Axioidea of the World and a Reconsideration of the Callianassoidea (Decapoda, Thalassinidea, Callianassida)

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Cover: Gyanacaris hirsutimana (Boesch & Smalley, 1972), male; see p. 122, fig. 22A.

Axioidea of the World and a Reconsideration of the Callianassoidea (Decapoda, Thalassinidea, Callianassida)

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PREFACE

With this book on the superfamily Axioidea I conclude my worldwide overview of the second major clade of the infraorder Thalassinidea, started in 2005 with a first treatise on the Callianassoidea (cf. Sakai, 2005b). The present text treats the Axioidea and reconsiders the classification of the Callianassoidea, thus resulting in a complete review of the **Callianassida** sectio nov., now conceived as a distinct section within the infraorder Thalassinidea (obviously in addition to the nominate section **Thalassinida** sectio nov.). In addition, the Upogebiidae have also been reviewed (Sakai, 2006), a family contained in the superfamily Thalassinoidea. Together these volumes are intended to present both an inventory of the currently known species of those taxa of the infraorder Thalassinidea, as well as my views on their classification.

Descriptions of the taxa included have been made as accurate as required, both in text and in figures. Nomenclature and literature have been screened to comply with international standards and to be as exhaustive as possible. The principles of classification I have used primarily refer to the classical school in taxonomic practice, also known as "Evolutionary Systematics", that was established by J. Huxley, G.G. Simpson, and E. Mayr, largely during the years 1940-1960. I fully realize that in the future other criteria of classification may increasingly be employed, mainly those of "Phylogenetic Systematics" based on the principles explained by W. Hennig, most effectively in 1966. Also, classifications will progressively be founded on data other than those derived from morphology and anatomy, as, e.g., molecular and genetic evidence. Nevertheless, I trust that my present compilation may serve as a basis from which to work on a more and more fine-tuned and well-corroborated classification of this interesting and important group of animals. I also hope that the distributional data presented may likewise be of value in detailing the biogeography of the Callianassida (as well as, of course, of the Upogebiidae in the Thalassinida).

Having remarked this, I all the same point to the fact that, where during recent years cladistic analyses have become available, I have carefully compared those with my own data and, where I deemed such appropriate, have

implemented some of those results into my own classification, i.e., as far as I judged relevant.

While acknowledging the above, I am fully aware of the fact that new thalassinidean taxa are continuously being described as more material and more sophisticated techniques become available. Yet, as with every review work, the present text can only give a momentaneous picture of what is known to date — though I have made every attempt to ensure that this report on the current status quo will be as complete as humanly possible*).

Tokushima, April 2010
K. SAKAI

*) Meanwhile, some new results have indeed been published: I refer to the Addenda following the main text for recent additions to thalassinidean systematics.

Tokushima, July 2010
K. SAKAI

INTRODUCTION

The infraorder Thalassinidea Latreille, 1831 as a whole was reviewed by Borradaile (1903), Poore (1994, 1997), and Tudge et al. (2000). The families Axiidae and Callianassidae were reviewed by De Man (1925, 1928); the family Axiidae was reviewed by Kensley (1981a, 1989, 1994, 1996a-e, 2003) and by Sakai & De Saint Laurent (1989); the Callianassidae and Ctenochelidae were reviewed by Manning & Felder (1991); the Callianassidae were reviewed by Sakai (1999c); the families contained in the Callianassoidea were reviewed by Sakai (2005b); and the Upogebiidae were reviewed by Sakai (2006).

The recent morphological phylogeny of the families Callianassidae and Ctenochelidae was established by Manning & Felder (1991) on the basis of features of the carapace, the third maxilliped, the larger cheliped, the abdomen, the tail-fan, and the appendix interna. The families included in the three superfamilies (Thalassinoidea Dana, 1852a in the Thalassinida, and Callianassoidea Dana, 1852a and Axioidea Huxley, 1879 in the Callianassida) were further reviewed by Poore (1994) using cladograms resulting from cladistic analysis. Sakai (2005a: 1117) and Sakai & Sawada (2006: 1353) proposed that the Thalassinida [as Thalassinidea] should be distinguished from the Callianassida [as Callianassidea] by morphological features of the second pereiopod, the gastric mill, and the uropodal exopod.

A dichotomous scheme for the relationships among 14 species of thalassinidean shrimp (Callianassidae, Laomediidae, Strahlaxiidae, Thalassinidae, and Upogebiidae) has been drawn up by using partial sequences of the 18S nuclear and 16S mitochondrial ribosomal genes (Tudge & Cunningham, 2002: 842). According to that analysis, there appear to be two strongly supported major clades in the Thalassinidea: the first clade includes a monophyletic Callianassidae Dana, 1852 as the sister-group of a representative of the axioid family, Strahlaxiidae Poore, 1994; the second clade includes three families, Laomediidae Borradaile, 1903, Thalassinidae Latreille, 1831, and Upogebiidae Borradaile, 1903.

By employing partial segments of two nuclear protein-coding genes, phosphoenolpyruvate carboxykinase (PEPCK, 570 bp) and sodium-potassium

ATPase a-subunit (NaK, 534 bp), Chu et al. (2008) reconstructed the phylogeny of six species of the superfamily Axioidea Huxley, 1879, i.e., *Calastacus crosnieri* Kensley & Chan, 1998, *Calaxius acutirostris* Sakai & De Saint Laurent, 1989 (syn. *Calaxius manningi* Kensley et al., 2000), *Paracalocaris sagamiensis* Sakai, 1991, *Eiconaxius indicus* (De Man, 1907), and *Calocarides chani* Kensley, Lin & Yu, 2000, which are separated from *Upogebia edulis* Ngoc-Ho & Chan, 1992 (= *Austinogebia edulis*) and *Thalassina anomala* (Herbst, 1804).

Those results mentioned above are systematically in accordance with the results of the classification proposed on the basis of the morphology of the gastric mill (Sakai, 2005a; Sakai & Sawada, 2006): the first sectio Callianassida Dana, 1852 (**new status**), was supposed to contain the superfamily Callianassoidea Dana, 1852 with five families [as then conceived, see Sakai 2005a]: Axiidae Huxley, 1879, Callianassidae Dana, 1852, Callianideidae Kossmann, 1880, Ctenochelidae Manning & Felder, 1991, and Gourretiidae Sakai, 1999; and the second sectio Thalassinida Latreille, 1831 (**new status**) with a single superfamily, Thalassinoidea Latreille, 1831, was presumed to include three families: Laomediidae Borradaile, 1903, Thalassinidae Latreille, 1831, and Upogebiidae Borradaile, 1903.

The present taxa, then, comprise two sections, Thalassinida including one superfamily, Thalassinoidea Dana, 1852a, and Callianassida including two superfamilies, Axioidea Huxley, 1879 and Callianassoidea Dana, 1852a.

Those two superfamilies are characterized by the presence or absence of a rostral carina, (a) cardiac sulcus(i), cardiac prominence, dorsal oval of the carapace, linea thalassinica, setal rows on the carapace, abdomen, tail-fan, and pereiopods, a posterior whip on the maxilla 2 scaphognathite, a dorsal plate or lateral notch on the uropodal exopod, male pleopods 1-2, and the median tooth of the urocardiac ossicle in the gastric mill.

In the present, new classification the section Callianassida consists of two superfamilies (Axioidea and Callianassoidea), 19 families including 3 new (or newly ranked) families, 119 genera including 38 new genera and 9 sensu novo, and 433 species including 22 uncertain species [= species inquirendae], as outlined below; the classification at family level of the whole infraorder Thalassinidea is here given for convenience:

Infraorder Thalassinidea Latreille, 1831
  Section Thalassinida Latreille, 1831 [**sectio nov.**]
    Superfamily Thalassinoidea Latreille, 1831
      Family Laomediidae Borradaile, 1903
      Family Thalassinidae Latreille, 1831

Family Upogebiidae Borradaile, 1903
Section Callianassida Dana, 1852 [**sectio nov.**]
Superfamily Axioidea Huxley, 1879
Family Axiidae Huxley, 1879
Family Callianideidae Kossmann, 1880
Family Calocarididae Ortmann, 1891
Family Coralaxiidae Sakai & De Saint Laurent, 1989
Family Eiconaxiidae Sakai & Ohta, 2005
Family Eiconaxiopsididae **fam. nov.**
Family Meticonaxiidae Sakai, 1992
Family Micheleidae Sakai, 1992c
Family Strahlaxiidae Poore, 1994
Superfamily Callianassoidea Dana, 1852
Family Anacalliacidae Manning & Felder, 1991
Family Bathycalliacidae Sakai & Türkay, 1999
Family Callianassidae Dana, 1852
Family Callianopsidae Manning & Felder, 1991
Family Ctenochelidae Manning & Felder, 1991
Family Eucalliacidae Manning & Felder, 1991
Family Gourretiidae Sakai, 1999
Family Lipkecallianassidae Sakai, 2005 (**new status**)
Family Pseudogourretiidae Sakai, 2005 (**new status**)
Family Thomassiniidae De Saint Laurent, 1979

TABLE I

List of families, subfamilies, and genera in the Axioidea and Callianassoidea as conceived herein

Families	Subfamilies	Genera	Species
Superfamily **AXIOIDEA** Huxley, 1879			
AXIIDAE		*Acanthaxius*	7
		Albatrossaxius **gen. nov.**	1 + 1 sp. inq.
		Alienaxiopsis **gen. nov.**	2
		Allaxiopsis **gen. nov.**	3
		Allaxius	1
		Amakusaxius **gen. nov.**	1
		Anophthalmaxius	1
		Australocaris	1
		Axiopsis	3 + 1 sp. inq.
		Axiorygma	1
		Axius	4
		Balssaxius **gen. nov.**	1
		Boasaxius **gen. nov.**	1
		Bouvieraxius	5
		Bruceaxius **gen. nov.**	1
		Calaxius	1 + 1 sp. inq.

TABLE I
(Continued)

Families	Subfamilies	Genera	Species
		Calocarides	14
		Coelhocalaxius **gen. nov.**	1
		Colemanaxius **gen. nov.**	1
		Dorphinaxius	1
		Eutrichocheles	7
		Guyanacaris **gen. nov.**	2
		Heterocalaxius **gen. nov.**	1
		Leonardsaxius **gen. nov.**	3 + 1 sp. inq.
		Levantocaris	1
		Litoraxius	1
		Manaxius (**sensu nov.**)	12
		Marianaxius	1
		Michelaxiopsis	1
		Newzealandaxius **gen. nov.**	1
		Oxyrhynchaxius	3
		Parascytoleptus	1
		Paratrichocheles **gen. nov.**	1
		Paraxiopsis	9 + 1 sp. inq.
		Paraxius	1
		Pilbaraxius	1
		Pillsburyaxius **gen. nov.**	1
		Planaxius	1
		Platyaxiopsis **gen. nov.**	1
		Platyaxius	2
		Pseudoaxiopsis **gen. nov.**	1
		Ralumcaris **gen. nov.**	1
		Scytoleptus	2
		Spongiaxius	1
CALLIANIDEIDAE		*Callianidea*	3
		Paracallianidea	1
CALOCARIDIDAE		*Ambiaxius*	4 + 1 sp. inq.
		Briancaris	3
		Calastacus	8
		Calaxiopsis	1 + 1 sp. inq.
		Calocaris	4 + 1 sp. inq.
		Calocarisopsis **gen. nov.**	1
		Eucalastacus	1
		Lophaxiopsis **gen. nov.**	1
		Lophaxius	2
		Nipponcalaxiopsis **gen. nov.**	1
		Paracalocaris	1
CORALAXIIDAE		*Coralaxius*	3
		Meinertaxius **gen. nov.**	1
EICONAXIIDAE		*Eiconaxius*	30

