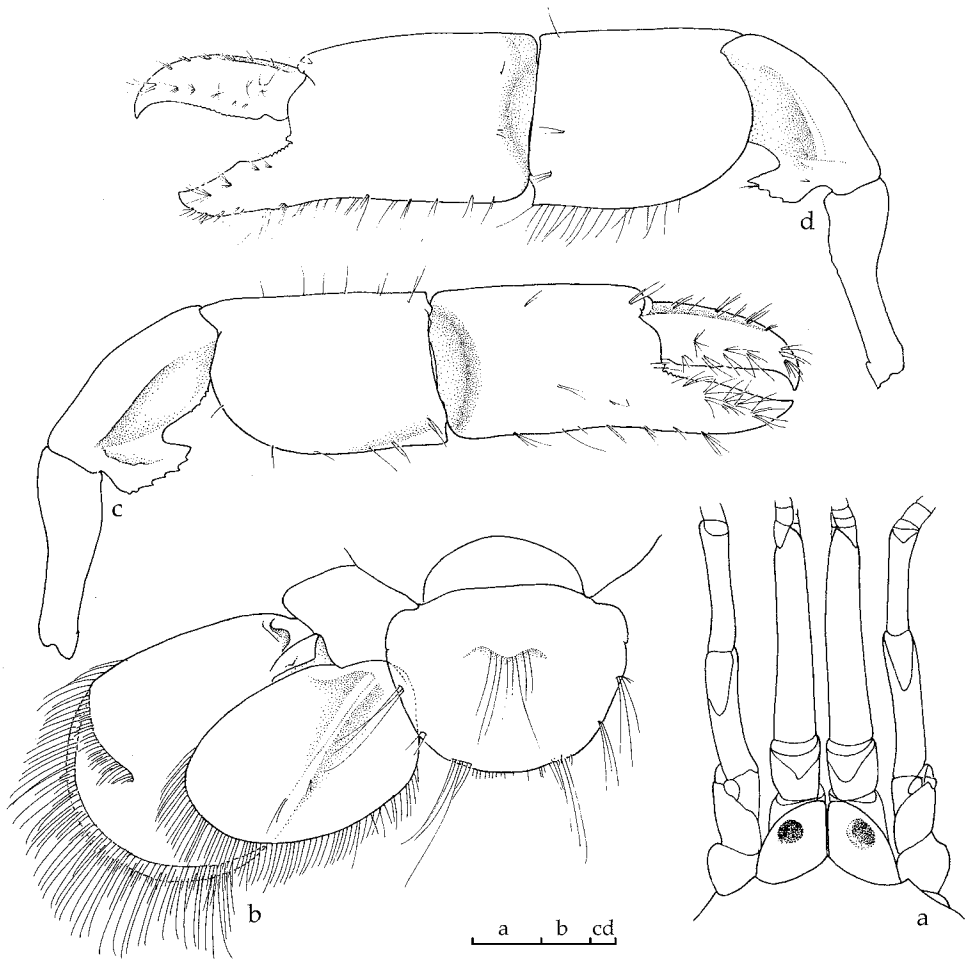

Fig. 2. *Callianassa candida* (Olivi, 1792). a, Anterior part of carapace, eyestalks and A1-2 peduncles; b, telson and uropod; c, male larger chelipeds; d, female larger chelipeds. a-b, d: SMF 23572, 1 ♀, neotype, Istria, Croatia; c: SMF 23572, 1 ♂, same locality. Scale = 1 mm.

Distribution.— Mediterranean from Tunisia and Tyrrhenian Sea (Naples and Sicilia) to Adriatic Sea and Aegean Sea (Peristera); Black Sea. Common in coarse sand or mud, under stones in the intertidal and shallow subtidal, and in sandy silt or mud in 7-9 m depth (Dworschak, 1992: 194).

Callianassa convexa De Saint Laurent & Le Loeuff, 1979

Callianassa convexa De Saint Laurent & Le Loeuff, 1979: 53, fig. 10a-e.

Material examined.— MNHNP Th 617, 1 ♀ (TL 23.0, CL 4.0), paratype, Gambia, 18 m depth, 31.iii.1954; MNHNP-Th 723, 1 ♀ (TL 41.0, CL 8.2), off Mauritania, N.Diago sta. 61, 18.iv.1982, leg. R. de Forge.

Diagnosis.— A1 peduncle distinctly longer than A2 peduncle. Uropodal endopod rounded distally, bearing faint median dorsal carina (not shown in De Saint Laurent & Le Loeuff, 1979: 54, fig. 10e), uropodal exopod with submarginal setal row apart from lateral margin.

Remarks.— This eastern Atlantic species is closely related to *C. candida*, however, differs as mentioned in the remarks regarding *C. candida*.

Type locality.— South of Cape Bald, Gambia, 18 m.

Distribution.— Gambia; Mauritania.

Callianassa diaphora Le Loeuff & Intès, 1974

Callianassa diaphora Le Loeuff & Intès, 1974: 32, fig. 7a - v; De Saint Laurent & Le Loeuff, 1979: 49, fig. 8a, b, e, g.
Callianassa guineensis; Longhurst, 1958: 31 (part).

Material examined.— RMNH D 32129, 1 ♂ (TL 14.0, CL 3.1), 3 ovig. ♀♀ (TL 19.0, CL 4.3 - TL 15.0, CL 3.5), 1 ♀ (TL 14.0, CL 3.0), coast of Sierra Leone (13°30'N 17°06'W), West Africa, 24.xii.1956, leg. A.R. Longhurst; RMNH D 32130, 2 ♂♂ (TL 20.0, CL 4.6; TL 13.0, CL 3.8), 1 ♀ (TL 17.0, CL 4.0), coast of Sierra Leone (13°53'N 11°39'W), West Africa, 26.x.1956, leg. A.R. Longhurst; RMNH D 32131, 1 ♂ (TL 19.5, CL 4.5), Sierra Leone, A.R. Longhurst leg.; RMNH D 32132, 1 ovig. ♀ (TL 17.0, CL 3.7), 2 ♀♀ (TL 10.5, CL 2.5; TL 20.0, CL 4.1), Banana Grounds, Sierra Leone, December 1955, leg. A.R. Longhurst.

Remarks.— It was observed that the male Plp1-2 are absent. However, Loeuff & Intès (1974: 32) mentioned that the male Plp2 is sometimes present as a vestigial appendage.

Type locality.— Grand Lahou, Côte D' Ivoire, 5°07'N 5°04.5'W, 22 m.

Distribution.— Siera Leone to Côte D' Ivoire, 10-60 m.

Callianassa marchali Le Loeuff & Intès, 1974

Callianassa marchali Le Loeuff & Intès, 1974: 35, fig. 8a-r; De Saint Laurent & Le Loeuff, 1979: 51, fig. 8c, d, f, h.
Callianassa guineensis; Longhurst, 1958: 31 (part).

Material examined.— RMNH D 32121, 1 ♀ (TL 19.0, CL 4.5), Sierra Leone (6°51'N 11°57'W), 25.x.1956, leg. A.R. Longhurst, det. M. De Saint Laurent.

Remarks.— Male Plp1-2 are absent.

Type locality.— Côte D' Ivoire, Between Vridi and Jacqueville (5°09.5'N 4°09'W), 70 m.

Distribution.— Pointe-Noire, Congo; Côte D'Ivoire; Sierra Leone; Senegal, 70-250 m.

Callianassa oblonga Le Loeuff & Intès, 1974

Callianassa oblonga Le Loeuff & Intès, 1974: 38, fig. 9a-r; De Saint Laurent & Le Loeuff, 1979: 55.

Remarks.— One male specimen measuring 13 mm in total length is known. Mxp3 merus is broadened distally, P3 propodus is characteristically subquadrate, broad-

ened distally, and the telson is broader than long. The male Plp1-2 are developed (De Saint Laurent & Le Loeuff, 1979: 55).

Type locality.— Ivory coast, Grand Bassam (4°59'N 3°48'W), 200 m.

Distribution.— Ivory coast, Grand Bassam (4°59'N 3°48'W), 200 m.

Callianassa subterranea (Montagu, 1808)

Cancer Astacus subterraneus Montagu, 1808: 89, pl. 3 figs. 1, 2; De Saint Laurent, 1973: 514.

Callianassa subterranea; Leach, 1815: 343, pl. 32; Desmarest, 1825: tab. 36, fig. 2; H. Milne Edwards, 1837a: 309 (part?); H. Milne Edwards, 1837b: 130 (part?); White, 1847: 70; Bell, 1853: 219, fig.; A. Milne Edwards, 1870: 80, 101; Stalio, 1877: 106; Neumann, 1878: 34; Gustafson, 1934: 14; Lutze, 1938: 170, figs. 28-51; Makarov, 1938: 62, 63 (part); Poulsen, 1940: 229, figs. 10-12; De Saint Laurent & Bozic, 1976: 17, figs. 1, 9, 17, 28; Adema et al., 1982: 23, fig. 6a-c; Christiansen & Greve, 1982: 213; Witbaard & Duineveld, 1989: 209-219, fig. 1; Dworschak, 1992: 203.

Callianassa (*Cheramus*) *subterranea*; Borradaile, 1903: 545; Bouvier, 1915: 101, fig. 67; De Man, 1928a: 6, pl. 1 fig. 1-1h; De Man, 1928b: 27, 91, 92, 94, 97; Makarov, 1938: 63, fig. 21; Bouvier, 1940: 101 (part), fig. 67; Cédigh, 1962: 163.

Cheramus subterraneus; Colosi, 1923: 6.

Callianassa helgolandica Lutze, 1938: 174, figs. 52-61. [Type-locality: Helgoland].

Callianassa tyrrhena; Holthuis & Gottlieb, 1958: 62 (part), fig. 13 (= *C. subterranea*); Zariquiey Alvarez, 1968: 230.

Callianassa (*Callianassa*) *subterranea*; Zariquiey Alvarez, 1968: 229.

Not *Callianassa subterranea*; H. Milne Edwards, 1837b: pl. 48 fig. 3-3e; Heller, 1863: 202, pl. 6 fig. 9-11; Ortmann, 1891: 55, pl. 1 fig. 10 [= *C. tyrrhena* (Petagna, 1792)]; Czerniavsky, 1868: 122; Giard & Bonnier, 1890: 362, figs. 1-3 [= *C. pontica* Czerniavsky, 1884 = *C. candida* (Olivi, 1792)]; Adensamer, 1898: 620 [= *Gourretia minor* (Gourret, 1887) = *Gourretia denticulata* (Lutze, 1937)].

Not *Callianassa*; Kinahan, 1859: 266.

Not *Callianassa subterranea* forma *pontica* Czerniavsky, 1884: 81 [= *C. pontica* Czerniavsky, 1884, = *C. candida* (Olivi, 1792)].

Not *Callianassa subterranea* var. *minor* Gourret, 1887: 1034; Gourret, 1888: 96, pl. 8 figs. 1-15 [= *Gourretia minor* (Gourret, 1887) = *Gourretia denticulata* (Lutze, 1937)]

Not *Callianassa subterranea* var. *japonica* Ortmann, 1891: 56 [= *C. japonica*].

Material examined.— SMF 4954, Heligoland, Germany, July 1913, leg. L. Nick; SMF 12405-6, 1 juv., 1 specimen, German Bight (54°00.000'N 006°00.000'E), North Sea, 30.x.1975, R.V. *"Victor Hensen"*; SMF 12407, 1 juv., German Bight (54°01.000'N 007°49.000'E), North Sea, 28.viii.1975, R.V. *"Victor Hensen"*; SMF 12408, 1 ♂, German Bight (54°04.320'N 007°44.950'E), North Sea, 24.x.1982, R.V. *"Gauss"*; SMF 12409, 1 ♀, German Bight (54°01.800'N 007°46.950'E), North Sea, 24.x.1982, R.V. *"Gauss"*; SMF 12410, 2 ♂♂, German Bight (55°01.960'N 006°24.970'E), North Sea, 25.x.1982, R.V. *"Gauss"*; SMF 18046-18047, 1 ♂ (TL 57.0, CL 14.5 mm), 1 ♀, 1 ovig. ♀ (TL 48.0, CL 10.5 mm), German Bight (54°01.000'N 007°45.000'E), North Sea, 35 m, 03.ii.1989, det. S. Forster, R.V. *"Valdivia"*; SMF 18048, 1 ♂, German Bight (54°01.000'N 007°45.000'E), North Sea, 35 m, October 1988, det. S. Forster, R.V. *"Valdivia"*; SMF 21878, 2 Specimens, German Bight (54°39.9'N 6°00'E-54°40'N 6°01'E), North Sea, 42.5 m, 24.v.1987, R. V. *"Senckenberg"*; SMF 21879, 1 ♂, German Bight (54°39.90'N 6°00.00'E), North Sea, 42.5 m, 24.v.1987, F.K. *"Senckenberg"*; SMF 21880, 1 specimen, North Sea, German Bight (54°10'N 5°39.5'E-54°40'N 5°38'E), North Sea, 43.5 m, 24.v.1987, R.V. *"Senckenberg"*; SMF 21881, 1 ♂, German Bight (55°00.02'N 6°20.02'E - 55°00.00'N 6°21.47'E), 46 m, 24.v.1987, R.V. *"Senckenberg"*; SMF 23575, 1 ♀, German Bight (54°00.100'N 007°45.000'E), North Sea, 34.7 m, 16.vii.1959; SMF 12411, 1 ♂, 1 ♀, North Sea, White Bank (55°18'N 06°07'E), North Sea, 47 m, 17.v.1977, R.V. *"Senckenberg"*; SMF 17947, 1 Specimen, S. Elich, Doggerbank (55°15.28'N 04°30.10'E - 55°14.54'N 04°29.88'E), North Sea, 48.5-48.5 m, 23.iv.1986, R.V. *"Senckenberg"*, ICES-North Sea survey; SMF 20653, 1 ♂, North Western North Sea (54°01.00'N 7°45.03'E), 34.1 m, 26.vii.1989, R.V. *"Senckenberg"*; SMF 20654, 2 ♂♂, North Western North Sea

(54°00.97'N 7°44.99'E), 34.1 m, 26.vii.1989, R.V. *"Senckenberg"*; SMF 21877, 1 ♀, North Sea (55°00.02'N 5°00.10'E), 42 m, 23.iv.1986, F.V. *"Senckenberg"*; ZMH-K 14245, 2 ♂♂, 2 ♀♀, Helgoland, North Sea, (54° 57'N, 7° 54.0'E), leg. D. Wolff; SMNH 1183, 1 ♂, Skagen-Nidingarne, Denmark, 35 fathoms, leg. Théel & Trybom; SMNH 1185, 1 ♀, Wäderöarne, Denmark, 60 fathoms, mud, 13.vii.1877, leg. Bovallius & Théel; SMNH 1184, 1 ♂, Kattegat, Sweden, leg. Gunh. Expedition, I. Skådesmal; SMNH 4586, 1 ♀, Dalsvik-Tova, Gullmaren, Sweden, 30-40 m, mud, 10.x.1924, leg. Krist. Zool. Sta.; SMNH 4733, 1 ♂, Bläckhall, Sweden, rännan. 40 m, sandymud, mud with shells. 22.7.1931, leg. Krist. Zool. Sta.; SMNH 4777, 1 ♂, Gullmaren, Kölvik, Sweden, 30 m, 17.vii.1933, leg. Krist. Zool. Sta.; ZMU, 1 ovig. ♀, Utanför Blåbärsholmen, Kristineberg, Sweden, 31.vii.1939, leg. Gullmaren, M. Tova & Dalsvik; SMF 4960, Naples, Campania, Italy, 1867, leg. M. Goldschmidt; SMF 23573, 4 ♂♂, 1 ♀, off Licola, N Naples, Gulf of Gaeta, Campania, Italy, 1966-1968, leg. J. Doerje; SMF 23574, 1 ♀, Istria, near Rovinj, Mouth of Limski-Kanal, Croatia, 09.ix.1974, leg. M. Türkay; SMF 13984, 1 ♀, Istria, near Rovinj, Limski Kanal, Sotto Castello, Croatia, 1.3 m, E. Mündung, Sta. YU-85/9b, RD, 32 m, 11.ix.1985, R.V. *"Burin"*, excursion of Universität Frankfurt.

Remarks.— The type specimen was not examined, however, the present species is safely determined because the type locality of *C. subterranea* is Devon, England, where only the present species is distributed in the family Callianassidae. Male Plp1 is uniramous, biarticulate, and male Plp2 is biramous, the endopod is thicker than the exopod, rounded distally, and about the same length as the exopod. Female Plp1 uniramous, three segmented, and female Plp2 biramous, endopod thicker and longer than exopod.

Type locality.— Devon, England.

Distribution.— Eastern Atlantic from Scandinavia to the eastern Mediterranean, subtidal usually in 10-80 m.

Callianassa truncata Giard & Bonnier, 1890

Callianassa truncata Giard & Bonnier, 1890: 362, figs. 2, 4; Caroli, 1940: 73; Caroli, 1946, fig. 1b, 3; Holthuis, 1953a: 91, fig. 4; Lagardère, 1966: 195, pls. 2-5; De Saint Laurent & Bozic, 1976: 19, figs. 2, 10, 18, 29; Beaubrun, 1979: 84, figs. 56, 57, 62, 63, and 64.

Callianassa (*Trypaea*) *truncata*; Borradaile, 1903: 546; Bouvier, 1915: 102, fig. 68; De Man, 1928b: 27, 101; Bouvier, 1940: 102, fig. 68; Zariquiey Alvarez, 1950: 81, fig. 1; pl. 2 figs. 1-6; pl. 3 fig. 2; Zariquiey Alvarez, 1968: 229.

Callianassa italica Parisi, 1915: 64, figs. 1, 2. [Type-locality: Italy].

Callianassa (*Trypaea*) *italica*; De Man, 1928a: 11, figs. 5-5h; De Man, 1928b: 27, 101.

?*Callianassa truncata*; Dolgopolskaia, 1954: 186; Kobjakova & Dolgopolskaia, 1969: 286; Dolgopolskaia, 1969: 316, pls. 35-38.

?*Callianassa* (*Trypaea*) *truncata*; Bacescu, 1967: 229, fig. 104.

Material examined.—SMF 18698, 18700-18701, 1 ♂, 2 ♀♀, Isola del Giglio, Tyrrhenian Sea, Italy, 3 m, 02.vii.1989, leg. W. Ziebis & C. Humborg; SMF 18699, 1 ♂ (TL 20.0, CL 4.8), Isola del Giglio, Tyrrhenian Sea, Italy, 3 m, 02.vii.1989, leg. W. Ziebis & C. Humborg; SMF 18702-18703, 2 ovig. ♀♀ (TL 20.0-20.5, CL 4.3-4.4), Isola del Giglio, Tyrrhenian Sea, Italy, 3 m, 29.vi.1989, leg. W. Ziebis & C. Humborg; SMF 23587, 18 specimens, Isola del Giglio, Tyrrhenian Sea, Italy, 28.v.1993, leg. W. Ziebis; SMF 23588-23604, 8 ♂♂, 9 ♀♀, Isola del Giglio, Tyrrhenian Sea, Italy, 2 m, 06-26.vi.1993, leg. W. Ziebis; IG 27244, 1 ♂, 1 ovig. ♀, Plaka, Crete, 20.vii.1987, leg. C. d'Udekem d'Acoz.

Remarks.— The male Plp1 is simple and two-segmented. The male Plp2 is absent. The female Plp1 is uniramous. The female Plp2 is biramous and filiform in structure.

Type locality.— Gulf of Naples, Italy.

Distribution.— Mediterranean: Gulf of Gascogne, France; Melilla; Crete; Tyrrhenian Sea (Isola del Giglio; Naples). Eastern Atlantic (Morocco). ? Black Sea.

Callianassa tyrrhena (Petagna, 1792)
(figs. 3a-c)

Astacus tyrrhenus Petagna, 1792: 418, pl. 5 fig. 3.

Callianassa laticauda Otto, 1821: 11; Otto, 1828: 345, pl. 21 fig. 3; Heller, 1863: 203; Stalio, 1877: 107; Zariquiey Alvarez, 1946: 106; Caroli, 1946: 71; Caroli, 1950: 189; Holthuis, 1953a: 91; Forest & Gantès, 1960: 348. [Type locality: Nice, S. France, Mediterranean].

Gebios Davyanus Risso, 1822: 243. [Type locality: Nice, Mediterranean].

Callianassa tyrrhena; Risso, 1827: 54 (part); Holthuis, 1947: 320, fig. 1; Holthuis, 1953a: 91, 93, figs 1; Holthuis & Gottlieb, 1958: 62 (part), not fig. 13 (= *C. subterranea*); Forest, 1967: 6 (part); De Saint Laurent & Bozic, 1976: 22, figs. 4, 12, 20, 31; Holthuis, 1978: 57; Beaubrun, 1979: 84, 90, figs 55, 60, 61, 66 and 67; De Saint Laurent & Le Loeuff, 1979: 53; Adema et al., 1982: 26, fig. 7a-c; Manning & Stevcic, 1982: 295; Garcia Raso, 1983: 323, fig. 2. Holthuis, 1991: 252, 264, figs. 457, 458; Koukouras et al, 1992: 223; Dworschak, 1992: 206; Gruner, 1993: 997.

Callianassa subterranea; H. Milne Edwards, 1837a: 309 (part?); H. Milne Edwards, 1837b: 130 (part?), pl. 48 fig. 3-3e; Heller, 1863: 202, pl. 6 fig. 9-11; Ortmann, 1891: 55, pl. 1 fig. 10 (part?).

?*Callianassa subterranea*; Bell, 1847: 219 (part).

Callianassa (*Callichirus*) *laticauda*; Stalio, 1877: 664; Carus, 1885: 489; Giard & Bonnier, 1890: 366; Borradaile, 1903: 547; Pesta, 1912: 105; Pesta, 1918: 204; De Man, 1928a: 33, pl. 8 fig. 15-15d; De Man, 1928b: 28, 91, 92, 111; Bouvier, 1940: 102, fig. 69 (part); Céidigh, 1962: 164 . [Not *Callianassa laticauda* Otto, 1821].

Callianassa sp. Stebbing, 1893: 184.

Callianassa (*Callichirus*) *Stebbingi* Borradaile, 1903: 547; Selbie, 1914: 100, pl. 14 figs. 8-10. [Type locality: Jersey, NE Atlantic].

Callianassa stebbingi; Schellenberg, 1928: 78, fig. 59, 60; Steinitz, 1933: 147; Bodenheimer, 1937: 281; Lutze, 1937: 6, fig; Lutze, 1938: 165, figs. 1-9.

Callianassa (*Cheramus*) *subterranea*; Bouvier, 1940: 102 (part).

Callianassa (*Callichirus*) *tyrrhena*; Zariquiey Alvarez, 1968: 230.

Not *Alpheus Tyrhenus* Risso, 1816: 94 (only references), not pl. 2 fig. 2 (= *Pontonia pinnophylax* (Otto, 1821)).

Material examined.— RMNH D 938, 3 ♂♂ (TL 55.0, CL 12.5 - TL 45.0, CL 10.3), 2 ovig. ♀♀ (TL 48.0, CL 9.8 - TL 43.0, CL 9.0), 1 ♀ (TL 39.0, CL 8.8), Napels, det, J.G. De Man, 1876 as *Callianassa laticauda* Otto; ZMA 100.014, 1 ♀ (TL 33.0, CL 7.0), Belgian Coast, 01. 1902, leg. Gilson, don. De Man, det. L.B. Holthuis; SMF 2581, 2 ♀♀, Gulf of Naples, Campania, Italy, 21.vii.1959, leg. R. Bott; SMF 3462, 1 ♂, Naples, Campania, Italy; SMF 4952, 1 ♂, Naples, Campania, Italy, 1905; SMF 4961, 2 ♂♂, 6 ♀♀, Naples, Campania, Italy, 11.iv.1912-12.iv.1912, leg. L. Nick; SMF 4962, 21 ♂♂, 2 ovig. ♀♀, 14 ♀♀, Naples, Campania, Italy, 1939, leg. R. Bott; SMF 4963, 7 ♂♂, 9 ♀♀, no locality; SMF 5122, 1 specimen, Southland, Karpathos, Dodecanesos, Greece, 03.iv.1963, leg. R. Kinzelbach; SMF 9753, 3 ♂♂, Naples, Campania, Italy, 1879; SMF 9754, 3 ♀♀, no locality; SMF 9829, 4 ♂♂ (TL 25.0, CL 6.0 - TL 43.0, CL 10.0), 7 ♀♀ (TL 24.0, CL 6.0- TL 45.0, CL 11.), Kuvi Bay (= Villas Rubin) ca. 2.5 km S. Rovinj, Istria, near Rovinj, Croatia, 1 m, sandy bottom, 05.ix.1974, leg. M. Türkay; SMF 12142, 2 ♂♂, 1 ♀, Kuvi Bay, Istria, near Rovinj, Croatia, Sta. YU-83/4c, 1 m, sandy bottom, 08.ix.1983, excursion of Universität Frankfurt; SMF 12563, 2 ♀♀, Ornoma Peristeri (39°10.000'N 23°58.000'E), Peristera, Northern Sporades, Greece, littoral, 11.vii.1978, leg. M. Türkay; SMF 13957, 2 ♂♂, 1 ♀, Kuvi Bay, Istria, near Rovinj, Croatia, Sta. YU-85/5c, P, muddy sand, 09.ix.1985, excursion of Universität Frankfurt; SMF 14069, 2 ♂♂, 7 ♀♀, Concarneau, Bretagne, France, rocky shore, October 1982, leg. U. Pettke; SMF 14084, 1 ♀, Plage des Dames, Concarneau, Bretagne, France, 16.iv.1984-30.iv.1984, leg. U. Pettke; SMF 14085, 1 ♂,

beach at the Rue de la Liberation, near Concarneau, Bretagne, France, January 1982, leg. U. Pettke; SMF 14086, 1 ♂ (TL 45.0, CL. 10.0), Mousterlin, near Concarneau, Bretagne, France, beach, January 1982, leg. U. Pettke; SMF 14087, 1 ♀, Kerleven, near Concarneau, Bretagne, France, beach, January 1982, leg. U. Pettke; SMF 21876, 1 ♀, off Zeebrugge (51°32.56'N 02 40.28'E - 51°34.12'N 02 41.26'E), Belgium, Western North Sea, 37-42.5 m, 10.vii.1988, R.V. *"Senckenberg"*; SMF 23581, 1 ♀, Cattolica, Emilia Romagna, Italy, 09.ix.1952-27.ix.1952, leg. E. Schirner; SMF 23582, 5 ♂♂, 3 ♀♀, Port Lligat, Cataluña, near Cadaqués, Spain, 0.1-0.5 m, 23.vii.1985, leg. G. Fischer; SMF 23583, 2 ♂♂, 2 ♀♀, Port Lligat, Cataluña, near Cadaqués, Spain, shallow water, muddy sand, 01.viii.1985, leg. U. Pettke; SMF 23584, 2 ♀♀, Côte d'Azur, near Marseilles, France, 1992, don. H. Zibrowius; SMF 23585, 1 ♂, 1 ♀, Kuvi Bay, Istria, Croatia, Sta. YU-87/4c, P, 0.3-0.5 m, muddy bottom, 16.ix.1987, excursion of Universität Frankfurt; SMF 23586, 2 ♂♂, 2 ♀♀, Kuvi Bay, Istria, Croatia, Sta. YU-89/10, Seagrass-meadow, 18.viii.1989, excursion of Universität Frankfurt; SMF 23605, 1 ♂, Kuvi Bay, Istria, Croatia, Sta. Rov-95/6e, P, 1 m, muddy and sandy bottom, 02.ix.1995, excursion of Universität Frankfurt; ZMH-K 8380,

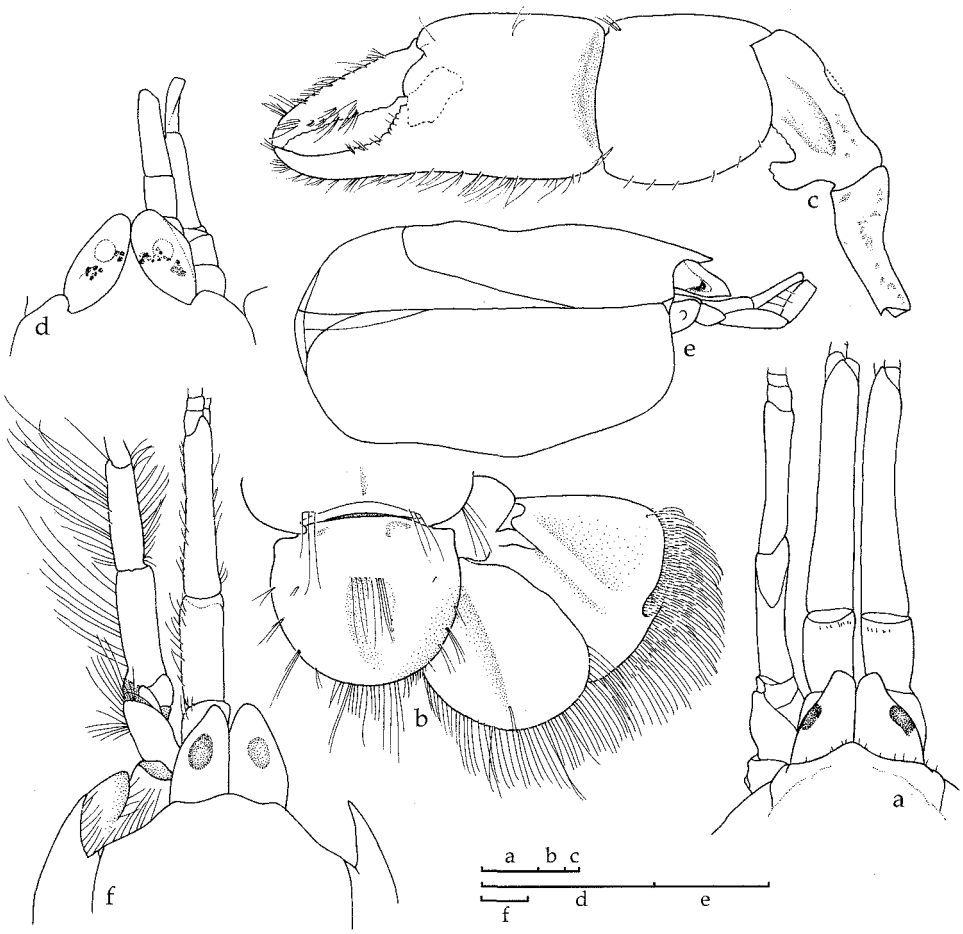

Fig. 3. *Callianassa tyrrhena* (Petagna, 1792), *C. gaucho* (Rodrigues & Manning, 1992b) & *C. uncinata* H. Milne Edwards, 1837. a, d & f, Anterior part of carapace, eyestalks and A1-2 peduncles; b, telson and uropod; c, male larger chelipeds; e, carapace with linea thalassinica, lateral view. a-c, *C. tyrrhena*, SMF 14086, 1 ♂ (TL 45.0, CL. 10.0), near Concarneau, Bretagne, France; d-e, *C. gaucho*, MZUSP 10 581, 1 ♀, holotype of *Poti gaucho*, Brazil; f, *C. uncinata*, ZMH-K 8437, 1 ♂, Chile. Scale = 1 mm.

2 ♂♂, 1 ovig. ♀, 1 ♀, Naples, 26.ii.1918, leg. Hagmeir; ZMB 11598, 1 ♀, Mediterranean Sea; ZSM 82/1, 1 ♂, Naples, Mediterranean Sea, 1912, leg. H. Balss; IG 27244, larger cheliped, Crete, Mediterranean Sea, creek, 22.vii.1987, leg. C. d'Udekem d'Acoz; IG 8698, 3 ♂♂, Bay of Naples; IG 27244, 1 ♀, Bay of Sauda, Crete, leg C. d'Udekem d'Acoz; NHML 1992:1086, 1 ♂, 4 ♀♀, Iles Chause, Atlantic coast of France, September 1992, leg. P. Clark et al.; UM-Ma 159, 5 ♂♂, 2 ovig. ♀♀, 3 ♀♀, Naples, Italy; BLT 6227, 2 ♂♂ (TL 45.0, CL 9.7 - TL 54.0, CL 11.0), 3 ♀♀ (TL 35.0, CL 7.2 - TL 47.0, CL 11.0), Chause, SW side of Grand Ile, France, 26.viii.1992, leg. A. Crosnier, R.B. Manning, & B. R. de Forges leg.

Diagnosis.— Rostrum scarcely developed (fig. 3a). A1 peduncle subequal to A2 peduncle. Uropodal endopod (fig. 3b) rounded distally, and uropodal exopod with submarginal setal row near lateral margin. Telson rounded posteriorly. P1 unequal. Larger cheliped merus with obtusely tipped ventral lobe proximally (fig. 3c).

Remarks.— Petagna's (1792: 418) original figure of an ovigerous female clearly shows the important characteristics of this species.

Gebios Davyanus Risso, 1822, (described on the basis of a cheliped) is thought to be a synonym of *Callianassa tyrrhena*. Holthuis (1977: 48, 57) noted: "It is impossible to make out which of the Mediterranean species of *Callianassa* was meant by Risso with *Gebios Davianus*..." and handled Risso's *Davianus* as a synonym of *C. tyrrhena*. However this is not the case for *Gebios Davyanus* as later recorded by Risso (1827: 52), which, by his description, can hardly be anything like a species of *Callianassa*. On page 54 of the same paper, Risso incorrectly identified *Pontonia pinnophylax* as *Callianassa tyrrhena* (Holthuis, 1978: 48, 57).

Type locality.— Naples, Italy, Mediterranean.

Distribution.— Mediterranean from Cataluña, near Cadaques, Spain, and Côte d'Azur, near Marseille, France to Aegean Sea (Thassos Limenas, Greece; Aliki, Thassos) and Adriatic Sea. Eastern Atlantic (Iles Chausez, France; Belgian Coast, Bretagne). Intertidal.

Callianassa whitei spec. nov.
(fig. 4a-d)

Callianassa Davyana; White, 1847: 70 (Not: *Gebios Davyana*, Risso, 1822); De Man, 1928a: 37.
Callianassa (Callichirus) Davyana; De Man, 1928a: 6.
Callianassa (Callichirus) stebbingi; Pesta, 1918: 201, fig. 63.
Callianassa candida; Dworschak, 1992: 194 (part).

Material examined.— NHML 697, 2 specimens damaged, Mediterranea (Press: Rev. W. Hennah. det. De Man, 1928a: 37 as *Callianassa Davyiana* White, 1847); SMF 14033, holotype 1 ♂ (TL 49.0, CL 11.3), Kap Monsena, S. Val Salina, Istria near Rovinj, Croatia, vii.1982, leg. U. Pettke; SMF 24574, paratype, 1 ♂ (TL 45.0, CL 10.0), Kap Monsena, S. Val Salina, Istria near Rovinj, Croatia, vii.1982, leg. U. Pettke; SMF 14047, 2 ♂♂, S. Kap Gustinja, Bale Bay, Istria, Croatia, 4 m, seagrass meadow, vii.1982, leg. U. Pettke; SMF 14051, 1 ♂, S. Kap Gustinja, Bale Bay, Istria, Croatia, 0-4 m, seagrass meadow, vii.1982, leg. U. Pettke; NHMW 6902, 1 ♀, S. Salu, Rovinj, Croatia, intertidal in mud, under stones, 28.ii.1982, leg. P. Dworschak, det. P. Dworschak 1922 as *Callianassa candida*; NHMW 6778, 1 ♂, Montauro, Croatia, boulder field in 3 m, sand under stone, vii.1988, leg. J. Ott, det. P. Dworschak, 1982 as *Callianassa candida*.

Diagnosis.— A1 peduncle distinctly longer than A2 peduncle. Uropodal endopod

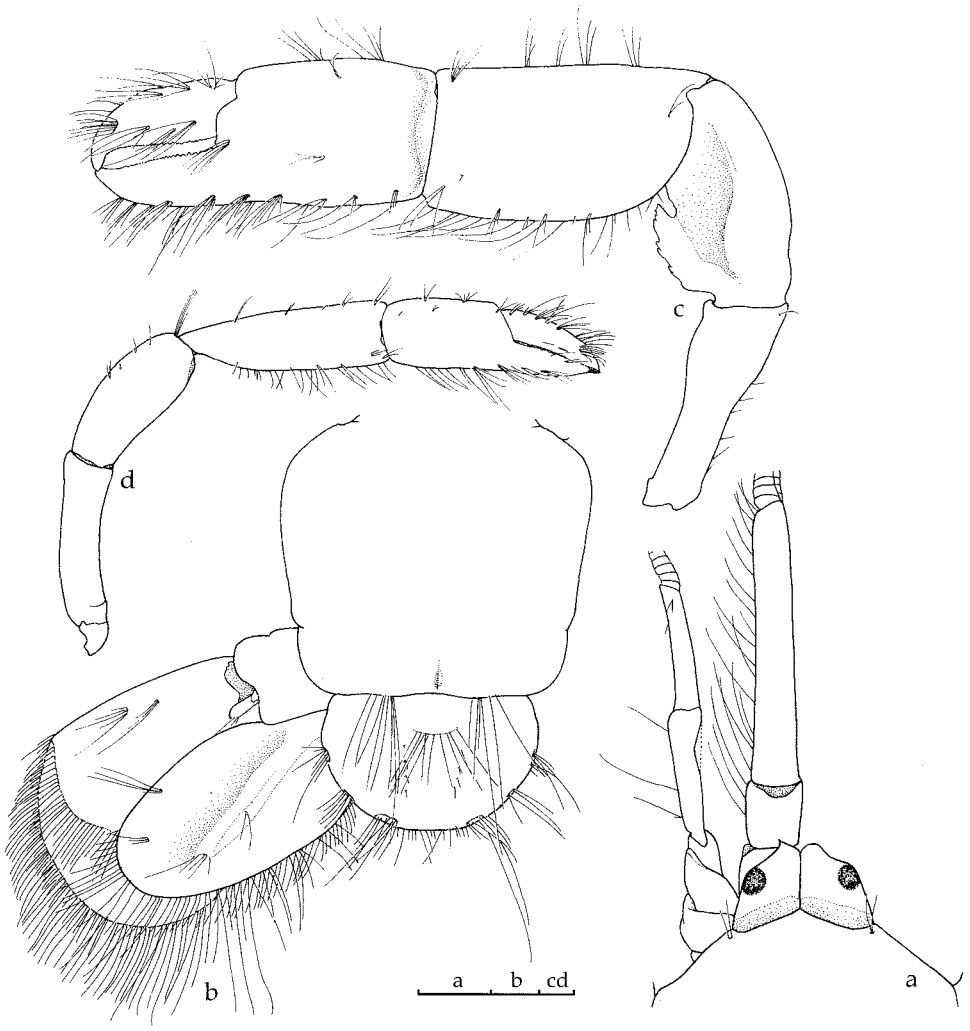

Fig. 4. *Callianassa whitei* n. sp., SMF 14033, 1 ♂ , holotype, Istria near Rovinj, Croatia. a, Anterior part of carapace, eyestalks and A1-2 peduncles; b, abdominal somite 6 and tail-fan; c, male larger cheliped, lateral view; d, male smaller cheliped, lateral view. Scale = 1 mm.

elongated, and uropodal exopod with a submarginal setal row apart from lateral margin. Telson rounded posteriorly.

Description of male holotype.— Dorsal oval of carapace convex, posterior region posterior to cervical region narrow, about one-sixth of carapace length. Rostrum poorly triangular in dorsal view (fig. 4a), incurved downward distally. Abdominal somite 2 elongated, about twice as long as somite 1; somite 3 1.5 times as long as somite 1. Telson (fig. 4b) about half length of abdominal somite 6, about 1.5 times as broad as long, distal margin largely rounded, beset with three pairs of setal tufts submarginally, median part concave with row of 4-6 setal tufts laterally.

Eyestalks distomesially produced, calcified in proximal part. A1 peduncle much longer than A2 peduncle. Mxp3 ischium-merus ovoid; propodus and dactylus narrow.

P1 unequal. Merus of larger cheliped (fig. 4c) irregularly serrated on ventral margin, sharp triangular proximal lobe serrated ventrally; carpus about as long as merus, slightly longer than broad; chela 1.8 times as long as carpus, palm about as long as carpus, convex on distal margin; fixed finger minutely serrated in proximal half of cutting edge; dactylus incurved distally, slightly longer than fixed finger, cutting edge minutely serrated. Smaller cheliped (fig. 4d) slender; merus spindle-formed, slightly longer than ischium; carpus 1.5 times as long as merus; chela slightly longer than carpus; dactylus about as long as palm on dorsal margin.

Plps 1-2 in males absent. Uropodal endopod elongated and oval, about twice as long as broad; uropodal exopod longer than endopod, submarginal setal row apart from distal margin.

Remarks.— Two British Museum specimens registered under the name of *Callianassa davyana* and identified by White, NHML 697, from the Mediterranean, presented by the Rev. W. Hennah were examined. One specimen is preserved in rather good condition, but the anterior part of the carapace is damaged. The uropodal exopod is distinctively elongated as in the other specimens. De Man (1928a: 37) also examined the present British Museum specimens and wrongly identified them as *Callianassa pestae* (= *C. candida*). The new species is named *Callianassa whitei* in memory of Dr. A. White.

The present species is closely related to *C. convexa*, known from Gambia. Both species have an elongated A1 peduncle. In *C. whitei*, the uropodal endopod is elongated, bearing a median dorsal carina, and the uropodal exopod has a submarginal setal row apart from the lateral margin; whereas in *C. convexa*, the uropodal endopod is rounded distally, bearing a faint median dorsal carina (not described by De Saint Laurent & Le Loeuff, 1979: 54, fig. 10e), and the uropodal exopod is armed with a submarginal setal row apart from the lateral margin.

Type locality.— Mediterranean.

Distribution.— Mediterranean, rarely found in the Adriatic Sea, Croatia.

Western Atlantic species

Key to the species of the genus *Callianassa* in the western Atlantic:

1. A1 peduncle longer than A2 peduncle. Eyestalks with a distal protrusion. Mxp3 ischium-merus broadened. Uropod endopod broadened distally ..... ***C. setimanus***
- A1 peduncle not longer than A2 peduncle. Eyestalks without distal projection ... 2
2. Mxp3 ischium-merus narrow and pediform; merus truncate or concave distally. P3 propodus not hammer-shaped 3
- Mxp3 ischium-merus broadened and operculiform; merus convex distally. P3 propodus hammer-shaped 5
3. Rostrum scarcely developed. P1 ischium and merus convex and serrated ventrally ..... ***C. profunda***
- Rostrum triangular. P1 ischium serrated, merus unarmed 4

4. Eyestalks calcified in proximal half, cornea distinct. Uropodal endopod tapering distally, telson with median spine posteriorly ..... ***C. marginata***
- Eyestalks calcified entirely, cornea dispersed. Uropodal endopod rounded distally, telson without median spine posteriorly ..... ***C. gaucho***
5. A1 peduncle subequal to A2 peduncle. Mxp3 merus concave distally. Smaller cheliped narrow, merus without median spine ventrally ..... ***C. fragilis***
- A1 peduncle slightly overreaching A2 penultimate segment. Mxp3 merus rounded distally. Smaller cheliped moderately broad, merus with median spine ventrally 6
6. Telson convergent laterally, truncate posteriorly, with median spine. Uropodal endopod about as long as telson, truncate distally. Merus of larger cheliped with large proximal tooth, serrated ventrally ..... ***C. biformis***
- Telson slightly convex on lateral margins, convex posteriorly, bearing no median spine. Uropodal endopod shorter than telson, convex posteriorly. Merus of larger cheliped with small distally directed tooth in ventral middle part ..... ***C. delicatula***

Callianassa biformis Biffar, 1971

Callianassa biformis Biffar, 1971b: 225, fig. 1; Rabalais, Holt, & Flint, 1981: 101; Manning, 1987: 397.

Material examined.— **U.S.A., Georgia.** SMF 23527, 3 ♂♂, 3 ♀♀, Ogeechee-River, 9-10 m, 22.iv.1971, leg. J. Doerjes; SMF 23528, 1 ♀, Ogeechee-River, 9-10 m, river bed, sandy mud, 17.iii.1971, leg. J. Doerjes; SMF 23529, 1 ♀, Ogeechee-River, south bank, 4-5 m, river bed, 17.iii.1971, leg. J. Doerjes; SMF 23530, 3 ♂♂, 7 ♀♀, Ogeechee-River, 9-10 m, muddy fine sand, 22.iv.1971, leg. J. Doerjes; SMF 23531, 25 ♂♂, 11 ♀♀, Ogeechee-River, river mouth behind shoals, 4-5 m, muddy fine sand, 16.iii.1971, leg. J. Doerjes; SMF 23532, 2 ♂♂, Ogeechee-River, mouth, 7 m, muddy fine sand, 16.iii.1971 leg. J. Doerjes; SMF 23533, 2 ♂♂, Blackbeard Island ca. 30 km off coast McIntosh County, mud flat, viii.1969, leg. J. Doerjes; SMF 23534, 2 ♀♀, Blackbeard Island ca. 30 km off coast McIntosh County, Sandbank, vii.1969, leg. J. Doerjes; SMF 23535, 1 ♀, Blackbeard Island ca. 30 km off coast McIntosh County, Creek, Point Bar, muddy fine sand, 02.xi.1972, leg. J. Doerjes; SMF 23536, 1 ♂, Cabretta Island, Sapelo Island, 0.4 m, from 15 cm deep muddy fine sand, 19.vi.1971, leg. J. Doerjes; SMF 23537, 1 ♂, Cabretta Island, Sapelo Island, tidal channel, sandy bottom, 19.vi.1971, leg. J. Doerjes; SMF 23538, 8 ♂♂, 10 ♀♀, N-Inlet, Cabretta Island, Sapelo Island, 5-6 m, muddy fine sand, 17.vii.1969, leg. J. Doerjes; SMF 23539, 1 ♂, 2 ♀♀, southern tip, Sapelo Island, Sta. SapS-15, 2.4 m, 26.v.1969, leg. J. Doerjes; SMF 23540, 1 ♂, 3 ♀♀, southern tip, Sapelo Island, Sta. SapS-16, 4 m, 23.vi.1969, leg. J. Doerjes; SMF 23541, 3 ♂♂, 4 ♀♀, southern tip, Sapelo Island, behind shoal, Sta. SapS-26, 4.2 m, 23.vi.1969, leg. J. Doerjes; SMF 23542, 1 ♂, 1 ♀, southern tip, Sapelo Island, behind shoal, Sta. SapS-28, 3.5 m, 23.vi.1969, leg. J. Doerjes; SMF 23543, 1 ♀, southern tip, Sapelo Island, behind shoal, Sta. SapS-33, 8.6 m, 23.vi.1969, leg. J. Doerjes; SMF 23544, 2 ♂♂, 2 specimens, southern tip, Sapelo Island, behind shoal, Sta. SapS-35, 10 m, 23.vi.1969, leg. J. Doerjes; SMF 23545, 1 juv., southern tip, Sapelo Island, behind shoal, Sta. SapS-36, 11.2 m, 23.vi.1969, leg. J. Doerjes; SMF 23546, 1 ♂, 4 ♀♀, mouth of Doboy-Sounds, South end of Sapelo, Sapelo Island, Sta. SapW-4, tidal flat, sediment depth 50 cm, 28.v.1969, leg. J. Doerjes; SMF 23547, 6 ♂♂, 1 ♀, mouth of Doboy-Sounds, South end of Sapelo, Sapelo Island, Sta. SapW-5, tidal flat, sediment depth 50 cm, 28.v.1969, leg. J. Doerjes; SMF 23548, 1 specimen, southern tip, Sapelo Island, Sta. SapN-18, 1.2 m, sediment depth 40 cm, 20.v.1969, leg. J. Doerjes; SMF 23549, 1 ♀, southern tip, Sapelo Island, Sta. SapN-19, 1.2 m, sediment depth 40 cm, 20.v.1969, leg. J. Doerjes; SMF 23550, 5 ♂♂, southern tip, Sapelo Island, Sta. SapN-20, 1.2 m, sediment depth 40 cm, 20.v.1969, leg. J. Doerjes; SMF 23551, 1 ♂, 5 ♀♀, southern tip, Sapelo Island, Sta. SapN-21, 1.8 m, fine sand, 21.v.1969, leg. J. Doerjes; SMF 23552, 2 ♂♂, 1 ♀, southern tip, Sapelo Island, Sta. SapN-22, 3.6 m, fine sand, 21.v.1969, leg. J. Doerjes; SMF 23553, 2 ♀♀, southern tip, Sapelo Island, Sta. SapN-23, 4.3 m, fine sand, sediment depth about 20 cm, 21.v.1969, leg. J. Doerjes; SMF 23554, 1 ♂, 3 ♀♀, southern tip, Sapelo Island, Sta. SapN-

24, 3.6 m, fine sand, sediment depth about 25 cm, 21.v.1969, leg. J. Doerjes; SMF 23555, 4 ♀♀, southern tip, Sapelo Island, Sta. SapN-25, 4.6 m, fine sand, sediment depth about 25 cm, 21.v.1969, leg. J. Doerjes; SMF 23556, 1 ♂, 4 ♀♀, 1 juv., southern tip, Sapelo Island, Sta. SapN-26, 4.8 m, fine sand, 21.v.1969, leg. J. Doerjes; SMF 23557, 1 ♀, southern tip, Sapelo Island, Sta. SapN-28, 3 m, fine sand, 29.v.1969, leg. J. Doerjes; SMF 23558, 6 ♂♂, 3 ♀♀, southern tip, Sapelo Island, Sta. SapN-29, 3.2 m, fine sand, 29.v.1969, leg. J. Doerjes; SMF 23559, 1 ♂, 2 ♀♀, southern tip, Sapelo Island, Sta. SapN-30, 3.2 m, fine sand, 29.v.1969, leg. J. Doerjes; SMF 23560, 2 ♂♂, southern tip, Sapelo Island, Sta. SapN-31, 3.5 m, fine sand, 29.v.1969, leg. J. Doerjes; SMF 23561, 1 ♀, southern tip, Sapelo Island, Sta. SapN-33, 3.8 m, fine sand, 29.v.1969, leg. J. Doerjes; SMF 23562, 1 ♂, 4 ♀♀, southern tip, Sapelo Island, Sta. SapN-34, 4.2 m, fine sand, 29.v.1969, leg. J. Doerjes; SMF 23563, 10 ♂♂, 3 ♀♀, southern tip, Sapelo Island, Sta. SapN-35, 4.8 m, fine sand, 30.v.1969, leg. J. Doerjes; SMF 23564, 2 ♂♂, 7 ♀♀, southern tip, Sapelo Island, Sta. SapN-37, 6.1 m, fine sand, 30.v.1969, leg. J. Doerjes; SMF 23565, 2 ♂♂, 1 ♀, southern tip, Sapelo Island, Sta. SapN-38, 6.1 m, fine sand, 30.v.1969, leg. J. Doerjes; SMF 23566, 4 ♂♂, southern tip, Sapelo Island, Sta. SapN-39, 6.4 m, fine sand, 30.v.1969, leg. J. Doerjes; SMF 23567, 11 ♂♂, 6 ♀♀, southern tip, Sapelo Island, Sta. SapN-40, 7 m, fine sand, 30.v.1969, leg. J. Doerjes; SMF 23568, 1 ♂, 1 ♀, southern tip, Sapelo Island, Sta. SapN-41, 7.7 m, fine sand, 30.v.1969, leg. J. Doerjes; SMF 23569, 1 juv., southern tip, Sapelo Island, Sta. SapN-44, 11.2 m, fine sand, 11.vi.1969, leg. J. Doerjes. **Atlantic**. ZMH-K 22668, 1 ♂, Atlantic, leg. Schaer & Gippe.