TABLE I
(Continued)

Families	Subfamilies	Genera	Species
EICONAXIOPSIDIDAE **fam. nov.**		*Eiconaxiopsis* **gen. nov.**	2
METICONAXIIDAE		*Marcusiaxius*	7 + 1 sp. inq.
		Meticonaxius	7 + 1 sp. inq.
		Tethisea	2
MICHELEIDAE		*Michelea*	12 + 1 sp. inq.
STRAHLAXIIDAE		*Neaxiopsis*	2
		Neaxius	4
		Strahlaxius	2
Superfamily **CALLIANASSOIDEA** Dana, 1852			
ANACALLIACIDAE		*Anacalliaopsis* **gen. nov.**	1
		Anacalliax	1
		Capecalliax **gen. nov.**	1
BATHYCALLIACIDAE	Bathycalliacinae	*Bathycalliax*	1
	Vulcanocalliacinae	*Vulcanocalliax*	1
CALLIANASSIDAE	Callianassinae (**sensu nov.**)	*Callianassa* (**sensu nov.**)	1
		Cheramoides **gen. nov.**	2
		Cheramus (**sensu nov.**)	16 + 1 sp. inq.
		Gilvossius (**sensu nov.**)	12 + 1 sp. inq.
		Notiax (**sensu nov.**)	6
		Trypaea (**sensu nov.**)	52 + 1 sp. inq.
	Callichirinae (**sensu nov.**)	*Balsscallichirus* **gen. nov.**	2
		Barnardcallichirus **gen. nov.**	2
		Callichirus	5
		Corallichirus (**sensu nov.**)	3
		Forestcallichirus **gen. nov.**	1
		Glypturoides **gen. nov.**	1
		Glypturus	11
		Grynaminna	1
		Lepidophthalmoides **gen. nov.**	8
		Lepidophthalmus	5
		Michaelcallianassa	1
		Neocallichirus	28 + 1 sp. inq.
		Podocallichirus	1
		Sergio (**sensu nov.**)	7
		Thailandcallichirus **gen. nov.**	1
		Tirmizicallichirus **gen. nov.**	1
CALLIANOPSIDAE	Callianopsinae	*Callianopsis*	1
		Pleurocalliax **gen. nov.**	1
	Neocallianopsinae **subfam. nov.**	*Neocallianopsis* **gen. nov.**	1

TABLE I
(Continued)

Families	Subfamilies	Genera	Species
CTENOCHELIDAE		*Ctenocheles*	6 + 4 spp. inq.
EUCALLIACIDAE	Calliapaguropinae	*Calliapagurops*	2
	Eucalliacinae	*Andamancalliax* **gen. nov.**	1
		Calliax	2
		Calliaxina (**sensu nov.**)	8
		Eucalliax	1
		Eucalliaxiopsis **gen. nov.**	1
		Paraglypturus	1
		Pseudocalliax **gen. nov.**	1
GOURRETIIDAE		*Dawsonius*	1
		Gourretia	6 + 1 sp. inq.
		Laurentgourretia	1
		Paracalliax	1
		Paragourretia	6
LIPKECALLIANASSIDAE (**new status**)		*Lipkecallianassa*	1
PSEUDOGOURRETIIDAE (**new status**)		*Pseudogourretia*	1
THOMASSINIIDAE		*Crosniera*	4 + 2 spp. inq.
		Garyia **gen. nov.**	2
		Heardaxius **gen. nov.**	1
		Mictaxius	1
		Thomassinia	2 + 1 sp. inq.
19 families (incl. **3** fam. nov. or new status)	**8** subfamilies (incl. **1** subfam. nov. and **2** sensu nov.)	**119** genera (incl. **38** gen. nov. and **9** sensu nov.)	**433** + **22** spp. inq.

Legend. — sp(p). inq. = species inquirenda(e).

Abbreviations

Museums and institutes referred to for scientific material examined. — AM, Australian Museum, Sydney; CBM, Natural History Museum and Institute, Chiba; DOUFPe, Departamento de Oceanografia, Universidade Federal de Pernambuco, Pernambuco; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; MNHN, Muséum national d'Histoire naturelle, Paris; NHM, Natural History Museum, London; NSMT, National Science Museum, Tokyo; NTOU, National Taiwan Ocean University, Keelung; QM, Queensland Museum, Brisbane; RMNH, Rijksmuseum van Natuurlijke Historie [now National Museum of Natural History], Leiden; SMF, Forschungsinstitut Senckenberg, Frankfurt am Main; SMNH, Swedish

Museum of Natural History (Natur Historiske Riksmuseet), Stockholm; UF, Florida Museum of Natural History, University of Florida, Gainesville, Florida; USNM, United States National Museum, Smithsonian Institution, Washington, D.C.; ZIASP, Zoological Institute of the Academy of Science in St. Petersburg, St. Petersburg; ZMA, Zoölogisch Museum, Universiteit van Amsterdam, Amsterdam; ZMB, Zoologisches Museum, Humboldt-Universität zu Berlin, Berlin; ZMM, Zoological Museum of Moscow University, Moscow; ZMUC, Zoological Museum, Copenhagen; ZRC, Zoological Reference Collection, University of Singapore, Singapore.

Abbreviations in morphological terminology. — A1, antennule or antenna 1; A2, antenna or antenna 2; CL, carapace length; Mxp, maxilliped; P, pereiopod; Plp, pleopod.

INFRAORDER CLASSIFICATION

Infraorder THALASSINIDEA Latreille, 1831

Section THALASSINIDA Latreille, 1831

Superfamily THALASSINOIDEA Latreille, 1831

Diagnosis. — Urocardiac*) ossicle triangular, anteriorly protruded downward, and posteriorly concave. Its surface shows a longitudinal median carina with a row of fine transverse septa on each side. P2 simple (in the Laomediidae and Upogebiidae) or subchelate (in the Thalassinidae). [After Sakai & Sawada, 2006: 1355.]

Families included. — Laomediidae Borradaile, 1903; Thalassinidae Latreille, 1831; Upogebiidae Borradaile, 1903.

Section CALLIANASSIDA Dana, 1852

Diagnosis. — Median tooth of urocardiac ossicle simple, with a smooth posterior surface. P2 chelate. [After Sakai & Sawada, 2006: 1357.]

Superfamilies included. — Axioidea Huxley, 1879; Callianassoidea, Dana, 1852a.

Remarks. — In this revision, the section Callianassida is divided into two superfamilies, Callianassoidea and Axioidea, by the presence or absence of the linea thalassinica. In Callianassoidea the linea thalassinica is present, but in Axioidea the linea thalassinica is absent, although in each of those two superfamilies there is a family that includes genera in which the linea thalassinica is morphologically intermediate. In *Crosniera* and *Thomassinia* included in the Thomassiniidae under Callianassoidea, the linea thalassinica is present, though it is incomplete, and in *Paracallianidea* included in the Callianideidae under Axioidea, the linia thalassinica is present, though very short.

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*) As pointed out by A. Brösing (in litt.), the ossicle we have previously referred to as "prepyloric ossicle" in reality is the **urocardiac ossicle**.

Much attention is paid also to the male Plps1-2, though it is difficult to define their features, because they are sometimes either undeveloped, or underdeveloped in juvenile individuals. Furthermore, only a few descriptions of them have been made until recently, or if any, mostly of female Plps1-2, because little attention was paid to male Plps1-2. All the genera included in the families belonging to the Axioidea and Callianassoidea have been reviewed in this respect. In consequence, almost all of the families and genera are classified by the morphological features of the male Plps1-2 of the species included, as shown in the following sections. The only exceptions involve the genera *Bouvieraxius* and *Eiconaxius* in the Axioidea, as well as the genera *Callichirus*, *Lepidophthalmoides* gen. nov. and *Sergio* sensu nov. in the Callianassoidea, in which male Plp2 appendices interna and masculina are not consistent in characteristics, since 2 or 3 different forms occur within one genus.

1. Families and genera lacking male Plps1-2; male Plps3-5 endopods with appendix interna
   Family Callianassidae Dana, 1852a: subfam. Callianassinae; *Gilvossius* (= *Pestarella*; *Paratrypaea*).
2. Families and genera lacking male Plp1, but bearing Plp2; male Plps3-5 endopods with or without appendix interna
   a. Male Plp2 with appendices interna and masculina.
      Family Axiidae: *Acanthaxius*; *Albatrossaxius* gen. nov.; *Alienaxiopsis* gen. nov.; *Allaxiopsis* gen. nov.; *Allaxius*; *Anophthalmaxius*; *Axiopsis*; *Calaxius*; *Calocarides*; *Dorphinaxius*; *Manaxius* (sensu nov.); *Newzealandaxius* gen. nov.; *Platyaxiopsis* gen. nov.; *Platyaxius*; *Pseudoaxiopsis* gen. nov.
      Family Eiconaxiidae: *Eiconaxius**).
      Family Bathycalliacidae: subfam. Bathycalliacinae; *Bathycalliax*.
      Family Thomassiniidae: *Garyia* gen. nov.; *Mictaxius*; *Thomassinia*.
   b. Male Plp2 with appendix interna, but without appendix masculina.
      Family Axiidae: *Axiorygma*; *Heterocalaxius* gen. nov.; *Michelaxiopsis*; *Paratrichocheles* gen. nov. (Plps3-5 endopods lacking appendix interna); *Pilbaraxius*.
      Family Eiconaxiidae: *Eiconaxius**); *Pseudocalliax* gen. nov.
      Family Strahlaxiidae: *Neaxiopsis*; *Neaxius*.
   c. Male Plp2 with appendix masculina, but without appendix interna.
      Family Axiidae: *Ralumcaris* gen. nov. (Plps3-5 endopods without appendix interna).
3. Genus with male Plp1, but without male Plp2; Plps3-5 with appendix interna
   Family Callianassidae: subfam. Callianassinae; *Trypaea*.
4. Families and genera with male Plps1-2; Plps3-5 with or without appendix interna
   a. Male Plp1 without appendix interna; male Plp2 with appendices interna and masculina.
      Family Axiidae: *Axius*; *Boasaxius* gen. nov.; *Bouvieraxius**); *Bruceaxius* gen. nov.; *Guyanacaris* gen. nov.; *Leonardsaxius* gen. nov.; *Levantocaris*; *Litoraxius*; *Oxyrhynchaxius*; *Spongiaxius*.
      Family Callianideidae: *Callianidea*; *Paracallianidea*.
      Family Calocarididae: *Ambiaxius*; *Briancaris*; *Calastacus*; *Calaxiopsis*; *Calocaris*; *Eucalastacus*; *Nipponcalaxiopsis* gen. nov.; *Paracalocaris*.
      Family Coralaxiidae: *Coralaxius*; *Meinertaxius* gen. nov.

Family Eiconaxiopsididae fam. nov.: *Eiconaxiopsis* gen. nov.
Family Meticonaxiidae: *Marcusiaxius*; *Meticonaxius*; *Tethisea*.
Family Micheleidae: *Michelea**).
Family Callianassidae: subfam. Callichirinae sensu nov.; *Glypturoides* gen. nov.; *Glypturus*; *Grynaminna*; *Lepidophthalmoides**) gen. nov.; *Lepidophthalmus*; *Neocallichirus*; *Podocallichirus*; *Sergio**) sensu nov.; *Thailandcallichirus* gen. nov.
Family Anacalliacidae: *Anacalliaopsis* gen. nov.; *Anacalliax*; *Capecalliax* gen. nov.
Family Callianopsidae: *Callianopsis*; *Neocallianopsis* gen. nov.
Family Eucalliacidae: *Calliaxina**) sensu nov.; *Eucalliax*; *Eucalliaxiopsis* gen. nov.; *Paraglypturus*.
Family Ctenochelidae: *Ctenocheles*.
Family Gourretiidae: *Dawsonius*; *Gourretia*; *Paragourretia*.
Family Thomassiniidae: *Crosniera*; *Heardaxius* gen. nov.

b. Male Plp1 without appendix interna; male Plp2 with appendix interna, but without appendix masculina.
Family Axiidae: *Australocaris*; *Bouvieraxius**); *Parascytoleptus*; *Paraxius*; *Scytoleptus*.
Family Calocarididae: *Calocarisopsis* gen. nov.
Family Micheleidae: *Michelea**).
Family Strahlaxiidae: *Strahlaxius*.
Family Bathycalliacidae: *Vulcanocalliax*.
Family Callianassidae: subfam. Callichirinae sensu nov.; *Callichirus**); *Corallichirus* sensu nov.; *Lepidophthalmoides**) gen. nov.
Family Eucalliacidae: *Calliapagurops*.
Family Gourretiidae: *Gourretia**).

c. Male Plp1 without appendix interna; male Plp2 with appendix masculina, but without appendix interna.
Family Axiidae: *Eutrichocheles* (Plps3-5 endopods without appendix interna); *Marianaxius* (male Plps3-5 endopods without appendix interna); *Paraxiopsis* (male Plps3-5 endopods without appendix interna).
Family Callianassidae: subfam. Callichirinae sensu nov.; *Lepidophthalmoides* gen. nov.; *Sergio**) sensu nov.
Family Eucalliacidae: *Andamancalliax* gen. nov.; *Calliax**).

d. Male Plp1 without appendix interna; male Plp2 without appendices interna and masculina.
Family Axiidae: *Bouvieraxius**).
Family Callianassidae: subfam. Callianassinae; *Callianassa*; *Cheramoides* gen. nov.; *Cheramus*; *Notiax* (= *Rayllianassa*).
Family Callianassidae: subfam. Callichirinae sensu nov.; *Balsscallichirus* gen. nov.; *Barnardcallichirus* gen. nov.; *Callichirus**); *Forestcallichirus* gen. nov.; *Michaelcallianassa*; *Tirmizicallichirus* gen. nov.

e. Genera with male Plp1 with appendix interna; male Plp2 with appendices interna and masculina; and Plps3-5 with appendix interna.
Family Axiidae: *Planaxius*.
Family Calocarididae: *Lophaxius*.
Family Eucalliacidae: *Calliaxina**) sensu nov.

*) Genus with 2-3 forms of male Plp2.

5. Genus with unknown male Plp2
   Family Pseudogourretiidae (new status): *Pseudogourretia*.
6. Genera with unknown male Plps1-2
   Family Axiidae: *Amakusaxius* gen. nov. (1 sp.); *Balssaxius* gen. nov. (1 sp.); *Colemanaxius* gen. nov. (1 sp.); *Pillsburyaxius* gen. nov. (1 sp.).
   Family Calocarididae: *Lophaxiopsis* gen. nov. (1 sp.).
   Family Callianassidae: *Trypaea* (12 spp.).
   Family Callianopsidae: *Pleurocalliax* gen. nov. (1 sp.).
   Family Gourretiidae: *Laurentgourretia* (1 sp.); *Paracalliax* (1 sp.).
   Family Lipkecallianassidae (new status): *Lipkecallianassa* (1 sp.).

SUPERFAMILY AXIOIDEA HUXLEY, 1879

Not: Axioidea sensu De Saint Laurent, 1979: 1395; Poore, 1994: 96; Poore, 2004: 173.

Diagnosis. — Carapace without cardiac sulcus and linea thalassinica. Maxilla 2 scaphognathite with or without posterior whip. Uropodal exopod with or without distal flap. Setal row present or absent.

Remarks. — De Saint Laurent (1979) included three families (Axiidae Huxley, 1879; Callianideidae Kossmann, 1880; and Callianassidae Dana, 1852a) in the superfamily Axioidea. Poore (1994, 2004) included four families (Axiidae Huxley, 1879; Calocarididae Ortmann, 1891 [as: Calocaridae]; Micheleidae Sakai, 1992c; and Strahlaxiidae Poore, 1994). In the present classification, however, nine families are included in the Axioidea.

Families included. — Axiidae Huxley, 1879; Callianideidae Kossmann, 1880; Calocarididae Ortmann, 1891; Coralaxiidae Sakai & De Saint Laurent, 1989; Eiconaxiidae Sakai & Ohta, 2005; Eiconaxiopsididae fam. nov.; Meticonaxiidae Sakai, 1992c; Micheleidae Sakai, 1992c; and Strahlaxiidae Poore, 1994.

KEY TO THE FAMILIES OF THE SUPERFAMILY AXIOIDEA

1 – Uropodal exopod with distal flap 2
– Uropodal exopod without distal flap and lateral notch 4

2 – Male Plp2 endopod bearing distally un- or bisegmented appendix masculina with slender appendix interna with hooklets mesioproximally; hermaphroditic . . . . . Calocarididae
– Male Plp2 endopod bearing mesiomedially appendices masculina and interna, but sometimes only appendix interna; gonochoristic 3

3 – P2 chela ovate; Mxp3 exopod with distal segment bending from distal margin of penultimate segment with acute angle; no epipod on Ps1-4 . . . . . Coralaxiidae
– P2 chela elongate; Mxp3 exopod with distal segment elongate, arising straight from penultimate segment; epipod present on Ps1-4 . . . . . Axiidae

4 – Maxilla 2 scaphognathite with posterior whip 5
– Maxilla 2 scaphognathite without posterior whip 7

5 – Plps2-5 without respiratory filaments . . . . . Meticonaxiidae
– Plps2-5 with respiratory filaments 6

6 – Rostrum pointed apically; dorsal surface flat . . . . . Callianideidae

– Rostrum small, short, and obtusely triangular between orbits, located between branchiostegals, protruded to proximal half of eyestalks . . . . . Micheleidae

7 – Uropodal endopod trapezoid . . . . . Strahlaxiidae
– Uropodal endopod oval 8

8 – Male Plp1 absent . . . . . Eiconaxiidae
– Male Plp1 present, consisting of elongate, bisegmented proximal segment and circular (regularly rounded) distal segment . . . . . Eiconaxiopsididae fam. nov.

FAMILY AXIIDAE HUXLEY, 1879

Axiidae Huxley, 1879: 785; Bate, 1888: 36; Ortmann, 1891: 46; Stebbing, 1893: 187; Ortmann, 1898: 1141; Alcock, 1901: 186; Borradaile, 1903: 536; Borradaile, 1907: 476 (key); Lagerberg, 1908: 47; Wollebæk, 1908: 3; Stebbing, 1910: 367; Balss, 1914: 85; Selbie, 1914: 88; Pesta, 1918: 190; Schmitt, 1921: 110; Balss, 1925: 209; Rathbun, 1929: 25; Gurney, 1938: 340; Makarov, 1938: 48; Bouvier, 1940: 93; Edmondson, 1946: 256; Barnard, 1950: 497 (key), 498; Vinogradov, 1950: 222; Balss, 1957: 1579; De Saint Laurent, 1979: 1395; Sakai, 1987a: 303 (list); De Saint Laurent, 1988: 59; Kensley, 1989: 964; Sakai & De Saint Laurent, 1989: 4; Sakai, 1992a: 158; Dworschak, 1992: 214; Poore, 1994: 96; Sakai, 1994: 175; Hendrickx, 1995: 386 (key), 392, figs.; Poore, 2004: 173; Sakai & Ohta, 2005: 88; Poore & Collins, 2009: 222.

Axiinae — Sakai & De Saint Laurent, 1989: 11.

Diagnosis. — Carapace more or less compressed from each side, bearing lateral lobes on posterior margin. Rostrum triangular, and distinct or short with acute or obtuse apex. Linea thalassinica absent; cervical groove distinct at full length. Gastric region flat, convex or concave, usually bearing lateral, submedian, and median carinae. Postcervical carina present or absent. Eyestalks discernible; eyes rounded, and cornea usually pigmented. A2 scaphocerite distinct or reduced. Maxilla 2 scaphognathite with 1-2 long setae on posterior margin. Mxp3 with exopod. Ps1-2 chelate. Ps3-4 propodi linear or broadened; P4 coxa more or less cylindrical. Ps1-5 bases and ischia fused. Abdominal somite 1 protruded posteroventrally; abdominal somite 2 less than twice as long as somite 3. Male Plp1 uniramous and un- or bisegmented, or absent; male Plp2 biramous, slender or foliaceous, endopod usually bearing appendices interna and masculina, but sometimes only appendix interna; male Plps3-5 usually with appendix interna; female Plp1 uniramous, un- or bisegmented, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 biramous, endopods with appendix interna. Telson without proximal lobate process on each lateral margin. Uropodal endopod oval; uropodal exopod with or without transverse suture. Gonochoristic or hermaphroditic.

Remarks. — The Axiidae include 44 genera, 39 of which are characterized by the uropodal exopod usually bearing a distal flap bordered by a transverse suture. In *Axius stirhynchus* Leach, 1815, the type species of *Axius* Leach, 1815, type genus of the family, the uropodal exopod bears a distal flap, though in a larger specimen examined the uropodal exopod seems to lack a distal

flap, because it is indistinct and virtually indiscernible. In the following five genera: *Allaxius* Sakai & De Saint Laurent, 1989, *Anophthalmaxius* De Man, 1905, *Michelaxiopsis* Poore & Collins, 2009, *Parascytoleptus* Sakai & De Saint Laurent, 1989, and *Pseudoaxiopsis* gen. nov., the uropodal exopod lacks a distal flap regardless of size.

Type genus. — *Axius* Leach, 1815.

Genera included. — *Acanthaxius* Sakai & De Saint Laurent, 1989; *Albatrossaxius* gen. nov.; *Alienaxiopsis* gen. nov.; *Allaxiopsis* gen. nov.; *Allaxius* Sakai & De Saint Laurent, 1989; *Amakusaxius* gen. nov.; *Anophthalmaxius* De Man, 1905; *Australocaris* Poore & Collins, 2009; *Axiopsis* Borradaile, 1903; *Axiorygma* Kensley & Simmons, 1988; *Axius* Leach, 1815; *Balssaxius* gen. nov.; *Boasaxius* gen. nov.; *Bouvieraxius* Sakai & De Saint Laurent, 1989; *Bruceaxius* gen. nov.; *Calaxius* Sakai & De Saint Laurent, 1989; *Calocarides* Wollebæk, 1908; *Coelhocalaxius* gen. nov.; *Colemanaxius* gen. nov.; *Dorphinaxius* Sakai & De Saint Laurent, 1989; *Eutrichocheles* Wood-Mason, 1876b; *Guyanacaris* gen. nov.; *Heterocalaxius* gen. nov.; *Leonardsaxius* gen. nov.; *Levantocaris* Galil & Clark, 1993; *Litoraxius* Komai & Tachikawa, 2007; *Manaxius* Kensley, 2003 (sensu nov.); *Marianaxius* Kensley, 1996e; *Michelaxiopsis* Poore & Collins, 2009; *Newzealandaxius* gen. nov.; *Oxyrhynchaxius* Parisi, 1917; *Parascytoleptus* Sakai & De Saint Laurent, 1989; *Paratrichocheles* gen. nov.; *Paraxiopsis* De Man, 1905; *Paraxius* Bate, 1888; *Pilbaraxius* Poore & Collins, 2009; *Pillsburyaxius* gen. nov.; *Planaxius* Komai & Tachikawa, 2008; *Platyaxiopsis* gen. nov.; *Platyaxius* Sakai, 1994; *Pseudoaxiopsis* gen. nov.; *Ralumcaris* gen. nov.; *Scytoleptus* Gerstaecker, 1856; *Spongiaxius* Sakai & De Saint Laurent, 1989.