Type locality.— Mouth of Doboy Sound, south end of Sapelo Island, McIntosh County, Georgia, sandy lower intertidal.

Distribution.— Bass River, Yarmouth, Massachusetts to Florida, western Atlantic; Gulf of Mexico, sandy lower intertidal (Rabalais, Holt & Flint, 1981).

Callianassa delicatula (Rodrigues & Manning, 1992)

Biffarius delicatulus Rodrigues & Manning, 1992a: 324, fig. 1.

Remarks.— As cited in the remarks of *C. biffarius*, the present species is very similar to *C. biformis*. The fig. 1 of *C. delicatula* by Rodrigues and Manning (1992a) is almost the same as the Fig. 1 of *C. biffarius* by Biffar (1971) comparing the female cheliped, pereiopod 3 and the tail-fan. Plp 1 is uniramous, two-segmented. Plp2 is small, but uniramous, two-segmented as seen in *Callianassa brachyophthalma*. The rostrum is short.

Type locality.— Praia do Araça, São Sebastião, Brazil.

Distribution.— São Sebastiãno, State of São Paulo, Brazil.

Callianassa fragilis Biffar, 1970

Callianassa fragilis Biffar, 1970: 45, fig. 3; Biffar, 1971a: 652, 654, 667, figs. 7, 8; Manning, 1987: 397.
Biffarius fragilis; Manning & Felder, 1991: 769.

Material examined.— MCZ 760, 2 ♂♂, paratypes, Cumaná, Venezuela, 1859, Capt. Couthouy; RMNH D 28888, 1 ♂ (TL 14.0, CL 3.0), Saquarium, Miami, Florida, flats, 21.x.1969, leg. T.A. Biffar.

Remarks.— Male Plp1 is slender, two-segmented. Male Plp2 is absent.

Type locality.— Puerto Rico, Punta Arenas, sandy flat.

Distribution.— Miami, Southeastern Florida; Puerto Rico; Antigua; Venezuela, sandy flat (Biffar, 1971a).

Callianassa gaucho (Rodrigues & Manning, 1992) (fig. 3d-e)

Poti gaucho Rodrigues & Manning, 1992b: 10, fig. 1.

Material examined.—MZUSP 10 581, 1 ♀ holotype & USNM 256376, 1 ♂, paratype, 33° 43'S, 51° 13'W, Off Chui, near the border between Brazil and Uruguay, 150 m deep.

Diagnosis.— Rostrum triangular, shorter than eyestalks (fig. 3d); anterolateral projection of carapace rounded. A1 peduncle slightly shorter than A2 peduncle. Linea thalassinica running through the carapace (fig. 3e).

Remarks.— Rodrigues & Manning (1992b) established the genus *Poti* because of an incomplete linea thalassinica. However after reexamining the holotype, it is found that the linea thalassinica is present as a slender line from the frontal to the posterior margins of the carapace. Therefore this species is transferred to *Callianassa*.

Type locality.— Off Chui, near the border between Brazil and Uruguay (33°43'S 51°13'W), 150 m.

Distribution.— Off Chui, near the border between Brazil and Uruguay (33°43'S 51°13'W), 150 m.

Callianassa marginata Rathbun, 1901

Callianassa marginata Rathbun, 1901: 92, fig. 15; Schmitt, 1935b: 4; Biffar, 1971a: 651, 654, 689, figs. 15, 16; Coelho & Ramos, 1973: 161; Rabalais, Holt, & Flint, 1981: 100; Manning, 1987: 397.

Callianassa (*Callichirus*) *marginata*; Borradaile, 1903: 547; Bouvier, 1925: 472; De Man, 1928b: 29, 94, 113; Schmitt, 1935a: 195, fig. 56.

? *Callichirus marginatus*; Bouvier, 1905: 804.

Cheramus marginatus; Manning & Felder, 1991: 780, figs. 2, 4-6, 14.

Material examined.— RMNH D 11763, 1 ♂ (TL 18.0, CL 4.2), S.E. Honduras, 16°35.4'N 82°47.2'W, Caribbean Sea, 19.7°C, 183-335 m (100-183 fms) depth, R.V. *"Explorer"* Sta. 1a, U.S.

Remarks.— Biffar (1971a: 689) stated in his key that the propodus of Mxp3 is narrow, and about twice the width of the dactylus (fig. 15f). Male Plp1 is a slender two-segmented appendage, and male Plp2 is absent. Manning & Felder (1991: 780) included this species in *Cheramus*, however the present species is here included in *Callianassa*, because I consider *Cheramus* to be congeneric with *Callianassa*.

Type locality.— Puerto Rico, Mayaguetz Harbor, 315 m.

Distribution.— Northeastern Gulf of Mexico; Arrowsmith Bank, Barbados to Puerto Rico; Colombia in Caribbean Sea, 55-640 m (Rabalais, Holt & Flint, 1981).

Callianassa profunda Biffar, 1973

Callianassa occidentalis Bate, 1888: 29, pl. 2 fig. 2k; Borradaile, 1903: 548; Balss, 1925: 212; De Man, 1928b: 115; Schmitt, 1935b: 3; Biffar, 1971a: 649. [Type locality: 18°29.3'N 63°24.6'W, off Sombrero Island, West Indies, 686-724 m]. [Not *Callianassa occidentalis* Stimpson, 1856].

Cheramus occidentalis Bate, 1888: 32, pl. 2 fig. 1. [Type locality: 18°29.3'N 63°24.6'W, off Sombrero Island, West Indies, 686-724 m]. [Not *Callianassa occidentalis* Stimpson, 1856 (= Subjective junior

synonym of *Callianassa californiensis* Dana, 1852)].
Callianassa (*Cheramus*) *Batei* Borradaile, 1903: 546; De Man, 1928a: 10, pl. 1 fig. 3; De Man, 1928b: 26, 98. [New name for *Cheramus occidentalis* Bate, 1888].
Callianassa batei; Schmitt, 1935b: 5; Manning, 1987: 398; Biffar, 1971a: 649, 654.
Callianassa profunda Biffar, 1973: 225, figs. 1-2. [New name for *Callianassa batei* Borradaile, 1903].
Neocallichirus batei; Manning & Felder, 1991: 780.

Remarks.— Bate (1888) described two species, *Callianassa occidentalis*, and *Cheramus occidentalis*. Biffar (1973: 224) found a single specimen from Bate's station off Sombrero Island, and decided that Bate's two species are one and the same. *Callianassa occidentalis* Bate, 1888, is a subjective junior homonym of *Callianassa occidentalis* Stimpson, 1856. *Cheramus occidentalis* Bate, 1888, was renamed as *Callianassa* (*Cheramus*) *batei* by Borradaile, 1903. However, *Callianassa* (*Cheramus*) *batei* is a subjective junior homonym of a fossil species, *Callianassa batei* Woodward, 1868, so that the type species of the genus *Cheramus* was renamed by Biffar as *Callianassa profunda* Biffar, 1973.

The male Plp2 is biramous, with the endopod and exopod slender and blade-like as shown by Biffar (1973: 225, figs. 1-2).

Type locality.— 18°29.3'N 63°24.6'W, off Sombrero Island, West Indies, 686-724 m.

Distribution.— Off Sombrero Island, West Indies, 686-724 m.

Callianassa setimana (DeKay, 1844)

Gonodactylus setimanus DeKay, 1844: 34, pl. 8 fig. 23; Manning, 1987: 386.
Callianassa Stimpsoni Smith, 1873: 549, pl. 2 fig. 8; Kingsley, 1878: 327; Borradaile, 1903: 548; Hay & Shore, 1917: 406, pl. 29 fig. 5. [Type locality: "Our species ranges from the coast of the Southern [United] States north to Long Island Sound" (Smith, 1873)]. [Junior homonym of *Callianassa stimpsoni* Gabb, 1864].
Callianassa atlantica Rathbun, 1926: 107; Schmitt, 1935b: 4; Biffar, 1971a: 652, 654; Rabalais, Holt, & Flint, 1981: 101, fig. 2; Manning, 1987: 397. [New name for *C. stimpsoni*].
Callianassa (*Callichirus*) *atlantica*; De Man, 1928a: 37, pl. 9 fig. 17-17d; De Man, 1928b: 28, 94, 112; Williams, 1965: 102, fig. 79.
Callianassa setimanus; Manning, 1987: 397.
Gilvossius setimanus; Manning & Felder, 1992: 558, fig. 1.
Callianassa stimpsoni; Manning, 1987: 397.

Material examined.— RMNH D 16616, 7 ♂♂ (TL 17.0, CL 3.0 - TL 21.0, CL 5.0), 1 ovig. ♀ (TL 25.0, CL 5.4), 1 ♀ (TL 16.5, CL 3.5), Nantucket Sound, Massachusetts, USA, viii.1958, leg. T. Shafes, don. M.M. Petti; SMF 23523, 3 juv., Bahia Gairaca ca. 20 km norht east of Santa Marta, Magdalena Depto., Colombia, 05.xii.1980; SMF 23524, 2 ♂♂, 2 ♀♀, Cabbage Island, south east of Savannah, Wassaw-Sound, Georgia, USA, sand-mud-gravel, 30.vi.1972; SMF 23526, 2 ♂♂, 1 ♀, Ogeechee River, Georgia, USA, KG, 9-10 m, 22.iv.1971, leg. J. Doerjes; SMNH 7932, locality unknown.

Remarks.— A1 peduncle longer than A2 Peduncle.

Type locality.— New York.

Distribution.— Bass River, Nova Scotia to South Carolina; Franklin County, Florida, 38 m; northwestern Gulf of Mexico, 134 m; Colombia.

Callianassa sp. Rabalais, Holt & Flint, 1981

Callianassa sp. Rabalais, Holt & Flint, 1981: 106, fig. 4; Manning, 1987: 397.

Remarks.— Five females, four immature specimens, and one sexually undetermined specimen measuring 6.5 mm in total length, have been recorded. Rabalais, Holt & Flint (1981) described this species as being superficially similar to *Callianassa marginata* Rathbun, 1901 and *Dawsonius latispina* (Dawson, 1967).

Distribution.— NW Gulf of Mexico.

Eastern Pacific species

Key to species of the genus *Callianassa* in the Eastern Pacific:

1 A1 peduncle shorter than A2 peduncle. Rostrum triangular. Eyestalks triangular, and pointed distomesially. Merus of larger cheliped with narrow triangular proximal lobe ventrally, with row of obtuse tubercles dorsally. Telson with median spine posteriorly ..... ***C. brachyophthalmua***

- A1 peduncle slightly or distintly longer than A2 peduncle. Rostrum short, rounded 2

2. Eyestalks triangular, obtuse distally, failing to reach distal margin of A1 somite 1. Merus of larger cheliped produced proximally into a sharp straight tooth; chela of male larger cheliped with rounded concavity in anterior margin of palm above base of fixed finger 3

- Eyestalks overreaching distal margin of A1 somite 1 4

3. Telson subquadrate, posterior margin almost straight without median spine ..... ***C. uncinata***

- Telson subquadrate, posterior margin largely concave with median spine ..... ***C. rochei***

4. A1 peduncle distinctly longer than A2 peduncle. Eyestalks triangular and obtuse distally. Uropodal endopod rounded distally. Telson without median spine posteriorly. Chela of male larger cheliped serrated ventrally ..... ***C. biffari***

- A1 peduncle slightly longer than A2 peduncle. Eyestalks triangular and elongated distally. Uropodal endopod truncate. Telson with median spine posteriorly. Chela of male larger cheliped not serrated ventrally 5

5. Carpus of larger cheliped incurved dorsally; carpus of smaller cheliped wider than merus. Carpus of male larger cheliped broadened, shorter than chela; chela with distinct triangular concavity in anterior margin of palm above base of fixed finger ..... ***C. californiensis***

- Carpus of larger cheliped with sharp straight dorsal ridge; carpus and merus of the smaller cheliped subequal in width. Carpus of male larger cheliped slender, about as long as chela; chela with shallow concavity in anterior margin of palm above base of fixed finger ..... ***C. gigas***

Callianassa biffari Holthuis, 1991

Callianassa affinis Holmes, 1900: 162, pl. 2 figs. 29-30; Rathbun, 1904: 154; Schmitt, 1921: 116, 119, fig. 81; Stevens, 1928: 341, fig. 18; Haig & Abbott, 1980: 580, pl. 166 fig. 24.3.
Callianassa (*Callichirus*) *affinis*; Borradaile, 1903: 5 47.
Callianassa (*Trypaea*) *affinis*; De Man, 1928b: 27, 101.
Neotrypaea affinis; Manning & Felder, 1991: 771.
Callianassa biffari Holthuis, 1991: 242, figs. 443, 445. [New name for *Callianassa affinis* Holmes, 1900].

Material examined.— SMNH 13379, 1 ♂, Ensenada, Mexico, littoral, under stone, 03.iii.1930, leg. Gisléns Pacific Expedition 1930-31; SMNH 13418, 2 ♂♂, Ensenada, Mexico, littoral, under stone, 03.iii.1930, leg. Gisléns Pacific-Expedition, 1930-31; SMNH 10523, 1 ♂, S. Catalina, California, 1-15 fathoms, 1874, leg. Eisen, det. T. Odhner, 1920; ZMU, 2 ♂♂, 1 ♀, Ensenada, Mexico, 03.iii.1931, leg. T. Gisléns Pacific Exp. 1930-31; SCU, 1 ♂ (TL 44.0, CL 10.4 mm), Flat Rock Point, Los Angeles County, California, det. xii.1968. J. Haig; SCU, 1 ♂ (TL 45.0, CL 8.2 mm), South Lunada Bay, Palos Verdes Peninsula, California, 17.iii.1968, leg. Mary Wicksten, det. J. Haig.

Diagnosis.— A1 peduncle slightly longer than A2 peduncle. Chelipeds unequal, palm serrated on ventral margin. Male Plp1 vestigial, two-segmented, distal segment simple; Plp2 absent; Plp3-5 biramous, foliaceous, bearing appendices internae.

Remarks.—Holthuis (1991: 242) treated *Callianassa affinis* Holmes, 1900 as a junior primary homonym of *Callianassa affinis* A. Milne Edwards, 1860, for a fossile species from the Lutetian of Central France (Parnes).

Type locality.— Point Loma and San Clemente Islands, California, U.S.A.

Distribution.— Santa Monica Bay, Los Angeles, San Diego and San Clemente Is, USA; Ensenada and San Quantin Bay, Baja California, Mexico. On beaches.

Callianassa brachyophthalma A. Milne Edwards, 1870

Callianassa brachyophthalma A. Milne Edwards, 1870: 85, 101; De Man, 1928b: 115.
Callianassa (*Trypaea*) *brachyophthalma*; Borradaile, 1903: 546; De Man, 1928b: 27, 94, 115, 134; Holthuis, 1952: 92, fig. 9; Ferrari, 1981: 16, fig. 2.
Notiax brachyophthalma; Manning & Felder, 1991: 772, figs. 6, 11.

Material examined.— RMNH D 1138, Estero Reloncavi 41°24.30'S 72°19.45'W, Chile, Lund Univ. Chile Exped., 1948-49, Sta. M. 29, det. L.B. Holthuis; SMNH 15695, 2 ♂♂, 70 young specimens, Estero Reloncavi 41°24.30'S 72°19.45'W, Seno Reloncavi, Chile, inner part, Bahia Ralun, E. of Punta Direction, Sta. M. 29, 4.i.1949, Lund Univ. Chile-Expedition 1948-49, det. L.B. Holthuis.

Diagnosis.— Rostrum sharply triangular, without anterolateral projection on the front. A1 peduncle slightly shorter than A2 peduncle. P1 unequal, larger merus with a ventroproximal lobe. Male Plp1 uniramous, biarticulate; male Plp2 uniramous, uniarticulate. Female Plp1 uniramous, three-segmented; female Plp2 biramous, endopod biarticulate, without appendix interna. Telson subquadrate, slightly longer than broad, truncate posteriorly with small median spine. Uropodal endopod broadened distally.

Type locality.— Chiloé Islands, Chile.

Distribution.— Chile.

Callianassa californiensis Dana, 1854

Callianassa californiensis Dana, 1854: 175; Stimpson, 1857b: 89, pl. 21 fig. 4; Stimpson, 1860: 24; A. Milne Edwards, 1870: 82, 101; Lockington, 1878: 301; Bouvier, 1895: 8; Holmes, 1900: 159, pl. 2 fig. 27; Rathbun, 1904: 154; Hilton, 1916: 63; Schmitt, 1921: 116, 117, fig. 78; Stevens, 1928: 325, 333, figs. 10-13, 16-17, 55-71; MacGinitie, 1934: 166-176, pls. 5-6; MacGinitie, 1935: 709, fig. 14; Haig & Abbott, 1980: 579, pl 166, fig. 24.2; Hart, 1982: 58, fig. 15; Holthuis, 1991: 244, 264, figs. 445, 446; Dworschak, 1992: 192, fig. 2a, c, e.
Callianassa occidentalis Stimpson, 1856: 88; Manning, 1987: 399.
Callianassa (*Trypaea*) *californiensis*; Borradaile, 1903: 546; De Man, 1928b: 27, 105.
Neotrypaea californiensis; Manning & Felder, 1991: 771, fig. 10.
Not *Callianassa* (*Trypaea*) *californiensis*; Parisi, 1917: 23 (= *Callianassa japonica*).

Material examined.— SCU, 1 ♂ (TL 96.6, CL 23.2), 1 ovig. ♀ (TL 87.3, CL 19.5), Sonoma County, W side Bodega Bay, California, 30.xi.1948, leg. R. J. Menzies; SMNH 13416, 3 ♂♂, Morro Bay, California, tidal area, sandy mud, 30.i.1930, leg. Gisléns Pacific-Expedition, 1930-31; SMNH 16035, 4 ♂♂, 1 ♀, near Nanaimo, Vancouver Island, Hammond Bay, Canada, host of *Clausidium vancouverense*, 28.vi.1957, leg. R. Gooding; ZMU, 2 ♂♂, 1 ovig. ♀, Morrow Bay, California, 30.i.1931, leg. T. Gisléns Pacific Exp. 1930-31.

Diagnosis.— A1 peduncle slightly longer than A2 peduncle. Chelipeds unequal, larger one in adult males with short, broad palm, with distinct gap between fingers when closed. Male Plp1 vestigial, two-segmented, distal segment not subdivided but simple; male Plp2 absent. Female Plp1 uniramous, three-segmented; female Plp2 biramous. Plp3-5 biramous, foliaceous, bearing appendices internae.

Type locality.— California.

Distribution.— Mutiny Bay, Alaska; Vancouver Island British Columbia to mouth of Tia Juana River, San Diego, California; and Bahia de San Quintin, Mexico. Sandy sediments in the upper tidal zone (Dworschak, 1992: 196).

Callianassa gigas Dana, 1852

Callianassa gigas Dana, 1852a: 19; Dana, 1852b: 512; Dana, 1855, pl. 32 fig. 3; Stimpson, 1857b: 489, pl. 21 fig. 3; A. Milne Edwards, 1870: 81, 101; Lockington, 1878: 302; Holmes, 1900: 162. - Rathbun, 1904: 154; Schmitt, 1921: 116, 119, fig. 80; Stevens, 1928: 325, figs. 6-9, 14-15, 38-54; MacGinitie, 1935: 712; Haig & Abbott, 1980: 579; Hart, 1982: 56, fig. 14; Holthuis, 1991: 245, 264, figs. 447, 448; Dworschak, 1992: 194, fig. 2b, d, f.
Callianassa longimana Stimpson, 1857a: 86; Stimpson, 1857b: 490, pl. 21 fig. 5; A. Milne Edwards, 1870: 83, 101; Lockington, 1878: 302; Newmann, 1878: 34; Holmes, 1900: 161, pl. 2 fig. 28; Rathbun, 1904: 154; Hilton, 1916: 63, fig. 14; Schmitt, 1921: 116, 117, fig. 79. [Type-locality: Puget Sound, Washington State, U.S.A.].
Callianassa (*Trypaea*) *gigas*; Borradaile, 1903: 546; De Man, 1928b: 27, 101, 134, 180, 181.
Callianassa (*Trypaea*) *longimana*; Borradaile, 1903: 546; De Man, 1928b: 27, 102, 106, 134.

Material examined.—SMF 9752, 1 ♀ (TL 63.0, CL 14.5), San Francisco, California, 1866; IG 8899, 1 ♂, middle of San Francisco; SCU, 1 ♂, abdominal segments 3 to telson lost, (CL 24.0), 1 ovig. ♀ (TL 11.5, CL 25.5), off Los Angeles, California, harbor light, 06.vii.1961, "*Velero* IV" Sta. 73 76 61.

Diagnosis.— A1 peduncle slightly shorter than A2 peduncle. Larger cheliped of adult males proportionately longer and narrower, no gap between fingers. Male Plp1

vestigial, uniramous, consisting of two segments, distal segment faintly subdivided; male Plp2 absent. Female Plp1 uniramous, three-segmented, and Plp2 biramous. Plp3-5 biramous, foliaceous, bearing appendices internae.

Type locality.— Puget Sound.

Distribution.— Vancouver Island, British Columbia; Puget Sound; Elkhorn Slough, Monterey Bay, San Juan Island, Poulsbo, Allyn, Washington, San Francisco, California to San Quentin Bay and Gulf of Farallones. Lower tidal in Muddy dediments (Dworschak, 1992: 196)

Callianassa rochei Bouvier, 1895

Callianassa Rochei Bouvier, 1895: 7.
Callianassa (*Trypaea*) *Rochei*; De Man, 1928a: 17, fig. 8-8d; De Man, 1928b: 28, 104.

Material examined.— MNHM P Th 101, Paratypes 1 ♂ (TL 36.0, CL 7.0), 1 ♀ (TL 33.0, CL 8.0), Baja California, leg. L. Diguet, 1984.

Remarks.— This species is similar to *C. biffari* in the shape of the large cheliped. It differs from *C. biffari* in the shape of the A1 peduncle. The A1 peduncle in *C. biffari* is much longer than the A2 peduncle while slightly longer than de A2 peduncle in *C. rochei*.

Type locality.— Baja California.

Distribution.— Baja California.

Callianassa uncinata H. Milne Edwards, 1837
(fig. 3f)

Callianassa uncinata H. Milne Edwards, 1837a: 310, pl. 25 fig. 1; Nicolet, 1849: 208; Guérin-Méneville, 1857: 43; A. Milne Edwards, 1870: 83, 101.
Callianassa chilensis A. Milne Edwards, 1860: 302, 16 fig. 2a, 2A; A. Milne Edwards, 1870: 84, 101. [Type locality: Chile].
Callianassa (*Trypaea*) *uncinata*; Borradaile, 1903: 546; Schmitt, 1921: 119, fig. 80; Stevens, 1928: 325, figs. 6-9, 14-15, 38-54; MacGinitie, 1935: 712.
Callianassa (*Trypaea*) *chilensis*; Borradaile, 1903: 546; De Man, 1928a: 15, fig. 7-7c; De Man, 1928b: 27, 94, 103.
Neotrypaea uncinata; Manning & Felder, 1991: 771.

Material examined.— ZMH-K 8437, 2 ♂♂, Chile, leg. Delfin; ZMH-K 8421, 3 ♂♂, 2 ovig. ♀♀, 1 ♀, Chile, leg. A. Gassmann; ZMB 10991, 1 ♂, 3 ♀♀, Calbuco, Chile, leg. Poto; ZMB 3513, 3 ♂♂, 1 ovig. ♀, Puerto Mont, Chile, leg. Fossck; ZMB 17114, 1 ♂ (damaged), 1 ♀ (damaged), Muerto Montt, Chile, leg. Fossck; SMNH 15696, 1 ♂, Isla Tenglo, NE point, 41°29.02'S 72°57.27'W, Canal Tenglo, Chile, sta. M 26, 17-18.xii.1948, Lund Univ. Chile-Expedition 1948-49 (det. L.B. Holthuis); SMNH 15697, 1 ♂, Punta Pilluco, 41°30.06'S 72°53.57'W, Seno Reloncavi, Chile, sta. M 37, 28.iii.1949, Lund Univ. Chile-Expedition 1948-49 (det. L.B. Holthuis); ZMU 3 ♂♂, 1 fragile specimen, 1897, leg. Dusén; NHML 1880.30.59, 1 ♂, Iatcahuano, Chile; MNHNP Th 74, type of *Callianassa uncinata*, Chile; MNHNP Th 72, type fragments of *Callianassa chilensis*, Chile; ZMB 10990, 1 ♂, 1 ♀, Tumbes, Peru.

Diagnosis.— Rostrum scarcely developed (fig. 3f). Eyestalks triangular; cornea located medially. A1 peduncle slightly longer than A2 peduncle.

Remarks.— The type specimen of *Callianassa chilensis* (MNHNP Th 72) is fragmented. On a memo with the specimen is written that the the species is synonymous with *C. uncinata*. De Man (1928a) however, shows that the larger cheliped of *C. chilensis* is different from that of *C. uncinata*. The dactylus in *C. chilensis* is expanded in the middle to a rounded elongated-triangular lobe which occupies half the length of the finger, the free edge of which is finely crenulate. A free narrow incision is present between the distal lobe of the palm and the fixed finger, which is finely crenulate on its proximal half (De Man, 1928a: 16, pl. 3 fig. 7).

Type locality.— Coast of Chile.

Distribution.— Island of Quehuy, off Chiloé; Puerto Montt, Province of Llanquihue, South Chile; Tumbes, near Lago Llanquihue; Talcahuano, Chile; Capon, Peru. Tide mark (De Man, 1928b).

Indo-West Pacific species

Key to the merus of the larger cheliped of the species of the genus *Callianassa* in the Indo-West Pacific:

1. Merus and ischium of the larger cheliped distinctly convex and serrated ventrally.
   C. ngochoae spec. nov.; *C. spinophthalma; C. bouvieri; C. lobetobensis; C. intermedia.*
2. Merus and ischium of the larger cheliped slightly convex and indistinctly serrated ventrally.
   C. amboinensis.
3. Merus of the larger cheliped with a median spine ventrally.
   C. gravieri; C. amboinae; C. gruneri spec. nov.; *C. sibogae.*
4. Merus of the larger cheliped with a proximal lobe ventrally.
   a. Simple tooth. - *C. joculatrix; C. pugnatrix*
   b. Triangular lobe.- *C. australiensis; C. tonkinae; C. austrais; C. rotundata; C. filholi; C. ceramica C. petalura; C. japonica; C. arenosa; C. lignicola*
5. Merus of the larger cheliped unarmed ventrally.
   C. lewtonae; C. parva.
6. Larger cheliped unknown.
   C. orientalis; C. parvula; C. acutirostella.

Key to the species of the genus *Callianassa* in the Indo-west Pacific:

1. Mxp3 merus with distinctive spine on distal margin 2
-. Mxp3 merus unarmed distally 5
2. P3 propodus oval. Larger cheliped with ischium and merus serrated ventrally. Dactylus of smaller cheliped less than twice length of palm. Telson longer than broad, bearing median spine posteriorly 3
- P3 propodus elongated. Dactylus of smaller cheliped slender, longer than palm .. 4
3. Dactylus of smaller cheliped slender, 2.3 times as long as palm. Uropodal endopod distinctly longer than telson ..... ***C. propinqua***
- Dactylus of smaller cheliped little longer than palm; merus with median spine ventrally. Uropodal endopod slightly longer than telson ..... ***C. praedatrix***

4. Rostrum triangular, pointed distally, not reaching beyond tip of eyestalk. Lateral margin of telson slightly produced laterally over proximal part ..... ***C. modesta***
- Rostrum spiniform, reaching tip of eyestalk. Lateral margin of telson less produced laterally over proximal part ..... ***C. longicauda***
5. Mxp3 ischium-merus narrow and pediform; merus concave on distomesial margin or slanting to articulation of ischium 6
- Mxp3 ischium-merus broadened and subpediform, suboperculiform, or operculiform, merus barely, or roundly, projecting beyond articulation of carpus 15
6. Telson straight posteriorly 7
- Telson concave posteriorly 10
7. Merus of larger and smaller chelipeds with median spine ventrally, unarmed dorsally. A1 peduncle reaching to A2 penultimate segment 8
- Merus of the larger cheliped with sharp proximal lobe ventrally, that of smaller chelipeds unarmed 9
8. Cutting edges of chelae in larger cheliped serrated; that of dactylus of chelae in smaller cheliped smooth, that of fixed finger serrated ..... ***C. gruneri*** spec. nov.
- Cutting edges of chalae in larger and smaller chelipeds unarmed ..... ***C. sibogae***
9. Merus of larger cheliped with sharp proximal lobe ventrally and with small proximal spine dorsally. Mxp3 merus jointed distally with carpus over its whole length. A1 peduncle about as long as A2 peduncle ..... ***C. joculatrix.***
- Merus of the larger cheliped with large proximal tooth venrally and unarmed dorsally. A1 peduncle distinctly shorter than A2 peduncle ..... ***C. australis***
10. Uropodal endopod shorter than telson 11
- Uropodal endopod longer than telson 13
11. Cornea small, rounded, located at center of eyestalks. Telson without median spine posteriorly. Cheliped unknown ..... ***C. orientalis***
- Cornea oval, located at middle of eyestalks. Ischium and merus of cheliped serrated. Telson with median spinule posteriorly 12
12. A1 peduncle shorter than A2 penultimate segment ..... ***C. intermedia****
- A1 peduncle longer than A2 penultimate segment ..... ***C. lobetobensis***
13. Merus of the larger cheliped with large proximal tooth ventrally 14
- Merus of both chelipeds with median spine ventrally. Uropodal endopod and exopod each with lateral spine. Cutting margins of fingers of both chelipeds not serrated ..... ***C. amboinae***
14. Telson broader than long, without spines laterally ..... ***C. tonkinae***
- Telson longer than broad, with spines laterally ..... ***C. pugnatrix***
15. Rostrum poorly developed 16
- Rostrum sharp and pointed 25
16. A1 peduncle much longer than A2 peduncle 17
- A1 peduncle subequal to A2 peduncle 20
17. Merus of larger cheliped without proximal lobe ventrally 18
- Merus of larger cheliped with proximal lobe ventrally 19
18. Merus of larger cheliped less convex and roughly serrated ventrally, terminal segment of A1 peduncle three times as long as penultimate segment ... ***C. amboinensis***
- Merus of the larger cheliped largely convex and serrated ventrally, terminal segment of A1 peduncle 1.5 times as long as penultimate segment .....

..... *C. ngochoae* spec. nov.

19. Telson largely rounded posteriorly. Merus of smaller cheliped unarmed .... *C. rotundicauda*
- Telson slightly concave on distal margin. Merus of smaller cheliped with median spine ventrally ..... *C. australiensis*

20. Mxp3 ischium-merus oval 21
- Mxp3 ischium-merus suboval 22

21. Eyestalks with subterminal spine on dorsal surface. Merus of larger cheliped with rounded proximal lobe ventrally ..... *C. fillholi*
- Eyestalks short, without spine dorsally. Merus of larger chelipeds with larger proximal and lower median lobe ..... *C. ceramica*

22. Merus of larger cheliped unarmed ..... *C. parva*
- Merus of larger cheliped with large proximal lobe ventrally 23

23. Telson subquadrate, without spine posteriorly. Eyestalks with distal cornea .... *C. arenosa*
- Telson oblong, with median spine posteriorly. Eyestalks triangular, with medial cornea 24

24. Larger cheliped with ischium smooth on dorsal margin, and merus crenulate on dorsal margin; ventroproximal lobe showing rounded ventral margin; living in tidal zone of protected coastal areas ..... *C. japonica*
- Larger cheliped ischium denticulate in proximal half, merus smooth on dorsal margin, ventroproximal lobe proproduced to pointed tip; burrow on sandy beaches facing open sea or similar habitats ..... *C. petalura*

25. A1 peduncle longer than A2 peduncle 26
- A2 peduncle longer than A1 peduncle 28

26. Eyestalks produced distally in small acute tip. Telson convergent posteriorly, uropods broadly foliaceous ..... *C. lignicola*
- Eyestalks rounded distally 27

27. P1 merus with triangular ventral lobe in larger cheliped, and with small spinous one in smaller cheliped. Dactylus of larger cheliped setose ..... *C. bouvieri*
- P1 merus unarmed ventrally in larger and smaller chelipeds ..... *C. lewtonae*

28. Eyestalks prolonged into short acute spine distally. P1 ischium denticulate on both chelipeds; merus of larger cheliped with large ventral lobe proximally, roughly denticulate; merus of smaller cheliped unarmed ventrally .... *C. spinophthalma*
- Eyestalks triangular, without distal prolongation 29

29. P3 propodus rounded; rostrum narrow and pointed, overreaching eyestaks .... *C. parvula*†
- P3 propodus produced in distoventral part; rostrum triangular, reaching tip of eyestalks ..... *C. gravieri*

* The Mxp3 of *C. intermedia* is unknown, but this species is similar to *C. lobetobensis* in the form of the telson, so it is placed in the key with the assumption that its Mxp3 merus is unarmed on the distal margin, and its ischium and merus is pediform as in *C. lobetobensis*.

† The Mxp3 of *C. parvula* is missing in the material examined, however Sakai

(1988: 59) stated that it is closely related to *C. acutirostella* Sakai, 1988, so it is placed in the key with the group of species that have an operculiform Mxp3 ischium-merus.

Callianassa acutirostella Sakai, 1988

Callianassa acutirostella Sakai, 1988: 53, 57, fig. 2.

Remarks.— Only one female measuring 20 mm in total length is known.

Type locality.— Western Australia, North West Shelf (19°05.1'S 118°53.7'E), 82 m.

Callianassa amboinae (Bate, 1888)
(fig. 5d-f)

Scallasis amboinae Bate, 1888: 34, pl. 2 figs. 3, 4; Manning & Felder, 1991: 780.
Callianassa (Scallasis) amboinae; Borradaile, 1903: 547; De Man, 1928b: 93.
Callianassa (Cheramus) pygmaea De Man, 1928b: 1, 18, 27, 93, 99, 155, pl. 16 figs. 24-24g. [Type locality: Ambon Anchorage, 54 m].
Callianassa (Scallasis) Amboinae; De Man, 1928b: 30.
Callianassa caledonica Ngoc-Ho, 1991: 285, fig. 2. [Type locality: East Lagoon, New Caledonia, 21 m].

Material examined.— NHML 1888.22, 1 ♂, holotype, Amboina, R.V. *"Challenger"*; RMNH D 16609, 1 ♀ (TL 13.0, CL 3.3), Bay of Nhatrang, South Vietnam, 01.i.-10.iv.1960, A. Gallardo Sta. 326; RMNH D 16610, 1 ♀ (TL 14.0, CL 3.5), Bay of Nhatrang, South Vietnam, 01.i.-10.iv.1960, A. Gallardo Sta. 18; RMNH D 16611, 1 ♀ damaged, (TL ca. 13.0, CL 3.3), Bay of Nhatrang, South Vietnam, 01.i-10.iv.1960, A. Gallardo Sta. 319; RMNH D 16612, 1 ♀ (TL 13.0, CL 3.3), Bay of Nhatrang, South Vietnam 01.i.-10.iv.1960, A. Gallardo Sta. 319; RMNH D 16613, 1 ♀ (TL 14.0, CL 3.8), Bay of Nhatrang, South Vietnam, 01.i.-10.iv.1960, A. Gallardo Sta. 319.

Description of male holotype.— Rostrum (Fig. 5d) narrow, triangular, over-reaching the distal margin of eyestalks. Eyestalks distally produced, cornea small, located at distal part. Abdominal somite 6 broader than long, telson (Fig. 5e) about 2/3 times the length of abdominal somite 6, slightly longer than broad, posterior margin with a median tooth. Mxp3 (Fig. 5f) ischium oblong, 1.8 times as long as broad, merus 1.8 times as long as ischium, distomesial margin truncate and slanting mesially, propodus oblong, and dactylus digitiform. Uropodal endopod about twice as long as broad, anterior margin with a spine on its distal third, and another spine on dorsal surface. Uropodal exopod larger than endopod, and rounded on distal margin, anterior margin with a median spine.

Remarks.— As mentioned in the remarks of the genus *Scallasis* (p. 27) after-examination of the type specimen of *Scallasis amboinae* (NHML 1888: 22), I found that this species does in fact have an orbit and no Mxp3 exopod, and therefore should be considered as a valid species of *Callianassa*.

In addition this species appears to be identical with *C. pygmaea*, though the male of *Callianassa pygmaea* is unknown.

Type locality.— Ambon, Indonesia.

Distribution.— Amboina, Indonesia; Bay of Nhatrang, South Vietnam.

Fig. 5. *Callianassa orientalis* (Bate, 1888) & *C. amboinae* (Bate, 1888). a, d, Carapace, dorsal view; b, carapace, lateral view; c, e, telson and uropod; f, Mxp3, lateral view. a-c, *C. orientalis*, NHML 1888.22, 1 ♀, holotype, Arafura Sea; d-f, *C. amboinae*, NHML 1888.22, 1 ♂, lectotype, Amboina. Scale = 1 mm.

Callianassa amboinensis De Man, 1888

Callianassa amboinensis De Man, 1888: 480, pl. 20 fig. 4; Zehntner, 1894: 194; Holthuis, 1958: 35; Poore & Griffin, 1979: 248, fig. 14; Sakai, 1984: 96, figs. 1, 2; Sakai, 1988: 53, 57, fig. 1.

Callianassa (*Trypaea*) *amboinensis*; De Man, 1928b: 27, 93, 107, 165, pl. 18 fig. 28-28c.

Callianassa (*Calliactites*) *amboinensis*; Borradaile, 1903: 545.

Not *Callianassa amboinensis*; Ngoc-Ho, 1991: 283, fig. 1 (= *Callianassa ngochoae* spec. nov.).

Material examined.— RMNH D 15224, 1 ovig. ♀ (TL 72.0, CL 5.8), Gulf of Aqaba, Elat, Israel, 02.v.1955, leg. H. Steinitz; ZMG 389, 2 ♂♂ (TL 58.0, CL 13.0; TL 44.0, CL 9.7), 1 ♀ (TL 60.0, CL 12.9), Amboina, Molucca-Islands, Indonesia, vii.1885-ix.1885, leg. J. Brock; ZMA 102.435, 1 ovig. ♀ (TL 19.0, CL 3.8), lacking chela of larger cheliped, Indonesia, anchorage off Lirung, Salibabu-island, mud and hard sand, trawl, dredge and reef-exploration, up to 36 m, Siboga sta. 133, 25/27.vii.1899.

Remarks.— Ngoc-Ho (1991: 283) re-examined the ovigerous female registered as ZMA 102.435, and considered it to be the holotype measuring 25 mm in body length, though it is 19 mm (see material examined). However, *C. amboinensis* was first described by De Man in 1888 from a collection made by Dr. J. Brock. This material was described long before the Siboga material was collected, so that the female from Siboga sta. 133 can not be the holotype. Brock's specimens preserved in the Senckenberg Museum under registered number ZMG 389 consist of one ovigerous female (TL 60.0 mm) and two males (TL 58.0 and 44.0 mm), collected in July-Sept.1885, they are larger than the female holotype (25 mm). As a result it must be presumed that the holotype specimen described by De Man is missing.

Type locality.— Ambon, Indonesia.

Distribution.— Amboina; off Lirung, Salibabu Island, Indonesia; Heron Island, Queensland; Table Head, Port Essington, Northern Territory; Delambre Island, Dampier Archipelago, northern Western Australia, reef to 18 m; Elat, Israel, Gulf of Aquaba.

Callianassa arenosa Poore, 1975

Callianassa arenosa Poore, 1975: 197-201, figs. 1-2; Poore & Griffin, 1979: 250, figs. 15-17; Sakai, 1988: 57.

Material examined.—SMF 23576, 1 ♂, 1 ♀, NW Anderson Point, 38°20.000'S, 141°36.000'E, Portland Bay, Victoria, Australia, beach, 02.iii.1992, det. G. Poore, 15.i.1997; SMF 23609, 1 ♂, 2 ♀♀, Towlers Bay, Pittwater, N. Sydney, New South Wales, Australia, muddy Mangrove or sand flat near bay, 16.vi.1980, leg. M. Türkay.

Type locality.— Port Phillip Bay, Victoria, Australia.

Distribution.— Moreton Bay, Queensland; New South Wales; Victoria; Tasmania, intertidal to shallow water (Poore & Griffin, 1979).

Callianassa australiensis (Dana, 1852)

Trypaea australiensis Dana, 1852b: 513, pl. 32 fig. 4; Fulton & Grant, 1906: 14; Manning & Felder, 1991: 774, figs. 1, 3, 12.

Trypaea porcellana Kinahan, 1856: 130, pl. 4 fig. 2. [Type locality: Port Philip, Victoria, Australia].

Callianassa (*Trypaea*) *porcellana*; Borradaile, 1903: 546.

Callianassa (*Trypaea*) *australiensis*; Borradaile, 1903: 546; De Man, 1928b: 27, 93, 104, 134; Stephenson et al., 1931: 56; Dakin & Colefax, 1940: 182-184, figs. 270, 271; Gurney, 1944: figs. 8, 9; Dakin et al., 1952: 199, pl. 44; Hailstone & Stephenson, 1961: 259-285, figs. 1-15, pls. 1-3; Hailstone, 1962: 29-31, 2 figs; McNeill, 1968: 26; Healy & Yaldwyn, 1970, pl. 30.

Callianassa australiensis; Poore & Griffin, 1979: 250, figs. 18-20; Sakai, 1988: 57; Holthuis, 1991: 241, 264, figs. 441, 442.

Material examined.— RMNH D 12007, 1 ♂ (TL 68.0, CL 13.0), 2 damaged ♂♂ (TL ca. 67.0, Cl 14.4; TL

ca.6.0, CL 13.8), 1 ♀ (TL 60.0, CL 13.8), Dunwich, Moreton Bay, S. Queensland, Australia, burrows in intertidal mud flats, 13.iv.1957, leg. T.S. Hailstone &, R.U. Gooding; SMF 23610, 1 ♂, Towlers Bay, Pittwater, N. Sydney, New South Wales, Australia, muddy mangrove or sand flat near bay, 16.vi.1980, leg. M. Türkay; SMF 23624, 1 ♀, Moona Moona Creek near Hiskisson, N. Sydney, New South Wales, Australia, muddy sand flat, 25.v.1980, leg. D. L. Felder & J. Sieg; NMV J-44737, 2 ♂♂, 2 ♀♀, Great Oyster Bay, East coast of Tasmania, Australia, leg. C. MacLeord.

Type locality.— Illawarra District, New South Wales, Australia.

Distribution.— Townsville to Port Phillip Bay, eastern Australia, intertidal (Poore & Griffin, 1979).

Callianassa australis Kensley, 1974

Callianassa subterranea australis Kensley, 1974: 271, 277, figs. 3-5.
Callianassa australis; De Saint Laurent & Le Loeuff, 1979: 51, fig. 9a, b, d.

Type locality.— South Africa, Lüderitzbucht, 180 m.

Distribution.— Lüderitzbucht; Orange River Mouth, 10-180 m; Southwest Africa (16°46'E 22°41'S) (De Saint Laurent & Le Loeuff, 1979).

Callianassa bouvieri Nobili, 1904
(fig. 6a-c)

Callianassa (*Trypaea*) *Bouvieri* Nobili, 1904: 236; Nobili, 1906b: 101, 105, pl. 6 fig. 3; De Man, 1928b: 27, 107.
Callianassa (*Trypaea*) *maldivensis* Borradaile, 1903: 546 (nomen nudum); Borradaile, 1904: 753, pl. 58 fig. 3a, 3b; Pearson, 1905: 90; De Man, 1928a: 22; De Man, 1928b: 28, 107, 134, 146. [Type locality: Hulule, Male Atoll, Maldives].
Callianassa bouvieri; Holthuis, 1958: 37, 38, fig. 15; Sakai, 1970a: 46; Sakai, 1987a: 303; Dworschak & Pervester, 1988: 3, fig. 3; Dworschak, 1992: 192.
Callianassa rectangularis Ngoc-Ho, 1991: 292, fig. 5. [Type locality: Atoll de Surprise, New Caledonia, 36 m].

Material.— UMC, holoype of *Callianassa maldivensis*, 1 ♂, Maldive Is , Male Atole, Kulule, leg. J.B. Gardiner; SMF 17708, 1 ♂ (TL 25.0, CL 10.0), Safaga island, Manteqad al-Bahr al Ahmar, Egypt, Red Sea, Mangrove, littoral, v.1986, leg. P. Pervelser, det. P. Dworschak; SMF 17709, 1 ovig. ♀ (TL 23.0, CL 5.0), Safaga island, Manteqad al-Bahr al Ahmar, Egypt, Red Sea, Mangrove, littoral, .v.1986, leg. P. Pervelser, det. P. Dworschak; SMF 17710, 1 ♂, Safaga island, Manteqad al-Bahr al Ahmar, Egypt, Mangrove, littoral, v.1986, leg. P. Pervelser, det. P. Dworschak; SMF 17711, 1 ♂, Safaga island, Manteqad al-Bahr al Ahmar, Egypt, Mangrove, littoral, v.1986, leg. P. Pervelser, det. P. Dworschak; SMF 17712, 1 ♀, Safaga island, Manteqad al-Bahr al Ahmar, Egypt, Mangrove, littoral, v.1986, leg. P. Pervelser, det. P. Dworschak; SMF 17713, 1 ♀ (TL 2.0, CL 4.3), Safaga island, Manteqad al-Bahr al Ahmar, Egypt, Mangrove, littoral, v.1986, leg. P. Pervelser, det. P. Dworschak; SMF 17714, 1 ♂ (TL 16.0, CL 3.5), Safaga island, Manteqad al-Bahr al Ahmar, Egypt, Mangrove, littoral, v.1986, leg. P. Pervelser, det. P. Dworschak; SMF 17715, 1 ♂, Safaga island, Manteqad al-Bahr al Ahmar, Egypt, littoral, v.1986 leg. P. Pervelser, det. P. Dworschak; SMF 23608, 1 ♂, Red Sea, 1827, leg. E. Rüppell; ZMH-K 27847, 1 ovig. ♀, Oahu, Hawaii Archipelago, 07.iv.1959, leg. H. Caspers (det. L.B. Holthuis as *Callianassa maldivensis*); ZMH-K 27848, 1 ♂, 1 ♀, Oahu, Kaneohe Bay, Sand Island, 10.iv.1959, leg. H. Caspers , (det. L.B. Holthuis as *Callianassa maldivensis*); MNHNP Th 65, type of *Callianassa bouvieri*, Djibouti, Gulf of Aden, leg. 1897, H. Coutière; SMF 23869, 1 ♂, North Island, Tung-hsian, Taiwan, finesand, 5 m,

18.x.1981, leg. j. Doerjes; SMF 23870, 1 specimen, fragmented, N. Tai-shi, western coast of Taiwan, finesand, 4 m, 07.x.1981, leg. J. Doerjes; SMF 23871, 1 ♀, S. Tai-shi, western coast of Taiwan, finesand, 11 m, 07.x.1981, leg. J. Doerjes; SMF 23872, 1 ♂, S. Tai-shi, western coast of Taiwan, finesand, 20 m, 07.x.1981, leg. J. Doerjes; TBL 1 ♂ (TL 24.0 mm, CL 5.3 mm), Higashi-hama, Amakusa, Kumamoto Prefecture, Japan, 24.iv.1963, leg. K. Sakai; ZLKU 10331 (no 3), 1 ♂, Higashi-hama, Amakusa, Kumamoto Prefecture, lower tidal zone with zoster vegitation, 24-25.iv.1963, leg. K. Sakai; ZLKU 10331 (no 5), 1 ♂, Higashi-hama, Amakusa, Kumamoto Prefecture, lower tidal zone with zoster vegitation, 24-25.iv.1963, leg. K. Sakai; ZLKU 10331 (no 9), 1 ♀, Higashi-hama, Amakusa, Kumamoto Prefecture, lower tidal zone with zoster vegitation, 24-25.iv.1963, leg. K. Sakai; ZLKU 10331 (no 10), 1 ♀, Higashi-hama, Amakusa, Kumamoto Prefecture, lower tidal zone with zoster vegitation, 24-25.iv.1963, leg. K. Sakai; KMNH 591, 1 ♂, locality unknown; KMNH 1997605-3, 1 ♂, Tekebu, Amami-Ohshima, 20.vii.1966, leg. K. Sakai.

Diagnosis.— Cervical groove located in posterior one-fifth of carapace. Telson subquadrate, without median spine on posterior margin. Rostrum (fig. 6a) a pointed triangle, anterolateral projections of carapace slightly developed. Eyestalks rounded distally. A1 peduncle shorter than A2 peduncle. Mxp3 operculiform, ischium about 1.5 times as long as merus and about as long as broad, merus about 1.7 times as broad as long. P1 unequal. Ischium of larger cheliped in male with row of anteriorly directed teeth in proximal half; merus slightly longer than ischium, ventral margin with broad triangular lobe which is marginallydenticulate, dorsal margin roughly crenulate in proximal part; carpus broader than merus, shorter or longer than merus; palm usually with rounded ventral projection (fig. 6b) on anterior margin, sometimes without (fig. 6c); dactylus setose on lateral surface, cutting edge sometimes irregularly denticulate (fig. 6b) or smooth (fig. 6c). In smaller cheliped ischium unarmed; merus with median tooth on ventral margin.

Remarks.— The type specimen of *Callianassa maldivensis* Borradaile, 1904 (5 July, 1904, P. Clark in litt.), was examined, and synonymized with *Callianassa bouvieri* Nobili, 1904 (28 June, 1904). The form of the male larger cheliped is variable, especially the cutting edge of the dactylus as shown in figs. 6b-c. It is confirmed that *C. rectangularis* from New Caledonia is also treated as a synonym of *C. bouvieri*. The male Plp1-2 are absent.

Type locality.— Djibouti.

Distribution.— Egypt, Red Sea; Djibouti, Gulf of Aden; Maldives; Sri Lanka (Borradaile, 1904); Gulf of Mannar, India (Pearson, 1905); Amami-Ohshima, Amakusa Island and Tsushima, Japan.

Callianassa ceramica Fulton & Grant, 1906

Callianassa ceramica Fulton & Grant, 1906: 12, pl. 5; Hale, 1927: 86; Poore, 1975: 205; Poore & Griffin, 1979: 257, figs. 22, 23; Sakai, 1988: 57.
Callianassa (*Trypaea*) *ceramica*; De Man, 1928b: 27, 93, 104.