Key to the Genera of the Family Axiidae

1 – Uropodal exopod without distal flap 2
– Uropodal exopod with distal flap 7

2 – Male Plp1 absent 3
– Male Plp1 present 6

3 – Pleura 2-5 smooth and acutely angulated ventrally . . . . . *Newzealandaxius* gen. nov.
– Pleura 2-5 smooth and rounded or angulated ventrally 4

4 – Eyestalks forming flat, quadrate plate; gastric region flat without submedian carinae . . . . . *Anophthalmaxius*
– Eyestalks subglobose; gastric region convex, with five carinae 5

5 – Gastric lateral carinae with some obscure tubercles, median carina with two spinules, running in anterior half; and two buttressed spinules between median and lateral carinae; abdominal somites 3-5 without denticle ventrally . . . . *Platyaxiopsis* gen. nov.

– Gastric lateral and submedian carinae smooth, median carina denticulate in anterior half, bearing distinct hepatic tubercle, abdomial somites 3-5 with denticle ventrally ..... *Platyaxius*

6 – Male Plp2 endopod with appendices interna and masculina ..... *Scytoleptus*
– Male Plp2 endopod with appendix interna, but without appendix masculina ..... *Parascytoleptus*

7 – Male Plp1 absent 8
– Male Plp1 present 28

8 – Abdominal terga with carinae dorsally 9
– Abdominal terga without carinae dorsally 10

9 – Dorsal carinae of abdominal terga linearly striated ..... *Pseudoaxiopsis* gen. nov.
– Dorsal carinae of abdominal terga broadened and swollen .. *Coelhocalaxius* gen. nov.

10 – Telson convergent posteriorly to form subtriangle 11
– Telson subquadrate or quadrate, and uropodal exopod with narrow distal flap 12

11 – Uropodal exopod bearing onion-shaped distal flap with strong distal spine ..... *Alienaxiopsis* gen. nov.
– Uropodal exopod bearing narrow distal flap ..... *Heterocalaxius* gen. nov.

12 – Rostrum short and triangular 13
– Rostrum elongate and triangular 19

13 – Gastric region without submedian carina dorsally 14
– Gastric region with submedian carina dorsally 15

14 – Rostrum proximally with one pair of distinct spines ..... *Ralumcaris* gen. nov.
– Rostrum proximally with two pairs of distinct spines ..... *Paratrichocheles* gen. nov.

15 – Rostrum trispinose distally 16
– Rostrum pointed distally 17

16 – Rostrum trispinose distally, median spine curved downward .... *Allaxiopsis* gen. nov.
– Rostrum trispinose distally, median spine not curved downward ..... *Colemanaxius* gen. nov.

17 – Rostrum without lateral spines, but with a pair of proximal spines ..... *Dorphinaxius*
– Rostrum with lateral spines 18

18 – Rostrum overreaching eyestalks ..... *Amakusaxius* gen. nov.
– Rostrum shorter than eyestalks ..... *Allaxius*

19 – Gastric submedian carinae smooth ..... *Axiorygma*
– Gastric submedian carinae with denticles 20

20 – Abdominal pleura sharply or moderately angulated ventrally 21
– Abdominal pleura truncate, rounded, or convex ventrally 23

21 – Gastric median carina linear ..... *Calaxius*
– Gastric median carina tuberculate 22

22 – Gastric median carina tuberculate anterior to median tubercle, and divided into two subparallel carinae ..... *Albatrossaxius* gen. nov.
– Gastric median carina tuberculate, and not divided into two carinae ..... *Manaxius*

23 – Postcervical carina present 24
– Postcervical carina absent 25

24 – Fingers of cheliped slender and longer than palm ..... *Pillsburyaxius* gen. nov.
– Fingers of cheliped shorter than palm ..... *Balssaxius* gen. nov.

25 – Fingers of cheliped slender and longer than palm ..... *Acanthaxius*
– Fingers of cheliped shorter than palm 26

26 – Male Plp2 endopod with appendix interna, but without appendix masculina .....
..... *Michelaxiopsis*
– Male Plp2 endopod with appendices interna and masculina 27

27 – Many tubercles among five gastric carinae; P1 palms smooth on lateral surface .....
..... *Axiopsis*
– No tubercles among five gastric carinae; P1 palms tuberculate on lateral surface .....
..... *Calocarides*

28 – Dactylus of larger cheliped semicircular ..... *Spongiaxius*
– Dactylus of larger cheliped slender 29

29 – Gastric region without submedian carinae 30
– Gastric region with five carinae 33

30 – Rostrum distinct and triangular [male Plp1 uniramous and bisegmented, distal segment spatulate, bearing mesiodistally patch of hooklets; hermaphroditic] ..... *Levantocaris*
– Rostrum short and triangular 31

31 – Rostrum lacking lateral spines; telson with row of 4 mobile postlateral spines; male Plp1 uniramous and unsegmented; male Plp2 endopod with distinct appendix masculina medially, but without appendix interna; Plps3-5 endopods without appendix interna ..... *Marianaxius*
– Rostrum bearing lateral teeth; telson without postlateral spines 32

32 – Male Plp1 uniramous, bisegmented, and rod-shaped; distal segment shorter than proximal one; male Plp2 endopod with appendix interna, but without appendix masculina; Plps3-5 endopods with appendix interna ..... *Paraxius*
– Male Plp1 uniramous, unsegmented, spatulate, mesially with hooks, and distally bilobed ..... *Planaxius*

33 – Gastric submedian carinae smooth 34
– Gastric submedian carinae with spines or denticles 37

34 – A2 scaphocerite short, and bifurcate distally ..... *Paraxiopsis*
– A2 scaphocerite elongate, and simple or armed 35

35 – A2 scaphocerite with basal mesial spine, and spines on ventral margin ..... *Australocaris*
– A2 scaphocerite without basal mesial spine and spines on ventral margin 36

36 – Telson unarmed on lateral margins; maxilla 2 scaphognathite with two posterior whips; median and submedian gastric carinae present; male Plp1 uniramous and bisegmented; distal segment narrower than proximal one, tapering distally ..... *Axius*
– Telson armed with spines on lateral margins; maxilla 2 scaphognathite with one posterior whip; submedian and median gastric carinae distinctly present, bearing no denticles; male Plp1 uniramous and bisegmented, distal segment elongate and longer than proximal one ..... *Leonardsaxius* gen. nov.

37 – Postcervical carina absent 38
– Postcervical carina present 39

38 – Gastric submedian carina with row of three spines; A2 scaphocerite distinctly protruded ..... *Bouvieraxius*

– Gastric submedian carina with row of denticles; A2 scaphocerite horn-shaped . . . . . *Boasaxius* gen. nov.

39 – Eyestalks distinct, reaching nearly to distal end of rostrum 40
– Eyestalks subglobose, not reaching middle of rostrum 42

40 – Eyestalks elongate; carapace covered with scale-like tubercles . . . . . *Oxyrhynchaxius*
– Eyestalks stout; carapace tuberculate, or not 41

41 – Carapace tuberculate; P1 chelae without prominent tufts of plumose setae . . . . . *Guyanacaris* gen. nov.
– Carapace not tuberculate; P1 chelae with prominent tufts of plumose setae . . . . . *Litoraxius*

42 – Chelipeds setose; A2 scaphocerite short, simple, bi- or trifurcate; male Plp1 uniramous and unsegmented, as stubby protrusion with truncate or slightly pointed apex; male Plp2 biramous, endopod with appendix masculina bearing distal setae, but without appendix interna; male Plps3-5 endopods lacking appendix interna . . . *Eutrichocheles*
– Body setose; A2 scaphocerite short, horn-shaped, and directed outside dorsodistal spine of A2 segment 2; male Plp1 uniramous and bisegmented, distal segment ovate; male Plp2 biramous, endopod and exopod elongate, endopod with appendices interna and masculina at proximal third; male Plps3-5 endopods with appendix interna . . . . . *Bruceaxius* gen. nov.

Genus **Acanthaxius** Sakai & De Saint Laurent, 1989

Acanthaxius Sakai & De Saint Laurent, 1989: 4, 12, 14, 66; Poore, 1994: 98 (key); Sakai, 1994: 192; Kensley, 1996b: 70; Ngoc-Ho, 2006b: 58; Poore & Collins, 2009: 224.

Diagnosis. — Rostrum narrow, protruded anteriorly with pointed tip, lateral margins extending posteriorly onto gastric region. Gastric region slightly convex with 5-7 parallel rows of spines, equivalent to median, submedian, and lateral carinae. Anterolateral margin of carapace usually unarmed. Cervical groove present at full length. Postcervical carina absent. Cardiac prominence present. Eyestalks subglobose; cornea pigmented. A2 scaphocerite protruded straightly forward or laterally. P1 unequal; chelae obliquely positioned, lateral surface covered with tubercles and setae, and armed with sharp teeth on dorsal margin; fingers of both chelipeds obviously longer than palm. No pleurobranchs. Abdominal somites without longitudinal carinae between terga and pleura; pleuron 1 narrow, pleura 2-5 truncate or rounded ventrally. Male Plp1 absent, male Plp2 biramous and elongate, endopod with appendices interna and masculina at proximal third to half; male Plps3-5 endopods with appendix interna; female Plp1 composed of proximal segment and multiarticulate flagellum; female Plps2-5 endopods with appendix interna. Telson subsquare; lateral margins bearing proximal lobate process with spine, and posterior margin with median tooth. Uropodal exopod with transverse suture. Gonochoristic.

Remarks. — The type species of the genus *Acanthaxius*, *Axiopsis* (*Axiopsis*) *pilocheira* (Sakai, 1987a) was described from a female, so that the features of male pleopods 1-2 of this species are uncertain. However, the males of the other species included in *Acanthaxius* suggest that the male Plp1 is absent, the male Plp2 is biramous, and that the endopod of Plp2 bears appendices interna and masculina at its midpoint. It can safely be stated that in *A. pilocheirus* the cardiac prominence is present as in *A. miyazakiensis*, though in the original description of *A. pilocheirus* it was undescribed because of lack of attention.

Recently, Ngoc-Ho (2006b) reviewed *Acanthaxius*, which included the following 10 species: *A. clevai* Ngoc-Ho, 2006b from the Solomon Islands; *A. formosa* Kensley & Chan, 1998 from Taiwan; *A. gadaletae* Ngoc-Ho, 2006b from the Solomon Is.; *A. grandis* Kensley & Chan, 1998 from Taiwan; *A. kirkmilleri* Kensley, 1996b from off Anguilla in the Caribbean Sea; *A. miyazakiensis* (Yokoya, 1933) from Miyazaki, Japan; *A. pilocheirus* (Sakai, 1987a) from Kumano-nada, Japan; *A. polyacanthus* (Miyake & Sakai, 1967) from the East China Sea; *A. polychaetes* Sakai, 1994 from the Great Barrier Reef, eastern Australia; and *A. spinosissimus* (Rathbun, 1906) from French Polynesia.