Material examined.— ZMH-K 38172, 1 ♂, 1 ovig. ♀, 3 ♀♀, Ceduna, Murat Bay, Australia, Australian Expedition 1975-76, 29.xi.1975, leg. G. Hartmann; ZMH-K 38174, 1 ♂, 2 ovig. ♀♀, 1 damaged, Foster, Port Welshpod, Mangrove, Australian Expedition 1975-76, Sta. 149. 28.xii.1975, leg. G. Hartmann; MNHN-Th 637, 1 ♂, Port Philip Bay, Australia, 21.xi.1971, leg. G. Poore; NMV J-16772, 3 ♂♂, Western Port, Sorrento, Victoria, Australia, leg S.W. Fulton; NMV J-16767, 1 ♀, Queenscliff, Victoria, Australia, v.1881, leg. Batchelor.

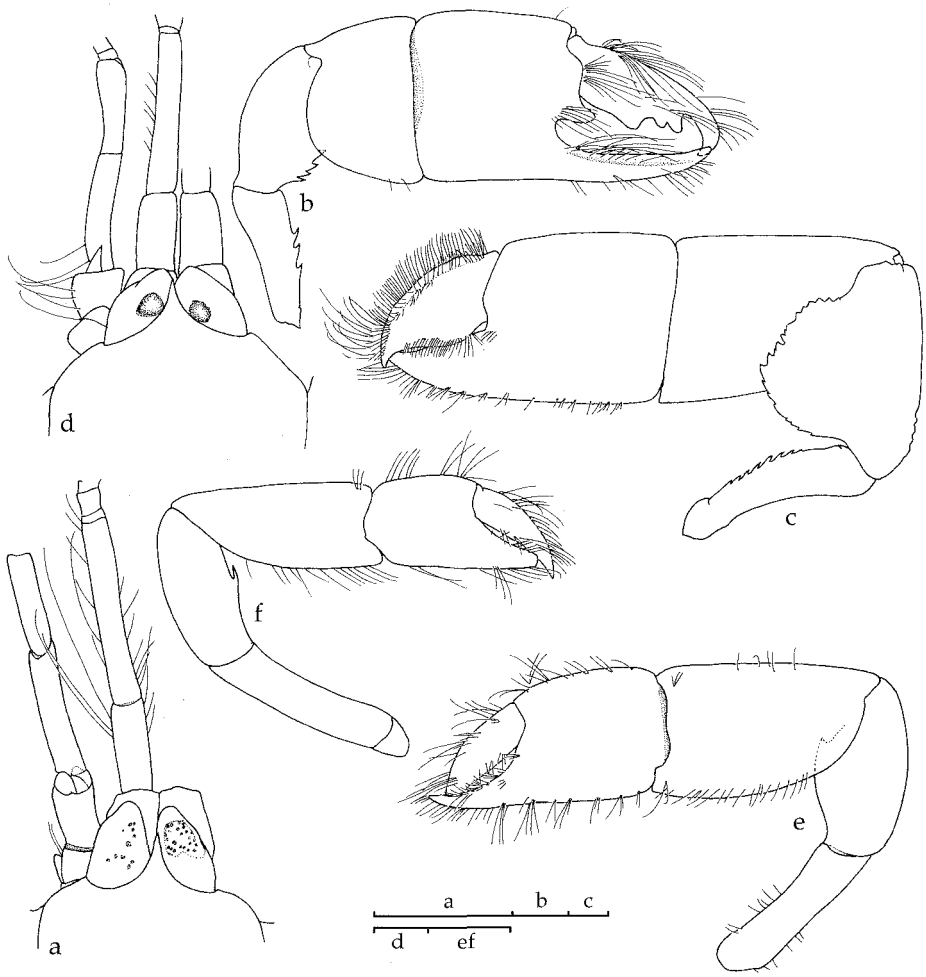

Fig. 6. *Callianassa bouvieri* Nobili, 1904 & *C. gravieri* Nobili, 1905. a, d, Anterior part of carapace, eyestalks, and A1-2 peduncles; b-c, male larger cheliped; e, female larger cheliped; f, female smaller cheliped. a-b, *C. bouvieri,* UMC, 1 ♂, holoype of *Callianassa maldivensis,* Kulule, Male Atole, Maldive Is.; c, *C. bouvieri,* SMF 17708, 1 ♂, Safaga Island, Egypt, Red Sea; d-f, *C. gravieri* RMNH D 23658, 1 ♀, Al Ghurdaqah, Egypt, Red Sea. Scale = 1 mm.

Remarks.— Male Plp1 are two-segmented; Plp2 is uniramous, narrow, but often absent. Females Plp1 three-segmented, of which proximal segment bent medially, and middle segment short and convex ventrally; Plp2 biramous, endopod two-segmented.

Type locality.— Port Phillip & Western Port, Victoria, Australia.

Distribution.— Victoria to south Western Australia, intertidal to shallow subtidal (Poore & Griffin, 1979).

Callianassa filholi (A. Milne Edwards, 1878) (fig. 7a-c)

Callianassa Filholi A. Milne Edwards, 1878: 112; Filhol, 1886: 491, pl. 53 figs. 10-12; Borradaile, 1903: 548.
Callianassa filholi; Chilton, 1907: 461-464, pl. 16 figs. 1-5; Miller & Batt, 1973: 110.
Callianassa (*Trypaea*) *Filholi*; De Man, 1928b: 27, 101, 104.

Material examined.— SMF 23627-23631, 3 ♂♂, 2 ♀♀, Otakau, Otago Peninsula near Dunedin, Otago, New Zealand, tidal flat, 17.xii.1996, leg. K. Berkenbusch; SMF 23634, 1 ♂, 2 ovig. ♀♀, 1 ♀, Muriwai Beach, Auckland, New Zealand, eulitoral sand, 30.vii.1950 (det. E.W. Dawson); SMF.23635, 1 ♂, 1 ovig. ♀, 1 ♀, Hutt River mouth, Wellington harbour, New Zealand, flats, 29.viii.1953, leg. J. C. Yaldwyn & E. W. Dawson.

Diagnosis.— Rostrum (fig. 7a) a low triangle; anterolateral projections of carapace showing lower triangle. Eyestalks with dorsally directed tooth near distomedial part, cornea located medially. A1 peduncle slightly longer than A2 peduncle. Telson (fig. 7b) oblong, longer than broad, bearing median tooth on posterior margin. Uropodal endopod truncate distally, slightly longer than telson, and uropodal exopod broadly rounded distally. Mxp3 ischium and merus oval (fig. 7c).

Remarks.— Filhol (1886: pl. 53 fig. 12) shows the anterior part of the carapace including the A1-2 peduncles, in which the A1 peduncle is subequal to the A2 peduncle, however in the present specimens the A1 peduncle is slightly longer than the A2 peduncle. Chilton (1907: 463, pl. 16) shows that the male Plp1 is uniramous, two-segmented, but the male Plp2 is absent. Miller & Batt (1973: 110) show that this species is common and easy to recognize on the lower beach zone.

Type locality.— Stewart Island

Distribution.— Timaru; Oamaru; Stewart I, New Zealand.

Callianassa gravieri Nobili, 1905 (fig. 6d-f)

Callianassa (*Trypaea*) *Gravieri* Nobili, 1905: 396 (not 395); Nobili, 1906b: 101, 107, pl. 6 fig. 4; Balss, 1915: 2; De Man, 1928a: 23, pl. 6 figs. 11-11e; De Man, 1928b: 27, 107.
Callianassa (*Trypaea*) *cristata* Borradaile, 1910: 263, pl. 16 fig. 7; De Man, 1928b: 27, 107. [Type locality: Salomon Atoll; Chagos Archipelago].
Callianassa (*Trypaea*) *gravieri*; Holthuis, 1953b: 51.

Material examined.— RMNH D 23658, 2 ♀♀ (TL 22.0, CL 4.5; TL 21.0, CL 4.0), Al Ghardaqa, Red Sea of Egypt, eulitoral, 1966, leg. Volke Storch.

Diagnosis.— Rostrum (fig. 6d) a large triangle with pointed tip, failing to reach the distal margin of eyestalks. Eyestalks broadly triangular distally, cornea distinctive, located medially. A1 peduncle longer than A2 peduncle. P1 (fig. 6e-f) unequal, ischium unarmed, merus with median tooth on ventral margin in both chelipeds.

Remarks.— De Man (1928b: 107) mentioned that these two species (*C. gravieri* and *C. cristata*) are probably identical with each other. Male Plp1-2 are unknown.

Type locality.— Obock, Gulf of Aden.

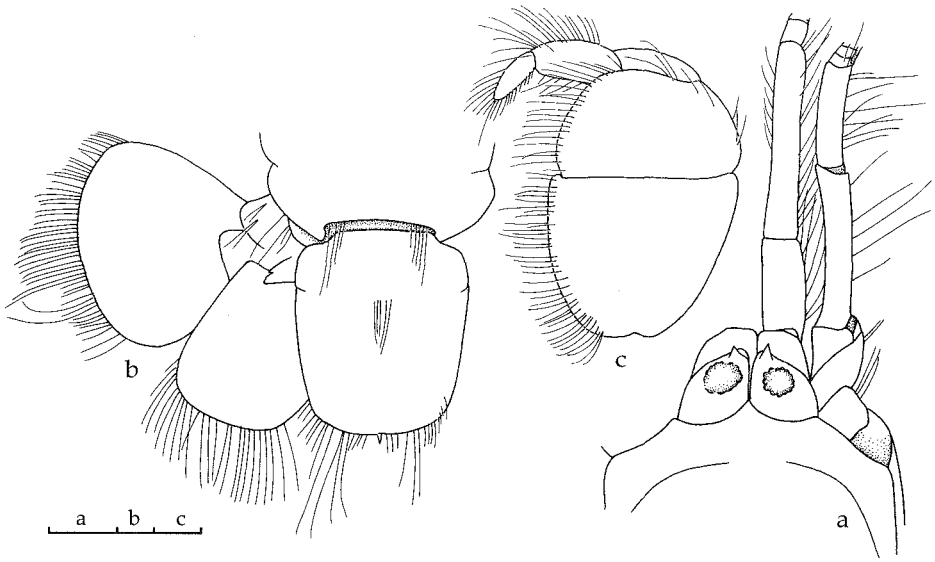

Fig. 7. *Callianassa filholi* A. Milne Edwards, 1878, SMF 23629-31, 1 ♂, Otago, New Zealand. a, Anterior part of carapace, eyestalks and A1-2 peduncles; b, telson and uropod; c, Mxp3, lateral view. Scale = 1 mm.

Distribution.— Harmil Island, Red Sea; Obock and Djibouti, Gulf of Aden; Salomon Atoll; Chagos Archipelago.

Callianassa gruneri spec. nov.
(fig. 8a-g)

Callianassa mucronata; Tirmizi, 1977 (part): 21, figs. 1b. [Not *Callianassa mucronata* Strahl, 1861].

Material examined.— ZMB 27222, 1 ♂ (TL 14.0, CL. 4.0), holotype, Luzon, Philippines, F. Jagor leg.

Diagnosis.— Rostrum (fig. 8a) triangular, pointed at tip, shorter than eyestalks. Anterolateral projections of carapace show obtuse triangle above antennal peduncle. Eyestalks convergent laterally, forming truncate or triangular distomesial projections, cornea uncertain. A1 peduncle subequal to A2 peduncle. Abdominal somite 2 (fig. 8b) twice as long as somite 1, somite 6 about 1.3 times as long as telson. Telson (fig. 8c) trapezoid, broader than long, divergent laterally on proximal third, convergent laterally on distal two thirds, truncate posteriorly.

Mxp3 merus (fig. 8d) obliquely truncate on distal margin, propodus longer than broad, dactylus finger-shaped. P1 unequal. Ischium of larger cheliped (fig. 8e) with two small and one sharp subterminal teeth on ventral margin; merus about as long as ischium, 1.5 times as long as broad, ventral margin with median sharp tooth, dorsal margin rounded, unarmed; carpus slightly shorter than merus, and slightly longer than broad; chela 2.5 times as long as carpus, about twice as long as broad, cutting edges of fixed finger and dactylus serrated; dactylus shorter than palm, bending

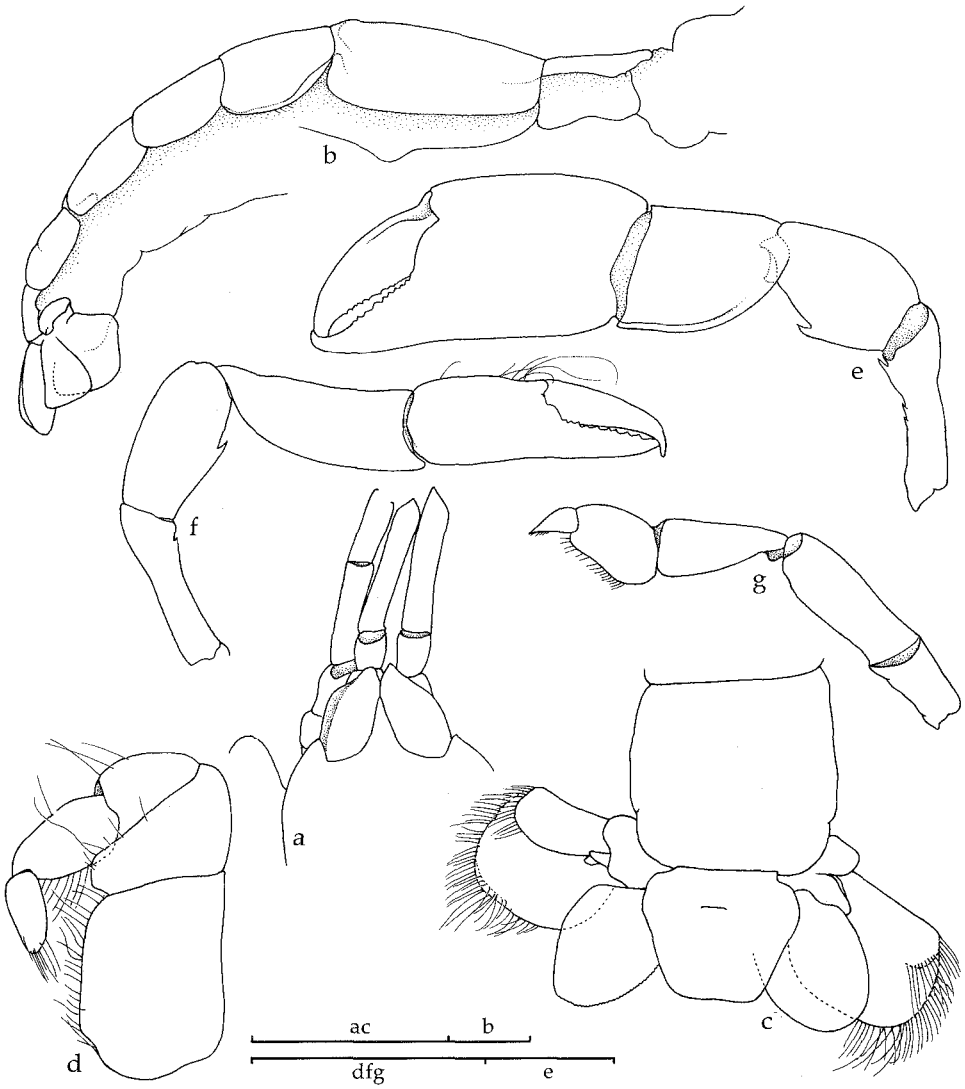

Fig. 8. *Callianassa gruneri* n. sp., ZMB 1128, 1 ♂, holotype, Luzon, Philippines. a, Anterior part of carapace with A1-2 peduncles; b, abdomen and tail-fan, lateral view; c, abdominal somite 6 and tail-fan; d, Mxp3, lateral view; e, male larger cheliped, lateral view; f, male smaller cheliped, lateral view; g, P3, lateral view. Scale = 1 mm.

downward distally. Smaller cheliped (fig. 8f) slender in shape; ischium with spine on ventral margin; merus rounded on dorsal and ventral margins, bearing median ventral spine; carpus slightly longer than merus; chela about 1.5 times as long as merus and about as long as carpus. P3 propodus (fig. 8g) broadening proximally on ventral margin, proximal part decreasing in breadth.

Plp1 wanting. Uropodal endopod ovoid, longer than telson.

Remarks.— This specimen was originally included as one of the two type specimens of *Neocallichirus mucronatus* (Strahl, 1862a), but my examination showed it to be a separate new species. It is clearly a species of *Callianassa* by the form of Mxp3 merus which is truncate on the distal margin. The merus of the male larger cheliped bears a median spine on the ventral margin as in *C. amboinae*, *C. sibogae*, and *C. gravieri*.

Type locality.— Philippines, Luzon.

Distribution.— Philippines, Luzon.

Callianassa intermedia De Man, 1905

Callianassa intermedia De Man, 1905: 609.
Callianassa (Cheramus) intermedia; De Man, 1928b: 26, 98, 143, pl. 14 figs. 21-21d.

Material examined.— ZMA 102.436, lectotype, 1 ♂ (TL 18.0, CL 4.2), Java, 07°46'S 114°30.5'E, Anchorage off Djankar, Indonesia, Siboga sta. 5, 10.iii.1899, Siboga Exp. (det. De Man).

Remarks.— This specimen was originally described by De Man as a female without eggs, but it is in fact a male. The male Plp1 shows a simple, two-segmented appendage, but male Plp2 is absent. Mxp3 is missing.

Type locality.— Indonesia, Bali Sea (7°46'S 114°30.5'E), 330 m.

Distribution.— Indonesia, Bali Sea (7°46'S 114°30.5'E), 330 m.

Callianassa japonica Ortmann, 1891

Callianassa subterranea var. *japonica* Ortmann, 1891: 56, pl. 1 fig. 10a; Bouvier, 1901: 332-334; Doflein, 1902: 644; Nakazawa, 1927: 1038, fig. 1999; Yokoya, 1930: 543; Yokoya, 1933: 52; Miyazaki, 1936: 317-320, figs. 1-3; Kamita, 1957: 107, fig. 49.
Callianassa californiensis var. *japonica* Bouvier, 1901: 332. [Type locality: Japan].
Callianassa Harmandi Bouvier, 1901: 332-334. [Type locality: Japan].
Callianassa (Trypaea) Harmandi; Borradaile, 1903: 546; Parisi, 1917: 24, fig. 7; De Man, 1928a: 13-15, fig. 6-6j; De Man, 1928b: 27, 102-103; Yü, 1931: 92-93, fig. 3.
Callianassa (Trypaea) japonica; Borradaile, 1903: 546; De Man, 1928a: 19-22, pl. 5 figs. 10-10a; De Man, 1928b: 27, 93, 106; Yü, 1931: 95-96, fig. 5; Makarov, 1938: 69-71, fig. 25.
Callianassa (Trypaea) californiensis; Parisi, 1917: 23. [Not *Callianassa californiensis* Dana, 1854].
Callianassa hermandi; Nakazawa, 1927: 1039, fig. 2000.
Callianassa (Trypaea) californiensis var. *japonica*; De Man, 1928a: 18-19, pl. 4 fig. 9-9e; De Man, 1928b: 27,105; Yü, 1931: 94, fig. 4.
Callianassa (Trypaea) harmandi; Makarov, 1938: 66-67, figs. 22-23.
Callianassa (Trypaea) californiensis var. *bouvieri* Makarov, 1938: 71-72, fig. 26. [Replacement name for *C. californiensis var. Japonica*].
Callianassa japonica; Nakazawa & Kubo, 1947: 754, fig. 2174; Miyake, 1965: 633, fig. 1037 (illustrated by K. Sakai); Miyake, 1982: 92, pl. 31 fig. 4; Sakai, 1968: 2-3, fig. 8; Sakai, 1969: 232, pls. 9-12; Sakai, 1987a: 303; Holthuis, 1991: 246, figs. 449, 450; Dworschak, 1992: 198.
Callianassa harmandi; Nakazawa & Kubo, 1947: 754, fig. 2173; Liu, 1955: 63, pl. 23 figs. 1-5; Utinomi, 1956: 63, pl. 32 fig. 2; Miyake, Sakai, & Nishikawa, 1962: 124.
Callianassa petalura; Liu, 1955: pl. 23 figs. 7-9; Holthuis, 1991: fig. 453 (larger cheliped of male and female). [Not *Callianassa petalura* Stimpson, 1860].
Callianassa subterranea japonica; Kamita, 1957: 107-109, fig. 49.

Material examined.—ZLKU 4365, 1 ♂, Najima, Hakata-bay, Kyushu, tidal flat, 05.v.1954, leg. S. Miya-

ka; ZLKU 5155, 1 ♂, estuary of Muromi, Hakata-bay, Kyushu, todal flat, 30.v.1958, leg. S. Miyake; ZLKU 12638, 1 ♂, 1 ♀, Arasaki, Sagami-Bay, 08.v.1964, leg. H. Kurata, det. S. Miyake; KMNH 50a, 1 ♀, Mutsuura, Kanazawa-Hakkei, Tokyo Bay tidal flat, 05.i.1961, leg K. Sakai; KMNH 50c, 1 ♀, damaged, Mutsuura, Kanazawa-Hakkei, Tokyo Bay, tidal flat, 05.i.1961, leg K. Sakai; KMNH 594, 1 ♀, locality unknown; KMNH 599-601, 3 ♂♂, locality unknown; KMNH 602, 2 larger chelipeds, locality unknown; KMNH 626-643, 13 ♂♂, 1 ovig. ♀, 2 ♀♀, estuary of Muromi, Hakata-bay, Kyushu, tidal flat, 09.iv.1963, leg. K. Sakai; KMNH 717, 2 ♂♂, Tuji-shima, Amakusa, Kyushu, 26.iv.1963, leg. K. Sakai; KMNH 717a, 1 ♂, Tuji-shima, Amakusa, Kyushu, 26.iv.1963, leg. K. Sakai; KMNH 4128b, 1 ♂, locality unknown; KMNH 4129, 1 ♀, locality unknown; KMNH 5157a, 1 ovig. ♀, locality unknown; KMNH 5157b, 1 ♀, locality unknown; KMNH 7485-3, 1 ♀, localiaty unknown; KMNH 7487, 1 ♂, locality unknown; KMNH 19970608-1, 1 cheliped, locality unknown; KMNH 19970612-4, 1 ♀, estuary of Muromi, Hakata-bay, Kyushu, tidal flat, 12.iv.1964., leg. K. Sakai; NHMB J96156, 2 ♂♂, Amnok-kang river, Dandong city, Liaoning, China, 14.v.1996, leg. Yang Siliang.

Remarks.— Male Plp1 uniramous, two-segmented, male Plp2 absent.

Type locality.— Japan, Bay of Tokyo.

Distribution.— Japan from Nemuro, Funka Bay, Hokkaido to Kagoshima, Kyushu Island, on both Pacific side and Japan Sea; Shantung Peninsula to southwestern coast of Korean Peninsula; Peter the Great Bay. Intertidal mud flats in bays and estuaries to 192 m.

Callianassa joculatrix De Man, 1905

Callianassa joculatrix De Man, 1905: 610; Poore & Griffin, 1979: 266, figs. 28-29; Sakai, 1988: 53 (key); Ngoc-Ho, 1991: 287, fig. 3; Ngoc-Ho, 1994: 51.

Callianassa (*Cheramus*) *joculatrix*; De Man, 1928b: 18, 26, 93, 95, 98, 130-137, 141, 146, 148, 151, 153, pl. 12 fig. 19, 19c, pl. 13 fig. 19a, d-m (non pl. 12 fig. 19b); McNeil, 1968: 26.

Material examined.— RMNH D 16631, 2 ♂♂ (TL 9.7, CL 2.5; TL 12.0, CL 3.0), Bay of Nhatrang, South Vietnam, sta. 147-I; RMNH D 16632, 1 ♀ (TL 14.5, CL 3.5), Bay of Nhatrang, South Vietnam, 01.i.1960-10.iv.1960, A. Gallardo sta. 281; RMNH D 16633, 1 ♂ (TL 9.0, CL 2.2) Bay of Nhatrang, South Vietnam; SMF 23580, 1 ♂, Taiwan, 1981 leg. J. Doerjes.

Diagnosis.— The male Plp1-2 are absent.

Type locality.— Bay of Labuan Tring, 08°44.5'S 116°02.5'E, west coast of Lombok, Indonesia, 18-27 m.

Distribution.— Lombok, Indonesia; Northern Queensland; north-west and north-east Australia; New Caledonia, 15-300 m; Taiwan; South Vietnam.

Callianassa lewtonae Ngoc-Ho, 1994

Callianassa lewtonae Ngoc-Ho, 1994: 52, fig. 1

Remarks.— Two ovigerous females measuring 19.0 and 19.5 mm in total length are known, but males are unknown (Ngoc-Ho, 1994: 52). Mxp3 merus truncate on the distal margin, and P3 propodus is longer than broad.

Type locality.— Queensland, Britomart Reef, reef front, (18°17'S 146°38'E), 15 m.

Distribution.— Queensland, Britomart Reef, reef front, (18°17'S 146°38'E), 15 m.

Callianassa lignicola Alcock & Anderson, 1899

Callianassa lignicola Alcock & Anderson, 1899: 288; Alcock, 1900: pl. 42 figs. 2, 2a, 2b; Alcock, 1901: 200; Borradaile, 1903: 545; Balss, 1925: 212.
Callianassa (Calliactites) lignicola; De Man, 1928b: 25, 97.

Remarks.— Males are unknown, but female Plp1-2 are present as described by Alcock & Anderson (1899: 288).

Type locality.— Andaman Sea, 185-244 m.

Distribution.— Andaman Sea, 180-445 m.

Callianassa lobetobensis De Man, 1905

Callianassa lobetobensis De Man, 1905: 607.
Callianassa (Cheramus) lobetobensis; De Man, 1928b: 26, 93, 98, 137, pl. 13 fig. 20, pl. 14 fig. 20a-d.

Material examined.— ZMA De 102.430, 1 ovig ♀ (TL 22.0, CL 5.6), 1 ♀ (TL 19.0, CL 4.8), Mount Lobetobi 08°27'S 122°54.5'E, Indonesia, Siboga Sta. 306, 08.ii.1900, Siboga Exp.(det. De Man).

Remarks.— Two females, the larger one with eggs and the other without eggs are known (De Man, 1928b: 137). Male specimen is unknown.

Type locality.— Indonesia, Banda Sea, Lobetobi Strait between Flores and Solor (8°27'S 122° 54.5'E), 247 m.

Distribution.— Banda Sea, Lobetobi Strait between Flores and Solor, Indonesia, 247 m.

Callianassa longicauda Sakai, 1967

Callianassa (Calliactites) longicauda Sakai, 1967: 324, figs. 3, 4; pl. 11C.
Callianassa longicauda; Sakai, 1987a: 303.

Type locality.— East China Sea (32°N 122°30'E).

Distribution.— East China Sea (32°N 122°30'E).

Callianassa modesta De Man, 1905

Callianassa (Calliactites) modesta De Man, 1905: 604 (part); Balss, 1925: 212; De Man, 1928b: 26, 97, 118, pl. 10 fig. 16-16b, pl. 11 fig. 16c-e.

Material examined.— RMNH D 1171, 1 ♂ (TL 13.7, CL 3.4), lectotype, W. Kwandang Bay, 0°58.5'N 122°42.5'E, Indonesia, 72 m depth, fine sand, Siboga sta. 116.

Remarks.— One male of the five specimens from the Siboga sta. 116 was examined. In De Man's figures (1928b: pls 10 fig. 16, 16a-b; pl. 11 fig. 16c-e) of the female specimen from the same station, he mentioned that "the pointed spiniform rostrum reaches until the distal end of the 1st joint of the antennular peduncle.", however in the present male syntype specimen the rostrum is triangular, pointed at its tip, and does not reach the tip of the eyestalks. De Man (1928b: pl. 11 fig. 16e) shows P3 with

an elongated propodus. This figure is evidently P4. This male specimen shows that Plp1 on the left side is present as a slender, two-segmented appendage; Plp2 is absent. Concerning the male mutilated specimens from the Siboga sta. 254, De Man (1928b: 120) described the male Plp1 as being two-segmented, and Plp2 as biramous in the form of two slender filaments.

Type locality.— Elat, Kepulauan Kai, Indonesia, 27 m.

Distribution.— West of Kwandang Bay; Bay of Bima (0°58.5'N 122°42.5'E), 27-310 m; Great Kei Island, Indonesia (5°40'S 132°26'E), 27-310 m.

Callianassa ngochoae spec. nov.

Callianassa amboinensis; Ngoc-Ho, 1991: 283, fig. 1. [Not *Callianassa amboinensis* De Man, 1888].

Remarks.— Ngoc-Ho (1991: 283) described a male specimen from New Caledonia under the name of *Callianassa amboinensis* De Man, 1888, however her specimen is very different from *C. amboinensis*, so I here make her specimen the holotype of a new species named *C. ngochoae* in honour of her contribution to the study of the Callianassidae.

In *C. ngochoae* the terminal segment of A1 peduncle is 1.5 times as long as the penultimate segment, the merus of the larger cheliped is serrated and largely convex ventrally, and the telson is slightly longer than broad, while in *C. amboinensis* the terminal segment of A1 peduncle is three times as long as the penultimate segment, the merus of larger cheliped is neither regularly serrated nor convex ventrally, and the telson is about as long as broad.

Type locality.— S. Grand Récif, 80 m depth, New Caledonia.

Distribution.— S. Grand Récif, 80 m depth, New Caledonia.

Callianassa orientalis (Bate, 1888)
(fig. 5a-c)

Cheramus orientalis Bate, 1888: 30, pl. 1 fig. 2.

Callianassa (*Cheramus*) *orientalis;* Borradaile, 1903: 546; De Man, 1928a: 9, fig. 2, 2a; De Man, 1928b: 26, 93, 98, 119, 132, 137.

Material examined.— NHML 1888.22, 1 ♀ (CL 6.3), holotype, Arafura Sea.

Diagnosis.— Rostrum (fig. 5a, b) triangular and pointed at its tip, slightly overreaching tip of eyestalks. Eyestalks short, truncate on distolateral margin, cornea small, located medially, pair of anterolateral projections slightly produced. A1-2 peduncle damaged. Telson subquadrate, more broadened in proximal part than in distal part, distal margin slightly concave medially (fig. 5c). Uropodal endopod broadly rounded distally, parallel with distal margin of telson; uropodal exopod truncate distally.

Remarks.— The fragile type specimen was examined by the courtesy of Dr. Paul Clark, the Natural History Museum in London.

Type locality.— Arafura Sea (9°59'S 139°42'E), 28 m.

Distribution.— Arafura Sea (9°59'S 139°42'E), 28 m.

Callianassa parva Edmondson, 1944

Callianassa (*Calliactites*) *parva* Edmondson, 1944: 45, fig. 5a-j; Edmondson, 1946: 261.

Remarks.— Edmondson (1944: 45) mentioned that the P3 propodus bears no lobe on its posterior border. The Mxp3 merus is illustrated in his figure b and shows the distal margin to be broadened with a slight concavity. The male Plp1 consists of two slender segments of nearly equal length, but the male Plp2 is unknown.

Type locality.— Hanauma Bay, Oahu.

Distribution.— Hanauma Bay & Palos Bay, Hawaii; Celebes (Edmondson, 1944).

Callianassa parvula Sakai, 1988

Callianassa parvula Sakai, 1988: 53, 59, fig. 3.

Remarks.—Only one male measuring 15 mm in total length is known. Male Plp1 is uniramous, two-segmented, and male Plp2 biramous (Sakai, 1988: 59, fig. 3 (not female)).

Type locality.— Western Australia, North West Shelf (19°04.4'S 118°47.35'E), 83 m.

Distribution.— North West Shelf, Western Australia, 83 m.

Callianassa petalura Stimpson, 1860

Callianassa petalura Stimpson, 1860: 23; A. Milne Edwards, 1870: 88, 101; Bouvier, 1901: 332-334; Yokoya, 1939: 277-278; Liu, 1955: 65, pl. 23, not. figs. 6-9 (= *C. japonica*); Miyake, Sakai, & Nishikawa, 1962: 124; Miyake, 1965: 633, fig. 1036 (illustrated by K. Sakai); Sakai, 1968: 2-3, fig. 9; Sakai, 1969: 233, pls. 13-15; Miyake, 1982: 91, pl. 31 fig. 3; Sakai, 1987a: 303; Holthuis, 1991: 249, 264, (not. figs. 453, 454 = *C. japonica*).

Callianassa (*Trypaea*) *petalura*; Borradaile, 1903: 546; De Man, 1928b: 28, 115.

Callianassa subterranea var. *japonica*; Balss, 1914: 91.

Callianassa subterranea japonica; Kikuchi, 1932: 7.

Callianassa (*Trypaea*) *gigas* var. *japonica* Makarov, 1935: 323-324, fig. 4. [Type locality: Patrocle Bay and Peter the Great Bay].

Callianassa (*Trypaea*) *gigas* var. *eoa* Makarov, 1938: 67-69, fig. 24. [New name for *Callianassa* (*Trypaea*) *gigas* var. *japonica* Makarov, 1938].

Material examined.— SMNH 13419, 2 ♂♂, 1 ovig. ♀, 2 ♀♀, Misaki, Sagami Bay, Japan, intertidal, 27.v.1930, Gisléns Pacific-Expedition 1930-1931; SMNH 13474, 1 ♂ (with *Bopyrus* on right branchial chamber), Koaziro, Sagami Bay, intertidal, mud and stones, 08.vii.1930, Gisléns Pacific-Expedition 1930-1931; ZLKU 12330, 2 ♂♂, 5 ♀♀, Tsuyazaki, Fukuoka Pref., Kyushu, sand, in front of the Sanatorium, 30.iv.1961, leg. & det. K. Sakai; KMNH 1 ♂, Tsuyazaki, Fukuoka Pref., Kyushu, in front of the Sanatorium, 13.vi.1960, leg. K. Sakai; KMNH 499, 1 ovig. ♀, locality unknown; KMNH 688, 1 ♂, Tsuyazaki, Fukuoka Pref., Kyushu, in front of the Sanatorum, 26.iv.1963, leg. K. Sakai; KMNH 4635, 1 ♂, locality unknown; KMNH 19970612-3, 5 ♂♂, Tomoe-zaki, 15.v.1972, 9-8 m deep.

Type locality.— Japan, Shimoda.

Distribution.— Japan from Hokkaido to Kyushu Island on both Pacific side and Japan Sea, on sandy mud flats, facing open sea.

Callianassa praedatrix De Man, 1905

Callianassa praedatrix De Man, 1905: 607; Sakai, 1988: 53, 59, fig. 4; Ngoc-Ho, 1994: 54, fig. 2.
Callianassa (Cheramus) praedatrix; De Man, 1928b: 26, 97, 99, 146, pl. 15 figs. 22-22d.

Material examined.— ZMA De 102.433, 1 ♀ (TL 24.0, CL 5.4), lectotype, between islands of Wowoni and Buton 04°20'S 122°58'E, Indonesia, Siboga Sta. 204, 20.ix.1899, Siboga Exp., (det. De Man).

Remarks.— The present species is closely allied to *C. propinqua*. The female type specimen of *C. praedatrix* was compared with the female type of *C. propinqua*. In *C. praedatrix* the dactylus of the smaller cheliped is more slender, and also the uropod more elongated than in *C. propinqua*.

Type locality.— Between Bowoni and Boetoeng (= Buton), Indonesia, 04°20'S 122°58' E, 75-94 m.

Distribution.— Between Bowoni and Boetoeng, Indonesia (= Buton), 75-94 m; North West Shelf, 41-51 m, Western Australia.

Callianassa propinqua De Man, 1905

Callianassa propinqua De Man, 1905: 609; Ngoc-Ho, 1991: 290, fig. 4; Ngoc-Ho, 1994: 54, fig. 2.
Callianassa (Cheramus) propinqua; De Man, 1928b: 27, 98, 127, pl. 12 fig. 18-18d.

Material examined.— ZMA De 102.432, lectotype, 1 ♀ (TL 13.0, CL 3.3), Kwandang Bay entrance, 00°58.5' N 122°55' E, Indonesia, Siboga sta. 114, 8.vii.1899, Siboga Exp. (det. De Man).

Remarks.— The type female specimen is damaged, and Mxp3, Plp3-5 and eggs are lost.

Type locality.— Teluk Kwandang, Sulawesi, Indonesia, 0°58.5'N 122°55'E, 75 m.

Distribution.— Kwandang Bay, Indonesia; New Caledonia, 75-300 m; North-west Shelf, Australia (Ngoc-Ho, 1994).

Callianassa pugnatrix De Man, 1905

Callianassa pugnatrix De Man, 1905: 611.
Callianassa (Cheramus) pugnatrix; De Man, 1928b: 27, 93, 99, 138, 146, 151, pl. 15 fig. 23-23a, pl. 16 fig. 23b-e.

Material examined.— ZMA 102.437, 1 ♂ (TL 16.0 , CL 4.2), lectotype, Anchorage of Djangkar, 07°46'S 114°30.5'E, Java, Indonesia, Siboga sta. 5, 10.iii.1899, Siboga Exp.(det. De Man).

Remarks.— De Man gives the size of the type as 23 mm in total length, and 5.9 mm in carapace length. These measurements are larger than the present specimen, but the shape of the major cheliped and other characters are in good accordance with his figures and descriptions. He treated it as a female without eggs, however it is clearly a male with a single, two-segmented Plp1, but without Plp2. Ngoc-Ho (1991: 285) mentioned that her species, *Callianassa caledonica* (Ngoc-Ho, 1991) is similar to *C. pugnatrix*, however differs slightly in the form of telson and rostrum; in *C. caledonica* the telson is slightly concave on its posterior margin, and the rostrum is styliform

Type locality.— Indonesia, 07°46'S 114°30.5'E, 330 m.

Distribution.— Indonesia, 07°46'S 114°30.5'E, 330 m.

Callianassa rotundicaudata Stebbing, 1902

Callianassa rotundicaudata Stebbing, 1902: 41, pl. 8; Pearson, 1905: 90; Kensley, 1974: 277 (key); Dworschak, 1992: 202, fig. 11a-f.

Callianassa (*Calliactites*) *rotundicaudata*; Borradaile, 1903: 545; De Man, 1928b: 26, 92, 94, 97, 123, 136, 149, 150; Barnard, 1950: 506, 512, fig. 95i-l.

Calliactites rotundicaudatus; Stebbing, 1910: 369.

Remarks.—Chilton (1907: 463) described that "in *C. rotundicaudata* there is, he (Mr. Stebbing) says, no trace of pleopods on the first two segments of the pleon". In addition, Mxp3 merus is rather broadly concave on its distal margin as in *G. setimana*.

Type locality.— 34°02.45'S 25°10'E, St. Francis Bay, South Africa.

Distribution.— Orange River mouth, Saldanha Bay; St. Francis Bay; Algoa Bay, 10-35 m; Kowie, Port Alfred; South Africa (Dworschak, 1992); Cheval Paar, Sri Lanka (De Man, 1928b).

Callianassa sibogae De Man, 1905

Callianassa Sibogae De Man, 1905: 613.

Callianassa (?*Cheramus*) *Sibogae*; De Man, 1928b: 124.

Callianassa (*Cheramus*) *Sibogae*; De Man, 1928b: 27, 98, pl. 11 figs. 17-17e.

Callianassa sibogae; Ngoc-Ho, 1994: 54, fig. 3.

Material examined.— ZMA De 102.439, 1 ♂ (TL 26.0 , CL 7.0), lectotype, off Djankar, 07°46'S 114°30.5'E, Java Anchorage, Indonesia, Siboga-Exp. sta. 5, 10.iii.1899, (det. De Man).

Remarks.— De Man's type is re-examined and identified by Ngoc Ho (1994: 56) as a male. I confirm that the Male Plp1 is uniramous, and male Plp2 is absent.

Type locality.— Indonesia, (7°46'S 114°30'E), 330 m, Indonesia.

Distribution.— Indonesia, (7°46'S 114°30'E), 330 m; North-west Shelf, Australia (Ngoc-Ho, 1994).

Callianassa spinophthalma Sakai, 1970

Callianassa (*Cheramus*) *spinophthalma* Sakai, 1970a: 40, figs. 2, 3, 4a-b; Sakai, 1987a: 306.

Remarks.— Only six females, three of which bear eggs, are recorded (Sakai, 1970a: 40). Male Plp1-2 are unknown.

Type locality.— Tsushima Island, 34°58'N 129°26'9E, Japan, 210 m.

Distribution.— Tsushima Island, 34°58'N 129°26'9E, Japan, 210 m.

Callianassa tonkinae Grebenjuk, 1975

Callianassa (*Scallasis*) *tonkinae* Grebenjuk, 1975: 302, fig. 3.

Remarks.— This species is very similar to *C. caledonica* Ngoc-Ho, 1991, in the form of the telson, and Mxp3 merus; the telson is concave on the distal margin, and Mxp3 is also concave on its distal margin. The morphology of male Plp2 is unknown, however this species is included in *Callianassa* on account of the close relationship with *C. caledonica*.

Type locality.— Tonkin Bay.

Distribution.— Tonkin Bay.

The following four species are not listed in the present key.

Callianassa sp. Haswell, 1882

Callianassa sp. Haswell, 1882: 167.

Remarks.— In Haswell's specimen the abdomen is lost, but he says that it is allied to the west American species, *Callianassa longimana* Stimpson, 1857 (= *C gigas* Dana, 1852). Locality.— Molle Island, Whitsunday Passage, Queensland.

Callianassa sp. De Man, 1928

Callianassa (*Calliactites*) sp. De Man, 1928b: 26, 93, 97, 116, pl. 10 fig. 15-15c.

Remarks.— The young specimen is described as lacking Plp1-2.

Locality.— Anchorage off Donggala, Sulawesi, Palos Bay, Celebes, Indonesia, 36 m.

Callianassa sp. Sakai, 1970

Callianassa (*Cheramus*) sp. Sakai, 1970a: 45, fig. 4c-f.

Remarks.— Only one female measuring 15 mm in total length is known.

Locality.— 34°37'5N 129°50'7E, 110 m, around Tsushima Island Japan. Coarse sand and mud.

Genus *Podocallichirus* gen. nov.

Definition.— Carapace with dorsal oval; rostral spine present or not. A1 peduncle longer than A2 peduncle. Mxp3 ischium-merus narrow, and pediform, keeping same width from proximal to distal part, propodus broadened, dactylus narrow, digitiform, expod absent. Pl 1 unequal, male larger cheliped with or without meral hook. Male Plp1 uniramous, single- or biarticulate, distal segment simple or chelate distally. Male Plp2 uniramous or biramous, with or without appendix interna. Female Plp1 uniramous. Female Plp2 consisting of 1-3 segments, with or without appendix interna. Uropodal endopod longer than wide, ovoid or rhombic in shape.

Remarks.—In the present genus the A1 peduncle is usually much longer than the A2 peduncle, and the Mxp3 propodus is broadened as in *Callichirus* and *Glypturus*. The abdominal somites 3-5 however, are not provided with dorsal ornamentation as

in *Callichirus*, and the anterolateral projections or spines of the carapace are not provided with a non-calicified part at their bases as in *Glypturus*. The Mxp3 ischium-merus is characteristically pediform as in *Callianassa diaphora, C. subterranea, C. marchali, C. profunda, C. marginata, C. gaucho, C. joculatrix, C. sibogae, C. australis, C. orientalis, C. intermedia, C. lobetobensis, C. tonkinae, C. pugnatrix,* and *C. amboinae.* The male Plp1 is uniramous and consists of a single appendage as in *P. guineensis,* while it is usually biarticulate, and its distal segment is simple as in *P. balssi* or chelate as in *P. tenuimanus, P. foresti, P. gilchristi,* and *P. madagassus.* The male Plp2 is uniramous, single and biarticulate as in *P. foresti,* while usually biramous as in *P. tenuimanus, P. balssi, P. guineensis, P. madagassus,* and *P. masoomi.*

Type species.— *Callianassa madagassa* Lenz & Richters, 1881, by present designation. The gender is masculine.

Eastern Atlantic-Mediterranean species

Key to species of *Podocallichirus* in the eastern Atlantic:

1. Merus of male larger cheliped with proximal ventral lobe 2
- Merus of male larger cheliped without proximal ventral lobe, but serrated proximally ..... ***P. foresti***

2-. Merus of male larger cheliped with stout proximal ventral lobe 3
- Merus of male larger cheliped with low truncate ventral lobe ..... ***P. guineensis***

3. Female smaller cheliped with slender carpus and chela ..... ***P. tenuimanus***
- Female smaller cheliped with typical carpus and chela ..... ***P. balssi***

Podocallichirus balssi (Monod, 1933)

Callianassa (*Callichirus*) *balssi* Monod, 1933: 13, fig. 2A-F.
Callianassa balssi; Longhurst, 1958: 45 (part).
Callichirus balssi; Le Loeuff & Intès, 1974: 4, fig. 13a-o; De Saint Laurent & Le Loeuff, 1979: 58, figs. 11c-e, 12d, 13a-b, 14a, 15a-d, 19a.

Material examined.— RMNH D 32110, 3 ♂♂ (TL 48.0, CL 10.8; TL 40.0, CL 9.0; TL 17.0, CL 4.0), 3 ♀♀ (TL 51.0, CL 12.0; TL 27.0, CL 5.7; TL 27.0, CL 5.5), coast of Sierra Leone , 13°34'N 16°43'W, 8 m deep, 27.xii.1956.

Diagnosis.— Rostrum triangular; anterolateral projection of carapace front absent. A1 peduncle remarkably longer than A2 peduncle. Mxp3 ischium-merus narrow and pediform, propodus broadened. Pl unequal. Male Plp1 uniramous, two-segmented, distal segment not chelate, male Plp2 uniramous, a simple-segment, without exopod. Female Plp1 three-segmented. Female Plp2 biramous, exopod pediform, endopod with appendix interna. Telson broader than long, slightly concave on posterior margin, uropodal endopod longer than broad, ovoid.

Type locality.— Bay of Repos, Nouadhibou, Mauritania.

Distribution.— Bay of Repos, Nouadhibou, Mauritania; Dakar, Senegal; Gambie; Pointe-Noire, Congo, 6-10 m (De Saint Laurent & Le Loeuff, 1979).

Podocallichirus foresti (Le Loeuff & Intès, 1974)

Callianassa guineensis; Longhurst, 1958: 31 (part). [Not *Callianassa* (*Callichirus*) *guineensis* De Man, 1928].
Callianassa balssi; Longhurst, 1958: 31,45,47 (part). [Not *Callianassa* (*Callichirus*) *balssi* Monod, 1933].
Callianassa pachydactyla; Longhurst, 1958: 42, 44. [Not *Callianassa pachydactyla* A. Milne Edwards, 1870].
Callichirus foresti Le Loeuff & Intès, 1974: 46, fig. 14a-x; De Saint Laurent & Le Loeuff, 1979: 58, figs. 11f-g, 12c, 13c-d, 14b, 15i-l, 19b.

Material examined.— RMNH D 32105, 1 ♂ (TL 20.0, CL 4.5), 1 ovig ♀ (TL 31.5, CL 7.7); 1 ♀ (TL 20.0, CL 4.5), Banana Grounds, coast of Sierra Leone, West Africa, xii.1955, leg. A.R. Longhurst (det. De Saint Laurent 1979); RMNH D 32104, 1 ♀ (TL 32.0, CL 7.0), Sierra Leone River, Siera Leone, 18.x.1954, leg. A.R. Longhurst (det. De Saint Laurent, 1979); RMNH D 32103, 1 ♀ (TL 25.0, CL 5.5), 1 ovig. ♀ (TL 20.0, CL. 5.0), 3 damage specimens, coast of Sierra Leone, 9°22'N 13°27'W, 31.xii.1956, leg. A. R. Longhurst (det. De Saint Laurent, 1979).

Diagnosis.— Rostrum triangular; anterolateral projections of carapace front absent. A1 peduncle slightly longer than A2 peduncle. Mxp3 ischium-merus narrow and pediform; propodus broadened. P1 unequal. Male Plp1 uniramous, two-segmented, distal segment chelate. Male Plp2 uniramous, two-segmented, without exopod. Female Plp1 uniramous, three-segmented. Female Plp2 uniramous, three-segmented, without exopod.

Type locality.— Grand Lahou (5°05'N 5°04.05' W), Ivory coast, 22 m.

Distribution.— Senegal; Ginea; Sierra Leone; Ivory Coast; Pointe-Noire, Congo, 5-30 m.

Podocallichirus guineensis (De Man, 1928a)

Callianassa (*Callichirus*) *guineensis* De Man, 1928a: 45, pl. 10, fig. 19 - l9e; pl. 11 fig. 19f-19r; De Man, 1928b: 28, 94, 114.
Callichirus guineensis; Le Loeuff & Intès, 1974: 46, fig. 12a-o; De Saint Laurent & Le Loeuff, 1979: 64, figs. 11h, 12e, 13g-h, 14d, 15m-p, 19d.
Not *Callianassa guineensis*; Longhurst, 1958: 31 (part) (=*Podocallichirus foresti*; *Callianassa diaphora*; *C. marchali*).

Material examined.— RMNH D 16629, 1 ovig. ♀ (TL 19.0, CL 4.0), Lagos, Nigeria, 02.1961, don. Zool. Staatssamml. München; ZSM 78/2, 1 ♀, lectotype, Prampram, Gold Coast, 5 fathoms. ZSM 78/1, 1 ovig. ♀, Nigeria, Lagos, 7 fathoms (det. L.B. Holthuis).

Type locality.— Prampram, Ghana, 9-10 m.

Distribution.— Ghana; Nigeria.

Podocallichirus tenuimanus (De Saint Laurent & Le Loeuff, 1979)

Callianassa balssi; Longhurst, 1958: 31 (part). [Not *Callianassa* (*Callichirus*) *balssi* Monod, 1933].
Callichirus tenuimanus De Saint Laurent & Le Loeuff, 1979: 61, figs. 11a-b, 12a-b, 13e-f, 14c, 15e-h, 19c.

Material examined.— RMNH D 32806, paratypes, 1 ♂ (TL 22.1, CL 5.1), 1 ♀ (TL 25.0, CL 5.3), Riviere Sierra Leone, W.A.F.R.A.I., 18.x.1954, dredged from 7 m depth.

Type locality.— Sierra Leone, 7 m.
Distribution.— Sierra Leone.

Indo-West Pacific species

Key to species of *Podocallichirus* in the Indo-West Pacific:

1. Chela of male smaller cheliped with characteristic distinct marginal serration ..... ***P. madagassus***
- Chela of male smaller cheliped without distinct marginal serration 2
2. Posterior margin of telson convex medially ..... ***P. masoomi***
- Posterior margin of telson straight ..... ***P. gilchristi***

Podocallichirus gilchristi (Barnard, 1946)
(fig. 9a-d)

Callianassa gilchristi Barnard, 1946: 379; Barnard, 1950: 506, 509, fig. 95a-e; Kensley, 1974: 277.

Material examined.— RMNH D 7509, 1 ♀ (TL 77.0, CL 14.0), MacArthur Bath, Humewood, Port Elizabeth, South Africa, tidal zone, 2-4.x.1961, leg. A.C. van Bruggen.

Diagnosis.— Carapace with sharp triangular rostrum (fig. 9a), without anterolateral spines. Telson (fig. 9b) broader than long, straight on posterior margin. Uropodal endopod longer than broad, oval distally. A1 peduncle longer than A2 peduncle. Mxp3 ischium-merus narrow and pediform, propodus slightly longer than broad; dactylus digitiform; exopod absent. Ischium of larger cheliped (fig. 9c) serrated on ventral margin, smooth on dorsal margin; merus about as long as ischium, ventral margin serrated, proximal half with triangular lobe, dorsal margin with few denticles in proximal part, distally smooth; carpus little longer than merus; chela little shorter than twice length of carpus; palm about as long as carpus, distal margin convex with denticles; fixed finger serrated on cutting edge, some denticles found in proximal part of lateral surface; dactylus about 0.8 times as long as palm, cutting edge serrated, incurved distally. Ischium of smaller cheliped (fig. 9d) almost smooth with some minute denticles on ventral margin; merus a narrow spindle, slightly shorter than ischium, bearing small spine medially on ventral margin; merus 1.3 times as long as merus; chela about as long as carpus, distal margin smooth; fixed finger denticulate on cutting edge; dactylus slightly longer than palm, cutting edge smooth. The male Plp1 apically bilobed (Barnard, 1946: 379).

Type locality.— False Bay and Durban Bay, South Africa.

Distribution.— Saldanha Bay, False Bay to Port Elizabeth; Durban Bay and off Zululand coast, 37 m.

Podocallichirus madagassus (Lenz & Richters, 1881)
(fig. 10a-d)

Callianassa madagassa Lenz & Richters, 1881: 427, figs. 20-23.
Callianassa (*Callichirus*) *madagassa*; Borradaile, 1903: 547; De Man, 1928a: 42, pl. 10, fig. 18-18e; De Man, 1928b: 29, 92, 113.

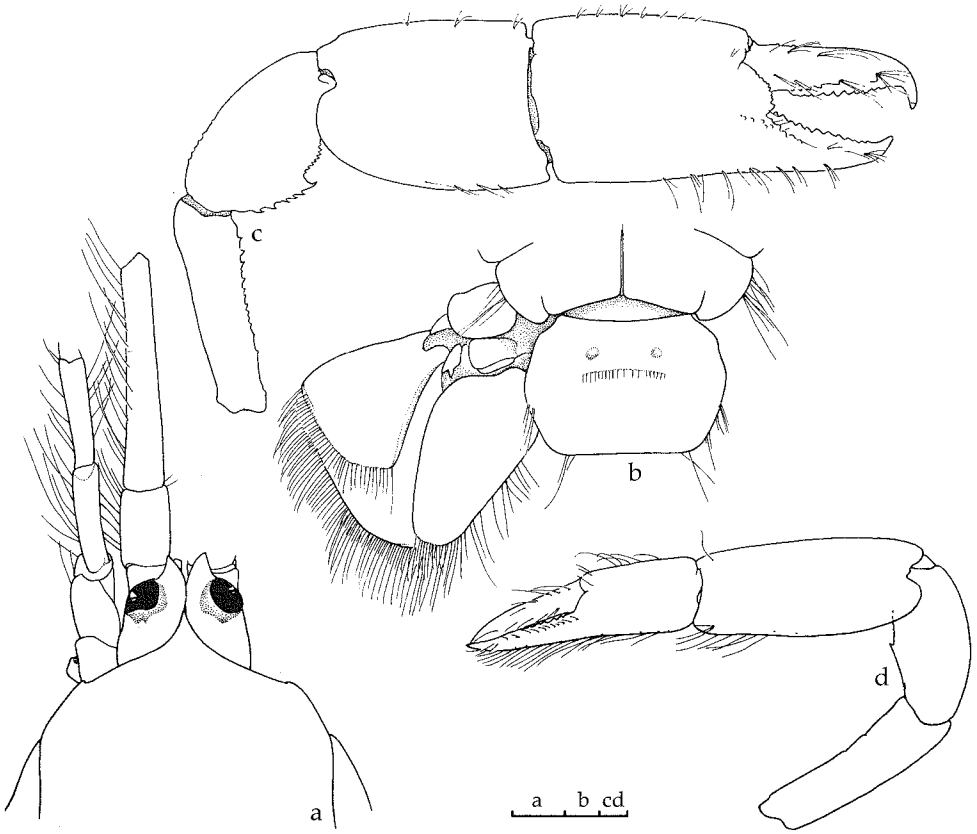

Fig. 9. *Podocallichirus gilchristi* (Barnard, 1946), RMNH D 7509, 1 ♀, from, Port Elizabeth, South Africa. a, Anterior part of carapace with A1-2 peduncles; b, telson and uropod; c, female larger cheliped; d, smaller cheliped. Scale = 1 mm.

Material examined.—SMF 7938, 1 ♀ (TL 52.0, CL 11.2), holotype, Madagascar, 1880 leg. C. Ebenau; SMF 4953, 1 ♂ (TL 49.0, CL 10.7), paratype, Madagascar, 1880 leg. C. Ebenau.

Diagnosis.— Carapace (fig. 10a) with a remarkable rostrum; without anterolateral projections of front. Telson broader than long, largely convex posteriorly. A1 peduncle extremely longer than A2 peduncle (fig. 10a). Mxp3 ischium-merus slender, propodus broadened, and dactylus sickle-formed, rounded distally. Pl 1 unequal, smaller cheliped with chela, bearing characteristic marginal spines. Male Plp1 two-segmented, the distal segment short and chelate distally (fig. 10b), and male Plp2 biramous, endopod distolaterally with appendix masculina enbedded with an appendix interna with hooks (fig. 10c-d). Uropodal endopod rhomboid.

Type locality.— Nossi Bé, NW Madagascar.

Distributtion.— Nossi Bé, NW Madagascar.

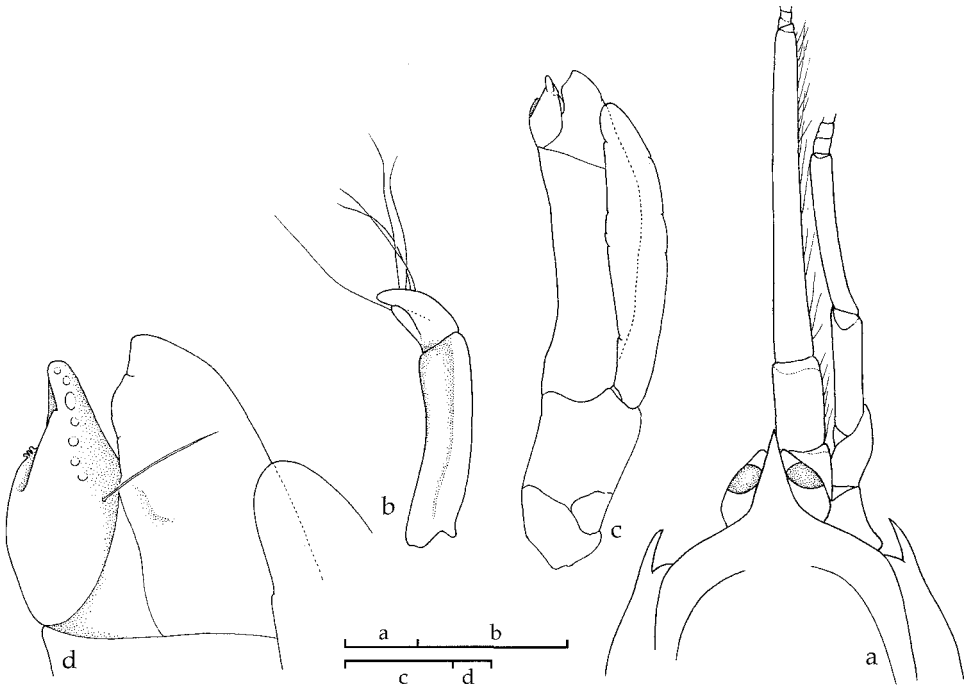

Fig. 10. *Podocalilichirus madagassus* (Lenz & Richters, 1881), SMF 4953, 1 ♂, paratype, from Madagascar. a, Anterior part of carapace with A1-2 peducles; b, male Plp1; c, male Plp2; d, distal part of male Plp2 endopod with appendix interna and appendix masculina. a-c, Scale = 1 mm; d scale = 0.1 mm.

Podocallichirus masoomi (Tirmizi, 1970)

Callianassa (*Callichirus*) *masoomi* Tirmizi, 1970: 245, figs. 1-3.
Callianassa (*Callichirus*) *kewalramanii* Sankolli, 1971: 94, figs. 5, 8. [Type locality: Ratnagiri, Bombay, India].
Callichirus kewalramanii; Rodrigues, 1984a: 253.

Material examined.— RMNH D 21248, 1 ♀ (TL 28.0, CL 6.2), Ratnagiri, S. Bombay, Mirkarwada, Maharashtra State, India, 19.iii.1965, leg. K.N. Sankolli (det. Sankolli 1971, paratype of *Callianassa* (*Callichirus*) *kewalramanii*); RMNH D 16615, 1 ♂ (TL 24.5, CL 6.0), fragile, Ratnagiri, S. Bombay, Mirkarwada, Maharashtra State, India, 19.iii.1965, leg. K.N. Sankolli (det. Sankolli 1971, paratype of *Callianassa* (*Callichirus*) *kewalramanii*); RMNH D 21249, 1 ♂ (TL 23.0, CL 5.6), Paratype, Ratnagiri, S. Bombay, Mirkarwada, Maharashtra State, India, 19.iii.1965, leg. K.N. Sankolli, (det. Sankolli, 1971, paratype of *Callianassa* (*Callichirus*) *kewalramanii*).

Remarks.— The type specimen of *P. masoomi* was not examined, however the figures and description were compared to the type specimens of *P. kewalramanii*, and I confirm that *P. masoomi* is identical to *P. kewalramanii*. In *P. masoomi* the merus of the female larger cheliped is characteristically armed with a row of teeth ventrally, of which the middle one is sharply pointed, and anterior to it, a small tooth (Tirmizi, 1970: fig 2E'), as in the male specimen of *P. kewalramanii* (RMNH D 21249), is present.

Also the forms of the rostrum, projected eyestalks, P3 propodus, and tail-fan, *P. masoomi* are identical with *P. kewalramanii*. The male is unknown.

This species is probably identical with *P. gilchristi*, though the telson differs between the two species. In *P. masoomi* the posterior margin of the telson is medially convex, while in *P. gilchrist* it is straight. This difference is probably due to the size of the specimens, because the male holotype of *P kewalramanii* is 46.5 mm in total length (Sankolli, 1971: 94) and the female holotype *P. masoomi* is only 22.5 mm (Tirmizi, 1970: 245), however the small number of specimens so far examined are not enough to allow a definite decision.

Type locality.— Pakistan, Bholegi, W of Karachi, intertidal zone of muddy sand beach with loose stones.

Distribution.— Bholegi, W of Karachi, Pakistan; Ratnagiri, Bombay, India.

Genus *Callichirus* Stimpson, 1866

Callichirus Stimpson, 1866: 47; De Man, 1928b: 96; Gurney, 1944: 83; Edmondson, 1944: 51; De Saint Laurent, 1973: 514; Le Loeuff & Intès, 1974: 40; De Saint Laurent & Le Loeuff, 1979: 55; Manning & Felder, 1986: 439; Manning, 1987: 397; Manning & Felder, 1991: 775, figs. 1, 3-6; Poore, 1994: 102.

Definition.— Carapace with dorsal oval; rostral spine present or not, anterolateral spine undeveloped. Abdominal somites 3-5 dorsally ornamented. A1 peduncle longer and stronger than A2 peduncle. Mxp3 ischium-merus broadened, subpediform or suboperculiform; propodus subquadrate; dactylus narrow, digitiform; exopod usually absent. P1 unequal. Ischium in male larger cheliped much elongated; merus much elongated or normal in length, with or without meral hook; carpus much longer than chela. Male Plp 1 uniramous, of 1-2 segments, distal segment simple distally. Male Plp2 biramous, endopod single or two-segmented, with or without appendix masculina embedded with appendix interna. Female Plp1 uniramous. Female Plp2 biramous. Plp3-5 foliaceous with appendices internae in both sexes. Uropodal endopod longer than broad, strap-shaped.

Remarks.— Mxp3 is usually not provided with an exopod except in *C. kraussi*. Manning & Felder (1986: 439) recognized a distinctive group of four species, *Callichirus major* Say, 1818, *Callichirus islagrande* (Schmitt, 1935), *Callichirus seilacheri* (Bott, 1955), and *Callichirus adamas* (Kensley, 1974) in the Callianassidae distinguished by the ornamentation of the third to fifth abdominal somites. However, the type species, *Callichirus major*, is different from the other three species in the form of the eyes. In *C. major*, the eyestalks are not elongated in the precornea region, but in *Callichirus islagrande, C. seilacheri*, and *C. adamas* they taper distally. Concerning Plp1-2, in *C. major* the male Plp1 is uniramous, and biarticulate; the distal segment is elongated and sickle-shaped. The male Plp2 is biramous, bearing a slender endopod and an exopod, while in *C. adamas*, the male Plp1 is vestigial, uniramous, two-segmented, and the male Plp2 is also biramous, the exopod is small, about one-sixth the length of the endopod (Kensley, 1974: 269; De Saint Laurent & le Loeuff, 1979, fig. 23f-i).

Manning & Felder (1986: 439) defined *Callichirus* by the fact that abdominal somites 3-5 have a midlateral patch of setae, visible dorsally. *Callichirus* is closely

related to the genus *Lepidophthalmus* in having A1 much longer than A2 peduncle, and Mxp3 propodus subquadrate in shape, but in *Lepidophthalmus* the abdominal somites are not dorsally ornamented. De Saint Laurent & Le Loeuff (1979: 55) placed this genus *Callichirus* closest to *Glypturus* Stimpson, 1866, *Lepidophthalmus* Holmes, 1904, and *Callianassa* sensu Borradaile, 1903 (part).

Type species.— *Callianassa major* Say, 1818, by original designation and monotypy. Gender masculine.

Western Atlantic species

Key to the species of *Callichirus* in the Western Atlantic:

1. Eyestalks elongated distally. Telson broadened distally ..... ***C. islagrande***
- Eyestals not elongated distally. Telson rounded, largely concave distally ..... ***C. major***

Callichirus islagrande (Schmitt, 1935)
(fig. 11b-f)

Callianassa (*Callichirus*) *islagrande* Schmitt, 1935b: 5, pl. 1, fig. 3, pl. 2, fig. 1, pl. 3, fig. 2, pl. 4, fig. 5.
Callianassa islagrande; Biffar, 1971a: 651, 654; Phillips, 1971: 165-196, fig. 3B, D, F, 4; Felder, 1973: 24, pl. 2, figs. 12-14; Rabalais, Holt & Flint, 1981: 105; Manning & Felder, 1986: 438. fig. 2.
Callichirus islagrande; De Saint Laurent & Le Loeuff, 1979: 79; Manning & Felder, 1986: 439, fig. 2; Abele & Kim, 1986: 27; Williams et al., 1989: 28; Manning, 1987: 397; Manning & Felder, 1991: 775; Dworschak, 1992: 208.

Material examined.— NHMW 6974, 1 ♂ (TL 84.0, CL 17.5), Perdido Key, Florida, Gulf of Mexico, beach 20-40 cm, 15.ix.1990, leg. P. Dworschak.

Diagnosis.— Rostrum triangular; anterolateral spines of carapace undeveloped. Telson (fig. 11b-c) broadened distally; posterior margin broadest, with median concavity; dorsal surface concave medially. Abdominal somites 3-5 with distinctive dorsal ornamentation. Cornea small, rounded, located at anteromesial part. A1 peduncle longer than A2 peduncle. P1 unequal. In male larger cheliped ischium, merus and carpus much elongated; chela (fig. 11d) elongated. Mxp3 ischium-merus oval; propodus subquadrate; without exopod. Male Plp1 uniramous, distal segment simply produced at tip. Male Plp2 (fig. 11e-f) endopod without appendix interna and appendix masculina. Uropodal endopod (fig. 11b) strap-shaped.

Remarks.—Manning & Felder (1986: 437) described *Callichirus islagrande* and *Callichirus seilacheri*, with figures of the male holotypes. According to their figures, the cornea of *C. islagrande* figured by Manning & Felder (1986: fig. 2a) is drawn out, with the pigment under the surface.

Type locality.— Grand Isle, Louisiana, U.S.A.

Distribution.— Gulf of Mexico, common in shallow subtidal of sandy beaches. (Dworschak, 1992).

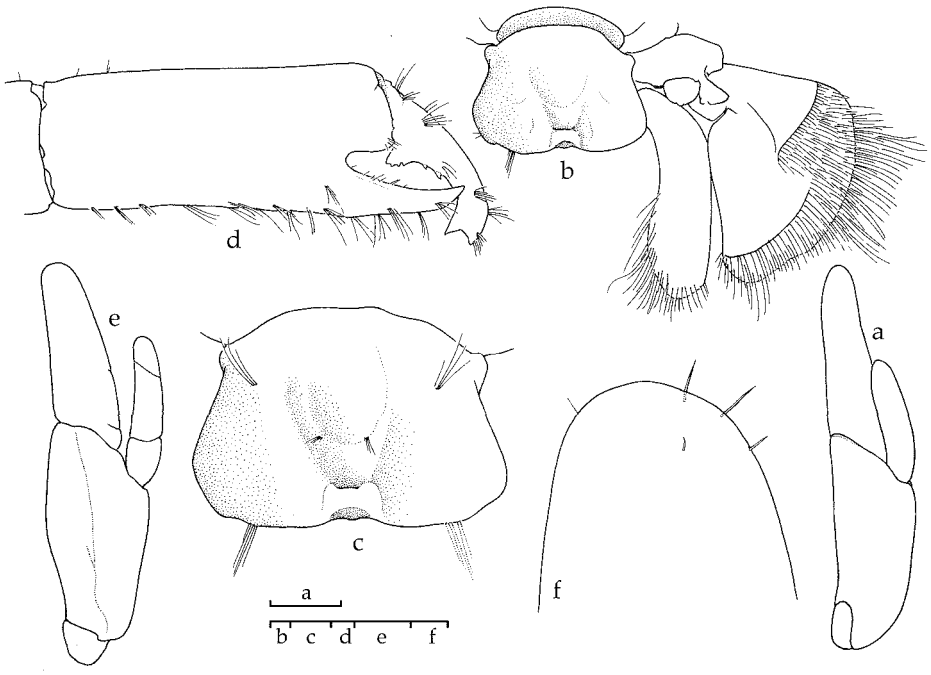

Fig. 11. *Callichirus major* (Say, 1818) & *C. islagrande* (Schmitt, 1935). a, e, Male Plp2; b, telson and uropod; c, telson; d, chela of male larger cheliped, lateral view; e, male Plp2; f, distal part of male Plp2 endopod. a, *Callichirus major*, NHMW 6755, 1 ♂ from Zarden Inlet, Cape Lookout, North Carolina; b-f, *C. islagrande*, NHMW 6974, 1 ♂, from Florida, Perdido Key, Gulf of Mexico. a-e, Scale = 1 mm; f, scale = 0.1 mm.

Callichirus major (Say, 1818)
(fig. 11a)

Callianassa major Say, 1818: 238; White, 1847: 70; Gibbes, 1850: 194; A. Milne Edwards, 1870: 86, 101; Stimpson, 1871: 122; Schmitt, 1935b: 3; Lunz, 1937: 1-15, figs. 1-3; Willis, 1942: 2; Pearse, Hum & Wharton, 1942: 153, 155, 156, 185, figs. 10, 14; Gurney, 1944: 83; Pohl, 1946: 71-80, figs. 7-28; Hoyt & Weimer, 1963: 10; Williams, 1965: 100-102; Frankenberg, Coles & Johannes, 1967: 113-120; Holthuis, 1969: 12; Biffar, 1971a: 651, 652, 653; Coelho & Ramos, 1973: 161; Rabalais, Holt & Flint, 1981: 105; Williams, 1984: 183, fig. 127.

Callichirus major; Stimpson, 1866: 47; Stimpson, 1871: 122; Kingsley, 1878: 327; Hay & Shore, 1917: 407, pl. 29, fig. 10; De Saint Laurent , 1973: 514; Rodrigues, 1983: 25, figs. 23-52; Manning & Felder, 1986: 439, fig. 1; Manning, 1987: 397; Rodrigues & Hödl, 1990: 50, fig. 1; Manning & Felder, 1991: 775, figs. 1, 3-6; Dworschak, 1992: 208.

Callianassa (*Callichirus*) *major*; Borradaile, 1903: 547; De Man, 1928a: 30, pl. 7, figs. 14-14b; pl. 8, figs. 14c, 14d; De Man, 1928b: 29, 91, 94, 111 (key); Williams, 1965: 100, fig. 78; Rodrigues, 1971: 191, figs. 1-20.

Material examined.— RMNH D 32145, 1 ♂ (TL 96.0, CL 15.4), 1 ovig. ♀ (TL 140.0, CL 18.8), Little Cumberland Island, Georgia, vii.1978, leg. J.J. Richardson, don L.D. Brongersma; SMF 23578, 1 ♂, Cabretta Island, Sapelo Island, Georgia, Sta. Cab-4, tidal flat, 31.v.1969, leg. J. Doerjes; SMF 23579, 1 ♀, Blackbeard Island, Sapelo Island, Georgia, Sta. Cab-4, Sandbank, vii.1969 leg. J. Doerjes; NHMW 6755, 1 ♂ (TL 85.0, CL 17.0), Zarden Inlet, Cape Lookout, North Calorila, 25.xi.1988, leg. Dworschak.

Diagnosis.— Rostrum in form of low triangle; not provided with frontal anterolateral spines. Telson convex on dorsal surface, posterior margin rounded with median concavity, lateral margin armed with two convex projections. A1 peduncle longer than A2 peduncle. Abdominal somites 3-5 with distinctive ornamentation. Mxp3 ischium-merus broadened, suboperculiform, propodus subquadrate, without exopod. P1 unequal. Ischium and carpus of male larger cheliped elongated. Male Plp1 uniramous, two-segmented, distal segment terminally simple. Male Plp2 endopod (fig. 11a) without appendix interna and appendix masculina. Female Plp1 three-segmented, distal segment foliaceous. Female Plp2 biramous. Uropodal endopod strap-shaped.

Type locality.— Coast of Southern [United] States and east Florida St. Johns River.

Distribution.— North Carolina, Gulf of Mexico and São Paulo, Brazil. Intertidal (Dworschak, 1992).

Eastern Pacific species

Callichirus seilacheri (Bott, 1955)
(fig. 12a-f)

Callianassa seilacheri Bott, 1955: 47, fig. 7a-g.
Callichirus seilacheri; Manning & Felder, 1986: 439, fig. 3; Manning & Felder, 1991: 775; Hendrickx, 1995: 390.
Callianassa garthi Retamal, 1975: 178, figs. 1-8. [Type locality: Playa Negra, Chile, 36°45'S 73°10'W].

Material examined.— SMF 2184, 1 ♀, carapace broken (TL ca 85), holotype, Los Blancos ca. 36 km E. of La Libertad, EI Salvador, 18.viii.1954, leg. A. Seilacher; SMF 2185, 1 ♀ (TL ca. 105, CL ca21), paratype, posterior part of carapace and abdominal segment 1-2 broken, Los Blancos ca. 36 km E. of La Libertad, EI Salvador, 18.viii.1954, leg. A. Seilacher; SMF 4941, 3 ♂♂ (TL 114, CL 25.0 - TL 117, CL 25.0), 3 ♀♀ (TL 10.3, CL 23.0 - TL 113, CL 23.6), S. Salaverry, 08°13.000'S, La Libertad, Peru, 0.8 m, sandy beach, 04.vi.1967, leg. M. Castaneda.

Diagnosis.—Carapace with low triangular rostrum and pair of low triangular anterolateral projections. Abdominal somites 3-5 with dorsal sculpture patterns (fig. 12a). Telson (fig. 12b) rounded, broader than long, posterior margin largely concave. Eyestalks overreaching segment 1 of A1 by elongated precorneal projection, cornea small and rounded. A1 peduncle much longer than A2 peduncle. Mxp3 exopod absent. P1 unequal. Ischium, merus and carpus in male larger cheliped much elongated; chela (fig. 12c-d) also elongated. Male Plp1 (fig. 12e) two-segmented, distal segment tapering distally with setae. Male Plp2 (fig. 12f) bilobed, endopod without appendix interna and appendix masculina. Uropodal endopod strap-shaped.

Remarks.— *Callianassa seilacheri* from El Salvador, Eastern Pacific side, and *Callianananassa garthi* from Chile are considered to be conspecific. The telson of *C. garthi* is described by Retamal (1975: 178, figs. 18) as bearing a median spine on the posterior margin, however this median spine is not present, because when the telson is observed correctly from the dorsal face, there is no such spine, but when it is observed downwards from the direction of the anterior side, the posteromedian convexity of the telson is seen as a spine. The sculpture pattern of the abdominal somites 3-5 is the same as shown in *C. islagrande*.

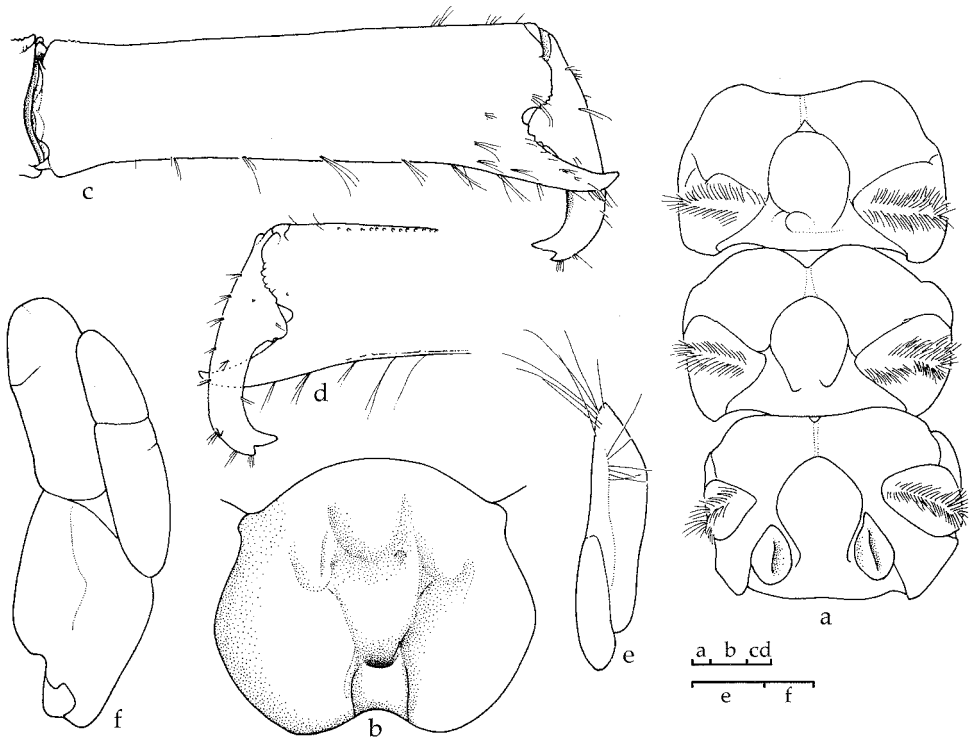

Fig. 12. *Callichirus seilacheri* (Bott, 1955). a, Abdominal somites 3-5, dorsal view; b, telson; c, chela of male major cheliped, lateral view; d, distal part of chela of male major cheliped, mesial view; e, male Plp1; f, male Plp2. a-b, SMF 2185, 1 ♀, Paratype, from Los Blancos, El Salvador; c-f, SMF 4941, 1 ♂, from Peru, La Libertad, S. Salaverry. Scale = 1 mm.

Type locality.— El Salvador.

Distribution.— El Salvador; (36°46'36S - 37°14'S 73°02'W - 37°27'W); W. Tubul to Playa Negra, Chile.

Indo-West Pacific species

Key to species of the genus *Callichirus* in the Indo-West Pacific:

1. Eyestalks elongated distally ..... ***C. adamas***
- Eyestalks not elongated distally ..... ***C. kraussi***

Callichirus adamas (Kensley, 1974)

Callianassa adamas Kensley, 1974: 266, 277, figs. 1-2; De Saint Laurent & Le Loeuff, 1979: 67, figs. 14f, 16a, 17a, 19f, 20e-g, 23f-i.

Callichirus adamas; Manning & Felder, 1986: 439.

Type locality.— Orange River mouth, South Africa.

Distribution.— Orange River mouth and Lambert's Bay, South Africa (Kensley, 1974); Senegal; Cape Verde Islands (De Saint Laurent & Le Loeuff, 1979).

Callichirus kraussi (Stebbing, 1900)
(fig. 13a-e)

Callianassa kraussi Stebbing, 1900: 39, pls. 2, 3; Kensley, 1974: 277 (key); Kensley, 1974: 277; Kensley, 1975: 57; Holthuis, 1991: 248, figs. 451, 452, 264; Dworschak, 1992: 198.
Callianassa (*Callichirus*) *Kraussi*; Borradaile. 1903: 547; De Man, 1928b: 28, 94, 95, 113, 179, 182, 183.
Callianassa (*Callichirus*) *kraussi*; Barnard, 1950: 506, fig. 94.
Callichirus kraussi; Stebbing, 1910: 369.

Material examined.— RMNH D 12002, 1 ♂ (TL 173.0, CL 12.5), 2 ♀♀ (TL 37.0, CL 8.6; TL 63.0, CL 11.6), Coast of Saldanha Bay, Langebaan, South Africa, 01.v.1957, leg. N. Paterson, don. R. Gooding; NHMW 6895, 1 ♂ (TL 61.0, CL 13.5).1 ♀ (TL 56.0, CL 11.5), Kaubooms estuary, South Africa, leg. N. Hanebom; ZMH-K 29840, 2 ♂♂, 2 ♀♀ (1 ♀ damaged), Langebaan, Africa Expedition 1967, 29.viii.1967, leg. G. Hartmann (det. 1970, L.B. Holthuis).

Diagnosis.— Abdominal somites 3-5 with distinctive ornamentation. A1 peduncle much longer than A2 peduncle; Mxp3 armed with broadened propodus. P1 unequal. Male larger cheliped (fig. 13b) with ischium and carpus much elongated; merus not much elongated, bearing denticulate ventroproximal lobe. Mxp3 with rudimentary exopod. Male Plp1 (fig. 13c) simple, three-segmented; male Plp2 (fig. 13d) biramous, endopod fused distally with appendix masculina embedded with appendix interna with hooks (fig. 13e). Uropodal endopod (fig. 13a) strap-shaped, longer than broad, tapering distally. Telson broader than long, posterior margin largely concave.

Remarks.— Barnard (1950: 506, fig. 94) illustrates the present species. The carpus of the larger cheliped, probably a male, is a little shorter in his figure than in the present male specimen (RMNH D, 12002), in which the carpus is 1.7 times as long as the merus and twice as long as broad. The male Plp1 is described as a small, two-segmented appendage (Barnard, 1950, fig. 94g). In the present specimen it is three-segmented, and similar to that of the female as mentioned in the diagnosis.

Type locality.— Cape of Good Hope, Gordon's Bay.

Distribution.— Saldanha Bay, False Bay to Zululand, a little below high water mark, sandy littoral zone in bays and estuaries.

Genus *Lepidophthalmus* Holmes, 1904

Lepidophthalmus Holmes, 1904: 310; Manning & Felder, 1991: 778, figs. 5, 13; Poore, 1994: 102.

Definition.— Rostrum sharply triangular; without pair of anterolateral spines in front. Abdominal somites 3-5 without dorsal ornament. Telson broader than long, posterior margin usually with medial, broadly convex lobe. A1 peduncle longer and stouter than A2 peduncle. Mxp3 ischium-merus broadened, subpediform; propodus subquadrate; dactylus narrow, digitiform; with rudimentary exopod. P1 unequal. Larger cheliped with a meral hook. Male Plp 1 uniramous, two-segmented, distal segment chelate distally. Male Plp2 biramous, endopod with appendix interna. Female

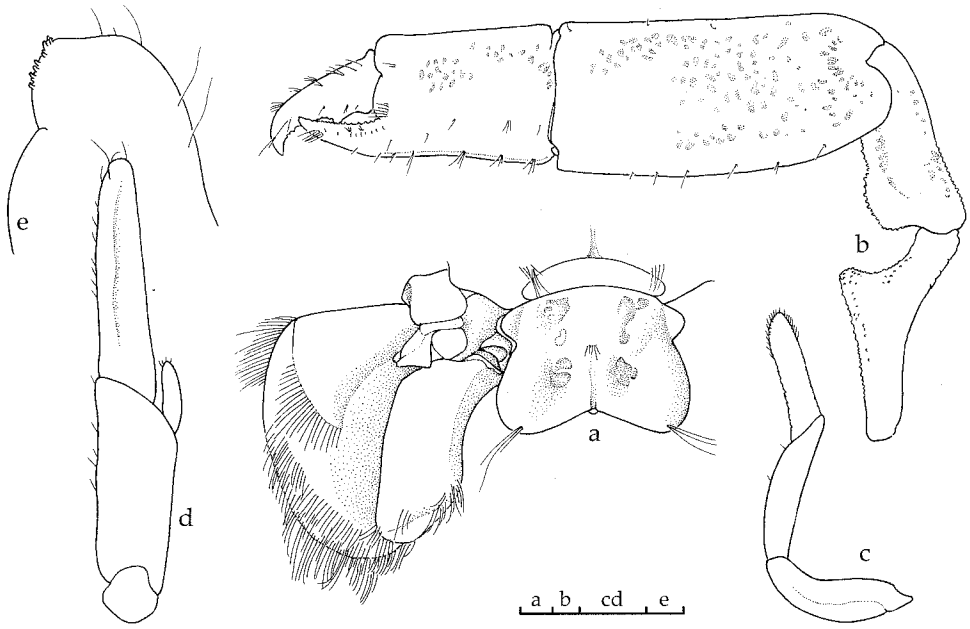

Fig. 13. *Callichirus kraussi* (Stebbing, 1900), RMNH D 12002, 1 ♂, from Coast of Saldanha Bay, Langebaan, South Africa. a, Telson and uropod; b, male larger cheliped; c, male Plp1; d, male Plp2; e, distal part of male Plp2 endopod. a-d, Scale = 1 mm; e, scale = 0.1 mm.

Plp1 uniramous. Female Plp2 biramous, endopod with appendix interna. Plp3-5 foliaceous with appendices internae in both sexes. Uropodal endopod more than twice as long as broad, distal half tapering or ovoid distally.

Remarks.— In *Lepidophthalmus tridentatus, L. grandidieri* and *L. sinuensis* the rostrum is trispinose. In *L. louisianensis, L. bocourti,* and *L. rosae* the male Plp2 endopod bears the appendix masculina embedded with appendix interna with hooks laterally; *L. tridentatus* has a finger-shaped appendix interna.

Type species.— *Callianassa bocourti* A. Milne Edwards, 1870, by monotypy. Gender masculine.

Eastern Atlantic and Mediterranean species

Lepidophthalmus turneranus (White, 1861)

Callianassa turnerana White, 1861a: 42, pl. 6; White, 1861b: 479; A. Milne Edwards, 1870: 89, 101; Rathbun, 1900a: 308; Nobili, 1900: 3; Lenz, 1911: 316, figs. 1-11; Vanhöfen, 1911: 105, fig. a, , d; Balss, 1916: 33; Monod, 1927: 595; Holthuis, 1991: 250, 246, figs. 455, 456.

Callianassa Krukenbergi Neumann, 1878: 34; Borradaile, 1903: 548. [Type locality: ? Central America].

Callianassa diademata Ortmann, 1891: 56, pl. 1, fig. 11; Bouvier, 1901: 332 (not from Japan). [Type locality: Africa].

Callianassa (*Callichirus*) *Turnerana*; Borradaile, 1903: 547; De Man, 1928b: 30, 114.

Callianassa (*Callichirus*) *diademata*; Borradaile, 1903: 547.

Callianassa (*Callichirus*) *Krukenbergi*; De Man, 1928a: 51, pl. 12, fig. 21-21d; De Man, 1928b: 94.

Callichirus turneranus; Le Loeuff & Intès, 1974: 40, fig. 10a-s; De Saint Laurent & Le Loeuff, 1979: 64, figs. 14e, 19e, 20a-d, 23a-e.
Callianassa ?turnerana; Dworschak, 1992: 205.

Material examined.— ZMG 390, 1 ♀ (TL 143.0, CL 28.5), Cameroon, 1890; SMF 22925, 1 ♀ (TL 134.0, CL 30.0), off NW-Afrika, probably Geronimo-Expedition 1963, 1963, R. V. "*Geronimo*", det. H. Thiel; ZMB 7458, 1 ♀, Congo, leg. Wolf; ZMH-K 26371, 6 ♂♂, 11 ♀♀, Cameroon, 11.iii.1914 (det. H. Balss); ZMH-K 8379, 1 ♂, Cameroon, 1912-13, leg. J. v. Eityen; SMNH 7506, 1 ♂, 1 ♀, Cameroon, 01.iii.1872, leg. Salmin.

Diagnosis.— A1 peduncle extremely longer than A2 peduncle as in *Callichirus major*. Abdominal somites 3-5 without distinctive sculpture.

Remarks.— Le Loeuff & Intès, (1974: 40) and De Saint Laurent & Le Loeuff (1979: 64) included this species in *Callichirus*, however in *L. turneranus* abdominal somites 3-4 are not sculptured, the carpus of the male larger cheliped is not elongated, and the rostrum is characteristically trispinose as in *L. grandieri*. For these reasons I am transferring it from *Callichirus* to *Lepidophthalmus*. However, the male Plp1 is similar to that of *Callichirus*, because it is uniramous, and the distal segment is simple distally. The male Plp2 is unknown.

Type locality.— Cameroon, fresh water.

Distribution.— Togo, Cameroon to Congo, W Africa. Lagoons and estuaries to practically fresh water.

Western Atlantic species

Key to the species of the genus *Lepidophthalmus* in the western Atlantic:

1. Frontal margin of carapace trispinose. Posterior margin of telson convex medially ..... ***L. sinuensis***
- Frontal margin of carapace with simple rostrum 2
2. Abdominal somites 1-2 with cuticular armour on ventral surface 3
- Abdominal somites 1-2 without cuticular armour on ventral surface. Posterior margin of telson weakly convex medially 4
3. Ventral plate of abdominal somite 2 consistently flat and unfurrowed. Merus of male larger cheliped with strong proximal notch dorsally ..... ***L. jamaicense***
- Ventral plate of abdominal somite 2 strikingly furrowed. Merus of male larger cheliped convex dorsally ..... ***L. richardi***
4. Merus of male larger cheliped with broad proximal notch on dorsal margin, with single rim on ventral margin ..... ***L. louisianensis***
- Merus of male larger cheliped with much stronger proximal notch on dorsal margin, bicarinate on ventral margin ..... ***L. siriboia***

Lepidophthalmus jamaicense (Schmitt, 1935)

Callianassa jamaicense Schmitt, 1935b: 1, 4, 9-12, pl. 1, fig. 1, pl. 2, figs. 6, 8, pl. 4, fig. 1; Biffar, 1971a: 650, 654 ; Coelho & Ramos, 1973: 162 (part); Abel & Kim, 1986: 27, 295, 296, 302-303, figs. j, k, l (part); Manning, 1987: 397; Dworschak, 1992: 196 (part) (not figs. 4a-d = *L. siriboia*).

Callianassa jamaicensis; Holthuis, 1974: 231.

Callichirus jamaicensis; De Saint Laurent & Le Loeuff, 1979: 67, 69 (only species name); Coelho & Ramos-Porto, 1987: 30.

Lepidophthalmus jamaicense; Felder et al., 1991: 101A (part); Manning & Felder, 1991: 778, fig. 13a-e (not f, which defined as *L. jamaicense* var. *louisianensis*); Lemaitre & Rodrigues, 1993: 357, 358, 367, 373; Felder & Manning, 1997: 311, figs. 1a-i, 2a-s, 3a-j.

Remarks.— In *L. jamaicense*, the telson of the type specimen is simply convex medially on the posterior margin, the form of which was shown by Schmitt (1935b, pl. 4, fig. 4) and is in good accordance with the figure of the telson in the male holotype (USNM 69363), given by Manning & Felder (1991, fig. 13f). However, it is not the same as the telson figured later by Felder and Manning (1997: fig. 1I, fig. 3h), but identical with the telson of *L. jamaicense* var. *louisianensis* Schmitt, 1935, in which the posterior margin of the telson is weakly trilobate. It is most probable that Manning & Felder (1991) mistakenly figured the telson in *L. jamaicense* var. *louisianensis* for that in *L. jamaicense*.

Type locality.— Jamaica, Montego Bay.

Distribution.— Caribbean Sea: Dangriga and Sao Luiz-MA, Rio Anil, Belize; Honduras, sandy beach between stones; Montego Bay, Jamaica, blackish pond.

Lepidophthalmus louisianensis (Schmitt, 1935)
(fig. 14a-b)

Callianassa jamaicense var. *louisianensis* Schmitt, 1935b:1, 12-15, pl. 1, fig. 2, pl. 2, figs. 2, 7, pl. 4. fig. 4; Hedgpeth, 1950: 113-114; Biffar, 1971a: 641-642, 650; Phillips, 1971: 165-196, figs. 1-3a, c, e, 6, 7b, c, d, 8b, c, d, tables 1-3, 5-7; Felder et al., 1986: 91; Manning & Felder, 1989: 9.

Callianassa stimpsoni; Reed, 1941: 42, 47 (part). [Not *Callianassa stimpsoni* Gabb, 1864].

Callianassa jamaicense louisianense; Anonymous, 1941: 5; Willis, 1942: 1, 2, 4, 5; Behre, 1950: 21; Hedgpeth, 1950: 114, table 1; Darnell, 1958: 369, 400; Pounds, 1961: 26, pl. 1, fig. 1; Leary, 1964: 26-27; Dawson, 1967a: 224; Felder, 1973: 3, 24; Fotheringham & Brunenmeister, 1975: 114-116, 166, figs. 6, 12; Fotheringham, 1980: 63, 106, figs. 7, 12; Foheringham & Brunenmeister, 1989: 62, 118, fig. 7, 12.

Callianassa jamaicense; Hedgpeth, 1950: 114; Menzel, 1971: 78; Phillips, 1971: 166; Felder, 1973: 3. 24, pl. 2, figs. 6-8; Felder, 1978: 409-427, figs. 2, 3, 5-10, tables I, II; Felder, 1979: 125-136, figs. 1-6; Rabalais et al., 1981: 96, 105, 112; Heard, 1982: 47; Felder et al., 1984: 67A; Lovett & Felder, 1984: 74A; Abele & Kim, 1986: 27, 295 (part, not 302, 303, figs. j, k, l); Felder et al., 1986: 91-104, figs. 1-8.

Callianassa jamaicense louisianensis; Wass, 1955: 46, 148; Menzel, 1956: 43.

Callianassa (*Callichirus*) *jamaicense*; Rodrigues, 1971: 198-204 (part), figs. 21-40, table 2.

Callianassa jamaicensis; Coelho & Ramos, 1973: 162 (part); Manning & Felder, 1986: 439; Williams et al., 1989: 28; Britton & Morton, 1989: table 1-1.

Callichirus jamaicense; Felder, 1975: i-x, (Part I) 1-63, table 1, figs. 1, 4, 6, 8, 10-15, (Part II) 74-110, tables 1, 2, figs. 1-6; Felder, 1979: 125; Abele & Kim, 1986: 296.

Callianassa jamaicensis louisianensis; Humm, 1953: 6; Tiefenbacher, 1976: 314-316 (part), figs. 1a, b (not figs. 1c, 1d = *L. siriboia*).

Callianassa jamaicense?; Shipp, 1977: 48-60, figs. 32-37.

Callichirus jamaicensis; Coelho & Ramos-Porto, 1987: 30 (part).

Callianassa jamaicense var; Felgenhauer & Felder, 1986: 34A.

Callianassa louisianensis; Manning, 1987: 397; Staton et al., 1988: 125A; Britton & Morton, 1989: 6, 121, 193, 195, 209, fig. 6, 7e, j, 7-9T; Felder & Lovett, 1989: 540-552, figs. 1-6, tables 1-3; Lovett & Felder, 1989: 530, figs. 1, 2, tables 1, 2; Manning & Felder, 1989: 9; Rabalais et al., 1989: 32-34, table 3;

Williams et at., 1989: 28, fig. 4; Dworschak, 1992: 198, fig. 7a-f.
Lepidophthalmus louisianensis; Felder & Staton, 1990: 137A; Felder et al., 1991: 101A; Lemaitre & Rodrigues, 1991: 629; Manning & Felder, 1991: 778 (part); Manning & Felder, 1992: 560; - Felder & Felgenhauer, 1993: 263-276, figs.
Lepidophthalmus jamaicense; Manning & Felder, 1991: fig. 13f (not *L. jamaicense*).

Material examined.— NHMW 6976, 1 ♂ (TL 66.0, CL 13.0), 1 ♀ (TL 90.0, CL 66.0), Macar Park, Nobile Bay, Alabama, Gulf of Mexico, Intertidal, 26.ix.1990, leg. P. Dworschak.

Remarks.—. Felder and Rodrigues (1993: 373) mentioned that *L. siriboia* can be distinguished from *L. louisianensis*, however these two species both lack characteristic dense plates and tubercles on the membranous ventral surfaces of the first and second abdominal somites, which will readily distinguish those species from *L. jamaicense*. Later, Felder and Manning (1997: 328) showed that in *L. richardi* and *L. jamaicense* a median ventral cuticular plate is present on the second abdominal somite, which is strikingly furrowed in *L. richardi*, and consistently flat and unforrowed in *L. jamaicense*. Further comparisons were made on the larger chelipeds in these species, however, the variations of the forms are not always clear. For example, Manning and Felder (1991) showed the figure of the larger cheliped of *L. jamaicense* of the male holotype, in which the strong proximal notch on the dorsal margin of the merus is clearly marked, however Felder & Manning (1993) showed the same structure for the male holotype of *L. siriboia*. For this reason, *L. siriboia* is distinguished from *L. louisianensis* only by the ventral plates of abdominal somites 1-2.

Mxp3 has a rudimentary exopod. The male Plp2 endopod has the appendix masculina placed mediolaterally with the appendix interna with some hooks (fig. 14a-b).

Type locality.— Grand Isle, Louisiana.

Distribution.— Florida (Perdido Key, Big Lagoon, 20-50 cm); Alabama (Nobile Bay and Dauphin Island near airport, intertidal); Mississippi (Bay St. Louis, intertidal), and Louisiana. (Dworschak, 1992).

Lepidophthalmus richardi Felder & Manning, 1997

Lepidophthalmus jamaicense complex; Felder et al., 1991: 101A (part).
Lepidophthalmus richardi Felder & Manning, 1997: 320-329, figs. 4a-j, 5a-f, 6a-i, 7a.

Type locality.— Intertidal shoreline at Pelican Beach Hotel, near Dangriga, Belize.

Distribution.— Intertidal shoreline at Pelican Beach Hotel, near Dangriga, Belize.

Lepidophthalmus sinuensis Lemaitre & Rodrigues, 1991

Lepidophthalmus sinuensis Lemaitre & Rodrigues, 1991: 623, figs. 1-4; Manning & Felder, 1991: 778.

Remarks.— This species is separated from other western Atlantic species by the front of the carapace bearing a rostral spine and two fixed subrectangular lateral projections.

Type locality.— Mouth of Rio Sin River, (9°07'N 75°0'W), Colombia.

Distribution.— Caribbean coast of Colombia. Intertidal, 1.5 m.

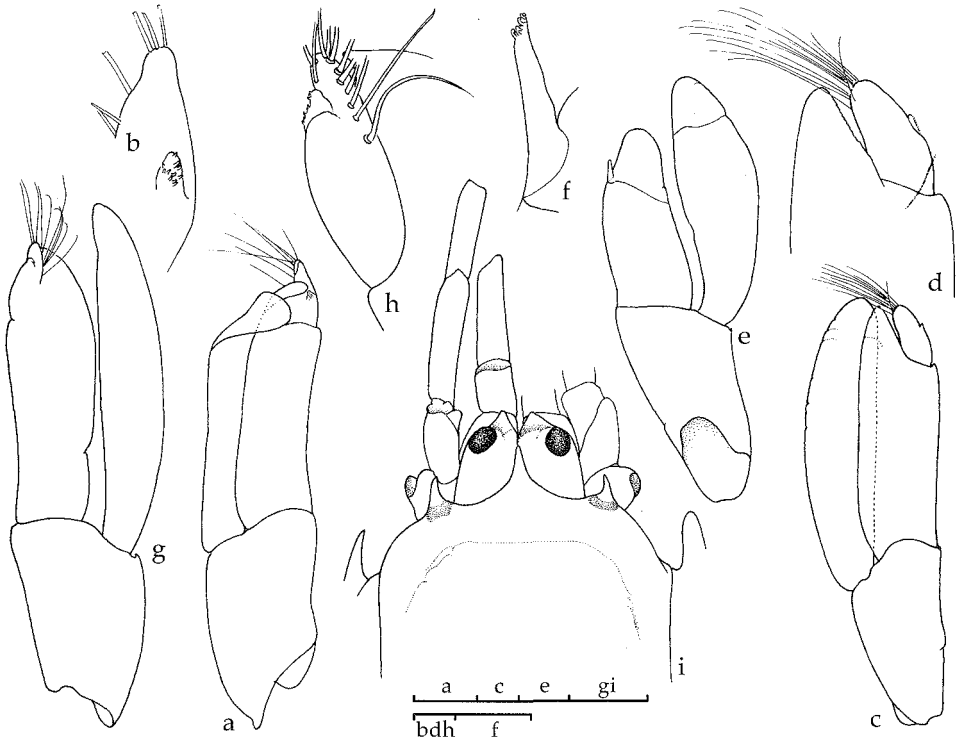

Fig. 14. *Lepidophthalmus louisianensis* (Schmitt, 1935), *L. bocourti* (A. Milne Edwards, 1870), *L. tridentatus* (*von Martens*, 1869), *L. rosae* (Nobili, 1904) & *Glypturus acanthochirus* Stimpson, 1866. a, c, e & g, male Plp2; b, d, f & h, distal part of male Plp2 with appendix masculina and appendx interna; i, anterior part of carapace with antennule and antennal peduncle. a-b. *Lepidophthalmus louisianensis*, NHMW 6976, 1 ♂ from Macar Park, Nobile Bay, Alabama, Gulf of Mexico; c-d, *L. bocourti* SMF 2183, 1 ♂ from, Estuary of Rio Banderas, El Salvador; e-f, *L. tridentatus*, RMNH D 12008, 1 ♂ from S. Colombo, Sri Lanka; g-h, *L. rosae*, RMNH D 27612, 1 ♂ from Tuléar, SW Madagascar; i, *Glypturus acanthochirus*, RMNH D 31083, 1 ovig. ♀, Caribbean coast of Colombia. a, c, e, g & i, Scale = 1 mm; b, d, f & h, scale = 0.1 mm.