However, *Acanthaxius polychaetes* Sakai, 1994 is different from the type species of *Acanthaxius*, *A. pilocheirus*, because in *A. polychaetes* the male Plp1 is present, the granulated postcervical carina is present, P1 chelae are thickly setose on the lateral surface, the palm of the larger cheliped is stout and longer than the fingers, the telson is longer than wide and oblong with a rounded posterior margin, and the flap of the uropodal exopod is broad; whereas in *A. pilocheirus*, the male Plp1 is absent, the postcervical carina is also absent, P1 chelae bear spines on the dorsal and ventral margins, the palms of the larger and smaller chelipeds are shorter than the fingers, the telson is as long as wide, and the flap of the uropodal exopod is narrow. Those differences between the two species suggest that *A. polychaetes* Sakai, 1994 is to be excluded from *Acanthaxius* and is herein reclassified under the new genus *Bruceaxius* gen. nov. Another species, *A. kirkmilleri* Kensley, 1996b is, though similar to the type species of *Acanthaxius*, *A. pilocheirus*, also to be excluded from *Acanthaxius* and is herein reclassified under the new genus *Pillsburyaxius* gen. nov., because of the following characteristics: the carapace bears an obscure postcervical carina, the A2 scaphocerite is protruded forward, and the abdominal somites 4-5 bear a spinule at the anteroventral angle; although the male Plp1 is unknown because the holotype is a female and no males have been reported, the female characteristics are deemed sufficient to establish a new genus below.

Type species: *Axiopsis* (*Axiopsis*) *pilocheira* Sakai, 1987a, by original designation (Sakai & De Saint Laurent, 1989). The gender of the current generic name, *Acanthaxius*, is masculine.

Species included. — *Acanthaxius clevai* Ngoc-Ho, 2006b; *A. gadaletae* Ngoc-Ho, 2006b; *A. garawa* Poore & Collins, 2009; *A. miyazakiensis* (Yokoya, 1933) [=*A. polyacanthus* (Miyake & Sakai, 1967); *A. formosa* (Kensley & Chan, 1998)]; *A. ningaloo* Poore & Collins, 2009; *A. pilocheirus* (Sakai, 1987a) [=*A. grandis* Kensley & Chan, 1998; *A. gathaagudu* Poore & Collins, 2009]; *A. spinosissimus* (Rathbun, 1906).

KEY TO THE SPECIES OF THE GENUS *ACANTHAXIUS*

1 – Posterior margin of cervical groove unarmed 2
– Posterior margin of cervical groove with denticles 4

2 – Gastric region bearing double submedian carina with spines . . . . . *A. gadaletae*
– Gastric region bearing single submedian row of spines 3

3 – P1 chelae with strong spines on dorsal and ventral margins . . . . . *A. pilocheirus*
– P1 chelae with few short spines on dorsal and ventral margins . . . . . *A. clevai*

4 – Gastric region with single submedian row of spines . . . . . *A. spinosissimus*
– Gastric region with double submedian row of spines 5

5 – Rostral median carina unarmed . . . . . *A. miyazakiensis*
– Rostral median carina denticulate 6

6 – Abdominal somite 2 smooth on ventral margin; P1 chelae spinous laterally . . . . . *A. ningaloo*
– Abdominal somite 2 armed with anterolateral spine; P1 chelae rugose laterally . . . . . *A. garawa*

Acanthaxius clevai Ngoc-Ho, 2006

Acanthaxius clevai Ngoc-Ho, 2006b: 59, figs. 1, 2, 3A-C; Poore & Collins, 2009: 225, figs. 1-3, 37.

Material examined. — MNHN Th 1492, paratype, 1 male (TL/CL, 79.0/27.0 mm); 1 ovig. female (TL/CL, 60.0/22.0 mm), Solomon Islands, Valla Gulf, R/V "Alis" Salomon 2-Expedition, Sta. 2260, 8°03.5′S 156°54.5′E, 399-427 m, 27.ix.2001, leg. Ph. Bouchet, A. Warren, and S. Samadi.

Diagnosis. — A2 scaphocerite protruded forward. Gastric lateral carinae with spine. Male Plp1 absent; male Plp2 with appendices interna and masculina at proximal third, appendix masculina much longer than appendix interna; male Plps3-5 endopods with appendix interna. Female Plp1 consisting of proximal segment and multiarticulate flagellum; Plps2-4 with appendix interna.

Type locality. — Valla Gulf, Solomon Islands, 8°03.5′S 156°54.5′E, 399-427 m.

Distribution. — Valla Gulf, Solomon Islands; off Mermaid Reef and off Point Leveque, WA, Australia.

Acanthaxius gadaletae Ngoc-Ho, 2006

Acanthaxius gadaletae Ngoc-Ho, 2006b: 62, fig. 3D-I.

Material examined. — MNHN Th 1495, paratype, 1 male (TL/CL, 49.0/17.0 mm), Solomon Islands, "Alis" Salomon 1-Expedition, Sta. 1761, [no coordinates], 191-290 m, 27.ix.2001, leg. Ph. Bouchet, B. Dayrat, A. Warren, and B. Richer de Forges.

Diagnosis. — A2 scaphocerite protruded laterally. Gastric region with double submedian carina with spines. Male Plp1 absent; male Plp2 endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna.

Type locality. — Solomon Islands, 135-325 m.

Distribution. — Only known from the type locality.

Acanthaxius garawa Poore & Collins, 2009

Acanthaxius garawa Poore & Collins, 2009: 227, figs. 4, 5.

Diagnosis. — Rostrum 0.2 times length of front to cervical groove, acutely triangular, bearing 4 lateral spines anterior to supraocular spine, weakly continuous with lateral gastric carinae. Supraocular spines prominent. Eyestalk 1.6 times length of rostrum; cornea weakly pigmented. A1 peduncle reaching to middle of A2 segment 5. A2 segment 1 with a spine and three spinules on distoventral margin; segment 2 with slender distal spine, directed slightly inwards, reaching distally to middle of A2 segment 4; scaphocerite slightly curved, reaching distally to just beyond midpoint of segment 4; segment 3 with 4 spines on mesioventral margin; segment 4 about two-thirds length of segment 2 (excluding distal spine), bearing distoventral spine; segment 5 about half length of segment 4. Carapace densely spinulose. Gastric lateral carina with 10 spines; gastric submedian carina duplicated, external row with 10-12 spines and internal with 10-12 spines; gastric median carina with about 20 spines. Mxp3 basis with spine; ischium with two spines on ventral margin; crista dentata with 24 teeth; merus with three spines; carpus with spine.

P1 asymmetrical, propodus of larger cheliped more swollen, 1.5 times as long as that of smaller one. In larger (left) cheliped coxa with two spines on ventral margin; basis without spine on ventral margin; ischium with three

spines on ventral margin; merus with 4 spines on convex dorsal margin, bearing 10 spines on ventral margin, lateral face spinose distally near dorsal margin, mesial face rugose distally; carpus with 6 spines on dorsal margin and 3 spines laterally on ventral margin and one spine mesially, lateral face tubercular and mesial face with 3 spines plus other smaller ones; propodus with a row of 7 spines on dorsal margin, and lateral row of 12 spines and obsolete mesial row on ventral margin, lateral face covered with dome-like tubercles and mesial face covered with larger, distinct tubercles, bearing spine near gape; fixed finger 1.2 times length of dorsal palm, cutting edge straight, bearing about 20 irregular, rounded teeth; dactylus with 8 spines on dorsal margin, lateral face with row of blunt spines and mesial face with row of 6 spines and denticles, cutting edge as in fixed finger; both fingers bearing setae. In smaller cheliped, coxa and ischium as in larger cheliped; merus with 5 spines on dorsal margin and 7 spines on ventral margin; carpus with 6 spines on dorsal margin, 4 spines laterally and one spine mesially on ventral margin, lateral face weakly spinose and mesial face with three spines; propodus with 5 spines on dorsal margin, and lateral row of 7 spines and mesial row of 7 spines on ventral margin, lateral face weakly tuberculate and mesial face grossly tuberculate, bearing two spines near gape; fixed finger 2.5 times length of dorsal palm, cutting edge with about 40 irregular teeth; dactylus with 6 spines on dorsal margin, lateral face with proximal row of 5 spines and mesial face with row of 4 denticles, cutting edge as in fixed finger, both fingers setose as in larger cheliped. P2 ischium with distal spine on ventral margin; merus with 4 spines on ventral margin; carpus as long as chela; propodus dorsal margin 0.8 length of dactylus. P3 merus with 5 strong spines on ventral margin; carpus with spine on ventral margin; propodus 1.9 times as long as dactylus, bearing 7 marginal robust setae (some duplicated) ventrally. P4 missing. P5 propodus 2.5 times as long as dactylus and subchelate; fixed finger short; dactylus with broad blade on cutting edge. Abdominal pleuron 1, 1.4 times as deep as middorsal length, and obtuse ventrally; pleuron 2 broad, lateral length as long as dorsal length, and rounded anteroventrally; pleura 3-5 becoming more quadrate ventrally, each with small anteroventral tooth; pleuron 6 rounded, bearing small anteroventral tooth; pleura 1-5 slightly flared laterally, bearing no lateral crease. Plp2-5 appendix interna one quarter length of endopod; appendix masculina just exceeding appendix interna. Telson about as long as broad and broadly convex on posterior margin with median spine, bearing proximal process with spine on lateral margin, and minute tooth and two robust setae at posterolateral angle; dorsal surface with two symmetrical, oblique rows of two spines. Uropodal

endopod twice as long as wide, bearing two lateral and one distolateral spines, dorsal surface with longitudinal ridge with 5 spines (including marginal one). Uropodal exopod 1.8 times as long as wide, bearing 4 spines on distal half of lateral margin, and fixed spine and robust seta at posterolateral angle; dorsal surface with two longitudinal ribs (outer rib with spine) and transverse suture with 6 spines. [Adapted from Poore & Collins, 2009.]

Remarks. — The present species, *Acanthaxius garawa* is similar to *A. miyazakiensis*, but differs from that species, because in *A. garawa* the rostral median carina is armed with a row of teeth, and the abdominal somite 2 is armed with an anteroventral spine, whereas in *A. miyazakiensis* the rostral median carina is smooth, and abdominal somite 2 is unarmed on the ventral margin.

Type locality. — Australia, Queensland, Gulf of Carpentaria, 12°10.5′S 139°56.7′E, 59 m.

Distribution. — Known from the type locality and from 11°25.2′S 139° 25.2′E.

Acanthaxius miyazakiensis (Yokoya, 1933)
(fig. 1)

Axius miyazakiensis Yokoya, 1933: 51, fig. 26.
Axiopsis (*Axiopsis*) *polyacantha* Miyake & Sakai, 1967: 303, fig. 1, pl. 4A; Sakai, 1987a: 303 (list). [Type locality. — East China Sea, 27°16′N 125°34′5″E, 118 m.]
Axiopsis (*Axiopsis*) *miyazakiensis* — Sakai, 1987a: 303 (list).
Acanthaxius polyacanthus — Sakai & De Saint Laurent, 1989: 73; Ngoc-Ho, 2006b: 66, fig. 4.
Acanthaxius miyazakiensis — Sakai & De Saint Laurent, 1989: 67, figs. 17-19; Kensley, 1996b: 71 (list); Komai, 2000b: 344 (list).
Acanthaxius formosa Kensley & Chan, 1998: 256, figs. 1A, 2; Komai, 2000b: 344 (list). [Type locality. — Ping Tong Country, southwestern coast of Taiwan, 350 m.]

Material examined. — NSMT, holotype, female (TL/CL, 33.0/11.3 mm, damaged), R/V "Soyo-maru", Sta. 305, east of southern Miyazaki-Pref., Japan, 137 m, 12.vii.1928; SMF 31971, 1 female (TL/CL, 48.0/16.0 mm), Tosa-Saga, Kochi Prefecture, 17.vi.2007, leg. S. Shinomiya; NTOU-H-1996-8-5, holotype of *Acanthaxius formosa*, male (TL/CL, 62.0/21.5 mm), Ping Tong Country, Formosa, south-western coast, sandy mud bottom, ca. 350 m.