Lepidophthalmus siriboia Felder & Rodrigues, 1993

Callianassa jamaicense; Biffar, 1971a: 650, 654 (part); Abele & Kim, 1986: 27 (part); Griffis & Suchanek, 1991: table 2; Dworschak, 1992: 196 (part), figs 4a-d. [Not *L.* jamaicense (Schmitt, 1935)].

Callianassa (*Callichirus*) *jamaicensis*; Rodrigues, 1971: 198 (part).

Callianassa jamaicensis; Rodrigues, 1971: 202-204, figs. 21-40, table 2 (part); Coelho & Ramos, 1973: 162 (part); Tiefenbacher, 1976: 314 (part), figs. 1c, d.(not figs. 1a, 1b = *L. louisianensis* (Schmitt, 1935)); Griffis & Suchaneck, 1991: table 2.

Callichirus jamaicensis; De Saint Laurent & le Loeuff, 1979: 67, 96 (part); Coelho & Ramos-Porto, 1987: 30 (part).

Lepidophthalmus siriboia Felder & Rodrigues, 1993: 367, figs 2e-h, 4a-f, 6a-l.

Material examined.— SMF 23521, 1 specimen, Baia de Marcos near São Luis, Maranhão, Brazil, 500 m, 01.xii.1987 leg. G. Richter; ZSM 1432/1, 2 ♂♂, 1 ♀, Salinas, Pará State, Brazil, 12.i.1974, leg. H. Sioli. (det. Tiefenbacher, 1976 as *Callianassa* aff. *jamaicensis*).

Remarks.— Felder & Manning (1997: 311) included in *L. jamaicense* the specimens of *Callianassa* aff. *jamaicense* from Brazil, Pará State, Salinas, determined by Tiefenbacher (1976: 314-316). I found, however, after reexamination of the specimens, that the ventral plates of abdominal somites 1-2 are not present, and the larger cheliped is clearly different from that of either *L. jamaicense* or *L. louisianensis*.

Type locality.— Brazil: Maranhão, São Luís, Mouth of Rio Anil.

Distribution.— Brazil: Mouth of Rio Anil, São Luís, Maranhão; Marapanin, Pará; mouth of Rio Gramame, João Pessoa, Paraiba; mouth of Rio Caravelas, Bahia.

Eastern Pacific species

Lepidophthalmus bocourti (A. Milne Edwards, 1870)
(fig. 14c-d)

Callianassa bocourti A. Milne Edwards, 1870: 95, 101.
Callianassa (*Callichirus*) *Bocourti*; Borradaile, 1903: 547; De Man, 1928b: 28, 94, 115.
Lepidophthalmus Eiseni Holmes, 1904: 311, pl. 35, figs. 6-13. [Type locality: Lower California.].
Callianassa (*Callichirus*) *Eiseni*; De Man, 1928b: 28.
Callianassa eiseni; Holthuis, 1954a: 12-15, fig. 3; Holthuis, 1954c: 160; Bott, 1955: 47, fig. 6a-g.
Lepidophthalmus bocourti; Manning & Felder, 1991: 778; Lemaitre & León, 1992: 44; Lemaitre & Ramos, 1992: 349, fig. 4; Hendrickx, 1995: 390.

Material examined.— SMF 2183, 1 ♂ (TL 85 CL 19), mouth of Rio Banderas, El Salvador, leg. A. Seilacher; SMF 2186, 1 ♂ (TL ca. 51, CL 12.5), 1 ♀ (TL 74, CL 16), Estero near La Playa de las Flores, near La Libertad, El Salvador, 18.ix.1952, leg. O. Schuster; SMF 4958, 1 ♀ (TL 65.0, CL 13.5), Guatemala, 1905, leg. C. Fleischmann, don. Konsul C. Fleis.

Remarks.— The male Plp2 endopod bears the appendix masculina fused with the appendix interna with hooks distally (fig. 14c-d). Holthuis (1954a: 15) briefly mentioned that "The second pleopods have the endopod with an appendix interna, which bears minute curved hooks." As observed on the present male specimen, the appendix masculina is obviously developed with some long setae distally, of which the lateral side is slightly swollen and has the appendix interna with minute hooks. It is observed here that the Mxp3 bears a rudimentary exopod.

Type locality.— San Jos del Cabo, Lower California.

Distribution.— Eastern Pacific from San Jos del Cabo, Baja California, Mexico and El Salvador to Colombia, intertidal (Lemaitre & Ramos, 1992).

Indo-West Pacific species

Key to the species of the genus *Lepidophthalmus* in the Indo-West Pacific:

1. Frontal margin of carapace with simple rostrum. Telson truncate or largely convex posteriorly ..... ***L. rosae***
- Frontal margin of carapace trispinose. Telson convex posteriorly 2
2. P1 carpus spinous on distodorsal and distoventral angles ..... ***L. grandidieri***
- P1 carpus unarmed on distodorsal and distoventral angle ..... ***L. tridentatus***

Lepidophthalmus grandidieri (Coutière , 1899)

Callianassa Grandidieri Coutière, 1899: 285, figs. 1-5.
Callianassa (Callichirus) Grandidieri; Borradaile, 1903: 547; De Man, 1928b: 28, 92, 110.

Remarks.— The details are unknown. Though the existence of a Mxp3 exopod, and the characteristics of the male Plp1-2 are not confirmed, this species is placed in *Lepidophthalmus* because the A1 peduncle is longer than A2 peduncle, Mxp3 propodus is subquadrate, and the front of the carapace is armed with a pair of lateral teeth.

This species is similar to *L. tridentatus* and *L. sinuensis* because of the trispinose rostrum, and to *L. tridentatus* also in bearing bearing a sharp posteroventral hook on the merus of the male larger cheliped.

Type locality.— River Mahanara, Northeast coast of Madagascar.

Distribution.— River Mahanara, northeast coast of Madagascar.

Lepidophthalmus rosae (Nobili, 1904)
(fig. 14g-h)

Callianassa (Callichirus) Rosae Nobili, 1904: 237; Nobili, 1906b: 101, 108, pl. 7 fig. 2; De Man, 1928b: 29, 110; Balss, 1933: 88.

Material examined.— RMNH D 27612, 1 ♂ (TL 32.0, CL 8.4), Tuléar, SW Madagascar, muddy sand, leg. M. Pichon, don. 1970, B. Thomassin; SMF 4956, 1 ♂ (TL 58, CL 14), Red Sea, 1826, leg. E. Rüppell; ZMB 23612, 1 ♂, 1 ♀ (abdominal somite 3 to tail fan missing), Ekas-Bay, Lombok, Indonesia, Sunda Exp. (det. Rensch).

Diagnosis.— A1 peduncle very long, longer than A2 peduncle. Mxp3 with rudimentary exopod. Male Plp1 chelate in distal segment. Male Plp2 biramous, endopod with appendix masculina bearing few long setae distally, attached to appendix interna bearing hooks (fig. 14g-h). Telson with broadly rounded posterior margin.

Type locality.— Red Sea.

Distributions.— Madagascar; Red Sea; Lombok, Indonesia.

Lepidophthalmus tridentatus (von Martens, 1869)
(fig. 14e-f)

Callianassa tridentata von Martens, 1869: 614; A. Milne Edwards, 1870: 94, 101.
Callianassa (Callichirus) tridentata; Borradaile, 1903: 547; De Man, 1928a: 27, pl. 7, fig. 13-13h; De Man, 1928b: 30, 93, 110, 171, 175; Sakai, 1970b: 393, figs. 1-3.

Material examined.— RMNH D 12008, 2 ♂♂ (TL 86.0, CL 18.0; TL 88.0, CL 18.0), S. Colombo, Sri Lanka, from muddy sand on banks of an artificial canal, ix.1957, leg. P. Kirtisinghe, don. R. Gooding.

Diagnosis.— Mxp3 with rudimentary exopod. Male Plp2 endopod with appendix masculina distally attached to finger-like appendix interna with hooks (fig. 14e-f).

Type locality.— Java, Indonesia.

Distribution.— Java, Indonesia; Sri Lanka (De Man, 1928b).

Genus *Glypturus* Stimpson, 1866

Glypturus Stimpson, 1866: 46; Borradaile, 1903: 548; Boone, 1927: 85; Sakai, 1988: 61; Manning, 1987: 390, 398; Manning & Felder, 1991: 778; Poore, 1994: 102.
Corallianassa Manning, 1987: 392, 397; Manning & Felder, 1991(part): 776, figs. 1, 2, 5; Poore, 1994: 102.
Corallichirus Manning, 1992: 571; Poore, 1994: 102.

Definition.— Carapace with dorsal oval; frontal margin with rostral spine and pair of anterolateral spines usually separated from front by noncalcified membrane. Telson broader than long. A1 peduncle not longer and stouter than A2 peduncle. Mxp3 without exopod, ischium-merus subquadrate; propodus subquadrate; dactylus narrow, digitiform. P1 unequal. Male larger cheliped without meral hook. Male Plp 1 uniramous, two-segmented, distal segment chelate distally. Male Plp2 biramous, endopod with appendix masculina and appendix interna. Female Plp1 uniramous. Female Plp2 biramous, with appendix interna; Plp3-5 foliaceous with appendices internae in both sexes. Uropodal endopod distinctly longer than broad and narrow or broad lanceolate in form. Uropodal exopod largely bent posteriorly in distal half.

Remarks.— Manning (1987) redefined *Glypturus* (type species, *G. acanthochirus*) as: "front trispinous, with the rostral spine upturned and the lateral spines separated from the front by a noncalcified membrane; the eyes with a small, lateral cornea; and the chelipeds in which the merus and palm of both the major and minor chelae are provided with dorsal spines."

The characters used to define *Glypturus* are not always unique to the genus (see the remarks of *G. acanthochirus*). The spinulous character of the chelipeds is also found in *Neocallichirus motupore*; in *N. motupore*, the merus and chela of the larger cheliped are armed with spines, however, the pair of anterolateral spines on the front of the carapace do not have a noncalcified area, and the uropodal endopod is broadened as in *Neocallichirus mucronatus*. The Hawaiian species, *Callianassa articulata, C. lanceolata*, and *C. winslowi* have anterolateral spines on the front, but are not assigned to *Glypturus*, but to *Neocallichirus* because there is no noncalcified area at their base, though the uropodal endopod is tapering distally as in the members of *Glypturus*.

Type species of *Glypturus*: *Glypturus acanthochirus* Stimpson, 1866: 46, by monotypy. Gender masculine.

The genus *Corallianassa* is based on the type species, *Callianassa longiventris* A. Milne Edwards, 1870. Manning & Felder (1991) mentioned that *Callianassa longiventris* is very similar to the type species of *Glypturus, G. acanthochirus* Stimpson, 1866, in having three strong anterior spines on the carapace, and a subquadrate propodus of Mxp3, however, the morphological differences between two type species depend only on whether the merus and the palm of the chelipeds lack dorsal spines as in *Callianassa longiventris*, or do show such spines as in *G. acanthochirus*. The subglobular cornea is much larger in *C. longiventris* than in *G. acanthochirus*. As a result, *Corallianassa* is treated as a junior synonym of *Glypturus*. Type species: *Callianassa longiventris* A. Milne Edwards, 1870, by original designation. Gender femine.

Manning (1992: 571) established the genus *Corallichirus*, and separated it from *Corallianassa* by the length of the second abdominal somite. However, as I can find no other differences between the two genera, *Corallichirus* is here treated as a synonym of

Corallianassa, and thus of *Glypturus*. Type species: *Corallianassa xutha* Manning, 1988, by original designation. Gender femine.

Eastern Atlantic species

Glypturus intesi (De Saint Laurent & Le Loeuff, 1979)

Callichirus Intesi De Saint Laurent & Le Loeuff, 1979: 69, figs. 14g, 16c, 17b, 18b, 19b, 21a-c, 23 j-m.

Remarks.— This species has a sharp rostrum; the carapace has a pair of anterolateral spines with a noncalcified membrane basally, and the uropodal endopod is tapering in its distal half (De Saint Laurent & Le Loeuff, 1979).

Type locality.— Port Dakar, Senegal.

Distribution.— Goree and Dakar, Senegal.

Western Atlantic species

Key to the species of the genus *Glypturus* in the western Atlantic:

1. Telson convex entirely on posterior margin; carpus and chela of major cheliped with marginal spines ..... ***G. acanthochirus***
- Telson concave with median convexity 2
2. Eyestalks with distal protrusion ..... ***G. longiventris***
- Eyestalks without distal protrusion ..... ***G. hartmeyeri***

Glypturus acanthochirus Stimpson, 1866
(fig. 14i)

Glypturus acanthochirus Stimpson, 1866: 46; Stimpson, 1871: 121; Kingsley, 1899: 821 (footnote); De Man, 1928b: 19, 25, 180; Manning, 1987 (part): 390, 398, fig. 3, (not figs. 4, 5 = *G. armata*. Fig 4 after A. Milne Edwards, 1870; fig. 5 after Kensley, 1975); Poore & Suchanek, 1988: 201, fig. 4d; Manning & Felder, 1991: 778, figs. 2, 4; Dworschak, 1992: 209; Dworschak & Ott, 1993: 282.

? *Glypturus acanthochirus*; Schmidt, 1924: 93.

Callianassa (*Callichirus*) *acanthochirus*; Schmitt, 1935b: 4, 20, pl. 1, fig. 6, pl. 2, fig. 5, pl. 3, fig. 4, pl. 4, fig. 6; Heard, 1979: 52.

Callianassa acanthochirus; Gurney, 1944: 84; Biffar, 1971a: 651, 653, 655, figs. 3, 4; Heard, 1979: 52, fig. 1; Rabalais, Holt & Flint, 1981: 103, fig. 3.

Callichirus acanthochirus; De Saint Laurent & Le Loeuff, 1979: 96.

Material examined.— RMNH D 31083, 1 ovig. ♀ (TL 19.0, CL 4.0), Caribbean coast of Colombia, 13-11 m depth, (8°21.6'N 76°47.6'W - 8°25.2'N 76°48.4'W), Otter trawl, 12.vii.1966, Pillsbury sta. 358; SMF 23507, 1 ♂, Santa Marta, Depto. Magdalena, Colombia, 10 m, sand, iii.1980, leg. B. Werding; SMF 23508, 1 ♀, Key Largo, Florida Bay, Florida, sta. FB-24, 2.2 m, from galleries in abt. 40 cm sediment depth, 16.v.1971, leg. J. Doerjes.

Remarks.— Manning (1987: 392) considered *Callianassa armata* from the Indo-Pacific region to be a synonym of the present species from Florida Keys. In the pre-

sent study the small female specimen from Ternate described as *Callianassa armata* by De Man (1902: 754), was compared with the small female specimen of *G. acanthochirus* from the Caribbean coast of Colombia (RMNH D 31083). It is observed that both specimens from Ternate and the Caribbean Sea are the same in the forms of the rostrum, the pair of anterolateral spines of carapace above the antenna, which is separated from the front by the noncalcified membrane (fig. 14i), the uropods, P3 propodus, and P1 merus bearing a single spine on both dorsal and ventral margins. However the Indo-Pacific specimen is clearly different from the Atlantic one; on the Caribbean female the telson bears a median spine on the posterior margin, and the lateral margin is rounded proximally, while on the Ternate female the telson bears no median spine on the posterior margin, and the lateral margin bears a proximal convexity, and the uropods are not as long as in the Caribbean female.

Abalais et al. (1981: 103) noticed that the telson is armed with an acute median posterior spine which is a characteristic of juveniles, however the telson of the largest specimen is also spined in the Atlantic specimen.

Type locality.— Florida Keys.

Distribution.— Atlantic coast of Florida, Gulf of Mexico, West Indies (Dry Tortugas; Puerto Rico; Jamaica; Barbados; Antigua); Caribbean coast of Colombia and Venezuela.

Glypturus hartmeyeri (Schmitt, 1935)

Glypturus grandimanus; Balss, 1924: 179, figs. 3, 4; Schmitt, 1935b: 4; Biffar, 1971a: 640, 649; Manning, 1987: 399. [Not *Callianassa grandimana* Gibbes, 1850].

Callianassa (*Callichirus*) *hartmeyeri* Schmitt, 1935b: 3, 4. [Replacement name for *Glypturus grandimanus* sensu Balss, 1924].

Callianassa hartmeyeri; Biffar, 1971a: 640, 641, 649, 651, 653; Manning, 1987: 388, 399.

Callichirus sp. aff. *placidus*; De Saint Laurent & Le Loeuff, 1979: 97.

Corallianassa hartmeyeri; Manning, 1988: 884, figs. 1, 2; Manning & Chace, 1990: 34, figs. 18, 19; Manning & Felder, 1991: 777.

Corallichirus hartmeyeri; Manning, 1992: 571.

Type locality.— Kingston [Kingston Habor, 17°57'N 76°47'W], Jamaica,

Distribution.— Jamaica, Caribbean Sea and Ascension, South Atlantic.

Glypturus longiventris (A. Milne Edwards, 1870)

Callianassa longiventris A. Milne Edwards, 1870: 92, 101; De Man, 1928a: 24, figs. 12a-h; Gurney, 1944: 85, figs. 1,2; Biffar, 1971a: 651, 653, 685, figs. 13-14; Chace et al., 1986: 334, pl. 110.

Callianassa (*Callichirus*) *longiventris*; Borradaile, 1903: 547; De Man, 1928b: 19, 29 (list), 94, 108 (key); Schmitt, 1935b: 4, 17, pl. 1, fig. 4, pl. 2, fig. 3, pl. 3, fig. 3, pl. 4, fig. 3.

Callichirus longiventris; De Saint Laurent & Le Loeuff, 1979: 97.

Corallianassa longiventris; Manning, 1987: 392, 397, fig. 6; Manning & Felder, 1991: 777; Dworschak, 1992: 214; Dworschak & Ott, 1993: 281.

Not ? *Callianassa longiventris* Borradaile, 1904: 752, pl. 58, figs. 2a, 2b (=*Glypturus coutierei* (Nobili, 1904)).

Material examined.— SMF 23509, 1 ♀, Bahia Gairaca ca. 20 km NE Santa Marta, Depto. Magdalena, Colombia, 2 m, muddy sand, 16.iv.1980; SMF 23510, 2 ♂♂, 2 ♀♀, Bahia Gairaca ca. 20 km NE Santa Marta, Depto. Magdalena, Colombia, 22.x.1978, leg. M. Türkay; SMF 23511, 1 ♀, Santa Marta, Depto. Magdalena, Colombia, 10-15 m, sand, refuse of a dredging boat, 08.v.1979, leg. B. Werding.

Remarks.— De Man (1928a: 24-25) mentioned that "...separated from them (= prominences) by a not calcified strip of the integument".

Type locality.— Martinique.

Distribution.— Bermuda; Carrie Bow Cay; Southeastern Florida; Belize; Caribbean Sea (Jamaica, Martinique; Virgin I).

Eastern Pacific species

Glypturus xuthus (Manning, 1988)

Callianassa hartmeyeri; Hult, 1938: 7, figs. 1-4, pl. 1; Schmitt, 1939: 15. [Not *Callianassa hartmeyeri* Schmitt, 1935].
Callianassa (Callichirus) placida; Chace, 1962: 617 (part). [Not *Callianassa placida* De Man, 1905].
Callianassa placida; Hermádrz Aguilera et al., 1986: 206. [Not *Callianassa placida* De Man, 1905]
Corallianassa xutha Manning, 1988: 885, fig. 3; Manning & Felder, 1991: 777, figs. 1, 2, 5; Lemaitre & León, 1992: 44; Lemaitre & Ramos, 1992: 347; Hendrickx, 1995: 390.
Corallichirus xuthus; Manning, 1992: 571, figs. 1-2.

Material examined.— SMNH 4283 1 ♂, paratype, Indefatigable Island, Academy Bay, Galapagos Island, lagoon, in sand at low tide, leg. 09.viii.1934, R. Blomberg (det. R.B. Manning).

Type locality.— Clipperton Island (10°18'N 106° 33'W).

Distribution.— Eastern Pacific: Mara Madre Island, Baja California, 7-18 m; Clipperton Island; Port Utria, Colombia; Indefatigable Island, Galapagos Islands, lagoon.

Indo-West Pacific species

Key to species of the genus *Glypturus* in the Indo-West Pacific:

1. Uropodal endopod broad, reaching beyond uropodal exopod. Telson convex laterally, concave posteriorly ..... ***G. articulatus***
- Uropodal endopod broad or narrow, shorter than uropodal exopod. Telson convergent laterally, convex posteriorly 2
2. A1 peduncle reaching distal margin of A2 terminal segment ..... ***G. haswelli***
- A1 peduncle reaching middle of A2 terminal segment 3
3. Rostrum upturened distally ..... ***G. lanceolatus***
- Rostrum directed fowrard 4
4. Chelipeds bearing marginal spines ..... ***G. armatus***
- Chelipeds unarmed with marginal spines 5
5. Telson semicircular on posterior margin 6
-. Telson trapezoid-shape, truncate posteriorly 7
6. Semicircular posterior margin of telson with median denticle ..... ***G. winslowi***
-. Semicircular posterior margin of telson unarmed ..... ***G. assimilis***
7. Ischium of larger and smaller chelipeds with row of sharp spines. Uropodal endopod slightly shotter than uropodal exopod ..... ***G. coutieri***
- Ischium of larger cheliped with row of obtuse spines, that of smaller cheliped unarmed. Uropodal endopod distinctly shorter than uropodal exopod ... ***G. martensi***

Glypturus armatus (A. Milne Edwards, 1870)

Callianassa armata A. Milne Edwards, 1870: 90, 101, pl. 1; De Man, 1902: 754; Kensley, 1975: 48, fig. 1A-H; Manning, 1987: 392 (part).
Callianassa (Callichirus) armata; Borradaile, 1903: 547; De Man, 1928b: 28, 93, 109.
Callichirus laurae De Saint Laurent (in Vaugelas & De Saint Laurent), 1984: 147, pl. 1 figs. A-D. [Type locality: Gulf of Aqaba, Red Sea].
Glypturus armatus; Poore & Suchanek, 1988: 201, fig. 4b.
Glypturus laurae; Poore & Suchanek, 1988: 201, fig. 4c; Dworschak, 1992: 209.

Material examined.— RMNH D 4779, 1 ♂ (TL 105.0, CL 24.0), don. Zool. Lab. Utrecht, locality unknown; ZMH-K 38200, 1 ♂, from Museum Godeffroy 897, Southern Pacific; ZMH K 38198, 1 ♂, Djibouti, Gulf of Aden, leg. E. Warke; SMF 4955, 1 ♀ (TL 28.0, CL 7.5), Ternate, Molucca islands, Indonesia, 1894, leg. W. Kükenthal; MNHN-Th 649, Paratype of *Callichirus laurae*, 1 ♂,(TL 104.0, CL. 26.0.), Gulf of Aquaba, 2 m, 06.ii.1983, leg, J. de Vaugelas.

Remarks.— The large male specimen from unknown locality (RMNH D 4779) is determined as *G. armatus*, because the telson bears no median spine on the posterior margin. The male Plp2 is armed with a thick appendix masculina with a slender appendix interna. The small female specimen (SMF 4955) is probably juvenile, because Plp1 is absent, and Plp2 endopod with an appendix interna.

The paratype of *Callichirus laurae* was compared with the present species, and the two species are found to be synonymous.

Poore & Suchanek (1988) established the species *G. motupore*. I doubt whether this species is a junior synonym of the present species. The number of granules on the propodus of the larger cheliped, the shapes of the telson, rostrum, and the eyestalks in *G. motupore* are very similar to those of *G. armatus*. This species is presently classified as a member of the genus *Neocallichirus*, because the anterolateral spines of the carapace are described as it being fixed with the carapace, and not articulating (Poore & Suchanek, 1988: 198).

Type locality.— Fiji.

Distribution.— Mataiva, Tuamotu Arch.; Mauritius; Ternate, Indonesia; Fiji (Kensley, 1975); Djibouti, Gulf of Aden; Aquaba, Red Sea, 5 to 45 m (Dworschak, 1992).

Glypturus articulatus (Rathbun, 1906)
(fig. 15a-f)

Callianassa articulata Rathbun, 1906: 892, fig. 47; Chilton, 1911: 551.
Callianassa (Callichirus) articulata; De Man, 1928b: 28, 94, 108; Edmondson, 1944: 54, fig. 9a-j.
Corallianassa articulata; Dworschak, 1992: 210, fig. 14a-e.

Material examined.— SMNH 16226, 1 ♂ (TL 22.0, CL 4.5), Apamama, Gilbert Island, outer reef, lithoral, 01.xii.1917, leg. S. Bock.

Diagnosis.— Rostrum (fig. 15a) sharply pointed, failing to reach distal end of eyestalks, with transverse non-calcified area at proximal part. Anterolateral spines sharp, transparent over whole length. Eyestalks rounded distally, cornea large, occupying

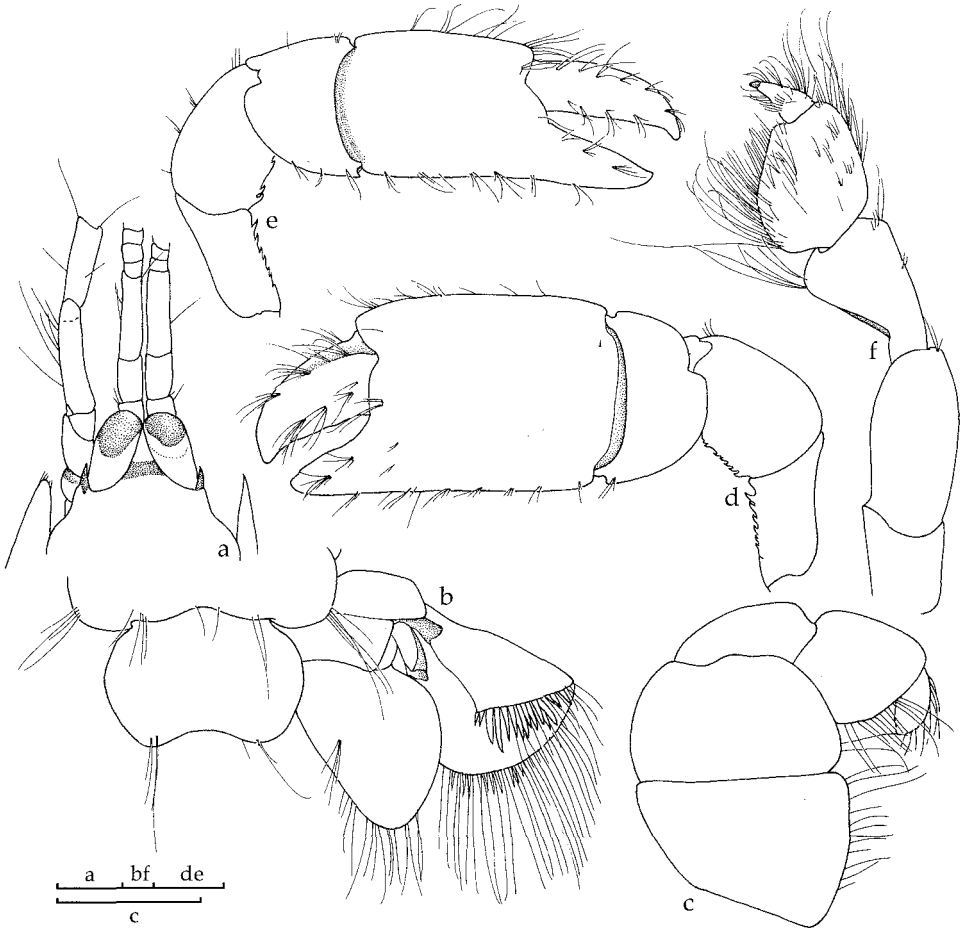

Fig. 15. *Glypturus articulatus* (Rathbun, 1906), SMNH 16226, 1 ♂, Gilbert Isl. a, Anterior part of carapace, eyestalks and A1-2 peduncles; b, telson and uropod; c, Mxp3, lateral view; d, male larger cheliped; e, male smaller cheliped; f, P3, lateral view. Scale = 1 mm.

its distal half. Telson (fig. 15b) broader than long, posterior margin largely concave. Mxp3 (fig. 15c) ischium-merus oval; propodus about as long as broad, largely rounded on ventral margin; dactylus digitiform. P1 (fig. 15d-e) unequal. Ischium of larger cheliped with row of spines on ventral margin; merus about as long as ischium, with row of spines on ventral margin; carpus broadened; chela about five times as long as carpus; dactylus 0.3 times as long as palm. Smaller cheliped sub-similar to larger one in shape; dactylus about as long as palm; ischium and merus with row of spines on ventral margin. P3 (fig. 15f) propodus about as long as broad, reduced in breadth distally. Uropodal endopod (fig. 15b) triangular, much longer than telson. Uropodal exopod rounded distally.

Remarks.— The type specimen was not accessible, however the specimen preserved in the Swedish Natural History Museum is identified as belonging to the pre-

sent species by the following characteristics: the anterolateral spines of the carapace are articulated at base; the telson is much broader than long, concave; the ischium and merus of the chelipeds are spined ventrally.

Type locality.— Vicinity of Modu Manu, Hawaii, 23-33 fathoms.

Distribution.— Honolulu, Oahu, Hawaii; Kermadec Islands (De Man, 1928b); Gilbert Island.

Glypturus assimilis (De Man, 1928b)
(fig. 16a-f)

Callianassa Martensi; De Man, 1888: 482-483, pl. 21, fig. 1. [Not *Callianassa martensi* Miers, 1884].
Callianassa (*Callichirus*) *assimilis* De Man, 1928b: 28, 109.

Material examined.— ZMG 842, 1 ♀ (TL 30.0, CL 5.9), lectotype, Ambon, Molucca, Indonesia, vii.1885-ix.1885, leg. J. Brock (det. De Man, 1888 as *Callianassa* cf. *martensi* Miers, 1884); ZMG 388, 2 ♀♀ (TL 34.0, CL 7.2; TL 40.0, CL 8.3), paralectotypes, Ambon, Molucca, Indonesia, vii.1885-ix.1885, leg. J. Brock. (det. De Man, 1888 as *Callianassa martensi* Miers, 1884); SMNH 16227, 1 ovig. ♀, 1 ♀, Aranuka, Gilbert Island lagoone, coral, sand, 20.x.1917, leg. S. Bock.

Diagnosis.— Rostrum (fig. 16a) sharply triangular; anterolateral spines of carapace with non-calcified area proximally. Eyestalks produced distally. A1 peduncle shorter than A2 peduncle. Abdominal somite 6 (fig. 16b) slightly longer than broad. Telson broader than long, broadly rounded distally. Mxp3 (fig. 16c) ischium-merus pediform; merus truncate distally; propodus subquadrate, longer than broad, rounded on ventral margin; dactylus slender, with setae distally. P1 unequal. Ischium of larger cheliped (fig. 16d) denticulate on ventral margin; merus slightly shorter than ischium, also with row of roughly arranged denticles ventrally; chela stout, three times as long as carpus, palm unarmed on anterior margin; dactylus about as long as palm, cutting edge shallowly concave in distal half. Ischium of smaller cheliped (fig. 16e) with row of denticles ventrally; chela twice as long as carpus; dactylus slender, longer than palm. P3 (fig. 16f) propodus twice as long as broad, posterior lobe parallel with ventral margin of carpus.

Remarks.— The type specimens are designated here as lectotype and paralectotypes. One male and two female specimens of *Callianassa martensi* described by De Man (1888: 482) were named by himself as *Callianassa* (*Callichirus*) *assimilis* (1928b: 109), however the three specimens (ZMG 388) preserved in the Senckenberg Museum are all females.

Type locality.— Ambon, Indonesia.

Distribution.— Ambon, Indonesia; Gilbert Island

Glypturus coutierei (Nobili, 1904)
(figs. 17a-f, 18a-d)

Callianassa (*Callichirus*) *Coutierei* Nobili, 1904: 237; Nobili, 1906a: 60; Nobili, 1906b: 101, 110, pl. 7, fig. 1; De Man, 1928b: 28, 109, 174, 179.

? *Callianassa* (*Callichirus*) *longiventris*; Borradaile, 1904: 752, pl. 58, fig. 2. [Type locality: Hulule, Male Atoll, Maldives]. [Not *Callianassa longiventris* A. Milne Edwards, 1870].

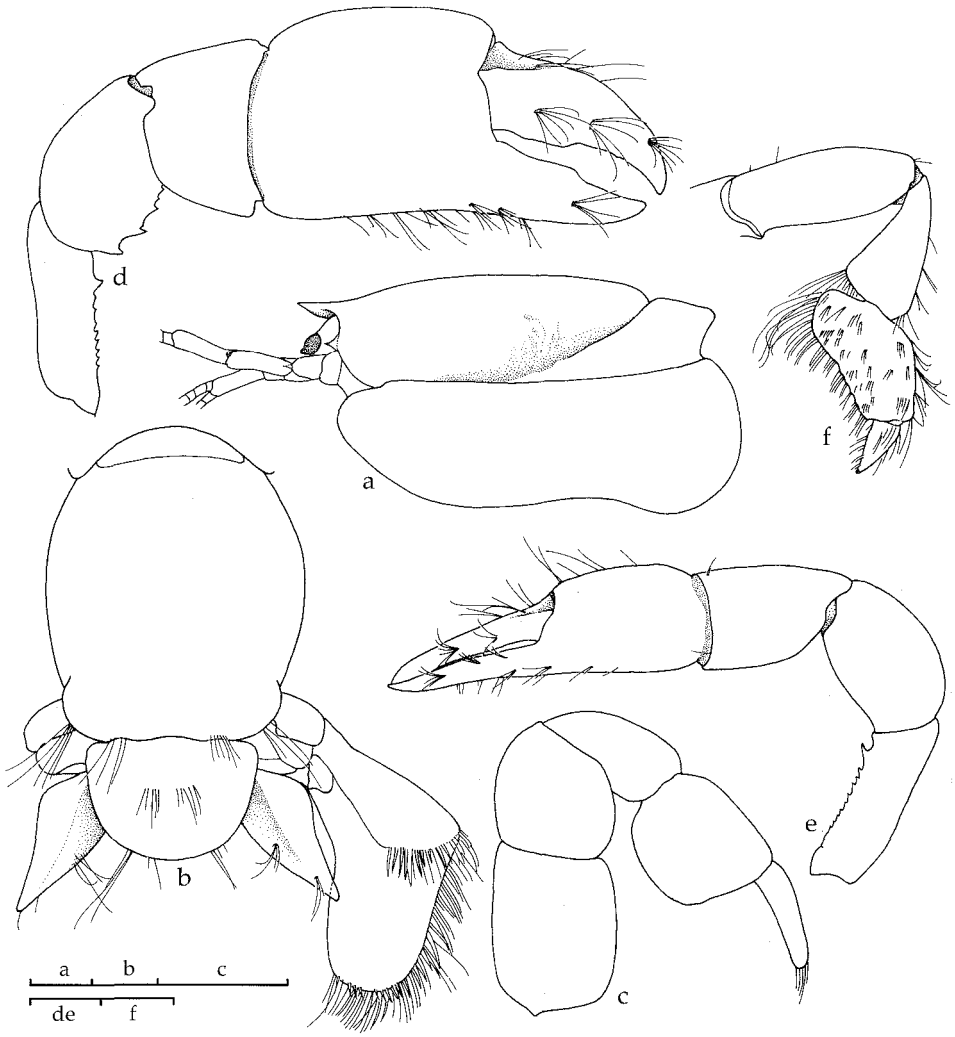

Fig. 16. *Glypturus assimilis* (De Man, 1928b), SMNH 16227, 1 ovig. ♀, Aranuka, Gilbert Isl. a, Carapace, lateral view; b, abdominal somite 6 and tail-fan; c, Mxp3, lateral view; d, female larger cheliped; e, female smaller cheliped; f, P3, lateral view. Scale = 1 mm.

Callianassa placida De Man, 1905: 612; Hernandez Aguilera et al., 1986: 206. [Type locality: off Laiwui, coast of Obi Major, Indonesia].

Callianassa (*Challichirus*) *longiventris* var. *borradailei* De Man, 1928a: 27; De Man, 1928b: 29, 108. [Type locality: Goidu, Goifurfehendu Atoll, Maldive Archipelago].

Callianassa (*Callichirus*) *placida*; De Man, 1928b: 29, 93, 108, 171, pl. 18, fig. 29-29b, pl. 19, fig. 29c-e; Chace, 1962: 617.

Callianassa (*Callichirus*) *borradailei*; Ward, 1942: 62.

Callianassa (*Callichirus*) *oahuensis* Edmondson, 1944: 56, fig. 10a-h. [Type locality: Hanauma Bay, Oahu].

Corallianassa borradailei; Manning, 1987: 394, figs. 7, 8; Manning, 1992: fig. 1a.

Corallichirus placidus; Manning, 1992: 571.

Material examined.—RMNH D 27620, 1 ♂ (TL 57.0, CL 12.4), Tuléar, SW Madagascar, 25.viii.1965, leg. B. Thomassin; RMNH D 35811, 2 ♀♀ (CL 7.0, without telson; TL 22.0, CL 5.4), Sissie by Misool, Indonesia, sand bank, Snellius Exp., 1929-1930, 06.x.1929 (det. De Saint Laurent as *Callichirus placida*); ZMA 102.440, paralectotype, 1 ♀ (Siboga Exp. sta. 58, not male as De Man, 1928b: 171)(TL 30.5, CL 6.8), Suba, Anchorage off Seba, Indonesia, Sigoba Exp. sta. 58, 25.iv.1899; lectotype, 1 ♂ (Siboga Exp. sta. 142, not female as De Man, 1928b: 171)(TL 20.0 CL 4.0), Coast of Obi Major, Anchorage off Laivwui, Siboga Exp. sta. 142, 5-7, viii.1899 (det. De Man); ZMG 841, 1 ♀, Zamboanga or Bohol, Mindanao, Philippines, 1863-1864, leg. C. Semper; ZMH-K 8430, 1 ♂, Tahiti, leg. A. Garrett, Museum Godeffroy Cat. No 16192; MNHNP-Th 75, 1 ♂ (CL 10.8), lectotype of *Callianassa coutierei*, Djibouti (Ngoc-Ho in litt.); SMNH 16228, 1 ♂, 1 ovig. ♀, Aranuka, Gilbert Isl., lagoone, reef, 01.x.1917, leg. S. Bock.

Deacription of male lectotype.— Rostrum (fig. 17a) sharply triangular, reaching about midline of eyestalks. Eyestalks calcified, with obtuse distomedian projection, cornea large, rounded, distally located, occupying less than distal half of eyestalks. A1 peduncle overreaches proximal part of A2 distal segment. Anterolateral spines of carapace above antenna non-calcified membrane proximally. Abdominal somite 2 1.3 times as long as abdominal somite 1 or 6. Telson (fig. 17b) broader than long, truncate

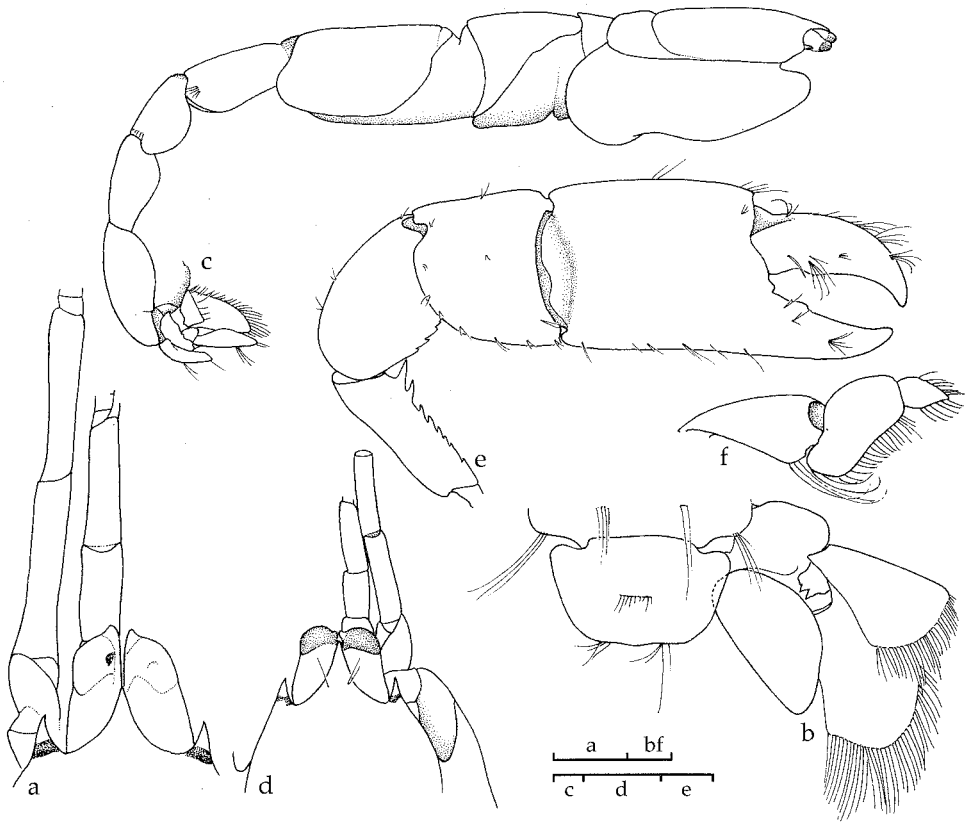

Fig. 17. *Glypturus coutierei* (Nobili, 1904). a, d, Anterior part of carapace, eyestalks and A1-2 peduncles; b, telson and uropod; c, body, lateral view; e, female larger cheliped; f, distal segments of P3. a, b & f, MNHNP-Th 75, 1 ♂, lectotype, Djibouti; c-e, ZMA 102.440, 1 ♀, lectotype of *Callianassa placida*, Sta. 58 (not male as in De Man, 1928b: 171), Suba, Anchorage off Seba, Indonesia. Scale = 1 mm.

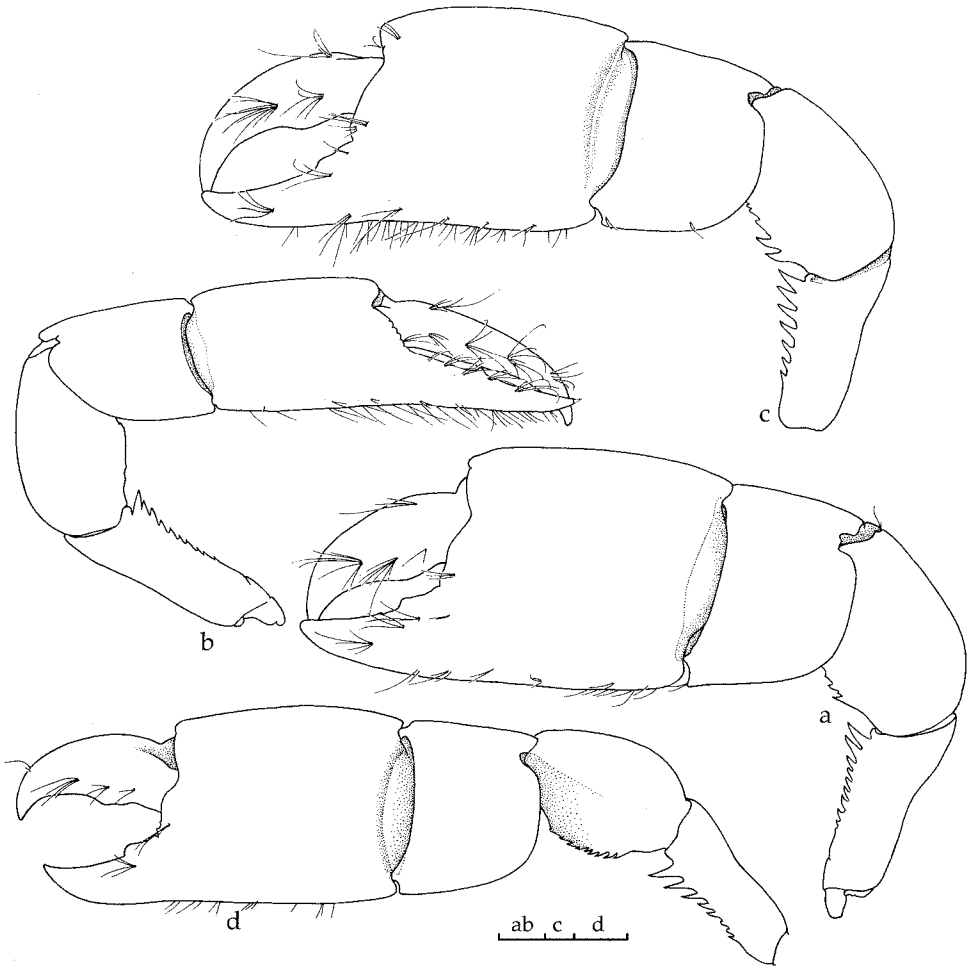

Fig. 18. *Glypturus coutierei* (Nobili, 1904) a, c, Male larger cheliped; b, male smaller cheliped; d, female larger cheliped. a-b, MNHNP-Th 75, 1 ♂, lectotype, Djibouti; c, ZMH-K 8430, 1 ♂, Tahiti; d, RMNH D 35811, 1 ♀, Sissie by Misool, Indonesia. Scale = 1 mm.

entirely on posterior margin. P1 unequal. Ischium of larger cheliped with series of sharp teeth ventrally; merus about as long as ischium, armed with row of rough teeth ventrally; carpus about 0.7 times as long as merus, about as broad as length of merus; chela about three times as long as carpus; palm two times as long as carpus on dorsal margin; fixed finger with triangular tooth at proximal one-third of cutting edge; dactylus 0.8 times as long as propodus, cutting edge sinuate (fig. 18a). Smaller cheliped (fig. 18b) with ischium and merus as in larger cheliped, carpus however, about as broad as merus; chela 2.5 times as long as carpus; distal margin of palm armed with denticles. P3 propodus with short posterior lobe (fig. 17f). Uropodal endopod broad and lanceolate, rounded distally, with median carina. Uropodal exopod with spine on proximal article.

Remarks.— The type specimen of *Callianassa* (*Callichirus*) *longiventris* var. *borradailei* De Man, 1928a, was not examined. The figure of the larger cheliped (Borradaile, 1904, pl. 58, fig. 2b), shows that the specimens are males. The row of spines on the ventral margins of ischium-merus of the larger cheliped is probably the same in form (figs. 18a, c-d) as that in *G. placidus*, though the type of *G. placidus* (figs. 17c-e) is small in size, and probably a female, males are unknown.

Manning (1987: 396) also considered *G. coutieri* to be synonymous with *Coralliannassa borradailei* by the features of the eyes, the three-spined front, and the relative lengths of the abdominal somites. The eyestalks of the type specimens of *G. coutieri* are slightly longer than these of the lectotype of *G. placidus* (fig. 17d).

The types of *Callianassa placida* (De Man 1928b: 171) are both females, the smaller from sta. 58, off Seba, Savu and the larger from sta. 142, off Laiwui, coast of Obi Major. Therefor the only mistake De Man made is that he thought the smaller one to be a male. There is no small male from Sta. 142, as far as I can see. He (1905: 612) mentioned that *Callianassa placida* is similar to *C. mucronata* Strahl, 1862, and cited erroneously (De Man, 1928b: 108, 171) that abdominal somites 2 and 6 are almost of equal length. However the present examination of the two types from sta. 58 (not male but female) and sta. 142 (female) reveals that the abdominal somite 2 is about 1.3 times longer than abdominal somite 6 or 1. This character is the same as that shown in *G. coutierei* (fig. 18c).

The large female shows that Plp1 consists of two segments. The female Plp2 is biramous, the endopod bears a slender appendix interna near the distal end. The small female also has the Plp1 two-segmented, the distal segment bears a rather sharp-pointed, hooked tooth. The Plp2 is also biramous, the endopod bears no appendix interna.

Type locality.— Djibouti.

Distribution.— Hawaii (Hanauma Bay, Oahu); Mindanao, Philippines; Tahiti; Fiji Island; Goidu, Goifurfehendu Atoll, Maldive Archipelago; Indonesia (Off Seba, Savu; Off Laiwui, coast of Obi Major); Gulf of Aden (Perim; Djibouti, Aden); Tuléar, SW Madagascar.

Glypturus haswelli (Poore & Griffin, 1979)

Callianassa haswelli Poore & Griffin, 1979: 263, figs. 26, 27.

Remarks.— It is uncertain in this species whether or not the male Plp2 has an appendix interna which makes placement in the genus *Glypturus* uncertain. The frontal margin of the carapace, however, is provided with a rostral spine and a pair of anterolateral spines as in the type species, *C. longiventris* (A. Milne Edwards, 1870).

Manning (1987: 392) considered *Glypturus haswelli* to be synonymous with *Coralliannassa nakasonei* Sakai, 1967. The shapes of the female Plp1-2 however, are different between the species.

Type locality.— Whitsunday Group, Queensland, Australia.

Distribution.— Torres Strait; Queensland, Islands off North and central Queensland coast (Poore & Griffin, 1979).

Glypturus lanceolatus (Edmondson, 1944)

Callianassa (*Callichirus*) *lanceolata* Edmondson, 1944: 52, fig. 8a-i.

Remarks.— Only two females are known.
Type locality.— Hanauma Bay, Oahu, in a shallow water on the reef.
Distribution.— Oahu, Hawaii.

Glypturus martensi (Miers, 1884)
(fig. 19a-d)

Callianassa Martensi Miers, 1884: 13-15, pl. 1 fig. 1; Lanchester, 1900: 261, pl. 12 figs. 4, 4a; Nobili, 1906b: 111, fig. 7.
Callianassa (*Callichirus*) *Martensi*; Borradaile, 1903: 547; De Man, 1928b: 29, 109, 171.
Callianassa (*Callichirus*) *nakasonei* Sakai, 1967: 46, fig. 3; Sakai, 1987a: 306. [Type locality: east coast of Tonaki Island, Okinawa-group, Ryukyu Islands].
Callianassa (*Callichirus*) *martensi*; Tirmizi, 1974: 286, figs. 1-4.
Callichirus martensi; De Saint Laurent & Le Loeuff, 1979: 97.
Callianassa martensi; Sakai, 1984: 99, fig. 3; Dworschak, 1992: 200, fig. 8a-e.
Glypturus martensi; Sakai, 1988: 61.

Material examined.— NHML 1883.18, 1 ♂ (TL 52.0. CL 11.5), holotype, Mauritius.

Diagnosis of male holotype.— Rostrum (fig. 19a-b) sharply triangular; anterolat-

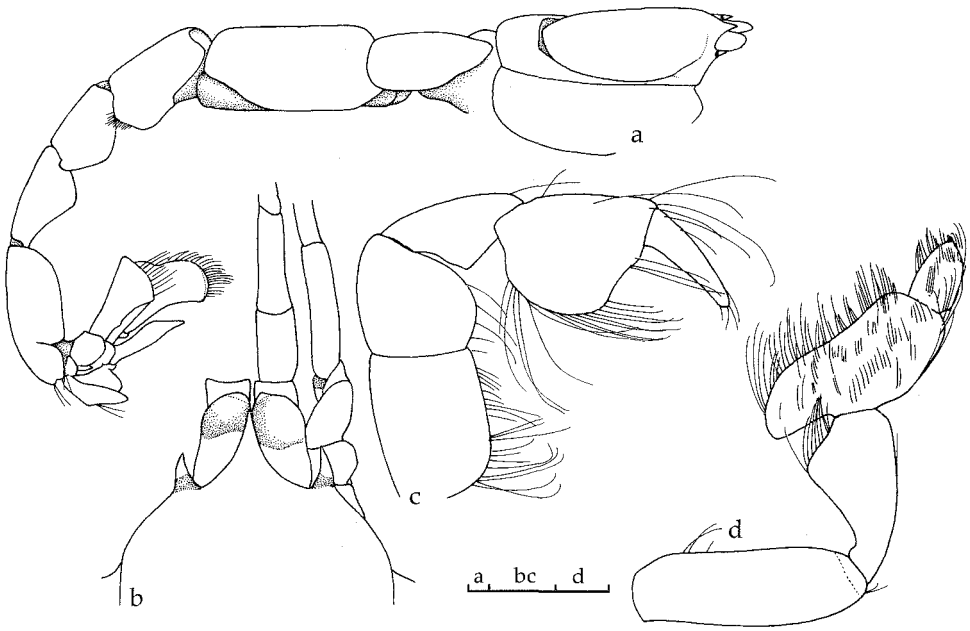

Fig. 19. *Glypturus martensi* (Miers, 1884), NHML 1883.18, 1 ♂, holotype, Mauritius. a, Body, lateral view; b, anterior part of carapace, eyestalks, and A1-2 peduncles; c, Mxp3, lateral view; d, P3, lateral view. Scale = 1mm.

eral spines sharp, with basal transparency. Abdominal somite 2 broader and longer than any other somites; somite 6 slightly longer than somite 2. Mxp3 (fig. 19c) ischium-merus pediform; propodus longer than broad, and rounded on ventral margin; dactylus slender, slightly shorter than propodus. P3 (fig. 19d) propodus twice as long as broad, with distinctive posterior lobe. Plp1 consists of two segments, distal segment chelate. Male Plp2 endopod without appendix interna.

The type specimen of *Callianassa nakasonei* was not accessible. This species bears the smaller female cheliped unarmed on the ventral margin of ischium, similar to that of *C martensi*, so that *C. nakasonei* is to be synonymized with the present species. Manning (1987: 392) treated *C. nakasonei* as a junior synonym of *G. laurae* (De Saint Laurent, 1984).

Type locality.— Mauritius.

Distribution.— East coast of Tonaki Island, Okinawa-group, Ryukyu Islands; Mauritius; Ambon, Indonesia; north and central Queensland, Australia; Sri Lanka; Belligom, West Pakistan.

Glypturus winslowi (Edmondson, 1944)

Callianassa (*Callichirus*) *winslowi* Edmondson, 1944: 59, fig. 11a-g.

Type locality.— Maui, Hawaii.

Distribution.— Maui, Hawaii.

Genus *Neocallichirus* Sakai, 1988

Neocallichirus Sakai, 1988: 61; Manning & Felder, 1991: 779 (part), figs. 1, 3, 4; Poore, 1994: 102.
Sergio Manning & Lemaitre, 1994: 40, fig. 1; Poore, 1994: 102.
Corallianassa Manning, 1987 (part): 392; Manning & Felder, 1991: 776.

Definition.— Carapace with dorsal oval; rostral spine present or not, and anterolateral spine without noncalified membrane proximally. Telson broader than long. A1 peduncle not longer and stouter than A2 peduncle. Mxp3 without exopod; ischium-merus subquadrate; propodus subquadrate; dactylus narrow, digitiform. P1 unequal. Male larger cheliped with or without meral hook. Male Plp 1 uniramous, two-segmented, distal segment chelate distally. Male Plp2 biramous, endopod with or without appendix masculina fused with appendix interna. Female Plp1 uniramous. Female Plp2 biramous, with or without appendix interna. Plp3-5 foliaceous, with appendices internae in both sexes. Uropodal endopod subquadrate, broadened distally, or slender, tapering distally.

Remarks.— *Neocallichirus* was established for the type species, *N. horneri*, from Australia, and defined by the male Plp2 endopod lacking both appendix masculina and appendix interna, the distal margin of the uropodal endopod being subquadrate, and truncate, and the posterior margin of the telson not being divided by an armed or unarmed median cleft into subtriangular or broadly rounded posterolateral lobes.

Recently, *N. cacahuate* Felder & Manning, 1995, from Florida, and *N. lemaitrei* Manning, 1993, from Colombia were included in the genus *Neocallichirus*. In these

two species it turned out that the appendix masculina is embedded with the appendix interna, that the uropodal endopod is subquadrate, and that the telson is convex on the posterior margin as in *Neocallichirus horneri*. Based on this remarkable discrepancy, the definition of *Neocallichirus* is redefined regarding the male Plp2 which is biramous, and an endopod which is with or without the appendix masculina fused with the appendix interna.

In *Neocallichirus* the uropodal endopod is typically broadened posteriorly as in the type species *N. horneri*. In *N. guaiqueri, N. denticulatus, N. mucronatus,* and *N. audax* however, the uropodal endopod is slender, tapering distally.

Type species.—*Neocallichirus horneri* Sakai, 1988, by original designation. Gender masculine.

The type-specimens of the type species of *Sergio, Callianassa guassutinga* Rodrigues, 1971, were examined. There appears to be no reason to separate *Sergio* from *Neocallichirus*. Manning & Lemaitre (1993: 39) established *Sergio* for four western Atlantic species previously placed under *Neocallichirus*: *N. guarus* and *N. mirim* from Brazil, *N. guassutingus* from Brazil and Florida, *N. trilobatus* from Florida. Later *Sergio sulfureus* Lemaitre & Felder, 1996, from Colombia was included. The characters used to separate *Sergio* were that the telson has a posterior margin divided by an armed or unarmed median cleft, and the uropodal endopod being longer than broad rather than broader than long. The telson and uropod characters, however, show intermediate forms. In *N. guassutingus,* and *N. guarus* the posterior margin of the uropodal endopod is remarkably widened (Manning & Lemaitre, 1993, fig. 1a, b), and shows an intermediate form between *Neocallichirus horneri* and two other *Sergio* species, *N. mirim* and *N. trilobatus*. In *N. guarus* and *N. trilobatus* the posteromesial angle of the uropodal endopod is not developed, the posteromesial margin is entire. In *N. monodi* from Senegal, the telson has a posterior margin divided by an armed median cleft into two parts as in *N. mirim;* and in *Glypturus articulatus* (Rathbun, 1906) from Hawaii, the telson has a posterior margin divided by an unarmed median concavity (fig. 24b). Moreover, in *N. guassutingus, N. mirim* (fig. 29a) and *N. trilobatus* (fig. 30a) the male Plp2 bears an appendix masculina embedded with an appendix interna with hooks. This fact dose not fit the generic definition, because Manning & Lemaitre (1993) say that *Sergio* shows "appendices internae present on Plp2 in female only", and in *N. sulfureus* and *N. mericeae* the male Plp2 bears no appendix interna as in *Neocallichirus horneri.*

Regarding the meral hook of the larger cheliped, the definition is also not useful; in *N. guassutingus* (=*N. mericeae*) and *N. guarus* , the larger cheliped has a meral hook, however in *N. guaiqueri,* it bears no meral hook (Blanco Rambla et al., 1995). Therefore, *Sergio* is synonymized here with *Neocallichirus*. Type species.— *Callianassa guassutinga* Rodrigues, 1971, by original designation.

Eastern Atlantic species

Key to the species of the genus *Neocallichirus* in the eastern Atlantic:

1. Uropodal endopod broadened posteriorly. Eyestalks serrated distally ..... ***N. pachydactylus***

- Uropodal endopod lanceolate, tapering distally. Eyestalks not serrated distally .. 2
2. Protopod and proximal part of uropodal exopod each with acute spine ..... ***N. sassandrensis***
- Protopod and proximal part of uropodal exopod without acute spine 3
3. Telson concave posteriorly, bearing median tooth; chela of larger cheliped with broad concavity in anterior margin of palm below distal margin of palm ..... ***N. monodi***
- Telson simply concave posteriorly, without median tooth; chela of larger cheliped with broad concavity in anterior margin of palm below distal margin of palm ..... ***N. pentagonocephalus***

Neocallichirus monodi (De Saint Laurent & Le Loeuff, 1979)

Callichirus monodi De Saint Laurent & Le Loeuff, 1979: 71, figs. 14h, 16f, 17a, 19h, 22a-b, 23n-r.

Remarks.— The male Plp2 bears an appendix masculina on the endopod (De Saint Laurent & Le Loeuff, 1979: 75, fig. 23q-r).

Type locality.— Senegal.

Distribution.— Senegal, intertidal.

Neocallichirus pachydactylus (A. Milne Edwards, 1870)
(fig. 20a-c)

Callianassa pachydactyla A. Milne Edwards, 1870: 86, 101, pl. 2 fig. 1a-d.
Callianassa (Cheramus) pachydactyla; Borradaile, 1903: 545; De Man, 1928b: 19, 26, 94, 100, 121, 160-164.
Callichirus pachydactyla; De Saint Laurent & Le Loeuff, 1979: 76, figs. 14j, 16d-e, 18e, 19k, 22c-d, 23s-v.
Not *Callianassa pachydactyla*; Longhurst, 1958: 42 [= *Podocallichirus foresti* (Le Loeuff & Intès, 1974)].

Material examined.— RMNH D 32106, 1 ♀ (TL 43.0, CL 11.5), Light House Reef, Axim, Gold Coast, 08.i.1951, leg. R. Bassindale (det. De Saint Laurent, 1979); RMNH D 32107, 1 juv. (TL 16.0, CL 3.8), Pram Pram Section, Gold Coast, 15.ii.1950, leg. R. Bassindale (det. De Saint Laurent, 1979); SMF 9618, 1 juv. ♀ (TL 22.5, CL 6.0), São Tiago, NE-Tarrafal, Cape Verde Islands, 5 m, from colonies of *Antipathes* sp., 21.x.1979, leg. W. Lobin.

Diagnosis.— Carapace (fig. 20a) with triangular rostrum; without anterolateral spines. Eyestalks projected distally with rough or rounded distal margin, cornea distinct, located subterminally on distolateral part. Telson (fig. 20b) subquadrate, slightly concave on posterior margin. A1 peduncle shorter than A2 peduncle. Mxp3 without exopod; propodus subquadrate. P1 unequal in female. Ischium of larger cheliped in female (fig. 20c) denticulate ventrally; merus also denticulate in proximal half of ventral margin; chela 3.5 times as long as carpus; distal margin of palm denticulate; fixed finger denticulate in proximal half of cutting edge. Uropodal endopod broadly truncate posteriorly.

Remarks.— The male Plp2 has the endopod with an appendix masculina distally (De Saint Laurent & Le Loeuff, 1979, fig. 23t). The juvenile female examined (SMF 9618) shows that Plp1 is a small, simple segment, and Plp2 has a simple endopod with a finger-like appendix interna.

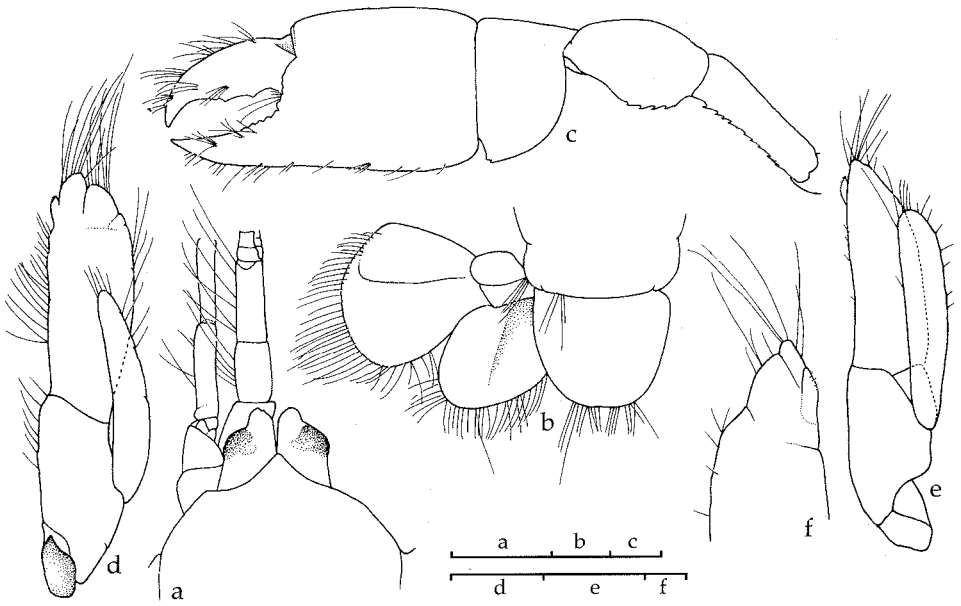

Fig. 20. *Neocallichirus pachydactylus* (A. Milne Edwards, 1870), *N. mirim* (Rodrigues, 1971) & *N. trilobatus* (Biffar, 1970). a. Anterior part of carapace, eyestalks and A1-2 peduncles; b, telson and uropod; c, female larger cheliped; d, e, male Plp2; f, distal part of male Plp2 with appendix masculina and appendix interna. a-c, *N. pachydactylus*, SMF 9618, 1 juv. ♀, São Tiago, Cape Verde Islands; d, *N. mirim*, RMNH D 37701, 1 ♂ from Menino, Praia de José, Santos, São Paulo, Brazil; e-f, *N. trilobatus*, RMNH D 28887, 1 ♂ from Key Biscayne, Florida. Scale = 1 mm.

Type locality.— Cape Verde.

Distribution.— Cape Verde; Senegal; Ghana; Ile Príncipe. Intertidal.

Neocallichirus pentagonocephala (Rossignol, 1962)

Callianassa pentagonocephala Rossignol, 1962: 139, fig. 1a-c.
Callichirus pentagonocephala; De Saint Laurent & Le Loeuff, 1979: 78, figs. 14k, 16b, 18d, 19i, 21d, 23w-x.

Remarks.— The carapace bears no rostral and anterolateral spines in the front. The uropodal endopod is broadened posteriorly. The male Plp1 is uniramous, the distal segment is chelate distally, and the male Plp2 endopod has an reduced appendix interna (De Saint Laurent & Le Loeuff, 1979: 78, fig. 23w, x).

Type locality.— Bay of Pointe Noire, Congo.

Distribution.— Congo; Cameroon, 6-7 m.

Neocallichirus sassandrensis (Le Loeuff & Intès, 1974)

Callichirus sassandrensis Le Loeuff & Intès, 1974: 43, fig. 11a-t; De Saint Laurent & Le Loeuff, 1979: 71, figs. 14i, 18c, 19i.

Remarks.— This species is transferred from *Callichirus* to *Neocallichirus*, as the frontal margin of the carapace is not armed with anterolateral spines, A1 peduncle is not longer than A2 peduncle, and the uropodal endopod is broadened posteriorly.

Type locality.— Ivory Coast, Sassandra (4°58.8'N 6°01'W), 10 m.

Distribution.— Ivory Coast.

Western Atlantic species

Key to the species of the genus *Neocallichirus* in the western Atlantic:

1. Uropodal endopod broadened posteriorly 2
- Uropodal endopod lanceolate, tapering distally 7
2. Anterolateral spines of carapace sharp 3
- Anterolateral spines of carapace less developed or undeveloped 4
3. Chela of male larger cheliped with distinctive concavity in anterior margin of palm above base of fixed finger. Telson slightly concave on posterior margin ..... ***N. sulfureus***
- Chela of larger male cheliped with narrow concavity in anterior margin of palm above base of fixed finger. Telson convex entirely on posterior margin ..... ***N. rahtbunae***
4. Mxp3 propodus concave in anterior margin below dactylus 5
- Mxp3 propodus straight in anterior margin below dactylus 6
5. Chela of male larger cheliped with large rounded concavity in anterior margin of palm above base of fixed finger ..... ***N. nickellae***
- Chela of male larger cheliped with triangular concavity in anterior margin of palm above base of fixed finger; cornea with ring ..... ***N. lemaitrei***
6. Merus of male larger cheliped regularly arcuate, clearly dentate on ventral margin. Eyestalks triangular distomesially ..... ***N. cacahuate***
- Merus of male larger cheliped articulate and irregularly dentate on ventral margin. Eyestalks roundedly produced distomesially ..... ***N. grandimanus***
7. Anterolateral spines of carapace pointed distally. Eyestalks with distal projection ..... ***N. guassutingus***
- Anterolateral spines of carapace obscurely triangular 8
8. Telson concave on posterior margin, bearing median spine ..... ***N. mirim***
- Telson concave posteriorly, bearing no median spine 9
9. Telson much broader than long. Cornea large, located at middle of eyestalks; merus of male larger cheliped triangular on ventral margin, chela with narrow space in anterior margin of palm above base of fixed finger ..... ***N. trilobatus***
- Telson in trapezoid form, concave on posterior margin 10
10. Telson convergent backward laterally. Merus of larger cheliped convex and serrated on ventral margin ..... ***N. guaiqueri***
- Telson straight proximally, then convergent backward on lateral margin. Merus of larger cheliped with broad proximal lobe on ventral margin ..... ***N. guara***

Neocallichirus cacahuate Felder & Manning, 1995

Neocallichirus cacahuate Felder & Manning, 1995: 478, figs. 1a-c, 2, 3a-e, 4a-c, 5.

Remarks.— The male Plp2 has an appendix masculina attached to the appendix interna. The presence of the appendix interna proves that the appendix masculina is relatively broader and bears a larger vestige of the appendix interna in *N. lemaitrei* than in *N. cacahuate* (Felder and Manning, 1995: 488).

Type locality.— Florida, West Palm Beach County, Lake Worth, north side of Peanut Island, sparsely vegetated sandy to shelly sand intertidal flats (26°46.7'N 80°2.9'W).

Distribution.— North side of Peanut Island, Lake Worth, West Palm Beach County, Florida.

Neocallichirus grandimanus (Gibbes, 1850)

Callianassa grandimana Gibbes, 1850: 194; Stimpson, 1866: 47; Stimpson, 1871: 122; Kingsley, 1899: 823; Schmitt, 1935b: 2; Biffar, 1971a: 649, 671-674; Manning, 1987: 388, 397, fig. 2; Dworschak, 1992: 196.

Glypturus branneri Rathbun, 1900b: 150, pl. 8 figs. 5-8; Rathbun, 1901: 93; Rathbun, 1920: 328, fig. 3; Verrill, 1922: 33, pl. 1 fig. 2, pl. 8 figs. 1a-e; Schmitt, 1924: 93; Schmitt, 1935a: 194, fig. 55; Manning, 1987: 397. [Type locality: Mamanguape Stone Reef, Brazil].

Glypturus grandimanus; Rathbun, 1900b: 151.

Glypturus grandimana; Borradaile, 1903: 548; De Man, 1928b: 25.

Glypturus Branneri; Borradaile, 1903: 548; De Man, 1928b: 19, 25.

Glypturus siguanensis Boone, 1927: 85, fig. 17; Manning, 1987: 397. [Type locality: Siguana Bay, Isle of Pines near Cuba, Gulf of Mexico].

Callianassa branneri; Schmitt, 1935b: 4; Gurney, 1944: 82, figs. 16, 17; Weimer & Hoyt, 1964: 764; Biffar, 1971a: 652, 654, 661, figs. 5, 6; Coelho & Ramos, 1973: 161; Manning, 1987: 398.

Callianassa siguanensis; Biffar, 1971a: 649.

Neocallichirus grandimana; Sakai, 1988: 61; Manning & Felder, 1991: 779, figs. 3, 4; Lemaitre & León, 1992: 44; Lemaitre & Ramos, 1992: 349, fig. 5; Dworschak & Ott, 1993: 281; Hendrickx, 1995: 398, figs.

Neocallichirus grandimanus; Manning, 1993: 113.

Not *Glypturus grandimanus*; Balss, 1924: 179, figs. 3, 4; Manning, 1987: 399. (= *C. hartmeyeri* Schmitt, 1935).

Material examined.— RMNH D 30374, 1 ovig. ♀ (TL 69.0, CL 17.0), Kudarebe, Aruba, Lesser Antilles, 0.5-1 m depth, 18.viii.1973, leg. J.C. Den Harog; RMNH D 35800, 2 ♀♀ (TL 37.0, CL 9.0; TL 36.0, CL 9.0), Santa Martha Bay, St. Nicolaus, Curaçao, Lesser Antilles, muddy sand, 3-4.ii.1957, L.B. Holthuis No. 1081 (det. T.A. Biffar); RMNH D 15731, 3 ♀♀ (TL 86.0, CL 20.0 - TL 95.0, CL 22.0), 1 ♀ carapace wanting, Virginia Key, sand strand by Marine Laboratory, Miami, Florida, 21.iv.1959, leg. D. Tabb & R.B. Manning leg.; SMF 23513-23518, 17 ♂♂, 13 ♀♀, 1 juv., Bahia Gairaca ca. 20 km NE Santa Marta, Magdalena Depto., Colombia, 22.x.1978, leg. M. Türkay; SMF 23519, 1 ♀, Great Pond Bay, St. Croix, Virgin Islands, beach, 05.xii.1972, leg. J. Doerjes; SMF 23633, 1 ♀, Great Pond Bay, St. Croix, Virgin Islands, from lime-sand, 04.xii.1972, leg. J. Doerjes.

Diagnosis.— Carapace with low rostrum and pair of obtuse anterolateral spines on front. A1 peduncle shorter than A2 peduncle. Mxp3 without exopod. P1 unequal. Telson oncave on posterior margin. Uropodal endopod broadened posteriorly.

Remarks.— No appendix interna is present on the endopod of male Plp2 (Biffar, 1971a, fig. 6f).

Type locality.— Florida, Key West.

Distribution.— Atlantic side: Bermuda; Southeast of Florida; west coast of Florida,

including Keys and Dry Tortugas Tobago; Bimini, and Little San Salvador, Bahamas; Cuba; Puert Rico; Barbados; Tobago; Curacao; South Water Cay (lagoonside intertidal to 0.5 m) and Belize; Mamanguape, Brazil.

Pacific side: Panama; Ecuador; Gorgona Island, Colombia (Lemaitre & Ramos, 1992).

Neocallichirus guaiqueri (Blanco et al., 1995)

Neocallichirus guaiqueri Blanco Rambla, J.P., I. Liñero Arana & M. L. Beltrán Lares, 1995: 102, text-figs. 1-3.
Sergio guaiqueri; Lemaitre & Felder, 1996: 453.

Remarks.— This species bears an elongated uropodal endopod as in *N. audax* and *N. mucronatus*, and the telson is concave on the posterior margin. It seems that the male holotype is immature because the carapace is only 4.2 mm long, and the male Plp1-2 are undeveloped (Blanco Rambla et al, 1995: fig. 3a, b). The male Plp1 is uniramous, two-segmented, the terminal segment is hooked at tip; the male Plp2 bears no appendix interna and appendix masculina (Blanco Rambla et al., 1995: 105).

Type locality.— Venezuela, Anzoategui State, north of Jose, Petersen grab (10°08.40'N 64°50.10'W).

Distribution.— Venezuela.

Neocallichirus guarus (Rodrigues, 1971)

Callianassa (Callichirus) guara Rodrigues, 1971: 210, figs. 61-76; Biffar, 1971a: 654; Coelho & Ramos, 1973: 162; Manning, 1987: 397.
Callianassa guara; Biffar, 1971a: 652, 654.
Neocallichirus guara; Manning & Felder, 1991: 779.
Sergio guara; Manning & Lemaitre, 1994: 41; Lemaitre & Felder, 1996: 453.

Remarks.— The type specimen was not accessible, but it is known from a figure (Rodrigues, 1971: fig. 74, 75) that the distal segment of male Plp1 is chelate. The male Plp2 has a rudimentary appendix interna in the endopod (Rodrigues, 1971: 212), similar to that of *N. mirim* (Rodrigues, 1971: fig. 95).

Type locality.— Brazil, São Sebastião, São Paulo, beach.

Distribution.— Tampa Bay, Miami; Lemon Bay, Florida; Brazil.

Neocallichirus guassutingus (Rodrigues, 1971)

Callianassa (Callichirus) guassutinga Rodrigues, 1971: 204, figs. 41-60.
Callianassa guassutinga; Biffar, 1971a: 651, 653, 674, figs. 9, 10; Coelho & Ramos, 1973: 162; Abele & Kim, 1986: vii, 26, 296, 298, figs. a-c; Manning, 1987: 397; Williams et al., 1989: 28, 61.
Callianassa; Rabalais et al., 1989: 35.
Neocallichirus guassutinga; Manning & Felder, 1991: 779.
Sergio guassutinga; Manning & Lemaitre, 1994: 40.
Sergio mericeae Manning & Felder, 1995: 267, figs. 1a-f, 2a-f, 3a-f, 4a-f, 5a-g. [Type locality: 27°28.2'N 80°18.8'W, north side of Fort Pierce Inlet, Florida, Indian River Lagoon, intertidal sandflat].
Sergio sp. Staton & Felder, 1995: 533.

Material examined.—RMNH D 35810, 1 ♀ (TL 41.0, CL 9.4), Venado Beach, Panama Canal Zone, Golf of Panama, 31.xii.1963, leg. T.M. Bayer; IBUSP 1 ♂ (TL 87.0, CL 21.0), Cebo Branco, Pararba, Brazil, 16.ix.1982, det. P.M. Dijek leg., S.A. Rodrigues; IBUSP 1 ovig. ♀ (TL 120.0, CL 26.5), Aracaju, Sergipe, Brazil, x.1976, leg. & det. S.A. Rodrigues.

Remarks.— The male and the female specimens of the present species from Brazil were compared with the description of *Neocallichirus mericeae* (Manning & Felder, 1995), and it was decided that *N. guassutinga* is synonymous with *N. mericeae*. Both *N. mericeae* and *N. guassutinga* are characterized by the frontal margin of the carapace bearing a pair of small anterolateral teeth, the same relative length between A1-2 peduncles, and the same forms of the male and female Plp1-2. In the male larger cheliped of the present specimen (IBUSP Male) the dactylus bears no serration on the distal half of the cutting edge, and also the fixed finger bears no serration on the cutting edge. It seems however, that these differences are merely individual variations. The female larger cheliped of *N. mericeae* is remarkably in accordance with that of *N. guassutinga*.

Mannding & Felder (1995: 279) mentioned that *N. mericeae* has bright red chelipeds and is overall bright red, while *N. guassutinga* has a whitish abdomen in females, and a pink abdomen and a pink-yellowish larger cheliped in males.

Type locality.— Brazil , São Sebastião.

Distribution.— North side of Fort Pierce Inlet, Florida; Indian River Lagoon, St. Lucie County, Florida; Louisiana, 12-13 m; Texas; Barra del Tordo, Tamaulipas, Mexico; Golf of Panama; Brazil.

Neocallichirus lemaitrei Manning, 1993

Neocallichirus lemaitrei Manning, 1993: 107, figs. 1-3; Felder & Manning, 1995: 488, fig. 6.

Material examined.— USNM 256875, 1 ♂, paratype, Isla de Baru, Isla de Rosario, Colombia, Caribbean Sea, viii.1986.

Type locality.— Isla del Rosario, 10°10'N, 75°46'W, Colombia, beach on south side.

Distribution.— Colombia.

Neocallichirus mirim (Rodrigues, 1971)
(fig. 20d)

Callianassa (*Callichirus*) *mirim* Rodrigues, 1971: 214, figs. 77-98.

Callianassa mirim; Biffar, 1971a: 654; Coelho & Ramos, 1973: 162; Manning, 1987: 397; Dworschak, 1992: 202.

Callichirus mirim; Ferrari, 1981: 12, fig. 1; Rodrigues, 1983: 31, figs. 53-60; Rodrigues, 1984a: 239, figs. 1-39 [larval stage]; Rodrigues, 1984b: 914 [larval stage]; Rodrigues & Hödl, 1990: 50, fig. 1.

Neocallichirus mirim; Manning & Felder, 1991: 779.

Sergio mirim; Manning & Lemaitre, 1994: 41.

Material examined.— RMNH D 37701, 1 ♂ (TL 81.0, CL 21.0), 1 ovig. ♀ (TL 115.0, CL 28.0), Menino, Praia de José, Santos, São Paulo, Brazil, 30.x.1986, leg. S.A. Rodrigues.

Remarks.— The present specimen examined shows that Mxp3 is not armed with an exopod. The male Plp2 bears an appendix masculina with setae distally, which is attached to the appendix interna with hooks (fig. 20d).

Type locality.— São Sebastião, São Paulo, Brazil.

Distribution.— Santos, State of São Paulo, Brazil to Argentina. Common in the lower intertidal and shallow subtidal of sandy beaches.

Neocallichirus nickellae Manning, 1993

Neocallichirus nickellae Manning, 1993: 110, figs. 4-6.

Material examined.— USNM 256879, holotype, 1 ♂, Buccoo reef, Tobago coral Garden, Trinidad and Tobago, Caribbean Sea, 28.vii.1989, leg. Lemaitre & Manning.

Remarks.— Male Plp2 has an appendix masculina.

Type locality.— Republic of Trinidad and Tobago, Tobago, Buccoo Reef, Coral Garden (11°11'N 60°49'W).

Distribution:— Republic of Trinidad and Tobago.

Neocallichirus rathbunae (Schmitt, 1935)

Callianassa (*Callichirus*) *rathbunae* Schmitt, 1935b: 4, 15, pl. 1 fig. 5, pl. 2 fig. 2, pl. 3 fig. 1, pl. 4 fig. 2.
Callianassa rathbunae; Biffar, 1971a: 651, 654, 699, figs. 19, 20; Manning & Heard, 1986: 347-349, fig. 1; Manning, 1987: 397; Dworschak, 1992: 202, fig. 10.
Callichirus rathbunae; De Saint Laurent & Le Loeuff, 1979: 97.
Neocallichirus rathbunae; Manning & Felder, 1991: 779; Manning, 1993: 113.

Material examined.— SMF 23520, 1 ♂, 2 ♀♀, Ensenada Granata, N. Santa Marta, Depto. Magdalena, Colombia, 15 m, sand, .ix.1987, leg. B. Werding.

Remarks.— The male Plp1 is biarticulate, distal segment chelate distally, and the male and female Plp2 have a slender appendix interna.

Type locality.— Bluefields, Jamaica.

Distribution.— Indian River, Miami, Florida; west coast of Florida; Bimini, Bahamas; Jamaica; St. Croix, Virgin islands; Twin Cays, Cassiopeia Cove, Belize; N Santa Marta, Colombia.

Neocallichirus sulfureus (Lemaitre & Felder, 1996)

Sergio sulfureus Lemaitre & Felder, 1996: 453-463, text-figs. 1-6.

Remarks.— *Neocallichirus sulfureus* (Lemaitre & Felder, 1996) is closely related to *Neocallichirus guassutingus* from Brazil. Lemaitre & Felder (1996: 462) mentioned the differences: in *N. sulfureus* the dactylus measured dorsally is considerably longer than the palm; the distal half of the prehensile edge of the dactylus has two or three small rounded teeth or small triangular teeth proximally, whereas in *N. guassutingus* the dactylus is at most subequal to the length of the palm; the distal half of the dactylus typically has a prominent row of sharp teeth.

Type locality.— Caribbean coast of Colombia, SW shoreline of Bar˙, beach facing Rosario Islands.

Distribution.— Caribbean coast of Colombia.

Neocallichirus trilobatus (Biffar, 1970)
(fig. 20e-f)

Callianassa trilobata Biffar, 1970: 36, fig. 1; Biffar, 1971a: 653, 654, 704, figs. 21, 22; Manning, 1987: 397.
Neocallichirus trilobata; Manning & Felder, 1991: 779.
Sergio trilobatus; Manning & Lemaitre, 1994: 41.

Material examined.— RMNH D 28887, 1 ♂ (TL 47.0, CL 9.5), Key Biscayne, Crandon Pk, Florida, 100 offshore, dredging, 28.iii.1969.

Diagnosis.— Male Plp2 endopod bears an appendix masculina with setae distally, which is laterally attached to the appendix interna with hooks (fig. 20e-d).

Type locality.— Off Pinellas Point, Tampa Bay, Florida, 2-3 m.

Distribution.— Tampa Bay, Miami; Lemon Bay, Florida (Biffar, 1971a).

Indo-West Pacific species

Characters on the merus of the male chelipeds.

1. Merus of both chelipeds unarmed ventrally.
   N. horneri (only known in female).
2. Merus of larger cheliped convex or not convex, serrated.

a. That of smaller cheliped unarmed.
   N. indicus, *N. jousseaumei*; *N. audax*; *N. karumba*; *N. mucronatus*; *N. caechabitator* (only known in females); *N. lanceolatus*.

b. That of smaller cheliped also serrated.
   N. collaroy; *N. motupore*.

3. Merus of larger cheliped triangular and serrated ventrally, that of smaller cheliped unarmed.
   N. calmani.
4. Merus of larger cheliped with serrated triangular swelling, that of smaller cheliped unarmed.
   N. mauritianus.
5. Merus of larger cheliped with triangular proximal tooth, that of smaller cheliped with small median spine.
   N. limosa
6. Merus of larger cheliped with simple sharp proximal tooth, that of smaller cheliped unarmed.
   N. ranongensis
7. Larger cheliped unknown, merus of smaller cheliped unarmed.
   N. darwinensis (only known in female); *N. vigilax*.
8. Chelipeds unknown.
   N. moluccensis.

Key to the species of the genus *Neocallichirus* in the Indo-west Pacific:

1. Uropodal endopod broadly truncate distally, with mesial angle 2
- Uropodal endopod lanceolate, having no angle on mesial margin, triangular or rounded distally 10
2. Anterolateral spines of carapace developed ..... ***N. vigilax***
- Anterolateral spines of carapace undeveloped 3
3. Eyestalks elongated and pointed distally at tip ..... ***N. jousseaumei***
-. Eyestalks truncate or triangular with one another 4
4. Eyestalks truncate 5
- Eyestalks triangular with one another 7
5. Eyestalks serrated distally; in male larger cheliped merus largely convex and serrated on ventral margin, and carpus less than half the length of chela; both female chelipeds with ischium and merus unarmed on ventral margin, carpus more than half length of chela ..... ***N. indicus***
- Eyestalks unarmed distally 6
6. Cornea small, and compact at middle of eyestalk ..... ***N. darwinensis***
- Cornea covered by large, tintly pigmented, circular dome at middle of eyestalk .... ***N. moluccensis***
7. Cornea scattered with pigment spots at middle of eyestalk ..... ***N. limosus***
- Cornea covered by a distinctive, tintly pigmented circular dome at middle of eyestalk 8
8. Telson broadly convex posteriorly. Ischium of major cheliped with a serrated middle tooth on ventral margin ..... ***N. calmani***
- Telson reducing in breadth backwards in posterior half, and truncate distally 9
9. P3 carpus with posterior lobe not extending beyond line of ventral margin of carpus; merus of major cheliped with a triangular proximal tooth on ventral margin . ..... ***N. mauritianus***
- P3 carpus with posterior lobe extending beyond line of ventral margin of carpus; merus of male major cheliped unknown, but that of female without proximal tooth on ventral margin ..... ***N. horneri***
10. Anterolateral spines of carapace above antenna developed. Uropodal endopod lanceolate and rounded distally 11
- Anterolateral spines of carapace poor or not developed 13
11. Telson distinctly broader than long 12
- Telson slightly broader than long, broadly rounded on distal margin .... ***N. denticulatus***
12. Telson convex on posterior margin. P1 carpus armed with marginal spines on ventral margin ..... ***N. motupore***
- Telson concave on posterior margin. Both chelipeds with carpus unarmed on ventral margin; ischium serrated ventrally; merus of larger cheliped with sharp proximal tooth, distal to it roughly denticulate on ventral margin; smaller cheliped only with sharp proximal tooth ..... ***N. collaroy***
13. Posterior lobe of P3 propodus rounded, or not much extended beyond line of ventral margin of carpus 14
- Posterior lobe of P3 propodus distinctly extended beyond line of ventral margin of carpus 16

14. Rostrum scarcely developed. Telson slightly broader than long, reducing in breadth backward. Cornea rudimentary, located at middle of eyestalks ..... ***N. caechabitator***
- Rostrum strong. Telson broadened, truncate posteriorly. Cornea distinct at middle of eyestalks 15
15. Cornea located medially. P1 merus with sharp proximal tooth on ventral margin; dactylus broadened; dactylus of smaller cheliped longer than its propodus ..... ***N. ranongensis***
- Eyestalks calcified in proximal half, transparent in distal half, with rounded subterminal cornea, prolonged at distomesial angle. Merus of larger cheliped entirely convex and denticulated; dactylus incurved distally, dactylus of smaller cheliped shorter than palm ..... ***N. mucronatus***
16. Telson truncate posteriorly ..... ***N. audax***
- Telson convex posteriorly. Dactylus of male larger cheliped longer than palm 17
17. Chela of larger cheliped granulate on lateral surface, broadly concave at proximal corner of fixed finger; merus with row of denticles reducing in size distally. Uropodal endopod narrow, median carina running from proximal part to middle of posterior margin ..... ***N. kempi*** spec. nov
- Chela of larger cheliped narrowly concave at proximal corner of fixed finger ..... ***N. karumba***

Neocallichirus audax (De Man, 1911)
(fig. 21d-f)

Callianassa audax De Man, 1911: 223; Dworschak, 1992:190, fig. 1a-d.
Callianassa (*Callichirus*) *audax*; De Man, 1928b: 28, 113, 179, pl. 20 fig. 31-31i; Rao & Kartha, 1967: 279, figs. 1-2; ? Tirmizi, 1967: 151-154, figs. 1-2.
Callichirus audax; De Saint Laurent & Le Loeuff, 1979: 97.

Material examined.— RMNH D 26533, 1 ♀ (TL 40.0 , CL 11.0), Mirkarwada, Ratnagiri, India, 21.vii.1918, K.N. Sankolli; ZMA 102.431, 2 ♀♀, lectotype (TL 67, CL 19), paralectotype (TL 60.0, CL 15.5), Strait of Malacca, Indonesia, 1892, leg. G.F. Tydeman (det. De Man).

Diagnosis.—Rostrum a low triangle, anterolateral margins unarmed. Telson slightly broader than long, posterior margin truncate, armed with low median lobe, both lateral sides with low submesial lobes. A1 peduncle shorter than A2 peduncle. Mxp3 without exopod. Uropodal endopod slightly longer than broad, tapering distally.

Remarks.— The male is unknown. Although De Man (1928b: 183) mentions that on the female Plp2 "The inner ramous (= the endopod) did not present a trace of an appendix interna or stylamblys", however through the reexamination of the female types, it is observed that the endopod bears a small appendix interna distally (fig. 21e-f). Tirmizi (1967: 151, figs. 1-2) described the specimens belonging to the present species, however his records are doubtful, because P3 propodus shows a more elongated posterior lobe than that of the type specimen (fig. 21d).

Type locality; Straits of Malacca.

Distribution; Straits of Malacca, Maley Peninsula; West Pakistan; Ratnagiri, India; East coast of India (Dworschak, 1992).

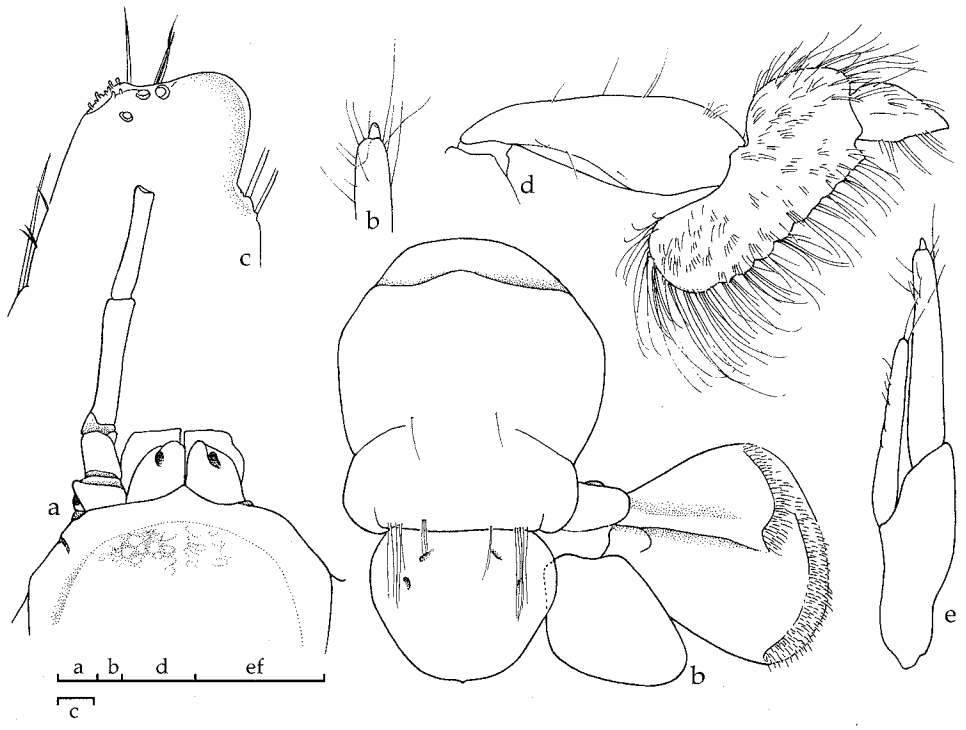

Fig. 21. *Neocallichirus mauritianus* (Miers, 1882) & *N. audax* (De Man, 1911). a, Anterior part of carapace with A2 peduncle; b, abdominal somite 6, telson and uropod; c, distal part of male Plp2 endopod; d, carpus, propodus and dactylus of P3; e, female Plp2; f, distal part of female Plp2 endopod. a-c, *N. mauritianus*, NHML 1879.2, 1 ♂, lectotype, from Mauritius; d-f, *N. audax*, RMNH D 26533, 1 ♀ from Mirkarwada, Ratnagiri, India. a-b, d-f, Scale = 1mm; c, scale = 0.1 mm.

Neocallichirus caechabitator Sakai, 1988

Neocallichirus caechabitator Sakai, 1988: 57, 67, figs. 9, 10.

Diagnosis.— The rostrum is triangular, and not armed with a pair of anterolateral spines. A1 peduncle shorter than A2 peduncle. Mxp3 without exopod; propodus subquadrate. P1 in female unequal. Telson broader than long, tapering posteriorly, distal margin narrow, slightly concave at middle (Sakai, 1988: 67).

Type locality.— Australia, Northern Territory, Darwin, Shoal Bay, False Creek Point, 1.0 m.

Distribution.— Australia, Northern Territory, Darwin, Shoal Bay, False Creek Point, 1.0 m.

Neocallichirus calmani (Nobili, 1904)
(fig. 22a-d)

Callianassa (*Cheramus*) *Calmani* Nobili, 1904: 236; Nobili, 1906b: 100, 104, pl. 5 fig. 2; De Man, 1928b: 26, 100.

Callichirus calmani; De Saint Laurent & Le Loeuff, 1979: 97.
Callianassa calmani; Dworschak, 1992: 192, fig. 3a-f.

Material examined.— NHMW 6780, 1 ♂ (TL 54.0 , CL 12.0), 1 ♀ (TL 62.0, CL 13.5), Aquaba, Red Sea, xii.1987, leg. J. de Vaugelas.

Diagnosis.— Rostrum (fig. 22a) a low triangle; anterolateral projections of carapace undeveloped. Telson (fig. 22b) slightly broader than long, distal margin broadly rounded. A1 peduncle shorter than A2 peduncle. Mxp3 propodus subquadrate. P1

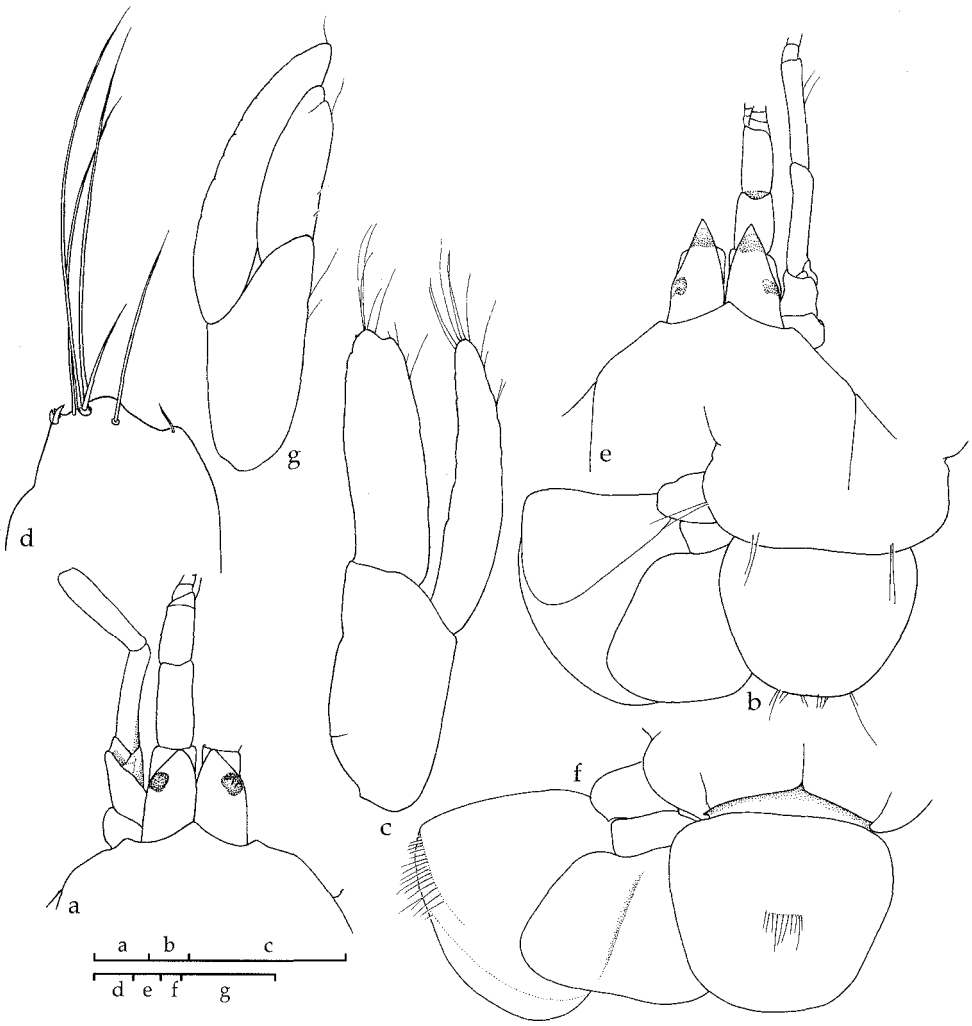

Fig. 22. *Neocallichirus calmani* (Nobili, 1904) & *N. jousseaumei* (Nobili, 1904). a, e, anterior part of carapace, eyestalks, and A1-2 peduncles; b, f, telson and uropod; c, g, male Plp2; d, distal part of male Plp2 endopod. a-d, *N. calmani*, NHMW 6780, 1 ♂, Aquaba, Red Sea; e-f, *N. jousseaumei*, NHMW 6980, 1 ovig. ♀, Aquaba; g, *N. jousseaumei*, SMF 4959, 1 ♂, Red Sea. a-c, e-g, Scale = 1 mm; d.=, scale = 0.1 mm.

unequal. Merus of male major cheliped rounded, denticulate on ventral margin. P3 propodus hammer-shaped. Male Plp1 uniramous, two-segmented, distal segment broadened and shallowly concave distally. Male Plp2 biramous, endopod with appendix interna merged with appendix masculina (fig. 22c-d). Uropodal endopod truncate distally.

Remarks.— De Saint Laurent & Le Loeuff (1979: 97) described this species as a member of the *Neocallichirus jousseaumei* group.

Type locality.— Obock, Djibouti.

Distribution.— Obock, Djibouti, Bay of Aden in the sandy intertidal and shallow subtidal (Vaugelas, 1990); Aquaba, Red Sea.

Neocallichirus collaroy (Poore & Griffin, 1979)

Callianassa collaroy Poore & Griffin, 1979: 260, figs. 24, 25.
Glypturus collaroy; Sakai, 1988: 61.
Corallianassa collaroy; Sakai, 1992: 212, fig. 1.

Material examined.— SMF 20357, 1 ♀ (TL 23.0, CL 5.0), barrier reef near Maharepa, ca. 2,6 km W of airport, Moorea, French Polynesia, Sta. FPM-5, 0.5 m, dead corals, iii.1988, leg. H.-G. Müller.

Remarks.— This female specimen is identified as *C. collaroy*, however the female Plp2 is not identical with that described by Poore & Griffin (1979); the appendix interna is slender, extending over the distal end of the endopod in the French Polynesian female specimen, while it is poorly developed in the female from Shellharbour, New South Wales. The front of the carapace bears a pair of anterolateral spines above the antenna separated from the carapace by a noncalcified membrane.

Type locality.— Australia, New South Wales, Collaroy, Long Reef, in sand among boulders.

Distribution.— Collaroy, New South Wales, intertidal (Poore & Griffin, 1979); Maharepa, Moorea, French-Polynesia.

Neocallichirus darwinensis Sakai, 1988

Neocallichirus darwinensis Sakai, 1988: 57, 62, figs. 5, 6.

Diagnosis.— Rostrum obtusely triangular; anterolateral spine not present on frontal margin of carapace. A1 peduncle shorter than A2 peduncle. Mxp3 without exopod; propodus subquadrate. P1 in female unequal. Telson broader than long, converging posteriorly over distal two-thirds, distal margin narrowly truncate. Uropodal endopod subquadrate.

Remarks.—No male specimens have been recorded (after Sakai, 1988: 62).

Type locality.— Australia, Northern Territory, Darwin, Mindil Beach.

Distribution.— Australia, Northern Territory, Darwin, Mindil Beach.

Neocallichirus denticulatus Ngoc-Ho, 1994

Neocallichirus denticulatus Ngoc-Ho, 1994: 56, fig. 4.

Material examined.—MNHN-Th 1246, 1 ♀, paratype, Queensland, Australia.

Remarks.— Only female specimens are known. As Ngoc-Ho mentioned the uropodal endopod is slender, tapering distally.

Type locality.— NW of Townsville, (18°56'S 146°50'E), Queensland, 24 m, muddy sand.

Distribution.— NW of Townsville, Queensland, Australia.

Neocallichirus horneri Sakai, 1988

Neocallichirus horneri Sakai, 1988: 57, 65, figs. 7, 8; Manning & Felder, 1991: 779.

Type locality.— Nightcliff, Darwin, Northern Territory, Australia.

Distribution.— Nightcliff and West Shoal Bay, Darwin, Northern Territory, intertidal.

Neocallichirus indicus (De Man, 1905) (fig. 23a-e)

Callianassa (*Cheramus*) *indica* De Man, 1905: 605; De Man, 1928b: 26, 93, 100, 159, 160, pl. 17 fig. 26-26g.

Callianassa (*Cheramus*) *variabilis* Edmondson, 1944: 47, figs. 1, 6a-i, 7a-j, l, p. [Type locality: Hanauma Bay, Oahu, in a gravel bed of the intertidal zone].