Diagnosis. — Rostrum elongate and triangular. Eyestalks thick, barely overreaching or reaching tip of rostrum. A2 scaphocerite directed outside. Gastric region with double submedian row of denticles; posterior margin of cervical groove with denticles; postcervical carina absent. Fingers of both chelipeds slender and longer than each palm. Abdominal pleura rounded ventrally. Abdominal terga without carinae dorsally. Male Plp1 absent; male Plp2 endopod with appendices interna and masculina. Telson subquadrate, and uropodal exopod with narrow distal flap.

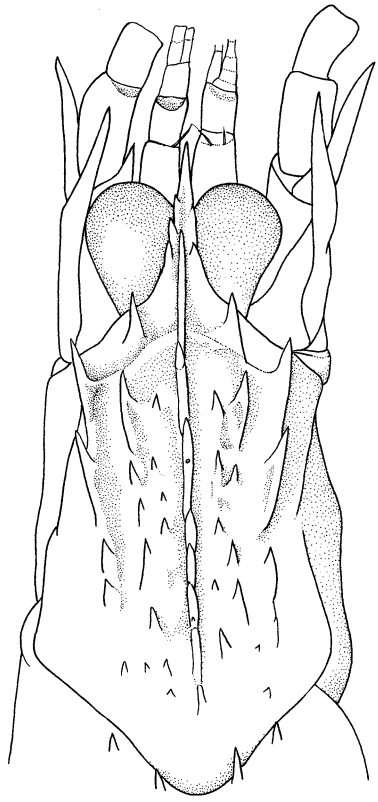

Fig. 1. *Acanthaxius miyazakiensis* (Yokoya, 1933). Gastric region of carapace, dorsal view. Lectotype, female (TL/CL, 33.0/11.3 mm, damaged), R/V "Soyo-maru", Sta. 305, east of southern Miyazaki-Prefecture, Japan, 137 m, 12.vii.1928. Scale 1 mm.

Remarks. — The cardiac prominence is present on the carapace. The two species, *Acanthaxius formosa* Kensley & Chan, 1998 from Taiwan and *A. polyacanthus* Miyake & Sakai, 1967 from the East China Sea, are synomymous with *A. miyazakiensis*, because those two species are the same as *A. miyazakiensis* in the characteristics of Ps1-2, tailfan, and the gastric region, which is provided with a double submedian row of spines and lateral rows of spines, the anterior two spines of which are strong, followed posteriorly by small spines (fig. 1).

Type locality. — East of southern Miyazaki-Prefecture, Pacific side of Kyushu Island, 137 m.

Distribution. — Off Miyazaki, Kyushu, 137 m (Yokoya, 1933); East China Sea, 118 m (Miyake & Sakai, 1967); Taiwan — Tong-Kong, Ping Tong

County, Su-Aou, I-Lan County, and Ta-Chi, I-Lan County, 350-400 m (Kensley & Chan, 1998); Philippines (Sakai & De Saint Laurent, 1989); New Caledonia, 137-210 m (Sakai & De Saint Laurent, 1989); Macassar Strait, Indonesia, 120-200 m (Sakai & De Saint Laurent, 1989); Solomon Islands, 191-290 m (Ngoc-Ho, 2006b).

Acanthaxius ningaloo Poore & Collins, 2009

Acanthaxius ningaloo Poore & Collins, 2009: 234, figs. 9, 10, 38.

Diagnosis. — Rostrum 0.4 times length of front to cervical groove, acute, with 3-4 lateral spines anterior to supraocular spine, continuous with definite gastric lateral carinae. Supraocular spines prominent. Eyestalk 0.8 length of rostrum, and cornea weakly pigmented. A1 peduncle reaching to proximal part of A2 segment 5. A2 segment 1 with spine and two spinules on ventrodistal margin; segment 2 with slender distal spine, directed slightly inwards, reaching distally to middle of A2 segment 4; scaphocerite slender and straight, reaching distally almost to end of segment 4; segment 3 with 4 spines on mesioventral margin; segment 4 about half length of segment 2 (excluding distal spine), bearing distoventral spine; segment 5 about two-thirds length of segment 4. Carapace densely spinulose; gastric lateral carina with 9 spines; gastric submedian carina duplicated, external row with 7-10 spines and internal with 12-13 spines; gastric median carina with 21 spines. Mxp3 basis with spine; ischium with two spines on ventral margin; crista dentata with 16 teeth; merus with three spines on ventral margin; carpus unarmed.

P1 scarcely differentiated, and subequal in length, propodus of larger cheliped more swollen than that of smaller one. In larger (right) cheliped, coxa with two spines on ventral margin; basis with spine on ventral margin; ischium with 4 spines on ventral margin; merus with 4 spines on convex dorsal margin and 9 spines on ventral margin, lateral face spinose distally and mesial face spinose distally; carpus with 6 spines on dorsal margin, and 4 spines laterally and one spine mesially on ventral margin, lateral face spinose, mesial face with spine; propodus with two rows of 4 spines each on dorsal margin, and lateral row of 21 spines and mesial row of 8 spines ventrally, lateral face spinose, and mesial face tuberculate, bearing 8 spines concentrated near gape; fixed finger twice length of dorsal palm, cutting edge straight, bearing about 20 irregular, rounded teeth; dactylus with 9 spines on dorsal margin, lateral face with proximal row of 5 submarginal spines and mesial face with proximal spine followed by short row of denticles, cutting edge as in fixed finger; both fingers with setae. In smaller cheliped, coxa, ischium, and merus as in larger cheliped;

carpus with 4 spines on dorsal margin and one spine on ventral margin, lateral face spinose and mesial face with spine; propodus with two rows of 4 spines each on dorsal margin, and lateral row of 23 spines and mesial row of 5 spines ventrally, lateral face spinose, and mesial face tuberculate, bearing 6 spines concentrated near gape; fixed finger 2.5 times length of dorsal palm, cutting edge with about 30 oblique, sharp teeth; dactylus with 10 spines on dorsal margin, lateral face with proximal row of 5 submarginal spines, and mesial face with row of denticles, cutting edge as in fixed finger; both fingers setose as in larger cheliped. P2 ischium with distal spine on ventral margin; merus with three spines on ventral margin; carpus slightly shorter than chela; propodus dorsal margin 0.8 length of dactylus. P3 merus with 3 spines on ventral margin; propodus 2.8 times as long as dactylus, bearing 6 marginal robust setae (some duplicated). P4 merus with 4 spines on ventral margin; propodus 2.6 times as long as dactylus, bearing 7 marginal robust setae (some duplicated). P5 propodus 2.9 times as long as dactylus, and subchelate, fixed finger short; dactylus with broad blade on cutting edge. Female Plp2-5 appendix interna one-third length of endopod. Abdominal pleuron 1 twice as deep as middorsal length, acute ventrally; pleuron 2 broad, lateral length 1.2 times dorsal length, and rounded anteroventrally; pleura 3-5 becoming less broad and gradually angled ventrally; pleuron 6 with small spine on ventral margin; pleura 1-5 with lateral crease. Telson about as long as broad, and convex on posterior margin with spine, bearing proximal process with spine on lateral margin, and one or two minute teeth and two robust setae at posterolateral angle; dorsal surface with two symmetrical, oblique rows of two spines. Uropodal endopod 1.6 times as long as wide, bearing three spines (including posterolateral one) on lateral margin and median longitudinal ridge with three spines (including marginal one) on dorsal surface. Uropodal exopod 1.6 times as long as wide, bearing 4 spines on lateral margin, and one fixed spine and one robust seta at posterolatral angle, dorsal surface with two longitudinal ribs (outer rib with two spines) and transverse suture with 7 spines.

Male P1 grossly differentiated, and subequal in length, propodus of larger cheliped more swollen than that of smaller cheliped. In larger (right) cheliped, coxa with two small spines on ventral margin; basis with spine on ventral margin; ischium with 5 spines on ventral margin; merus with 4 spines on convex dorsal margin, and 10 spines on ventral margin, lateral and mesial faces spinose distally; carpus with 6 spines on dorsal margin, and three spines laterally and one spine mesially on ventral margin, lateral face spinose and densely setose in dorsal half, and mesial face with spine; propodus with two

rows of 4 spines each (mesial row obsolete) on dorsal margin, and lateral row of 19 spines and mesial row of 14 spines diminishing ventrally, lateral face spinose and densely setose in dorsal half, and mesial face tuberculate, bearing 8 spines concentrated near gape; fixed finger as long as dorsal palm, cutting edge straight, bearing about 20 irregular, rounded teeth; dactylus with 6 spines on dorsal margin, lateral face densely setose, bearing proximal row of 5 submarginal spines, and mesial face with proximal spine and row of denticles, cutting edge as in fixed finger, both fingers with setae. Male Plp2 with appendix masculina about one-third length of endopod, and attached at proximal one-third of endopod; appendix interna slightly shorter than appendix masculina. [Adapted from Poore & Collins, 2009.]

Type locality. — Off Ningaloo North, Western Australia; 165 m.

Distribution. — Only known from the type locality.

Acanthaxius pilocheirus (Sakai, 1987)

Axiopsis (*Axiopsis*) *pilocheira* Sakai, 1987a: 296, figs. 1, 2.
Acanthaxius pilocheirus — Sakai & De Saint Laurent, 1989: 73.
Acanthaxius pilocheira — Kensley, 1996b: 71 (list).
Acanthaxius grandis Kensley & Chan, 1998: 259, figs. 1B, 3-4; Komai, 2000b: 344 (list). [Type locality. — Ping Tong County, Taiwan, 400 m.]
Acanthaxius gathaagudu Poore & Collins, 2009: 230, figs. 6-8. [Type locality. — Shark Bay, Western Australia, 404-407 m.]

Material examined. — USNM 231418, holotype, female (TL/CL, 10.0/35.0 mm), Kumanonada, 60 m, 5.iv.1937, coll. I. Kubo, Tokyo University of Fisheries, det. K. Sakai; NTOUH-1996-8-5, holotype of *Acanthaxius grandis*, 1 male (TL/CL, 120.0/41.1 mm), Ping Tong County, south-western coast of Taiwan, sandy mud bottom, about 400 m.

Diagnosis. — A2 scaphocerite protruded laterally. Male Plp1 absent; male Plp2 biramous, endopod with appendices interna and masculina at proximal third, appendix masculina with setae, and longer than appendix interna.

Remarks. — It seems that *Acanthaxius grandis* is a synonym of *Acanthaxius pilocheirus* (Sakai, 1987a), because *A. grandis* has the following characteristics in common with *A. pilocheira*: the rostrum is narrowly triangular with a pair of supraorbital teeth; the gastric lateral carinae are each armed with two triangular teeth, the submedian carinae bear four smaller teeth, respectively, and the median carina is provided with a hepatic tubercle and 6 denticles; the Ps1-2 fingers are longer than the palm, and the P1 chelae are asymmetrical, bearing anteriorly-directed denticles on the dorsal margin; the telson is subquadrate, bearing a proximal lobate process on each lateral margin, and a median spine on the posterior margin. It was found in the present examination of

the type specimen of *Acanthaxius grandis* (NTOUH-1996-8-5, holotype) that the cardiac prominence is present.

Type locality. — Kumano-nada, off east coast of Kii Peninsula, Japan, 360 m.

Distribution. — Japan — Kumano-nada, 360 m (Sakai, 1987a); Ping Tong County, south-western coast, Formosa (= Taiwan), sandy mud bottom, ca. 350-400 m (Kensley & Chan, 1998); Macassar, 120-200 m (Sakai & De Saint Laurent, 1989); Shark Bay, Western Australia, 404-407 m (Poore & Collins, 2009).

Acanthaxius spinosissimus (Rathbun, 1906)

Axius spinosissimus Rathbun, 1906: 894, fig. 50a-b.
Axiopsis (*Axiopsis*) *spinosissima* — De Man, 1925d: 6 (list), 70 (key), 98, pl. 8 fig. 18-18g.
Acanthaxius spinosissimus — Sakai & De Saint Laurent, 1989: 67; Kensley, 1996b: 70; Ngoc-Ho, 2005: 49, fig. 1.