Callianassa natalensis Barnard, 1946: 379; Barnard, 1950: 506, 511, fig. 95f-h; Kensley, 1974: 277. [Type locality: Zululand, S. Africa].

Callianassa indica; Kensley, 1975: 50, fig. 2A-E; Sakai, 1987a: 302, 306.

Neocallichirus manningi Kazmi & Kazmi, 1992: 296, fig. 1. [Type locality: 24°48'N, 66°58'E, Sandspit, Karachi, lower tidal region].

Neocallichirus taiaro Ngoc-Ho, 1995: 212, figs. 1-2. [Type locality: Taiaro atoll, Tuamotu Isle, French Polynesia].

Material examined.— RMNH D 18540, 1 ♀ (TL 68.0, CL 16.0), Sand Island, Kaneohe Bay, Oahu, Hawaii Archipel, 12.v.1959, leg. H. Caspers; RMNH D 18541, 1 ♀ (TL 58.0, CL 14.8), Sand Island, Kaneohe Bay, Oahu, Hawaii Archipel, 10.iv.1959, leg. H. Caspers; ZMA 102.438, 1 ♂ (TL 92, CL 23), lectotype, Coast of Kangeang, 06°59'S 115°24.7'E, Bay of Kankamaraän, Indonesia, Siboga Sta. 16, 15-16.iii.1899, Siboga Exp. (det. De Man); ZMA De 102.442, 1 ♀ (TL 89, CL 13.5), Larantuka, Flores, Indonesia, coll. unknown, (det. L.B. Holthuis); SMF 4959, 1 ♂ (TL 40.0, CL 10.0), Red Sea, 1827, leg. E. Rüppell; ZMH K-38197, 1 ♀, Djibouti, Gulf of Aden, leg. E. Warke; ZMH-K 27849, 1 ♂, Sand Island, Kaneohe Bay, Oahu, Hawaii Archipel, 10.iv.1959, leg. H.Caspers (det. L.B. Holthuis); ZMB 8914, 1 ♀, Matupi near Rabaul, New Britain; SAM 8339, 1 ♀ (TL 10.6, CL 24.6), holotype of *Callianassa natalensis*, from stomack of Rock-cod, Natal coast; MNHN-Th 1246, 1 ♀, holotype of *Neocallichirus taiaro*, Taiaro atoll, Tuamotu, French Polynesia; ZLKU 12409, 1 ovig. ♀ and damaged specimen with detached larger cheliped, east coast of Tonaki I., Ryukyu Is., 09.vii.1963, leg. Y. Nakasone.

Description of male lectotype.— Rostrum (fig. 23a) scarcely developed, with pair of low noncalcified anterolateral projections under ridge of carapace front. Telson (fig. 23b) broader than long, convergent distally on lateral margins, distal margin shortly truncate. A1 peduncle shorter than A2 peduncle. Mxp3 unarmed with exopod. P1 unequal, larger cheliped missing, and in smaller cheliped merus spindle-shaped, unarmed on ventral margin. Male Plp 2 endopod merged distally with appendix masculina, but without

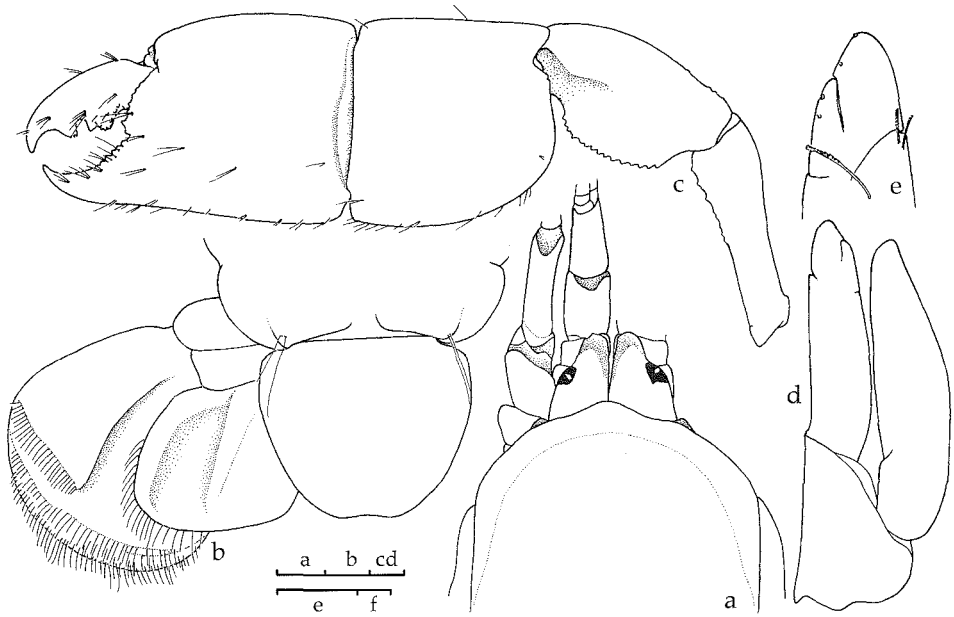

Fig. 23. *Neocallichirus indicus* (De Man, 1905). a, Anterior part of carapace, eyestalks, and A1-2 peduncles; b, telson and uropod; c, female larger cheliped; d, male Plp2; e, distal part of male Plp2 endopod. a-b & d-e, ZMA 102.438, 1 ♂, lectotype, from Bay of Kankamaraän, Indonesia; c, SAM 8339, 1 ♀, holotype of *Callianassa natalensis*. a-d, Scale = 1 mm; e, scale = 0.1 mm.

appendix interna (fig. 23d-e). Uropodal endopod broadened distally.

Remarks.— The type specimen of *Callianassa natalensis* Barnard, 1946, was examined and identical with the present species. Through the female holotype of *C. natalensis* (fig. 23c) the larger cheliped is observed for the first time. The ovigerous female from Japan agrees well with the female specimen from Zululand.

As shown by Kasmi & Kasmi (1992), *Callianassa manningi* is different from *N. indicus* in the shape of the telson, however, *C. manningi* was described from a female, and it is found that the description of *C. manningi* is exactly the same as that of *N. indicus* in the shapes of the distally serrate eyestalks, Mxp3, P3, and the more than usually broadenened uropodal endopod. As a result, it is most probable that *C. manningi* is synonymous with *N. indicus*.

Type locality.— Indonesia, south coast of Kangeang, Bay of Kankamaran, (6°59'S 115°24'7E).

Distribution.— Hanauma Bay, Oahu, Hawaii; Tuamotu Isle, French Polynesia; Tonaki Is, Ryukyu Is.; Flores, Indonesia; Mauritius (Kensley, 1975); Kangeang Reef, Bay of Kankamaran, East Indies; Sandspit, Karachi; Djibouti, Gulf of Aden; Red Sea; Zululand, S. Africa.

Neocallichirus jousseaumei (Nobili, 1904)
(fig. 22e-g)

Callianassa (*Cheramus*) *Jousseaumei* Nobili, 1904: 236; Nobili, 1906b: 101, pl. 6 fig. 2; De Man, 1928b: 26 ,

97, 100 (key), pl. 18 fig. 27-27a.
Callichirus jousseaumei; De Saint Laurent & Le Loeuff, 1979: 97.
Callianassa jousseaumei; Dworschak, 1992: 198, figs. 5a-d, 6a-c.

Material examined.— NHMW 6980, 1 ovig. ♀ (TL. 118.0 CL 23.5), Aquaba, Red Sea, 29.v.1984, leg. J. de Vaugelas.

Diagnosis.— Rostrum (fig. 22e) a low triangle; anterolateral projections of carapace slightly developed. Eyestalks an elongated triangle, transparent in distal part, divergent distally. Telson (fig. 22f) subquadrate, posterior margin broadly convex. A1 peduncle shorter than A2 peduncle. Mxp3 without exopod, propodus subquadrate. P1 subequal, larger cheliped merus denticulate on ventral margin. Male Plp2 (fig. 22g) biramous, endopod without appendix interna and appendix masculina. Uropodal endopod broadened distally.

Type-locality.— Djibouti, Perim, Gulf of Tadjourah, Red Sea.

Distribution.— Djibouti and Perim, Gulf of Aden; Safaga, Tubaya Al-Kabir, Red Sea; Aquaba, Gulf of Aquaba, 9 m (Dworschak, 1992).

Neocallichirus karumba (Poore & Griffin, 1979)

Callianassa karumba Poore & Griffin, 1979: 266, figs. 30-31.
Glypturus karumba; Sakai, 1988: 61.

Remarks.— Poore & Griffin (1979: 268) stated that Mxp3 bears a minute exopod, that Plp 2 (male) is biramous, the endopod 2-articulate, shorter than the exopod, and that the second article is small and with a mesiodistal digital lobe. This second article used in their description is seemingly identical with an appendix interna.

Type locality.— Norman River, Karumba, Queensland, Australia.

Neocallichirus kempi spec. nov.
(fig. 24a-e)

Callianassa (*Callichirus*) *maxima*; Kemp, 1915: 252, pl. 13 figs. 1-5; De Man, 1928b: 29, 92, 112. (not *Callianassa maxima* A. Milne Edwards, 1870).
Callianassa maxima; Pillai, 1954: 23-26,].

Material examined.—ZMB 3353, 1 ♀ (TL 131.0, CL 30.0), holotype, Bangka, Indonesia, leg. Schneider; NHML 1938.6.23.3-4, 1 ♂, 1 ♀, N. Parur, Travancore, India.

Descripion of female holotype.— Rostrum (fig. 24a) narrow and triangular; anterolateral projection of carapace slightly developed. Telson (fig. 24b) broader than long, rounded on lateral margins, and slightly convergent on posterior margin. Eyestalks longer than broad, triangular distally, touching each other, cornea located medially. A1 peduncle slightly overreaching middle of distal segment of A2 peduncle. Mxp3 (fig. 24c) with exopod; merus triangular, propodus broader than long, roundly produced on ventral margin; dactylus longer than broad.

P1 (fig. 24d-e) unequal. Ischium of larger cheliped 2.5 times as long as broad, lat-

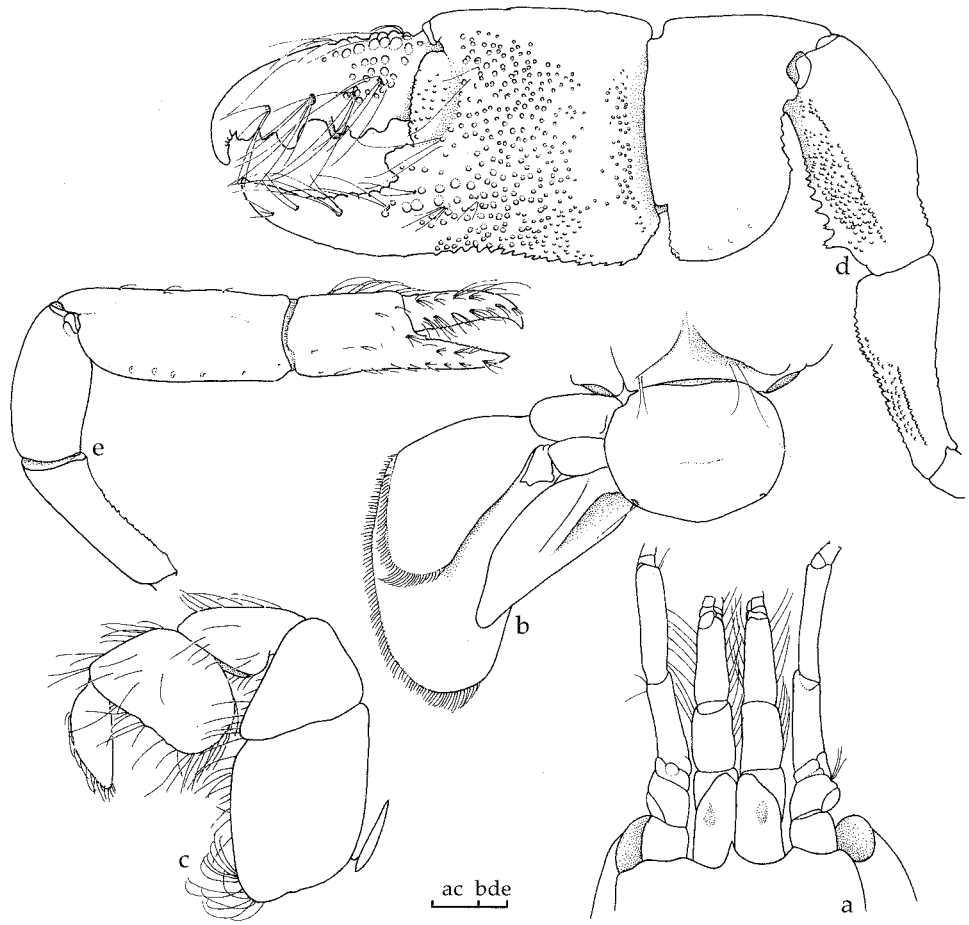

Fig. 24. *Neocallichirus. kempi* n. sp., ZMB 3353, 1 ♀, holotype, Bangka, Indonesia. a, anterior part of carapace, eyestalks and A1-2 peduncles; b, telson and uropod; c, Mxp3, lateral view; d, female larger cheliped; e, female smaller cheliped. Scale = 2 mm.

eral surface denticulate on ventral half, dorsal margin brimmed with row of denticles, ventral margin armed with a row of irregularly-formed denticles; carpus 1.8 times broader than long and about 3/4 as long as merus, lateral surface almost smooth; chela 2.5 times as long as carpus; palm denticulate on lateral and mesial surfaces, ventral and anterior margins also denticulate; fixed finger armed with row of rounded denticles on cutting margin; dactylus slightly longer than palm, with denticles on proximal part of lateral surface, roughly denticulate on cutting edge. Ischium of smaller cheliped 2.5 times as long as broad, with row of denticles on ventral margin; merus about as long as ischium; carpus slender, 1.5 times as long as merus; chela about as long as carpus; fixed finger slightly denticulate on cutting edge; dactylus about as long as palm, with row of denticles on cutting edge. Uropodal endopod (fig. 24b) 2.5 times as long as broad, median carina present, posterior margin straight,

anterior margin convex. Uropodal exopod larger than endopod, bent backward on distal half, anterior half elevated by longitudinal median carina.

Remarks.— The female from Bangda, Indonesia, is clearly adult as it has the remains of moulted eggs on Plp 1-2. This female has the large chela reaching 33 mm in length. The subfossil chela of *Callianassa maxima* A. Milne Edwards, 1870, from Thailand, which measures 60 mm in length, is about twice the size of the Indonesian female. The other chela of tmaterial from Madras (Kemp, 1915: 256) is only one third of the subfossil chela, and that from Travancore (Pillai, 1954: 25) measures only 17 mm (propodus 7.5 and dactylus 9.5 mm). The chela of the type specimen of *Callianassa maxima* A. Milne Edwards, 1870, is lost (in litt. Ngoc Ho). The present specimen from Bangka, Indonesia, differs from the description of C. *maxima* A. Milne Edwards, 1870, in size and armament of denticles. The present specimen confirms that Kemps material is different from *Callianassa maxima* and is in need of a new name: *Neocallichirus kempi*. The characteristics of the male Plp1-2 are not confirmed, but this species is to be classified in *Neocallichirus*, because the A1 peduncle reaches to half of the terminal segment of the antennal peduncle, Mxp3 propodus is subquadrate, and the front of the carapace is not armed with a pair of lateral teeth.

Type locality.— Indonesia, Bangka.

Distribution.— Bangka, Indonesia; Nalbano Island and Barhampur Island, Chilka Lake near Madras, India; Kayamkulam lake, Central Travancore, India.

Neocallichirus limosus (Poore, 1975)

Callianassa limosa Poore, 1975: 201-205, figs. 4, 5; Poore & Griffin, 1979: 270, figs. 32-33.
Neocallichirus limnosa; Sakai, 1988: 61 (erroneous spelling(= *N. limosus*)).

Material examined.— SMF 23577, 7 ♂♂, 4 ♀♀, S. Melbourne, Port Philipp Bay, Victoria, Australia, Sta. 956, (38°09.300'S, 144°53.300'E), 24 m, Silt-Clay, 14.ii.1970, det. G. Poore 15.i.1997, Port Philipp Bay Environmental.

Remarks.— Mxp3 propodus is broadened, and the male Plp2 is a minute medially lobed tapering papilla (Poore, 1975: 201, 204, fig. 5j).

Type locality.— Australia, Victoria, Port Phillip Bay.

Distribution.— Central New South Wales to Tasmania, low water to 100 m, Australia (Poore & Griffin, 1979).

Neocallichirus mauritianus (Miers, 1882)
(fig. 21a-c)

Callianassa mauritiana Miers, 1882: 341; Miers, 1884: 15, pl. 1 fig 2; Nobili, 1906b: 106, figs. 5, 6; Michel, 1974: 256; Kensley, 1975: 51, fig. 3A-H.
Callianassa (*Trypaea*) *mauritiana*; Borradaile, 1903: 546.
Callianassa (*Cheramus*) *mauritiana*; De Man, 1928a: 10, pl. 2 fig. 4; De Man, 1928b: 26, 99, 160.

Material examined.— NHML 1879.2, 1 ♂ (TL 83, CL 25) lectotype, 1 ♀ (TL 86, CL 21), Mauritius (det. M.V. de Robillard).

Description of male lectotype.— Carapace with low triangular rostrum, and pair of low, noncalcified anterolateral projections (fig. 21a). Telson (fig. 21b) broader than long, bearing obtuse median tooth on posterior margin. Mxp3 without exopod. Male Plp2 endopod merged distally with appendix masculina attached to appendix interna with hooks (fig. 25c).

Remarks.— A1 peduncles missing in male lectotype.

Type locality.— Mauritius.

Distribution.— Mauritius; Red Sea (Kensley, 1975).

Neocallichirus moluccensis (De Man, 1905)
(fig. 25a-f)

Callianassa (*Cheramus*) *moluccensis* De Man, 1905: 606; De Man, 1928b: 26, 93, 99, 159, pl. 16 fig. 25-25a, pl. 17 fig. 25b-c.

Material examined.— ZMA De 102.434, 1 ♂ (TL 60.0, CL 16.5), lectotype, Ambon Anchorage, Indonesia, Siboga Sta. 231, 14-18.xi.1899, Siboga Exp.

Description of male lectotype.— Rostrum (fig. 25a-b) broadly triangular, with low noncalcified anterolateral projections under brim. Eyestalks triangular distally, diver-

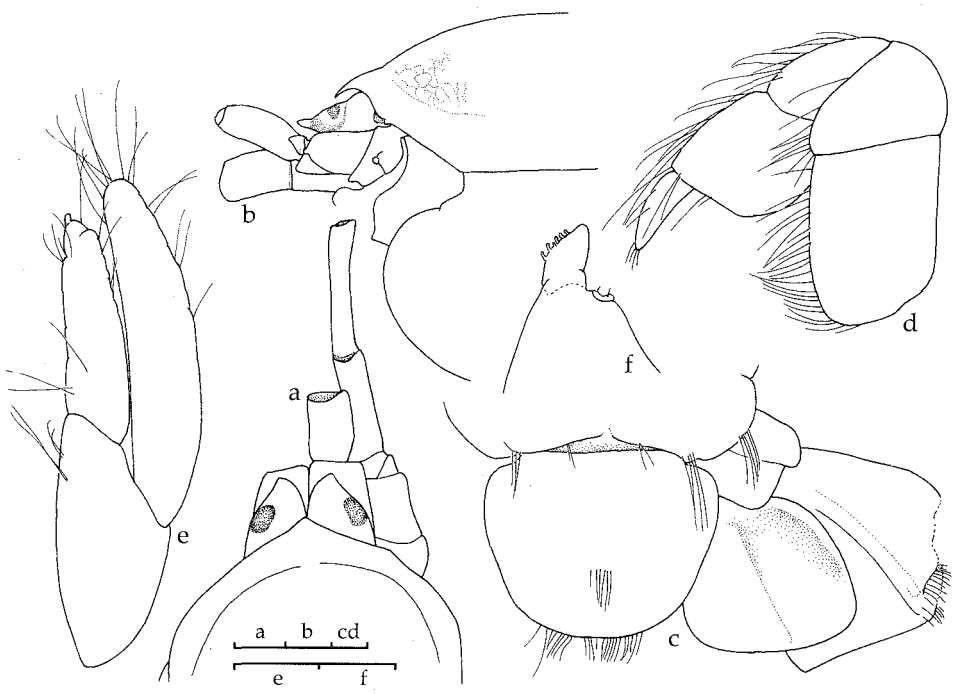

Fig. 25. *Neocallichirus moluccensis* (De Man, 1905), ZMA De 102.434, 1 ♂, type, from Ambon Anchorage, Indonesia. a. Anterior part of carapace, eyestalks and A1-2 peduncles; b, same, lateral view; c, telson and uropod; d, Mxp3, lateral view; e, male Plp 2; f, male Plp2 with appendix internae. a-e, Scale = 1 mm; f, scale = 0.1 mm.

gent distally from one another; cornea distinct, located at middle of lateral margin. Telson broader than long, distal margin broadly rounded. Mxp3 ischium-merus (fig. 25d) pediform, merus slanting distally; propodus as long as broad, its ventral margin broadly rounded; dactylus narrow and digitiform.

Remarks.— The carapace has a pair of minute non-calcified anterolateral spines (fig. 25b). The male Plp1 consists of two segments, the distal one is chelate distally. Tthe male Plp2 endopod is merged distally with an appendix masculina attached to a small appendix interna with hooks (fig. 25e-f). The female is unknown.

Type locality.— Amboina, Indonesia, reef.

Distribution.— Amboina, Indonesia.

Neocallichirus motupore (Poore & Suchanek, 1988)

Glypturus motupore Poore & Suchanek, 1988: 198, figs. 1-3, 4a, table 1.

Remarks.— This species is very similar to *Glypturus armatus* A. Milne Edwards, 1870, and *G. acanthochirus* A. Milne Edwards, 1870, with regards to the chelipeds. In *C. motupore* the frontal margin of the carapace has a pair of fixed anterolateral spines, and the male Plp2 bears only a slender appendix interna, while in *G. armatus* and *G. acanthochirus*, the frontal margin of the carapace bears a pair of articulated anterolateral spines, and the male Plp2 bears the oval, articulated appendix masculina with a slender appendix interna.

Type locality.— Bootless Inlet (9°32'S 147°16'E), Motupore Is., Papua New Guinea, intertidal.

Distribution.— Bootless Inlet, Motupore Is, Papua New Guinea, intertidal.

Neocallichirus mucronatus (Strahl, 1862)
(fig. 26a-i)

Callianassa mucronata Strahl, 1862a: 1056; Strahl, 1862b: 383; A. Milne Edwards, 1870: 94, 101; De Man, 1888: 484, pl. 21 fig. 2; Ortmann, 1891: 57; Ortmann, 1894: 23; Estanpador, 1937: 499; Tirmizi, 1977: 21 (part), figs. 1-3 (not fig. 1b = *Callianassa gruneri* spec. nov.); Poore & Griffin, 1979: 273, figs. 34, 35; Dworschak, 1992: 202, fig. 9a-f.

Callianassa brevicaudata A. Milne Edwards, 1870: 91, 101, pl. 2 figs. 2, 2a, 2b. [Type locality: Zanzibar].

Callianassa (*Cheramus*) *novaguineae* Thallwitz, 1891: 31, pl. 1 fig. 9. [Type locality: Papua New Guinea].

Callianassa novaeguineae; De Man, 1902: 757.

Callianassa (*Callichirus*) *novae-guineae*; Borradaile, 1903: 547.

Callianassa (*Callichirus*) *brevicaudata*; Borradaile, 1903: 547; De Man, 1928b: 28, 115.

Callianassa (*Callichirus*) *mucronata*; Borradaile, 1903: 547; Nobili, 1906b: 101, 108; De Man, 1928b: 29, 112, 175, pl. 19 fig. 30-30e.

Glypturus mucronatus; Sakai, 1988: 61.

Material examined.— ZMG 386, 1 ♀, Zamboanga, Mindanao, Philippines, viii.1859- .iii.1860 leg. C. Semper; ZMG 387, 2 ♂♂ (TL 33.5, CL 6.5), 1 ovig. ♀ (TL 51.0, CL 8.5), 2 ♀♀ (TL 47.0, CL 9.0; TL 53.0, CL 9.0), Zamboanga or Bohol, Mindanao, Philippines, 1863-1864 leg. C. Semper; SMF 7949, 1 ♂, Madagascar, 1881 leg. A. Stumpff; ZMH K 8423, 5 ♀♀, Djibouti, Gulf of Aden, leg. E. Warke; ZMB 1128, 1 ♀ (TL 28 mm by Tirmizi, 1977: 21), holotype, Luzon, Philippines; ZMB 3309, 1 ♀, Amboina; ZMB 15553, 3 ♀♀, Djibouti, Golf of Aden, leg. Wache; ZSM, 1 ♀, Baie de Pasandava, Madagascar, leg. Millot (det. L.B. Holthuis).

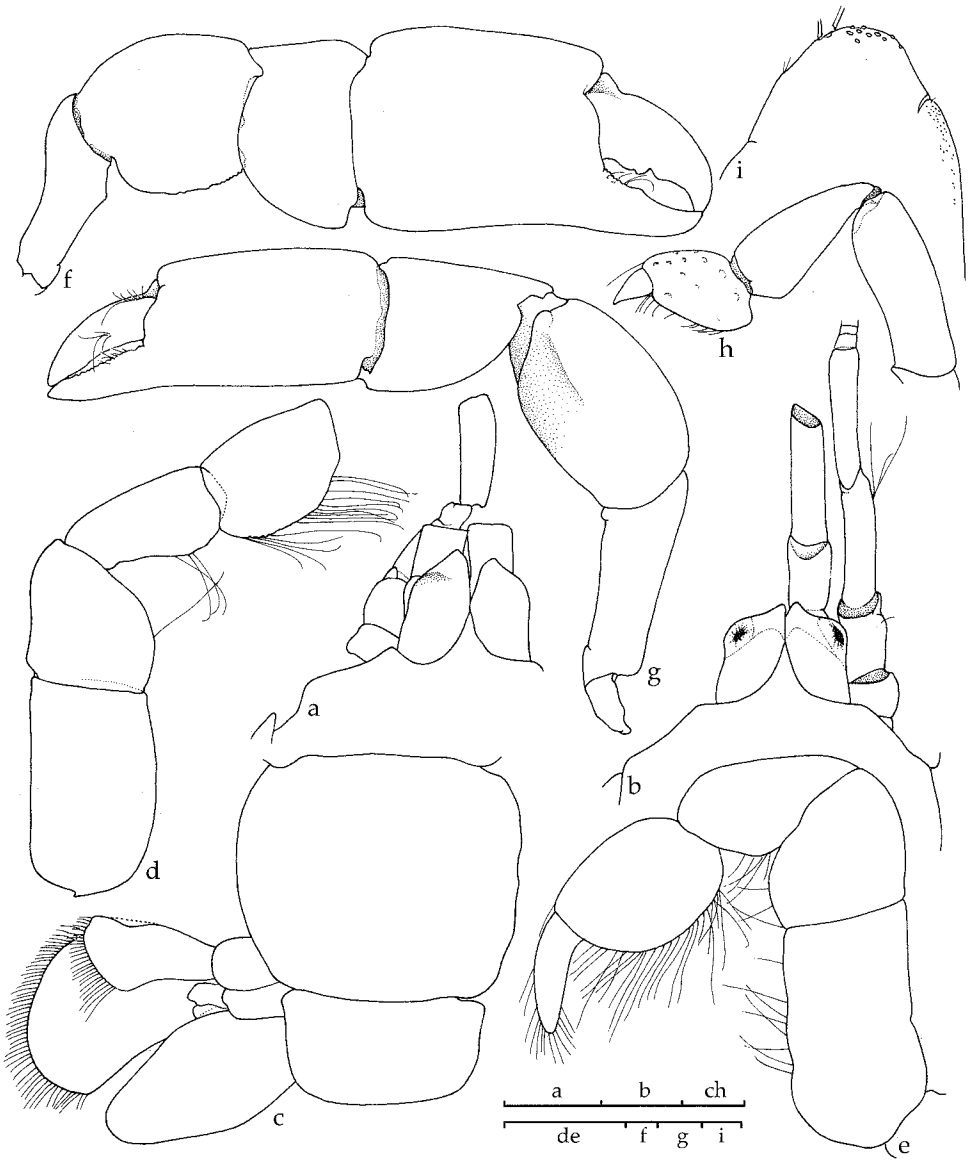

Fig. 26. *Neocallichirus mucronatus* (Strahl, 1862). a, b, Anterior part of carapace, eyestalks and A1-2 peduncles; c, abdominal somite 6 and tail-fan; d, Mxp3, attached to the body, lateral view; e, same, detached to the body; f, female larger cheliped; g, female smaller cheliped; h, P3, lateral view; i, distal part of male Plp2 endopod. a, c, d, ZMB 1128, 1 ♀, holotype, Luzon, Philippines; b, i, ZMG 387, 1 ♂, Philippines, Mindanao, Zamboanga or Bohol; f, g, ZMB 15553, 1 ♀, Djibouti, Golf of Aden. a-h, Scale = 1 mm; i, scale = 0.1 mm.

Description of female holotype.— Rostrum (fig. 26a) narrowly triangular, and anterolateral projection a lower triangle. Eyestalks slightly produced distally, and cornea located subterminally on distolateral part. Abdominal somite 6 (fig. 26c) broader than long, and telson broadened, and its distal margin truncate. Mxp3 ischium-merus (fig. 26d-e) oblong, merus slanting distally, propodus longer than broad, ventral margin broadly rounded, and dactylus pediform. P3 propodus (fig. 26h) as long as broad, ventral margin reduced in breadth distally.

Additional description of other specimens.— Male specimen with P1 unequal as in female (fig. 26f-g). In larger cheliped ischium with a proximal swelling, merus as long as ischium, but broadened, dorsal margin broadly rounded, and ventral margin roughly but scantily denticulate, chela stout, and three times as long as carpus, distal margin of palm unarmed. Dactylus 3/4 as long as palm, dorsal margin strongly rounded, and cutting edge with a triangular concavity medially. In smaller cheliped ischium and merus unarmed. Chela twice as long as carpus, dactylus 2/3 as long as carpus, cutting edge unarmed. Male Plp2 endopod distally fused with appendix masculina, with setae, but without appendix interna.

Remarks.— The type specimens from Luzon, Philippines (ZMB 1128), consisting of one male and one female specimen, were examined. The larger female is the holotype of *Callianassa mucronata*. The male is a new species, *Callianassa gruneri* spec. nov.

Tirmizi (1977: 21) re-examined the type specimens. Her description and figures of the types however, is a mixture of *C. mucronata* and *C. gruneri*. Tirmizi's fig. 1A (whole body) and 1C (telson and left uropod) are of the holotype, and show that the A2 peduncle on the left side bends outwards as can be seen in the female holotype. Fig. B (anterior part of carapace with eyestalks, part of A1-2) shows the other specimen which has the A2 peduncle directed forward as was observed in the male which is now described as the new species, *Callianassa gruneri*.

The female type is so fragile that it is impossible to examine real specimen in detail. The following characters could be observed: the eyestalks has an obscure distomedial swelling, the cornea is distally located, but indistinct because of the bad state of the specimen; the uropodal endopod is lanceolate, the median carina is not visible. The anterior part of the carapace and the eyestalks (fig. 26b) of the other specimen from Mindanao, the Philippines, are similar to those of the holotype.

In females of *N. mucronatus* (SMF 387) the Plp1 consists of three segments, the distal segment is elongated, foliaceous, and weakly segmented; the Plp2 has the endopod with a finger-like appendix interna near the distal end, while the male Plp1 consists of two segments, the distal one is chelate, and Plp2 is not provided with an appendix interna (fig. 26i).

Type locality.— Luzon, Philippines.

Distribution.— Papua New Guinea; Queensland, Australia, central reef (Poore & Griffin, 1979); Luzon, Philippines; Maldives; Amboina; N Ceram; Northwest coast of New Guinea; Siau Island and Karakelong Island, Indonesia; Djibouti and Perim, Gulf of Aden; Zanzibar; Madagascar, Baie de Pasandava.

Neocallichirus ranongensis (Sakai, 1983)

Callianassa ranongensis Sakai, 1983: 111-115, figs. 1-2; Sakai, 1987b: 45, figs. 1-2.

Material examined.—SMF 15127, Paratype, 1 ♀, Hatsaikhao, Ranong, Thailand, muddy bottom in Mangrove, 07.xii.1982 leg. K. Wada.

Remarks.— The male Plp1 is chelate in the distal segment, and the male Plp2 has both appendix masculina and appendix interna. It is very characteristic that the dactylus of Mxp3 is rounded distally, and that the propodus of P3 is medially convex on the ventral margin.

Type locality.— Hatsaikhao, Ranong Province, Thailand, Muddy mangrove swamp.

Distribution.— Ranong Province, Thailand; Halmahera, Indonesia (Sakai, 1987b).

Neocallichirus vigilax (De Man, 1916)

Callianassa (*Callichirus*) *vigilax* De Man, 1916: 57, pl. 1 figs. 1-6; De Man, 1928b: 30, 93, 109.

Remarks.— The type specimen is missing (pers. comm. D. Platvoet). The systematic position is also uncertain, however this species is shown in the figure by De Man (1916) as having the A1 peduncle shorter than A2 peduncle; the carapace bearing a pair of anterolateral spines; and the uropodal endopod broadened distally.

Type locality.— Ambon, Indonesia.

Distribution.— Ambon, Indonesia.

The following unnamed species is not listed in the key.

Neocallichirus sp. (Rathbun, 1906)

Callianassa sp. Rathbun, 1906: 893, fig. 48.
Callianassa (*Trypaea*) sp. Rathbun, 1906; De Man, 1928b: 28.

Remarks.— The identification of this species to belong to the genus *Neocallichirus* is uncertain. It is here included in the same group as the other Hawaiian species of the genus *Neocallichirus*. It does not belong to *Callianassa* because of the broadened shape of the Mxp3 propodus.

Distribution.— Honolulu, Hawaii (De Man, 1928b).

Subfamily **Eucalliacinae** Manning & Felder, 1991

Eucalliinae Manning & Felder, 1991: 781.

Definition.— Carapace lacks dorsal oval; rostrum developed or not; rostral carina present or not; cardiac prominence with a mid pit present or not; cardiac transverse line present or not; linea thalassinica complete. A1 peduncle not longer than A2 peduncle. Mxp3 ischium-merus subpediform; propodus and dactylus ovate; exopod present or not. P1 subequal or unequal, merus of larger cheliped without ventral hook.

Remarks.— The subfamily Eucalliacinae is defined only by the fact that the carapace lacks the dorsal oval. The type genus *Eucalliax* is considered a junior synonym of *Calliax*, as discussed in the remarks under *Eucalliax* and *Calliax*.

Type genus.— *Eucalliax* Manning & Felder, 1991.

Key to genera of the subfamily Eucalliacinae:

1. Mxp3 without exopod ..... ***Calliax***
- Mxp3 with a distinct exopod ..... ***Paraglypturus***

Genus *Calliax* De Saint Laurent, 1973

Calliax De Saint Laurent, 1973: 514; Sakai, 1987a: 306; Sakai, 1988: 61; Manning, 1987: 397; Manning & Felder, 1991: 783, figs. 3, 15f-j; Poore, 1994: 101.
Eucalliax Manning & Felder, 1991: 781, figs. 7, 15a-e; Poore, 1994: 101.

Definition.— Carapace lacks dorsal oval, rostrum triangularly or poorly developed. Mxp3 ischium-merus subpediform; propodus subquadrate; dactylus expanded in breadth; without exopod. P1 unequal or subequal in size, dissimilar in shape, major cheliped without meral hook. Male Plp1 uniramous, two-segmented; male Plp2 biramous, endopod with or without appendix interna and appendix masculia. Female Plp1 uniramous, two or three-segmented; female Plp2 biramous, endopod single or 2-3 segmented, with or without appendix interna. Plp3-5 foliaceous, with appendix interna in both sexes. Uropodal endopod oval or triangular in shape, much longer than telson; exopod without lateral notch.

Remarks.— *Callianassa lobata* was chosen as the type species of *Calliax* by De Saint Laurent (1973), as it was separated from other species by the presence of the lateral notch on the uropodal exopod. This notch is also found in *Callianassa tooradin* from Australia, and *Calliax jonesi* from the Bahamas; however, the present examination of *Calliax doerjesti* spec. nov. and *Callianassa tooradin* shows that there is in fact no lateral notch though it sometimes appears to be present depending on the direction of viewing the specimen. This misunderstanding arises from the fact that the uropodal exopod is laterally edged with a row of cuticulate spinules in the median-posterior half, followed by a smooth, non-spinulate margin in the anterior half, and the retreated brim of the elevated plate also bears a marginal band of cuticular spinules (figs 28g, 29).

Calliax lobata is different from *Callianassa tooradin* in that Mxp3 bears a distinct exopod as in *Calliax punica* from the Mediterranean, *Callianassa novaeabritanniae* from New Britain, *Callianassa sakaii* from Japan, and *Paraglypturus calderus* from the Marianas, while *C. lobata* bears no exopod as in *Callianassa quadracuta, Callianassa aequimana, Callianassa bulimba, Eucalliax mcilhennyi, Calliax jonesi,* and *Eucalliax cearaensis*. For this reason the genera *Calliax* and *Eucalliax* are grouped together under *Calliax* as both have Mxp3 with an exopod.

The genus *Calliax* is usually characterized by the slightly developed cardiac prominence with a mid pit, but without the cardiac transverse line, though this character is only described for the Ctenochelidae by Manning & Felder (1991: 784). The transverse line of the cardiac region is known in *Calliax mcilhennyi, Calliax aequimana, Calliax jonesi, Paraglypturus punica, Paraglypturus novaebritanniae* and *Paraglypturus sakaii*; the cardiac prominence with a mid pit is also recorded in *Calliax cearaensis, Calliax aequimana, Paraglypturus punica, Paraglypturus novaebritanniae* and *Paraglypturus sakaii*.

Type species.— *Callianassa lobata* De Gaillande & Lagardère, 1966.

Manning & Felder (1991: 782) separated the present genus from *Calliax* only because *Eucalliax* has the chelipeds equal and similar to each other. However my examination of the type specimen of *Eucalliax, E. quadracuta* (Biffar, 1970) revealed that the chelipeds are subequal in size, but dissimilar in the shape. Although *Calliax lobata* is known to bear unequal and dissimilar chelipeds, it seems that the form of the two chelipeds is not a useful character to define the genus. In *Eucalliax micilhennyi* from Florida, and *Eucalliax cearaensis* from Brazil the chelipeds are subequal in size, but in *Calliax lobata* from Mediterranean and *Calliax jonesi* from Bahamas unequal, though those four species, *Calliax lobata, Calliax jonesi, Eucalliax micilhennyi* and *E. cearaensis* as well as *Eucalliax quadracuta* all share in common the lack of an exopod on Mxp3. From those facts the genus *Eucalliax* seems invalid and should be grouped together with *Calliax* sharing the absence of a Mxp3 exopod. The type species of *Eucalliax, Callianassa quadracuta,* is very similar to that of *Calliax, C. lobata,* in the shape of male Plp2. Type species.—*Callianassa quadracuta* Biffar, 1970, by original designation. Gender feminine.

Eastern Atlantic and Mediterranean species

Calliax lobata (de Gaillande & Lagardère, 1966)
(figs 27a-c)

Callianassa (Callichirus) lobata De Gaillande & Lagardère, 1966: 259, pls. 1-4.
Calliax lobata; De Saint Laurent & Bozic, 1976: 28, figs. 7, 15, 23, 27, 34; De Saint Laurent, 1973: 514; Manning, 1987: 397; Manning & Felder, 1991: 783, figs. 3, 15f-j.

Material examined.— RMNH D 23011, paratypes, 1 ♂ (TL 28.0, CL 7.0), 1 ♀ (TL 30.0, CL 7.1), Port-Miou near Marseille, 2-8 m deep, x.1964, leg. O. de Gaillande (det. J.P. Lagardère); MNHN-Th 1297, paratype, 1 ♂ (TL 25.0, CL 6.7), paratype, 1 ♀ (TL 23.0, CL 5.5), Port-Miou near Marseille, 2-8 m deep, x.1964, leg. O. de Gaillande (det. J.P. Lagardère); MNHN-Th 1298, paratype, 1 ♂, same data as MNHN-Th 1297, eyestalks detached.

Remarks.— Some features are newly illustrated. The eyestalks (fig. 27a) have been figured differently by De Gaillande & Lagardère (1966: pl. 1 fig. 1a), and De Saint Laurent & Bozic (1976: fig. 7). In de Gaillande & Lagardère's figure the eyestalk is distally elongated with a blackish cornea, while in De Saint Laurent & Bozic' figure, it is slightly protruded distally with a compact small cornea near the tip. The rostral dorsomedian carina on the carapace is not present, nor the cardiac prominence, the midpit is present. There is no transverse cardiac sulcus.

Type locality.— Port Miou, Toulon, France, Mediterranean, 2-8 m.

Distribution.— Port Miou, Toulon, France, Mediterranean, 2-8 m.

Western Atlantic species

Key to the species of *Calliax* in the western Atlantic:

1. A1 peduncle about as long as A2 peduncle ..... ***C. cearaensis***

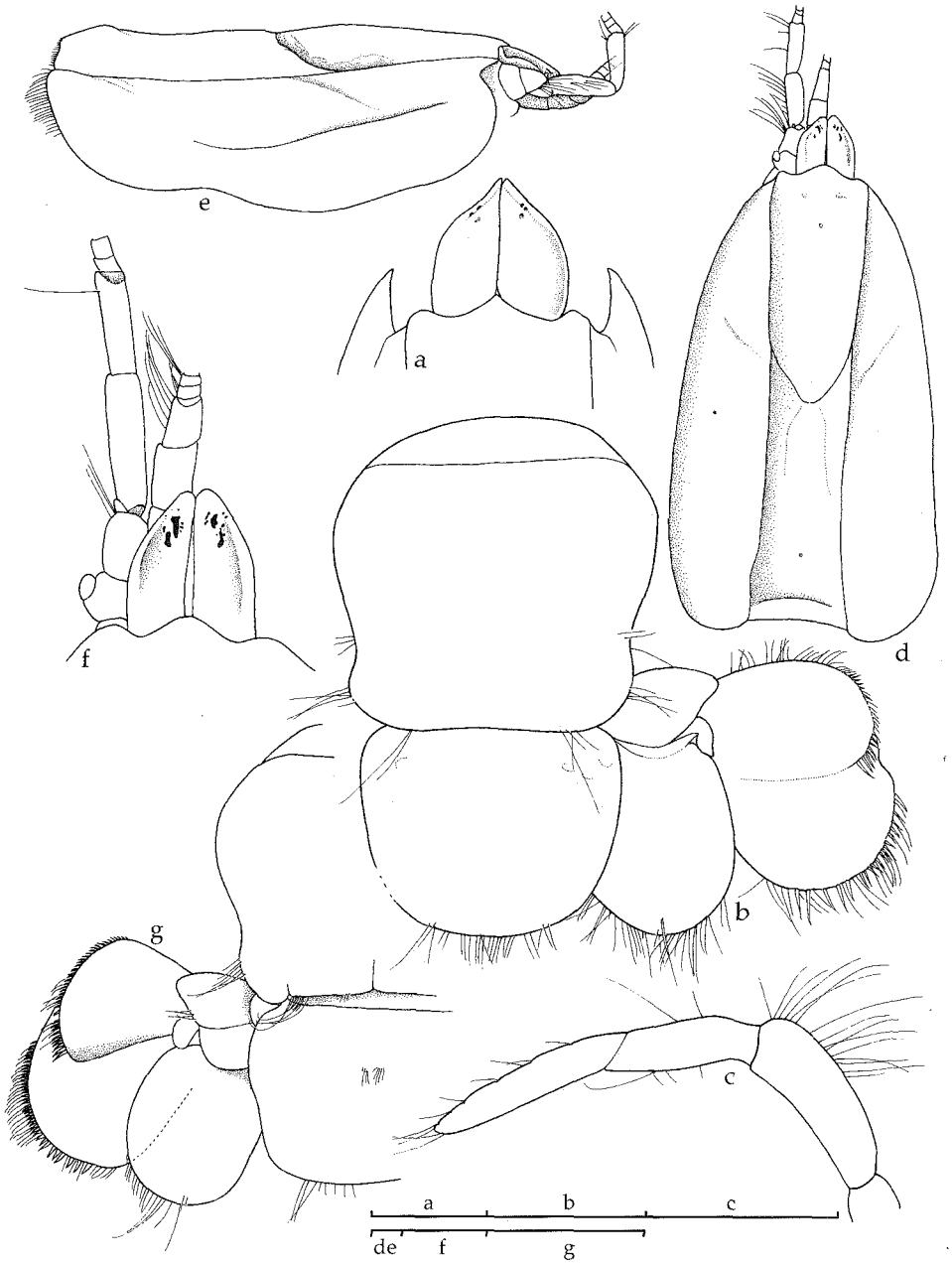

Fig. 27. *Calliax lobata* (de Gaillande & Lagardère, 1966) & *Calliax doerjesti* n. sp. a, f, anterior part of carapace and eyestalks; b, g, abdominal somite 6 and tail-fan; c, female Plp1; d, carapace, dorsal view; e, carapace, lateral view. a-c, *C. lobata*, RMNH D 23011, paratypes, 1 ♀, Port-Miou near Marseille; d-g, *C. doerjesti* n. sp., SMF 23865, holotype, 1 ♂, Ogeechee-River, Georgia, USA or Virgin Islands. Scale = 1 mm.

- A1 peduncle shorter than A2 peduncle 2
2. Rostrum obtuse or undeveloped 3
- Rostrum spinous 4
3. Uropodal endopod triangular. P1 palm L-shaped distal margin ..... ***C. quadracuta***
- Uropodal endopod oval. P1 palm with w-shaped distal margin ..... ***C. doerjesti***
4. Telson slightly concave on posterior margin ..... ***C. mcilhennyi***
- Telson entire posteriorly, with median convexity medially ..... ***C. jonesi***

Calliax cearaensis (Rodrigues & Manning, 1992)

Eucalliax cearaensis Rodrigues & Manning, 1992a: 327, fig. 2.

Remarks.— Rodrigues and Manning (1992: 327) mentioned that the carapace lacks a cardiac prominence and a rostral carina, but bears a pit on caudal portion of cardiac area.

Type locality.— Brazil, Barro de Cear Fortaleza, right bank of river mouth, (3°45'S 38°35'W).

Distribution.— Barro de Cear Fortaleza, Brazil.

Calliax doerjesti spec. nov.
(figs 27d-g, 28, 29a-f)

Material examined.— SMF 23865, holotype, 1 ♂ (TL 50.0, CL 12.0), paratype, 1 ♀(TL 48.0, CL 11.8), USA, Georgia, Ogeechee-River or Virgin Islands.

Description of male holotype.— Rostrum (fig. 27f) a lower triangle with rounded tip in dorsal view. Carapace (fig. 27d-e) smooth, without dorsal oval; cervical groove located in middle of carapace; linea thalassinica present throughout length of carapace; dorsomedian carina of carapace absent; cardiac prominence present with mid-pit developed. Abdominal somites smooth, glabrous dorsally; pleurites 1-2 smooth and glabrous laterally; pleurites 3-5 laterally with vertical row of setae; abdominal somite 6 broadly convex laterally in anterior two-thirds.

Telson (fig. 27g) subsquare and two-thirds length of its breadth; lateral margin concave in posterior half, continuous to broadly convex posterior margin; dorsal surface convex, with transverse row of setae medially. Uropodal endopod longer than telson, oval, 1.2 times as long as broad, posterior margin rounded; dorsal surface convex, without longitudinal carina; uropodal exopod oval, more than 1.3 times as long as broad, without recognizable lateral notch; dorsal surface provided with anterodorsal plate in its anterior third.

Eyestalks (fig. 27f) an elongate triangle with obtuse tip, flattened on dorsal surface, scattered distally with blackish pigments. Cardiac prominence slightly-swollen with a pit (figs. 27d-e); cardiac transverse line absent.

Antennular peduncle reaching to proximal part of antennal terminal article; rami of flagella subequal in length or with ventral ramus slightly more slender than and exceeding dorsal ramus. Antennal peduncle with first article with secretory pore

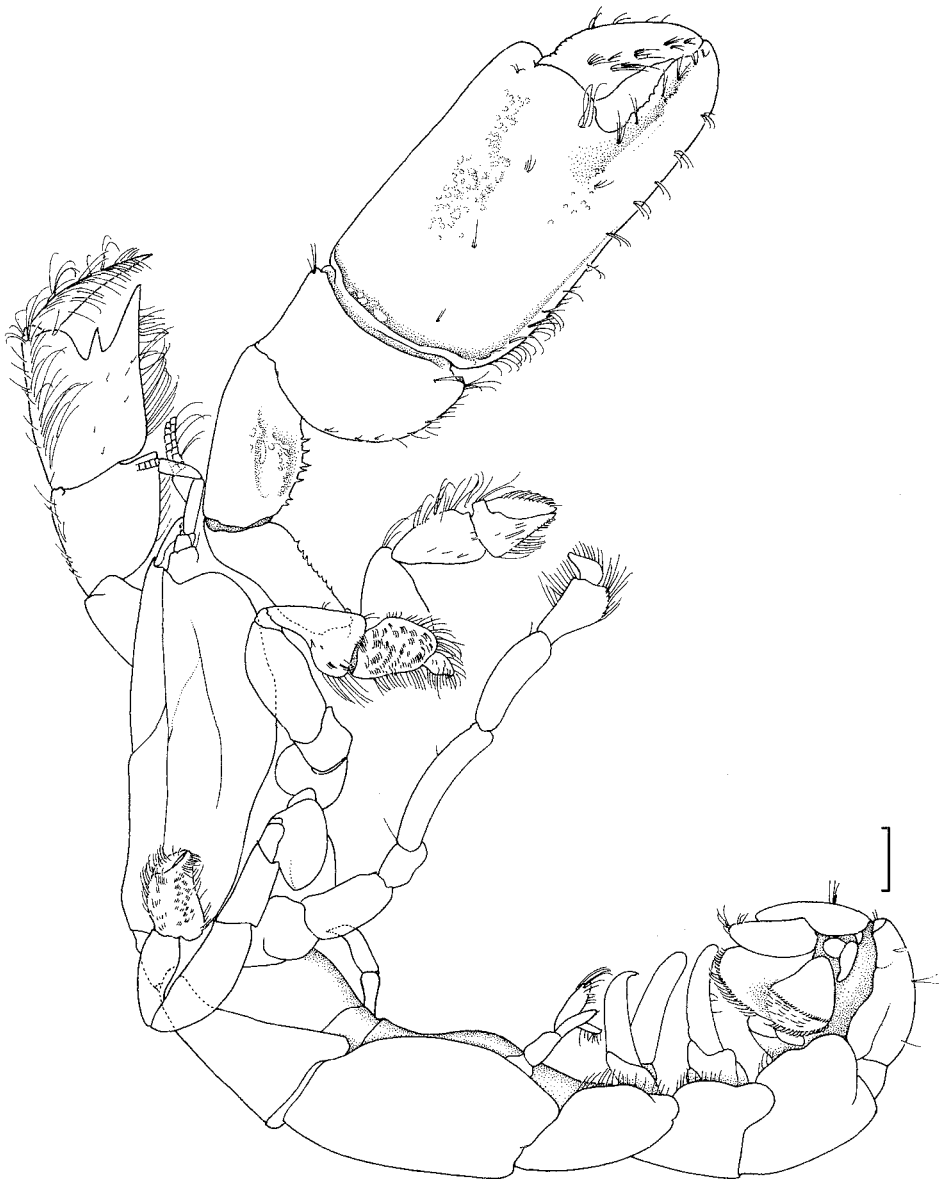

Fig. 28. *Calliax doerjesti* n. sp., SMF 23865, holotype, 1 ♂, Ogeechee-River, Georgia, USA or Virgin Islands. Scale = 2 mm.

proximally; small oval dorsal scale present; terminal article distinctly shorter than penultimate segment; antennal flagellum about five times length of antennular flagellum.

Mxp3 (fig. 29a) without exopod; endopod with long setae on mesial margin; length of endopodal merus-ischium 2.5 times width; ischium subrectangular, 1.5

times as long as broad, internal surface defined with dentate crista bearing curved row of sharp denticles; merus subtriangular, about as long as broad, slanting on distal margin; carpus subtriangular, as long as merus; propodus broader than long, two thirds length of carpus, with convex ventral margin; dactylus divergent distally in height, shorter than propodus, terminally truncate with brush of stiff bristles. Branchial formula including exopods and epipods as tabulated; branchiae limited to single podobranch on Mxp1, pair of arthrobranchs on Mxp3 to P4.

Gill-formula as follows:

	Maxillipeds			Pereiopods				
	1	2	3	1	2	3	4	5
Exopods 1	1	-	-	-	-	-	-	-
Epipods	-	-	-	-	-	-	-	-
Podobranchs	-	1	-	-	-	-	-	-
Arthrobranchs	-	-	2	2	2	2	2	-
Pleurobranchs	-	-	-	-	-	-	-	-

P1 unequal in size and dissimilar in shape. Larger cheliped (fig. 29b) massive; ischium more than twice length of high, superior margin sinuous and unarmed, inferior margin with row of sharp denticles; merus about as long as ischium, about two times as long as high, superior margin almost straight, inferior margin lacking distinct enlarged lobe, slightly convex in outline and armed with three interspaced denticles, exterior surface medially swollen; carpus 1.8 times as high as long, about one-third length of palm, superior margin almost straight, proximoinferior margin regularly rounded and smooth in outline; chela heavy, length about twice height, superior margin of palm carinate in proximal half, inferior margin with smooth keel extending to base of fixed finger, distal margin largely convex in upper part and roundly concave in lower part continuous to prehensile margin of fixed finger; fixed finger with prehensile margin armed with row of low rounded denticles in proximal half, distal to a lowly elongated tooth; dactylus about half as long as palm, prehensile margin unarmed and largely concave.

Smaller cheliped (fig. 29c) with ischium less than three times as long as high, inferior margin armed with row of denticles and superior margin unarmed; merus rectangular, and shorter than ischium, length about 1.8 times as long as height, inferior margin slightly convex with four interspaced denticles, external surface swollen medially; carpus subtriangular, proximoinferior margin regularly divergent to ventrodistal angle, length about as long as merus, about as long as height; chela slightly longer than twice high of palm; palm subrectangular, length about 1.2 times height, distal margin convex in upper part, characteristically with distinct triangular protrusion in ventral part; fixed finger distinctively shorter than dactylus, prehensile margin smooth, decreasing to sharp tip; dactylus three-fourth length of palm, conspicuously exceeding length of fixed finger, prehesile margin unarmed.

P2 chelate; ischium about as long as high, largely protruded in distroventral part; merus about twice length of height, convergent towards distal part on flexor margin; carpus about as long as flexor margin of merus; chela slightly shorter than carpus, set

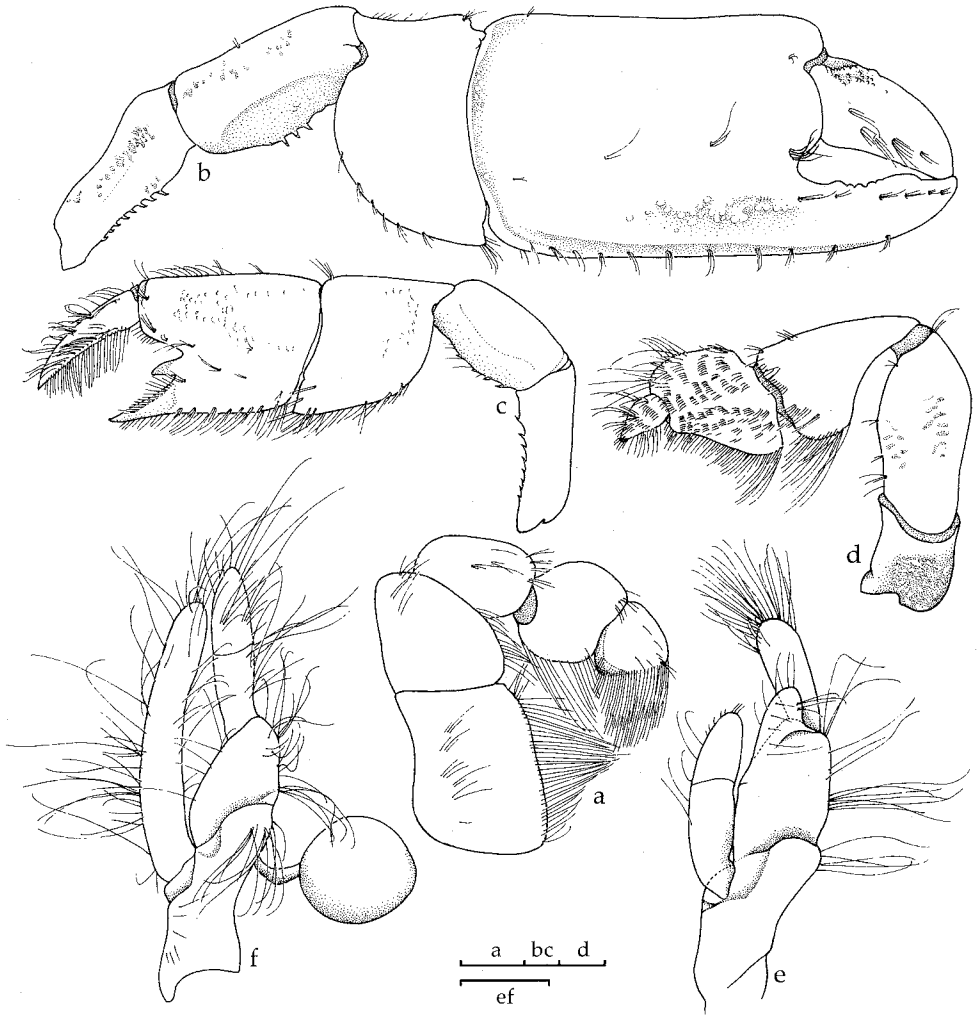

Fig. 29. *Calliax dorijesti* n. sp. a. Mxp3, lateral view; b, male larger cheliped, lateral view; c, male smaller cheliped, lateral view; d, P3, lateral view; e, male Plp2; f, female Plp2. a-e, SMF 23865, 1 ♂, holotype, Ogeechee-River, Georgia, USA or Virgin Islands; f, SMF 23865, 1 ♀, paratype. Scale = 1 mm.

with dense setae on inferior and dorsal margins; dactylus with dense setae on superior margin.

P3 (fig. 29d) meruslength about two times height; carpus broadest distally on dis-oventral margin, length more than 1.5 times height; propodus subquadrate, inferior margin convergent distally in high, superior and inferior margins with long setae, exterior surface scattered with small tufts of short setae on dorsal and ventral halves; dactylus tear-shaped, external surface densely setose, terminating in corneous tip.

P4 simple; merus subtriangular, longer than carpus, swollen in distoventral margin; propodus subrectangular, convergent distally on ventral margin, external surface

scattered with tufts of setae; dactylus tear-shaped, external surface with tuft of setae.

P5 subchelate; propodus forming inferodistally broad fixed finger, interior surface beset with dense setation, dactylus hooked toward external side of fixed finger, tip deflected.

Male Plp1 uniramous, composed of proximal segment and hock-shaped distal segment. Male Plp 2 (fig. 29e) biramous, exopod leaf-like, composed of two segments; endopod lacks appendix interna, with elongate appendix masculina. Plp3-5 biramous, endopod bearing appendix interna on mesial margin.

In the female paratype Plp1 uniramous, composed of three articles. Plp2 (fig. 29f) biramous, endopod three-segmented with long setae.

Remarks.— The male and ovigerous female from Georgia (USA) or the Virgin Islands, are determined as a new species. The new species is similar to *Callianassa lobata* from the Mediterranean in the forms of the rostrum, the chelipeds, and other characteristics. The new species differs from *Calliax lobata* in the following characters. In *Calliax dorijesti* the eyestalks are oblong (fig. 27f); the fixed finger of the larger cheliped is denticulate with a row of denticles and a lower tooth distally on the prehensile margin; the prehensile margin of dactylus is smooth; the merus of the smaller cheliped is armed with four interspaced denticles; the uropodal exopod is not notched laterally (fig. 27g); the telson is concave laterally in the posterior half, while in *Calliax lobata*, the eyestalks (fig. 27a) are triangular; the fixed finger of the larger cheliped bears an obtuse tooth medially on the prehensile margin; the prehensile margin of the dactylus is minutely serrated; the merus of the smaller cheliped is unarmed on the prehensile margin; the uropodal exopod is notched laterally (fig. 27b); the telson is convergent distally on the lateral margin.

Type locality.— Ogeechee-River, Georgia, USA, or Virgin Islands.

Distribution.— Ogeechee-River, Georgia, USA, or Virgin Islands.

Calliax jonesi (Heard, 1989)

Calliax jonesi Heard, 1989: 129, figs. 1-5.
Eucalliax jonesi; Manning & Felder, 1991: 781, figs. 7, 15a-e.

Remarks.— Although the cardiac protuberance and the rostral carina are mentioned in the text, the transverse cardiac sulcus is evidently shown as a suture line continuous with the linea anomurica on the branchial region (Heard, 1989: 129, fig. 3C (not 3D)).

Type locality.— 25°44'N 79°15'W, Bimini Harbor, Bahamas, 3-5 m.

Distribution.— Bahamas.

Calliax mcilhennyi (Felder & Manning, 1994)

Eucalliax mcilhennyi Felder & Manning, 1994: 341, figs. 1-6.

Material examined.—SMF 23502, 4 ♂♂, 1 ♀, Santa Marta, Colombia, 10-15 m, sand, in the refuse of a dredging boat, 12.ii.1976, leg. B. Werding; SMF 23503, 1 ♀, Bahia Gairaca ca. 20 km NE Santa Marta, Colombia, 22.x.1978, leg. M. Türkay; SMF 23504, 1 ♂, 2 ♀♀, Santa Marta, Colombia, 6-8 m, sand, ii.1980 leg. B. Werding; SMF 23505, 2 ♀♀, Santa Marta, Colombia, 10 m, sand, iii.1980, leg. B. Werding; SMF 23506, 1 ♀, Ensenada Granata, N. Santa Marta, Colombia, 15 m, sand, ix.1987, leg. B. Werding.

Remarks.— Felder & Manning (1994: 241-242, fig. 1) mentioned that the carapace lacks a cardiac prominence, that there is no rostral carina except for a slightly raised postrostral area between of postrorostral punctae, and they figured the cardiac transverse line of the ovigerous female in lateral view. This species is different from *Paraglypturus calderus* in the rostrum being distinctly developed, Mxp3 without having an exopod, and Plp2 being slender and not foliaceous in both sexes as for other species of this genus.

Type locality.— Indian River lagoon, (27°27.7'N 80°18.7'W), St. Lucie County, Florida, sandflat with sparse seagrass, south side of Fort Pierce Inlet.

Distribution.— Indian River lagoon, St. Lucie County, Florida; Santa Marta, Colombia.

Calliax quadracuta (Biffar, 1970)
(fig. 30a-c)

Callianassa quadracuta Biffar, 1970: 40, fig. 2; Biffar, 1971a: 650, 654, 694, figs. 17, 18.
Calliax quadracuta; De Saint Laurent & Manning, 1982: 222; Manning, 1987: 397.
Eucalliax quadracuta; Manning & Felder, 1991: 781.

Material examined.— MCZ 760, 1 ♂ (TL 78.0, CL 17.0), holotype; MCZ 12872a, 1 ovig. ♀, paratype; MCZ 732, 1 ♂, 3 ♀♀, paratypes, MCZ 760a, 3 ♂♂, 2 ♀♀, Cumaná, Venezuela, 1858, leg. J.P. Couthouy; RMNH D 31082, 1 ♂ (TL 20.0, CL 4.0), Gulf of Urabá, 8°00.1'N 76°50.3'W - 8°01.2'N 76°47.7'W, Caribbean coast, Colombia, 20-24 m depth (Pillsbury Sta. 357), 12.vii.1966.

Diagnosis.— Eyestalk in form of elongate triangle, convex dorsally, cornea located subdistally. Carapace (fig. 30a-b) lacking dorsal oval, cardiac region with obscure dorsal longitudinal carina, without transverse carina and cardiac protuberance, midpit on region of cardiac protuberance; gastric region with pair of lateral carinae. Mxp3 without exopod. Male chelipeds subequal; left cheliped with dactylus slender, much longer than of right cheliped. Male Plp2 with endopod attached distally to elongated appendix masculina; appendix interna without hooks (fig. 30c).

Gill-formula as follows:

	Maxillipeds			Pereiopods				
	1	2	3	1	2	3	4	5
Exopods	1	1	-	-	-	-	-	-
Epipods	-	-	-	-	-	-	-	-
Podobranchs	-	r	-	-	-	-	-	-
Arthrobranchs	-	-	2	2	2	2	2	-
Pleurobranchs	-	-	-	-	-	-	-	-

r = rudimentary form.

Remarks.— The type series including the male holotype was examined. It was found that there are no fundamental difference from the type species of *Calliax*, *C. lobata* except for the form of the chelipeds. Manning & Felder (1991) recognized some differences and considered them of generic and subfamily importance, a stance with which I can not agree.

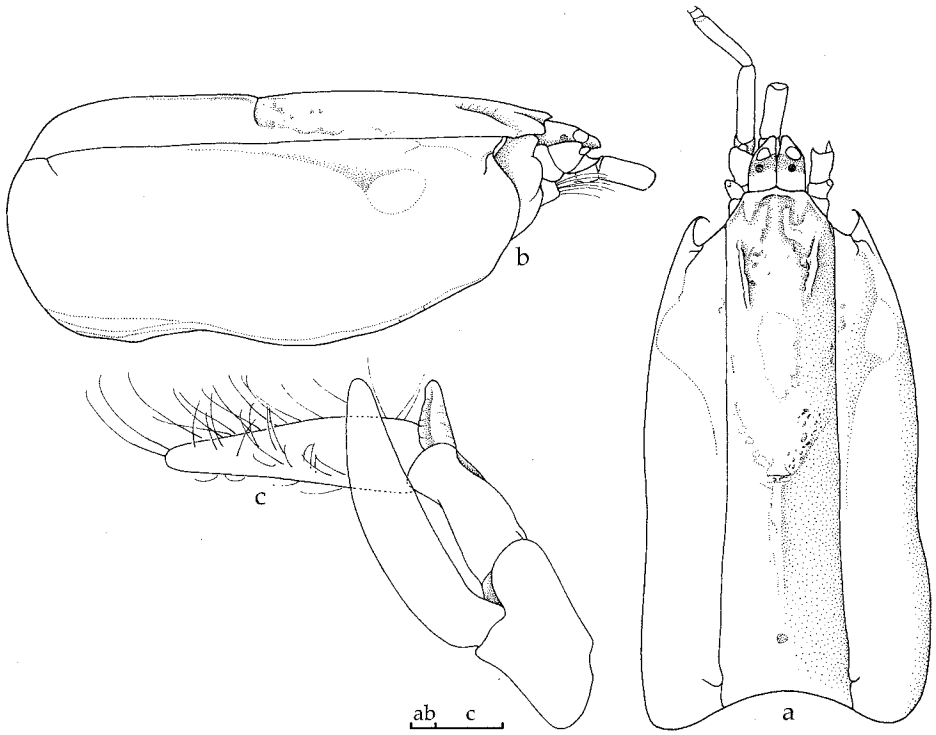

Fig. 30. *Calliax quadracuta* (Biffar, 1970). a, Carapace, dorsal view; b, same, lateral view; c, male Plp2, lateral view. a-b, MCZ 760a, 1 ♂, paratype, abdomen detached; c, MCZ 760, 1 ♂, holotype, Cumaná, Venezuela. Scale = 1 mm.

Type locality.— Cumaná, Venezuela.
Distribution.— Gulf of Uraba, Colombia, Caribbean Coast; Cumaná, Venezuela.

Indo-West Pacific species

Key to the species of *Calliax* in the Indo-West Pacific

1. Telson with a distinctive transverse carina notched at its mid-point. No linea anomurica developed ..... ***C. aequimana***
- Telson dorsally smooth without distinctive transverse carina. Incomplete linea anomurica present ..... ***C. bulimba***

Calliax aequimana (Baker, 1907)
(fig. 31a-e)

Callianassa aequimana Baker, 1907: 182-185, pl. 24 figs. 1-8; Hale, 1927: 87, fig. 83; Poore & Griffin, 1979: 245, figs. 12, 13.
Callianassa (*Callichirus*) *aequimana*; De Man, 1928b: 28, 93, 114.

Callianassa (*Callichirus*) *Novae-britanniae;* De Man, 1928a: 48 (part); De Man, 1928b: 29 (part). [Not *Callianassa novae-britanniae* Borradaile, 1900].
Callianassa (*Callichirus*) *novae-britanniae;* De Man, 1928b: 114.
Calliax aequimana; De Saint Laurent & Manning, 1982: 222; Sakai, 1988: 61.

Material examined.— ZMH-K 38201, 1 ♂, 1 ♀, Ceduna, Murat Bay, Australia, Australian Expedition 1975-76, 29.xi.1975, leg. G. Hartmann; UMC 1 ♀ (TL 36.0, CL 7.5), Goidu, Goifurfekendu, Maldive Archipelago, 20.vi.1904, leg. J.S. Gardiner (det. De Man, 1928b as *Callianassa* (*Callichirus*) *novae-britanniae*).

Diagnosis of female.— Rostrum small and triangular; anterolateral projection of carapace obtuse. Carapace without dorsal oval, anterior cervical groove located little posterior to midline of carapace, another transverse groove in cardiac region, running down cross linea thalassinica onto branchial region (figs 31a-b). No linea anomurica developed. Abdominal somite 2 about as long as somite 1, much longer than somite 6. Somite 6 with carina on posterior margin. Telson (fig. 31c) less than twice as long as broad, posterior margin slightly concave, dorsal surface with distinctive transverse carina notched at its mid-point. Eyestalks oval distally, cornea located distally. A1 peduncle slightly shorter than A2 peduncle. P1 subequal. Mxp3 without exopod. Ischium of arger cheliped (fig. 31d) armed with row of denticles ventrally, unarmed dorsally; merus slightly longer than ischium, 1.8 times as long as broad, unarmed on ventral margin; carpus about as long as merus, broader than long; chela twice as long as carpus; distal margin of palm convex and unarmed; cutting edge of fixed finger armed with triangular tooth; dactylus two-thirds length of palm, cutting edge weakly sinuated. Ischium of smaller left cheliped (fig. 31e) armed with few denticles proximally on ventral margin, unarmed dorsally; merus about as long as ischium, unarmed ventrally; carpus about as long as merus, broader than long; chela about twice as long as carpus; cutting edge of fixed finger concave proximally; dactylus about as long as palm, cutting edge also unarmed. Uropodal endopod 1.5 times as long as broad, reducing its breadth towards distal part, oval on distal margin. Uropodal exopod broadly rounded distally.

Remarks.— The present female from Maldive Archipelago was reported as *Callianassa* (*Callichirus*) *novaebritanniae* var. by De Man (1928b: 114). *Calliax aequimana* is closely related to *C. novaebritanniae* by having the transverse groove present in the cardiac region. Differences are as follows. *C. aequimana*: 1) Mxp3 without exopod, 2) no linea anomurica, 3) abdominal somite 6 with ridge on posterior margin, 4) telson with a transverse ridge, which is interrupted at its mid-point. *C. novaebritanniae*: 1) Mxp3 with exopod, 2) linea anomurica distinctive, 3) abdominal somite 6 without marginal brim, 4) telson without a transverse ridge.

Type locality.— South Australia, Kingston.

Distribution.— Southern Queensland to Kingston, south Western Australia, intertidal to 9 m (Poore & Griffin, 1979); Maldive Archipelago, Goifurfekendu, Goidu.

Calliax bulimba (Poore & Griffin, 1979)
(fig. 32a-c)

Callianassa bulimba Poore & Griffin, 1979: 257, fig. 21.
Calliax bulimba; De Saint Laurent & Manning, 1982: 222; Sakai, 1988: 61.

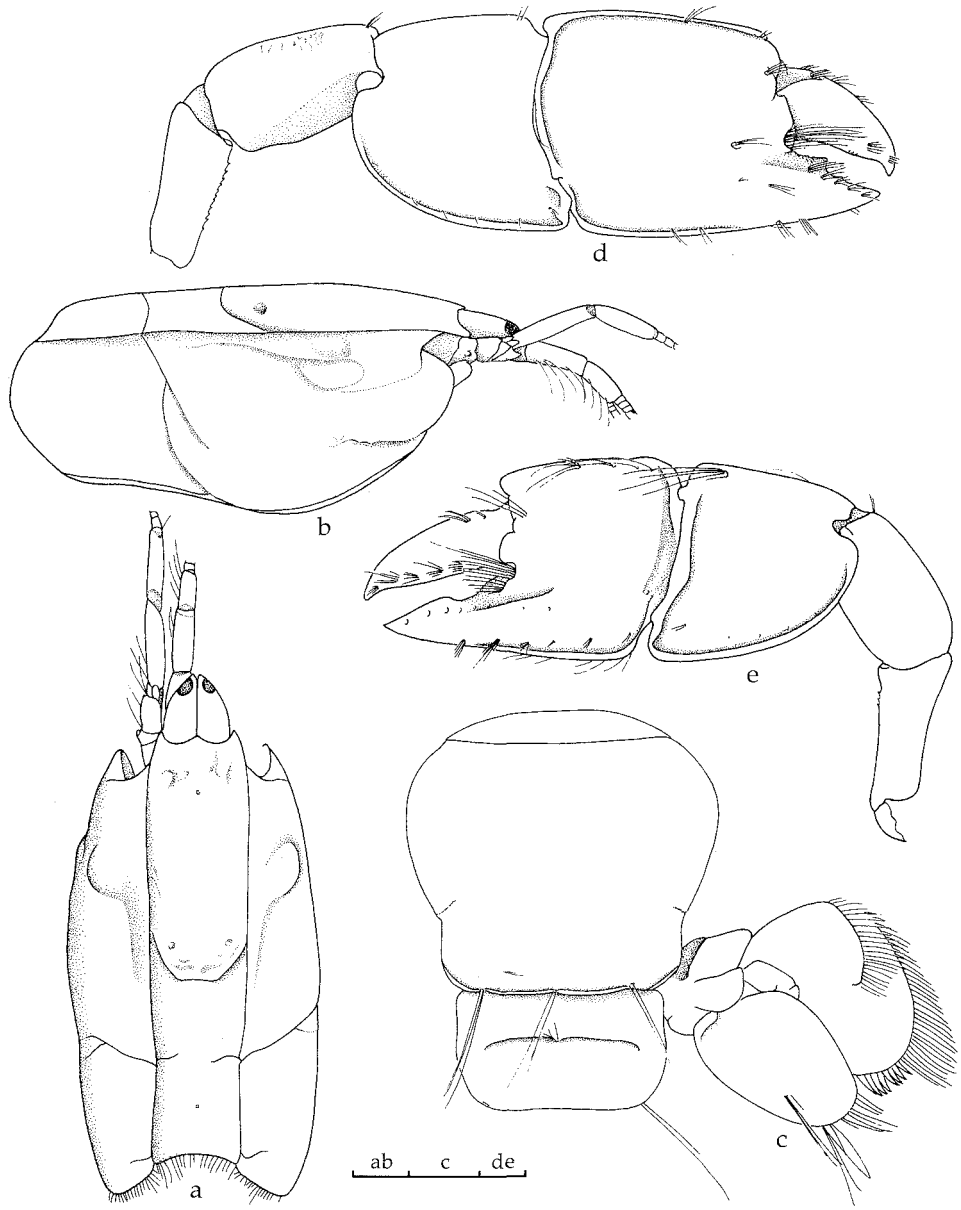

Fig. 31. *Calliax aequimana* (Baker, 1907), UMC 1 ♀, Goifurfekendu, Maldive Archipelago. a, Carapace, dorsal view; b, carapace, lateral view; c, abdominal somite 6 and tail-fan; d, female larger cheliped, left side; e, female smaller cheliped, right side. Scale = 1 mm.

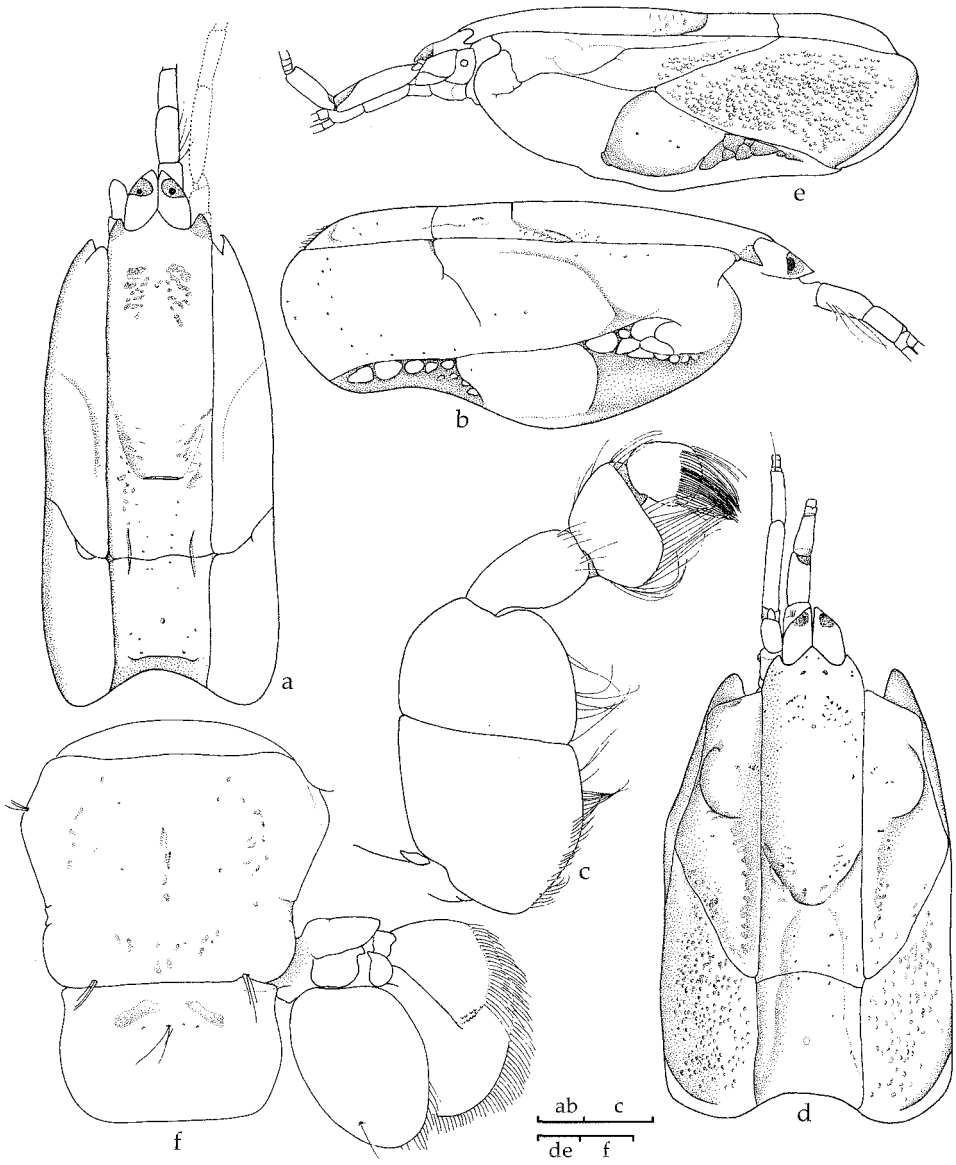

Fig. 32. *Calliax bulimba* (Poore & Griffin, 1979) & *Paraglypturus novaebritanniae* (Borradaile, 1900). a, d, Carapace, dorsal view; b, e, same, lateral view; c, Mxp3, lateral view; f, abdominal somite 6 and tail fan. a-c, *Calliax bulimba*, QMB W1525, 1 ♂, holotype, Mud Is., Moreton Bay, SE Queensland, Australia; d-f, *Paraglypturus novaebritanniae*, UMC, 1 ♂, New Britain. Scale = 1 mm.

Material examined.— QMB W1525, 1 ♂ (TL 36.0), Mud Island, Moreton Bay, SE Queensland, Australia, 12.x.1942, leg.V. F. Collin, det. G.C.B. Poore.

Remarks.— Only male characters are known. This species is closely related to *Paraglypturus novaebritanniae* and *P. sakaii* because of the transverse cardiac line and the incomplete linea anomurica on the branchial region. The rudimentary exopod of the Mxp3 more closely resembles *Calliax*, as it is more conspicuous in *Paraglypturus*. The cardiac protuberance is not developed, but has a mid-pit. The dorsal part of the carapace is obscurely swollen longitudinally in the middle part, which suggests is similar to the obscure dorsal longitudinal carina of the cardiac region in *C. quadracuta*.

Type locality.— Moreton Bay, Mud Island, Queensland, Australia.

Distribution.— Moreton Bay, Mud Island, Queensland, Australia.

Genus *Paraglypturus* Türkay & Sakai, 1995

Paraglypturus Türkay & Sakai, 1995: 26.

Definition.— Carapace lacks dorsal oval, rostrum distinct or poorly developed. Mxp3 with distinct exopod, ischium-merus subpediform, propodus subquadrate, dactylus ovate. P1 unequal, major cheliped without meral hook. Male Plp1 uniramous, biarticulate, or absent. Male Plp2 biramous, endopod with appendix interna, with or without appendix masculina. Female Plp1 uniramous, biarticulate. Female Plp2 biramous, endopod with or without appendix interna. Plp3-5 foliaceous, with appendices internae in both sexes. Uropodal endopod oval, much longer than telson; exopod with or without lateral notch or incision.

Remarks.— This genus is closely related to *Calliax* because of the relative length of A1-2 peduncles, the form of Mxp3 dactylus, the absence of a ventral hook on the merus of the major male cheliped. It is separated from *Calliax* because the Mxp3 bears a distinct exopod.

Type species.— *Paraglypturus calderus* Türkay & Sakai, 1995.

Eastern Atlantic and Mediterranean species

Paraglypturus punica (De Saint Laurent & Manning, 1982)

Callianassa subterranea; Ortmann, 1891: 56 (part). [Not *Callianassa subterranea* Montagu, 1808).
Calliax sp. De Saint Laurent & Bozic, 1976: 29, figs. 8, 16, 24, 35. [Locality: Salammbo, Tunisia].
Calliax punica De Saint Laurent & Manning, 1982: 212, figs. 1-6. [Type locality: Salammbo, Tunesia].

Material examined.— NHML 1974:179, 1 ♂, paratype, northern Punic, Salammbo, Tunisia, leg. Manning & Ingle.

Remarks.— The rostral carina and cardiac prominence unknown. Cardiac region bears a transverse line which is interrupted in its dorsal part,extended laterally to the dorsal part of the branchial region across the linea thalassinica (De Saint Laurent & Manning, 1982: 213). This structure is also found in *Calliax aequimana, Calliax mcilhennyi, Calliax jonesi, Paraglypturus novaebritanniae,* and *Paraglypturus sakaii.*

Type locality.— Gulf of Tunis.
Distribution.— Tunisia; Sardegna; Naples.

Indo-West Pacific species

Key to the species of *Paraglypturus* in the Indo-West pacific

1. Uropodal endopod with rounded yellow-transparent circular patch .... ***P. calderus***
- Uropodal endopod without circular patch 2
2. Uropodal endopod oval, three times as long as telson. Cornea small ... ***P. tooradin***
- Uropodal endopod oval, 1.2-1.3 times as long as telson. Cornea distinct 3
3. Uropodal exopod with distal spinule. Transverse and posteromedian carina on thoracic sternum 4 reduced ..... ***P. novaebritanniae***
- Uropodal exopod unarmed. Transverse and posteromedian carina on thoracic sternum 4 distinct .....***P. sakaii***

Paraglypturus calderus Türkay & Sakai, 1995

Paraglypturus calderus Türkay & Sakai, 1995: 27, figs. 2-6.

Material examined.— SMF 22947, 1 ♂ holotype, N Esmeralda Caldera off Saipan, 14°58.30'N 145°15.14'E, N of Marianas, W Pacific, 63 m, 21.vii.1990, R.V. *"Sonne"*; SMF 22948, 1 ♀, allotype, N Esmeralda Marianas, W Pacific, 63 m, 21.vii.1990, R.V. *"Sonne"*; SMF 22949-50, 7 ♂♂, paratype, N Esmeralda Caldera off Saipan, 14°58.30'N 145°15.14'E, N of Marianas, W Pacific, 63 m, 21.vii.1990, R.V. *"Sonne"*; SMF 22951-3, 5 ♂♂, 10 ♀♀, 16 juv., paratypes, N Esmeralda Caldera off Saipan, 14°58.38'N 145°15.05'E, N of Marianas, W Pacific, 114 m, 21.vii.1990, R.V. *"Sonne"*.

Type locality.— 14° 58.30'N 145° 15.14'E, North rim of Esmeralda Caldera, Marianas, 63 m.
Distribution.— North rim of Esmeralda Caldera, Marianas, 63-114 m.

Paraglypturus novaebritanniae (Borradaile, 1900) (fig. 32d-f)

Callianassa novae-britanniae Borradaile, 1900: 419, pl. 39 fig. 14a-d.
Callianassa (*Callichirus*) *novae-britanniae*; Borradaile, 1903: 547; Borradaile, 1904: 753.
Callianassa (*Callichirus*) *Novae-britanniae*; De Man, 1928a: 48 (part); De Man, 1928b: 29 (part).
Callianassa (*Callichirus*) *Novae-britanniae* var.; De Man, 1928a: 49, pl. 12 fig. 20-20g; De Man, 1928b: 29.
Callianassa (*Callichirus*) *novae-britanniae*; De Man, 1928b: 92-93(part) (not: 114 = *P. aequimanus*).
Callianassa (*Callichirus*) *novae-britanniae* var.; De Man, 1928b: 92, 114.
Calliax novaebritanniae; De Saint Laurent & Manning, 1982: 211-224, figs. 1c, 2b, 6c.

Material examined.— UMC 1 ♂ (TL 43.0, CL 10.5), lectotype, New Britain, leg. A. Willey.

Remarks.— De Man (1928b) examined the male specimen from New Britain and the female from the Maldive Archipelago, Goifurfekendu, Goidu, and unfortunately mistook the male specimen for *Callianassa* (*Callichirus*) *novaebritanniae* var., which lacks the transverse ridge on the telson (De Man, 1928b: 114), and the female for *Cal-*

lianassa (*Callichirus*) *novaebritanniae*. The female with a transverse carina on the dorsal surface of the telson is here identified as *Calliax aequimana*, the male from New Britain without a transverse carina (fig. 32d-e) as *Paraglypturus novaebritanniae*.

In the male lectotype the carapace bears the cervical groove and another transverse line on the cardiac region. Rostral carina and transverse cardiac sulcus are not present.

No cardiac prominence is developed, a mid-pit is prsent (fig. 32d).

Type locality.— New Britain, Papua New Guinea.

Distribution.— New Britain, Papua New Guinea.

Paraglypturus sakaii (De Saint Laurent & Le Loeuff, 1979)
(fig. 33d-e)

Callianassa (*Callichirus*) *novaebritanniae*; Sakai, 1966: 161, figs. 1-4. [Not *Callianassa novae-brittaniae* Borradaile, 1900].

Calliax sakaii De Saint Laurent & Le Loeuff, 1979: 95; De Saint Laurent & Manning, 1982: 211-224, figs. 1, 2, 6; Sakai, 1987a: 306.

Material examined.— MP Th 312 (ZLKU 10342), 1 ♂, holotype, east coast of Tomioka, Amakusa, Kyushu, 24.iv.1963, leg. K. Sakai (det. K. Sakai 1966: 161 as *Callianassa novaebritanniae* Borradaile, 1899; De Saint Laurent, lett. Ngoc-Ho and C.H.J.M. Fransen); MP Th 313 (ZLKU 10343), 1 ♀, same data with holotype; RMNH D 21085, 1 ♂, 1 ♀, same data as holotype, det. K. Sakai 1966: 161 as *Callianassa novaebritanniae* Borradaile, 1899; ZLKU 10344-1, 1 ♂ (TL 47.0, CL 12.0), same data as holotype and RMNH D 21085; ZLKU 10344-2, 1 ♂, same data as holotype and RMNH D 21085; ZLKU 10344-20, 4 ♂♂ (no. 14, 16, 17, 20), 3 ♀♀ (no 15, 18, 19), same data as holotype and RMNH D 21085; ZLKU 10344-23; ZLKU 10344-25-29, 2 ♂♂ (no 23, 26), 4 ♀♀ (no. 25, 27, 28, 29), same data as holotype and RMNH D 21085; ZLKU 10344-24, 1 ♀, damaged, missing abdominal somite 3-telson, same data as holotype and RMNH D 21085; ZLKU 10344-3-36, 7 ♀♀ (no 30, 31, 32, 35), same data as holotype and RMNH D 21085.

Remarks.— No rostral carina is present. The transverse carina is present on the cardiac region, and the cardiac protuberance with a mid-pit is slightly swollen (figs 33d-e). The sandy beach in the lower tidal zone with *Zostera* vegetation, Amakusa, Kyushu Island, which was situated in front of the Marine Laboratory, Kyushu University, no longer exists as a result of land development.

Type locality.— Tomioka, Amakusa, Japan, intertidal .

Distribution.— Tomioka, Amakusa, Kumamoto, Japan (Sakai, 1966).

Paraglypturus tooradin (Poore & Griffin, 1979)
(figs 33a-c)

Callianassa tooradin Poore & Griffin, 1979: 275, fig. 36.
Calliax tooradin; Sakai, 1988: 61.

Material examined.— NMV J303, 1 ♀, Crib Point, Western Port, Victoria, Australia, CPBS stn. 11, 31.iii.1965, det. G.C.B. Poore.

Remarks.— This species lacks a male Plp1 (Poore & Griffin, 1979: 277), and there-

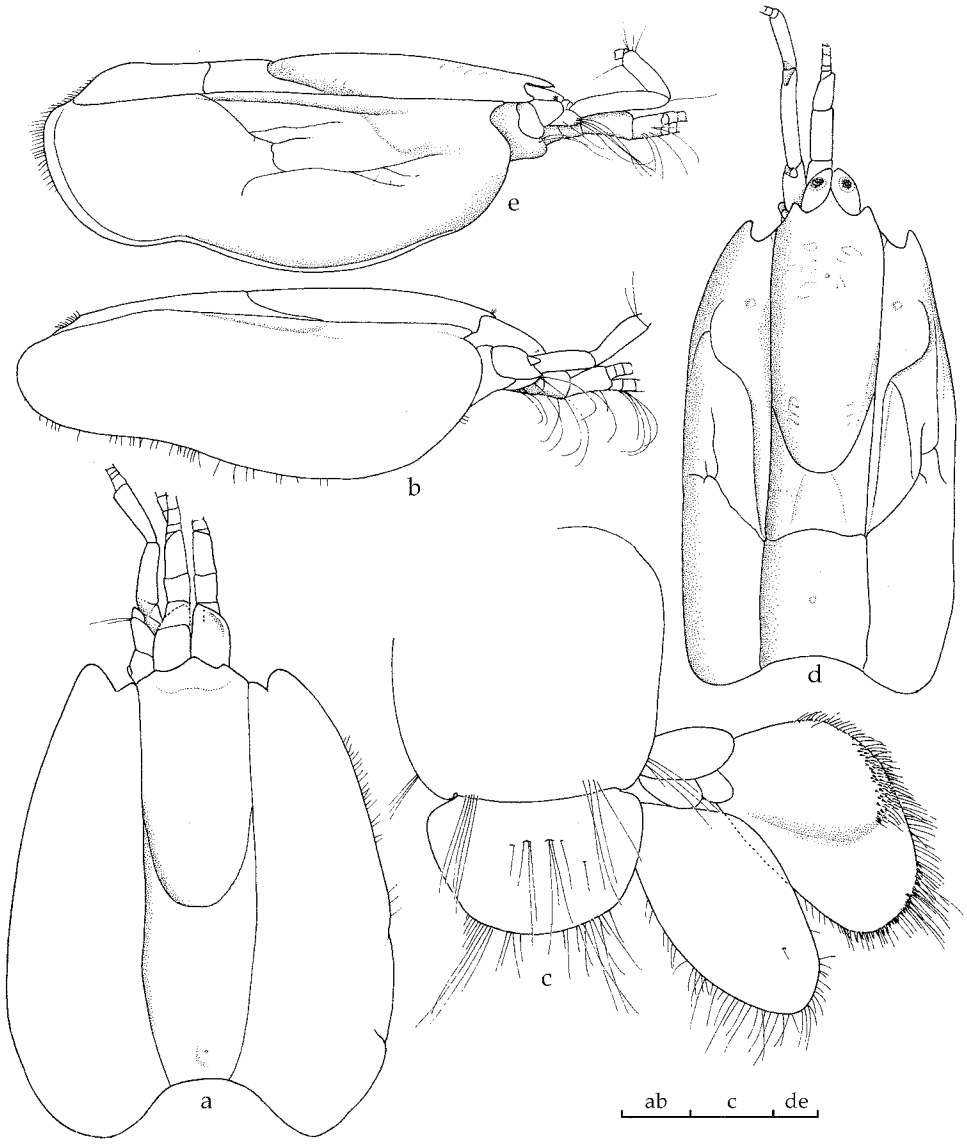

Fig. 33. *Paraglypturus tooradin* (Poore & Griffin, 1979) & *Paraglypturus sakaii* (de Saint Laurent & Le Loeuff, 1979. a, d, Carapace, dorsal view; b, e, carapace, lateral view; c, abdominal somite 6 and tail-fan.a-c, *P. tooradin*, NMV J303, 1 ♀, Western Port, Victoria, Australia; d-e, *P. sakaii*, ZLKU 10344-1, 1 ♂, Amakusa, Japan. Scale = 1 mm.

fore differs from *Calliax lobata*. In the female paratype the rostral dorsomedian carina is not present; the cardiac region is not provided with the cardiac prominence and the transverse line (fig. 33a-b); a mid-pit is present; the propodus and dactylus of Mxp3 are oval; Mxp3 has a distinct exopod; the male Plp1 is uniramous, biarticulate, the distal segment obtuse distally; the female Plp2 has a two-segmented endopod with-

out appendix interna as in *C. lobata*; ther is no lateral notch in the uropodal exopod (fig. 33c). The gill-formula is as follows:

	Maxillipeds			Pereiopods				
	1	2	3	1	2	3	4	5
Exopods	1	1	1	-	-	-	-	-
Epipods	-	-	-	-	-	-	-	-
Podobranchs	-	r	-	-	-	-	-	-
Arthrobranchs	-	-	2	2	2	2	2	-
Pleurobranchs	-	-	-	-	-	-	-	-

r = rudimentary form.

Type locality.— Australia, Victoria, Crib Point, Western Port, fine sand sediment, 5 m.

Distribution.— Western Port, Victoria, Australia (Poore & Griffin, 1979).

Subfamily **Anacalliacinae** Manning & Felder, 1991

Anacalliinae Manning & Felder, 1991:786.

Diagnosis.— Carapace with dorsal oval, rostral carina and cardiac prominence present. A2 with strong antennal scale. Mxp3 endpod pediform; merus without distal spine; propodus and dactylus slender. P1 subequal; merus of larger cheliped without ventral hook. Uropodal exopod lacking dorsal plate.

Remarks.— The subfamily Anacalliacinae was included in the family Ctenochelidae Manning & Felder, 1991, and later transferred to the family Callianassidae Dana, 1852 by Poore, 1994. The Anacalliacinae are characterised by the carapacal oval as in Callianassidae; by the rostral dorsomedian carina, the cardiac prominence with a mid-pit, and the pediform Mxp3 as in the Ctenochelidae.

Type genus.— *Anacalliax* De Saint Laurent, 1973.

Genus *Anacalliax* De Saint Laurent, 1973

Anacalliax De Saint Laurent, 1973: 515; Manning, 1987: 397; Manning & Felder, 1991: 786, figs. 2-3, 17.

Definition.— Carapace with oval well defined, rostrum slightly carinate, and cardiac protuberance present. Mxp1 with elongated anterior lobe. Mxp3 without exopod; endopod pediform, dactylus more than twice longer than broad. Male Plp1 two-segmented, distal segment simple or chelate distally. Male Plp2 with appendix interna and appendix masculina;. Female Plp1 uniramous, biarticulate. Female Plp2 biramous, endopod with appendix interna. Male and female Plp3-5 with appendices internae. Uropodal exopod unlobed, distally thickened, with strong indentation. Chelipeds slightly unequal. (revised after De Saint Laurent, 1973).

Type species; *Callianassa argentinensis* Biffar, 1971, by original designation and monotypy.

Eastern Atlantic species

Anacalliax pixii (Kensley, 1975)

Callianassa pixii Kensley, 1975: 53, figs. 4A-H, 5A-K.

Remarks.— Rostral carina is present. Cardiac protuberance and its mid-pit are unknown.

Type locality.— Kowie River estuary, Cape Province, South Africa.

Distributuion.— Kowie River estuary, Cape Province, South Africa.

Western Atlantic species

Anacalliax agassizi (Biffar, 1971)

Callianassa agassizi Biffar, 1971: 233, fig. 3.
Anacalliax agassizi; Manning, 1987: 397; Manning & Felder, 1991: 787 (list).

Material examined.—MCZ 12872c, 1 ♀, holotype, Cumana, Venezuela, leg. L. Agassiz; MCZ 12872b, 2 ♀♀, 1 ♂, paratypes, data as in holotype.

Diagnosis.— Carapace with oval well defined, rostrum subacute with highly elevated dorsal carina, which extends to midpoint of carapace, cardiac protuberance elevated, with mid-pit. Mxp3 without exopod. Gill-formula as follows:

	Maxillipeds			Pereiopods				
	1	2	3	1	2	3	4	5
Exopods	1	1	-	-	-	-	-	-
Epipods	-	-	-	-	-	-	-	-
Podobranchs	-	r	-	-	-	-	-	-
Arthrobranchs	-	-	2	2	2	2	2	-
Pleurobranchs	-	-	-	-	-	-	-	-

r = rudimentary form.

Male Plp1 uniramous, two-segmented, distal segment chelate distally. Male Plp2 biramous, exopod blade-like, endopod two-segmented with appendix interna bearing distal hooks and appendix masculina. Female Plp1 two-segmented. Female Plp2 biramous; exopod blade-like; endopod two-segmented with appendix interna.

Type locality.— Cumana, Venezuela.

Distribution.— Cumana, Venezuela.

Anacalliax argentinensis (Biffar, 1971)

Callianassa argentinensis Biffar, 1971: 229, fig. 2.
Anacalliax argentinensis; Manning, 1987: 397; Manning & Felder, 1991: 787 (list), figs. 2, 3, 17.

Remarks.— The rostral carina and the cardiac protuberance are present. The transverse cardiac sulcus is unknown.

Type locality.— Sandy beach on the north coast of Isla del Rey, Rio Deseado, Provincia Santa Cruz, Argentina, 47°42'S 66°W.

Distribution.— Argentina: Provicia Sant Cruz, Río Deseado; Provincia Rio Negro, Golfo San Catías; Provincia Buenos Aires, Riacho Jabali, Bahia San Blas.

Appendix

As mentioned in the introduction, *Callianassa celebica* De Haan, 1844 and *Scallasis amboinae* Bate, 1888 are not included in the present keys.

Callianassa celebica De Haan, 1844

Callianassa celebica De Haan, 1844, pl. N; Borradaile, 1903: 548; De Man, 1928b: 115.

Remarks.— The taxonomic position of this species is uncertain because the existing description is insufficient. It might belong to *Callichirus, Lepidophthalmus, Glypturus* or *Neocallichirus* by the form of Mxp3.

Type locality.— Unknown.

Gourretia denticulata (Lutze, 1937)

Callianassa denticulata Lutze, 1937: 6.
Gourretia denticulata; Manning & Felder, 1991: 785, fig. 3.

Remarks.— This species is most probably a synonym of *Gourretia minor* Gourret, 1887, Ctenochelidae, because the anterior part of the carapace with the rostrum, the major cheliped and P3 of *C. denticulata* are the same as *Callianassa minor* var. *minor* Gourret, 1887 (Holthuis 1958: fig. 11). The material of this species is lost (comm. Dr. M. Türkay).

Type locality.— Adriatic Sea.

Addendum

Necallianassa Heard & Manning, 1998

Necallianassa Heard & Manning, 1998: 883.

Remarks.— This new genus is distinguished from other genera of the Callianassidae by the presence of one or two lateral spines on the telson and a strong outer spine on the uropodal endopod. Those characters however, are also found in *Callianassa acanthura* Caroli, 1946 from the Bay of Naples, Mediterranean, in which the rostral spine is not sharply developed as in *C. berylae* but as in common callianassid species. In *Callianassa intermedia* De Man, 1905 from Indonesia, the rostrum is spinous and the telson is armed with lateral spinules. Based on the traditional generic criterion

derived from the form of the carapace, Mxp3 and P3, this new genus is safely included in *Callianassa*.

Callianassa berylae (Heard & Manning, 1998)

Necallianassa berylae Heard & Manning, 1998: 884, figs. 1-3.

Remarks.— From the above-mentioned reason, this new species is classified as a species of the genus *Callianassa*.

Nihonotrypaea Manning & Tamaki, 1998

Nihonotrypaea Manning & Tamaki, 1998: 89.

Remarks.— Manning & Tamaki (1998) established *Nihonotrypaea* on the basis of its projecting appendices internae on pleopods 3-5. It is certain that this character is shown by De Man (1928a, pl. 5, fig. 10l). However, I observed the appendix interna in the specimens of *C. japonica* and *C. petalura*, and confirmed that it is separated from the pleiodial endopod by a suture. This fact led to the error in the form of appendix interna. *Nihontrypaea* is here integrated in *Callianassa*.

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