Material examined. — USNM 30534, holotype, male (TL/CL, 18.5/7.5 mm), south coast of Molokai Island, Sta. Hawaii, 8.iv.1902, leg. R/V "Albatross", Albatross Sta. 3847, det. M. Rathbun.

Diagnosis. — A2 scaphocerite protruded forward. Male Plp1 absent; male Plp2 endopod with appendices interna and masculina, male Plps3-5 endopods with appendix interna.

Remarks. — Rathbun (1906) gave no description of the sex of the holotype from Molokai Island, Hawaii. However, the holotype has turned out to be a male in the present examination. Recently, Ngoc-Ho (2005) reported a female from French Polynesia.

Type locality. — South coast of Molokai Island, Hawaiian Islands, 41-43 m.

Distribution. — Hawaiian Islands — Molokai Island, 41-43 m (Rathbun, 1906); Indonesia — between Wowoni and Buton Island [= Butung Is.] (De Man, 1925d); Nuku Hiva, Marquesas Islands, French Polynesia, 90-155 m (Ngoc-Ho, 2005); Shark Bay, Western Australia, 404-407 m (Poore & Collins, 2009).

Genus **Albatrossaxius** gen. nov.

Diagnosis. — Rostrum triangular and pointed at tip; lateral margins armed with teeth, extending posteriorly to lateral carinae of gastric region. Gastric region forming horseshoe-shaped prominence with five longitudinal carinae; median carina tuberculate anterior to median tubercle, and divided into two subparallel carinae reaching posteriorly as far as submedian and lateral carinae; submedian carinae tuberculate in anterior half and smooth in posterior

half, lateral carinae each with a single tubercle. Anterolateral margin of carapace unarmed. Cervical groove present. Eyestalks subglobose; cornea pigmented. A2 scaphocerite strongly protruded forward. P1 chelate and subequal; in larger cheliped fingers shorter than palm, and palm broad and slightly longer than wide, whereas in smaller cheliped fingers about as long as palm, and palm about as long as wide; dorsal margin of palm unarmed. P2 chelae shorter than palm. No pleurobranchs. Abdominal pleura smooth on surface, pleuron 2 broadly truncate ventrally, pleura 3-5 with small denticle at anteroventral angle, and pleuron 6 triangular with ventral spine. Male Plp1 absent; male Plp2 biramous and slender, and endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and bisegmented, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 leaf-like, endopods with appendix interna. Telson subsquare, bearing median tooth on posterior margin. Uropodal exopod with transverse suture.

Remarks. — Kensley (1996e: 471) described a species of *Axiopsis*, *A. bythos*, showing in his figures (Kensley, 1996e, fig. 1H, I) that male Plp1 is absent, and the Plp2 endopod and exopod are slender as in *Axiopsis*. However, *A. bythos* does not belong in *Axiopsis*, because in *A. bythos*, the gastric median carina is tuberculate in the anterior half and divided in the posterior half into two subparallel carinae, P1 is subequal in size and similar in shape, and the P1 meri are thick; whereas in the type species of *Axiopsis*, *A. serratifrons* A. Milne-Edwards, 1873, the median gastric carina is straight and denticulate, P1 is unequal in size and dissimilar in shape, and the P1 meri are slender. His species is rather reminiscent of a species belonging to the sponge-commensal genus *Eiconaxius*, in which the gastric region bears a median carina divided medially into two subparallel carinae, P1 is subequal in size and similar in shape, and the P1 meri are thick. Yet, his species does not belong to *Eiconaxius* either, in which the maxilla 2 scaphognathite has no posterior whip, and the Ps3-5 dactyli are short, subspatulate, and armed with spinules on the ventral margin. Those differences suggest that *Axiopsis bythos* belongs neither to *Axiopsis* nor to *Eiconaxius*, so that a new genus *Albatrossaxius* is proposed for Kensley's species, *Axiopsis bythos*.

Type species. — *Axiopsis bythos* Kensley, 1996e, by present designation. The gender of the new generic name, *Albatrossaxius*, is masculine.

Species included. — *Albatrossaxius bythos* (Kensley, 1996e); *Albatrossaxius* sp. Tirmizi, 1983.

Etymology. — The new generic name *Albatrossaxius* is derived from the name of R/V "Albatross", by which the type specimen was collected during

the United States Philippines Expedition. The name of the vessel is used as a prefix for the existing generic name *Axius*.

Albatrossaxius bythos (Kensley, 1996)

Axiopsis bythos Kensley, 1996e: 469, fig. 1, table 1.

Material examined. — USNM 243508, paratype, male (TL/CL, 40.0/10.0 mm), Dumaguett, Negros Island, Negros Oriental, Philippines, Mindanao Sea, 09°15.45′N 123°22.00′E, 279 m, 19.viii.1909, leg. Philippines Expedition, R/V "Albatross", Sta. 5536, det. B. Kensley; USNM 243509, 1 ovig. female (TL/CL, 39.0/12.0 mm), same data as paratype.

Diagnosis. — Rostrum triangular and pointed at tip; lateral margins armed with teeth, extending posteriorly to lateral carinae of gastric region. Gastric region forming horseshoe-shaped prominence with five longitudinal carinae; median carina tuberculate anterior to median tubercle, and then divided into two subparallel carinae reaching posteriorly as far as submedian and lateral carinae; submedian carinae tuberculate in anterior half and smooth in posterior half, lateral carinae each with a single tubercle. Anterolateral margin of carapace unarmed. Cervical groove present. Eyestalks subglobose; cornea pigmented. A2 scaphocerite strongly protruded forward. P1 chelate and subequal; in larger cheliped fingers shorter than palm, and palm broad and slightly longer than wide, whereas in smaller cheliped fingers about as long as palm, and palm about as long as wide; dorsal margin of palm unarmed. P2 chelae shorter than palm. No pleurobranchs. Abdominal pleura smooth on surface, pleuron 2 broadly truncate ventrally, pleura 3-5 with small denticle at anteroventral angle, and pleuron 6 triangular with ventral spine. Male Plp1 absent; male Plp2 biramous and slender, and endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and bisegmented, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 leaf-like, endopods with appendix interna. Telson subsquare, bearing median tooth on posterior margin. Uropodal exopod with transverse suture.

Type locality. — Off Apo Island, Philippines, 9°15′45″N 123°11′00″E, "Albatross" Sta. 5536, 510 m.

Distribution. — Philippines — off Apo Island (Kensley, 1996e); 510 m.

Albatrossaxius sp.

Axius sp., Tirmizi, 1983: 94, fig. 5.

Remarks. — Tirmizi described the present species with figures as a species in the genus *Axius*. However, it is different from the species included in *Axius*,

but similar to the type species of *Albatrossaxius*, *A. bythos* (Kensley, 1996e), because the rostrum is triangular, though unarmed on the lateral margins; the eyestalks are stout; the A2 scaphocerite extends to the end of the penultimate segment; the chelipeds are stout, the palm of the larger cheliped is thick and granulate in its distal part, and the cutting edge of the fixed finger is denticulate. She failed to make a precise description of the abdomen except for its length (ca. 7 mm) of her fragmentary specimen, which is possibly a female.

Locality. — Close to Tg. Ani, Piru Bay, Ceram, Maluku Islands, Indonesia, 72-78 m, mud; R/V "Samudera", Sta. 1/3, 8.i.1973, leg. Lon-Rumphis.

Genus **Alienaxiopsis** gen. nov.

Definition. — Rostrum acutely triangular with pointed tip; lateral margins each armed with subdistal spine and proximal spine anterior to supraorbital spine; median gastric carina distinct with hepatic tubercle and terminated with pyramidal protuberance. Anterolateral margin of carapace triangularly convex just below supraorbital spine. Cervical groove entire. Eyestalks subglobose; cornea pigmented. A2 scaphocerite strongly protruded forward. P1 chelate and subequal. P2 chelate. Ps3-4 propodi with rows of ventrolateral spinules and strong ventrodistal spine; dactyli simple, tapering distally. Abdominal pleura smooth laterally, without longitudinal suture between terga and pleura, pleura 2-5 truncate ventrally, pleura 3-4 with spinule at anteroventral angle. Male Plp1 absent; male Plp2 endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Telson convergent posteriorly, bearing 4-5 spines on lateral margin and median spine on posterior margin. Uropodal exopod bearing onion-shaped distal flap with strong distal spine.

Remarks. — The type species of the new genus *Alienaxiopsis*, *A. lizardensis* sp. nov. is defined as follows: the rostrum is acutely triangular with two lateral spines, the median carina is terminated with a distinct pyramidal gastric protuberance, the A2 scaphocerite is elongate, and the distal flap of the uropodal exopod is protruded and onion-shaped. The other species, *Alienaxiopsis clypeata* (De Man, 1888b), once included in the genus *Allaxius*, is rather similar to *A. lizardensis* sp. nov. and considered to be a member of *Alienaxiopsis*, because it has turned out to be very different from the type species of *Allaxius*, *A. aethiopicus* (Nobili, 1904), in which the rostrum is triangular with 3-5 sharp lateral spines, the gastric region bears no median carina but a median row of spines, the A2 scaphocerite is short and horn-shaped, and the distal flap of the uropodal exopod is short and wider than long.

In consequence, *Allaxius clypeatus* (De Man, 1888b) is reclassified under the new genus *Alienaxiopsis*.

Type species. — *Alienaxiopsis lizardensis* sp. nov., by present designation. The gender of the new generic name is feminine.

Species included. — *Alienaxiopsis lizardensis* sp. nov.; *A. clypeata* (De Man, 1888b).

Etymology. — The new generic name *Alienaxiopsis* is a compound of the Latin word alienus, meaning "strange", and the generic name *Axiopsis*, because this new genus is distinctly different in morphological features, enough to be separated from *Axiopsis*, even though it has the same pleopodal form.

KEY TO THE SPECIES OF THE GENUS *ALIENAXIOPSIS*

1 – Lateral carinae in gastric region distinctly developed, and terminated with pyramidal protuberance; another protuberance present as a submedian carina on each side of median carina . . . . . *A. lizardensis* sp. nov.
– Lateral and submedian carinae in gastric region not developed, but three teeth present on each side of median carina . . . . . *A. clypeata*

Alienaxiopsis clypeata (De Man, 1888)

Axius clypeatus De Man, 1888b: 470, pl. 20 fig. 2.
Axiopsis (*Axiopsis*) *clypeata* — De Man, 1925d: 5 (list), 70 (key).
Allaxius clypeatus — Sakai & De Saint Laurent, 1989: 75; Kensley, 2003: 360; Poore & Collins, 2009: 237.

Diagnosis. — Rostrum acutely triangular with pointed tip; lateral margins each armed with subdistal spine and proximal spine anterior to supraorbital spine; gastric median carina distinct, with hepatic tubercle, and terminated with pyramidal protuberance. Three short teeth present on either side of median carina. Telson longer than wide, bearing two pairs of spines on dorsal surface. Uropodal endopod with three teeth on lateral margin, posterior margin denticulate with mesial and lateral spines, and median carina with 4 spines; uropodal exopod bearing 4 spines on lateral margin, 4 small spines on sublateral margin, two spines on distal margin, distinct movable spine at distolateral angle, and triangular movable distal flap with fine marginal spines and strong distal spine (De Man, 1888b, pl. 20 fig. 2; 1925d: 70).

Remarks. — The present species *A. clypeata* is similar to the type species of *Alienaxiopsis*, *A. lizardensis* sp. nov., but different in the characteristics of the gastric region.

Type locality. — Ambon, Indonesia.

Distribution. — Indonesia — Ambon (De Man, 1888b); Yonge Reef, Lizard Island, Queensland, Australia (Poore & Collins, 2009).

Alienaxiopsis lizardensis sp. nov.
(fig. 2)

Material examined. — AM P25014, holotype, male (TL/CL, 16.0/4.9 mm), Yong Reef, near Lizard Island, Queensland, 14°38′S 145°38′E, reef, 8.xi.1975, leg. N. Coleman.

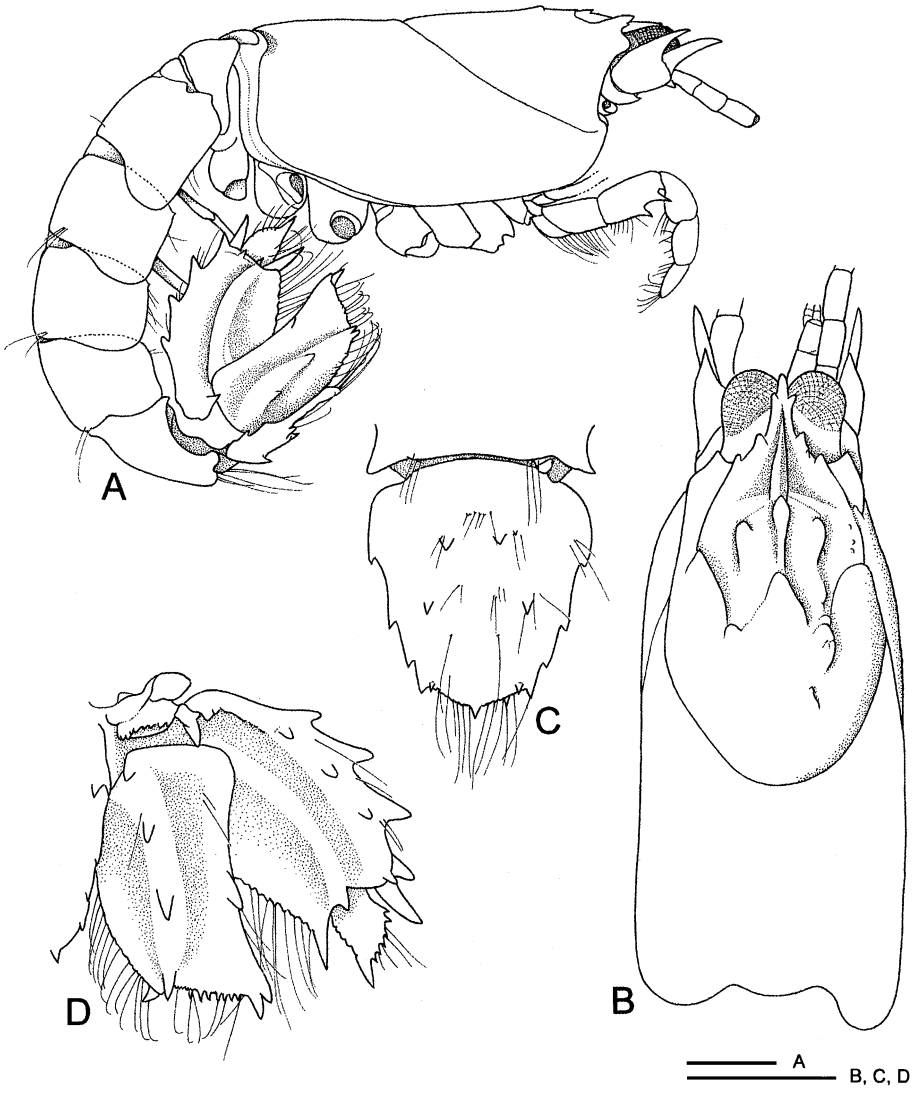

Fig. 2. *Alienaxiopsis lizardensis* sp. nov. A, whole body, lateral view; B, carapace, dorsal view; C, telson; D, uropod on right side. A-D, AM P25014, holotype, male (TL/CL, 16.0/4.9 mm), Yong Reef, near Lizard Island, Queensland, reef. Scales 1 mm.

Diagnosis and description of male holotype. — Rostrum (fig. 2B) acutely triangular with pointed tip, lateral margins each with subdistal spine and proximal spine anterior to supraorbital spine, extending posteriorly to gastric lateral carinae terminated with pyramidal protuberance; median carina thick with hepatic tubercle and terminated with pyramidal protuberance, another protuberance as submedian carina on each side of median carina. Cervical groove distinct and unarmed. Posteromedian carina absent. Posterolateral lobe of carapace present. Eyestalks subglobose, reaching almost tip of rostrum. A2 (fig. 2A, B) scaphocerite distinct and horn-shaped; A2 segment 2 with distinct dorsodistal spine. P1 unequal; in larger cheliped ischium denticulate on ventral margin; merus broad, slightly longer than wide, and denticulate on ventral margin; carpus short, thick, and 1.5 times as long as wide, palm 1.5 times as long as wide, lateral surface with distinct longitudinal carina located from distoventral part of palm to fixed finger, dorsal margin with distal tooth; dactylus incurved distally, and deeply concave mesially along dorsal margin; cutting edge proximally convex, and distally concave; fixed finger short, with irregular denticles on cutting edge. In smaller cheliped palm 1.2 times as long as wide, and slightly shorter than fingers; lateral surface with two longitudinal carinae extending to fixed finger; dorsal margin terminated with distal tooth; fixed finger armed with denticles on proximal third of cutting edge, then widely concave. P2 chelate, merus with median tooth on ventral margin. Ps3-5 missing. Abdominal pleura smooth; pleuron 1 triangular, with obtuse distal tooth ventrally, pleura 2 and 5 truncate ventrally, pleura 3-4 with small spinule at anteroventral angle. Male Plp1 absent; male Plp2 biramous, endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Telson (fig. 2C) almost as long as wide, lateral margins convergent distally, bearing proximal lobate process with spine, followed by three spines; posterior margin convex and denticulate, bearing median spine; dorsomedian surface with two pairs of distinct spines. Uropodal endopod (fig. 2D) bearing two distinct spines on lateral margin, another distinct tooth at distolateral angle, and small spinules and setae on distal margin, and also bearing median carina with a row of 4 teeth, distal one of which located on distal margin. Uropodal exopod convex on lateral margin, with 4 distinct spines, bearing row of 4 denticles sublaterally; distal margin bearing distinct, movable tooth at posterolateral angle, small median tooth, and sharp distinct tooth at posteromesial angle; distal flap onion-shaped, with marginal spinules and distinct distal spine.

Remarks. — The present new species, *Alienaxiopsis lizardensis* sp. nov. is similar to *Alienaxiopsis clypeata* (De Man, 1888b), in the characteristics of

rostrum, median carina, and tailfan. However, they are different from each other, because in *A. lizardensis* the lateral gastric carinae are distinctly developed, and each terminated with a pyramidal protuberance; another protuberance is present as a submedian gastric carina on each side of the median gastric carina, whereas in *A. clypeata* the lateral and submedian gastric carinae are not developed, but three teeth are present on each side of the median carina.

Type locality. — Yong Reef, near Lizard Island, Queensland, 14°38′S 145°38′E, reef.

Distribution. — Only known from the type locality.

Etymology. — The species name *lizardensis* is derived from the type locality of the present species, Yong Reef, near Lizard Island, Queensland, with the Latin suffix "-ensis", indicating the locality. The name is an adjective agreeing in gender with the generic name.

Genus **Allaxiopsis** gen. nov.

Allaxius Sakai & De Saint Laurent, 1989: 73; Poore, 1994: 98 (key) [partim].

Definition. — Rostrum trispinose distally, median spine curved downward; triangular supraocular teeth present. Anterolateral margin of carapace unarmed. Cervical groove distinct. Eyestalks subglobose; cornea pigmented. A2 scaphocerite short and horn-shaped. P1 chelate and asymmetrical. No pleurobranchs. Abdominal pleura smooth on surface. Male Plp1 absent; male Plp2 biramous, endopod with appendices interna and masculina at proximal third; male Plps3-5 endopods with appendix interna. Female Plp1 composed of proximal segment and multiarticulate flagellum; female Plps2-5 endopods with appendix interna. Telson subsquare, bearing posteromedian tooth. Uropodal exopod armed with distinct teeth on lateral margin, bearing distal flap with marginal spines. [Adapted from Sakai & De Saint Laurent, 1989.]

Remarks. — The three species belonging to the new genus *Allaxiopsis* gen. nov. were included in the genus *Allaxius* Sakai & De Saint Laurent, 1989, though those two genera are fundamentally different from each other in the shapes of rostrum and telson. In *Allaxiopsis* the rostrum is trispinose distally and its median spine is curved downward distally, the telson is wider than long and subsquare in shape, whereas in *Allaxius* the rostrum is triangular and pointed at the apex, the telson is longer than wide and oblong in shape.

Type species. — *Allaxiopsis bougainvillensis* sp. nov. by present designation. The gender of the new name is feminine.

Species included. — *Allaxiopsis bougainvillensis* sp. nov.; *A. picteti* (Zehntner, 1894); *A. spinimana* (De Man, 1905).

Etymology. — A Greek suffix "-opsis", meaning "appearance" is added to the generic name *Allaxius*, from which the new genus is different, though it is similar in appearance.

KEY TO THE SPECIES OF THE GENUS *ALLAXIOPSIS*

1 – Eyestalks reaching middle of rostrum . . . . . *A. bougainvillensis* sp. nov.
– Eyestalks reaching tip of rostrum 2

2 – Palm of larger cheliped with conical tubercles on lateral surface . . . . . *A. spinimana*
– Palm of larger cheliped with imbricated sculpture on lateral and mesial surfaces . . . . . *A. picteti*

Allaxiopsis bougainvillensis sp. nov.
(fig. 3)

Material examined. — ZMB 14440, holotype, female (TL/CL, 12.0/4.9 mm); paratype, 1 female (TL/CL, 11.0/4.5 mm, missing larger cheliped), Triop Bougainville, German New Guinea, leg. H. Schoede.

Diagnosis of female holotype. — Rostrum (fig. 3A, B) trispinose distally, armed with stout spine medially on lateral margins, extending posteriorly to lateral gastric carinae. Anterolateral margin of carapace unarmed. Eyestalks subglobose; cornea pigmented, reaching middle of rostrum. Gastric region bearing elongate median carina with three tubercles; lateral carina with supraorbital spine at its anterior extremity, extending to cervical groove, medially bearing a shield-shaped protuberance; distinct tooth on either side of median carina, and some tubercles in posterior half of gastric region. Cervical groove distinct. Posteromedian carina absent. A2 scaphocerite short and horn-shaped, located under short distodorsal spine of A2 segment 2. Ps3-4 (fig. 3C, D) carpi with distodorsal spine; Ps3-5 propodi with four vertical rows of two spines on ventrolateral margin, and Ps3-5 dactyli with spines laterally. Telson (fig. 3E) wider than long, bearing proximal lobate process with spine, followed distally by 2-3 strong spines on lateral margin, and another lobate process dorsally between two proximal ones on lateral margin and posterior to these a pair of spines; posterior margin convex, with median spine. Uropodal endopod bearing 11 distinct spines on posterior margin, three distinct spines on lateral margin, distinct movable spine mesial to posterolateral spine, and median carina with three spines, distal one of which distinct. Uropodal exopod bearing 5 distinct spines on lateral margin, a row of three spines sublaterally in proximal half, transverse distal suture with 5 teeth, and distal flap with 5 distinct spines.

Remarks. — *Allaxiopsis bougainvillensis* sp. nov. is similar to *A. picteti* (Zehntner, 1894), however, they differ from each other. In *A. bougainvillensis*

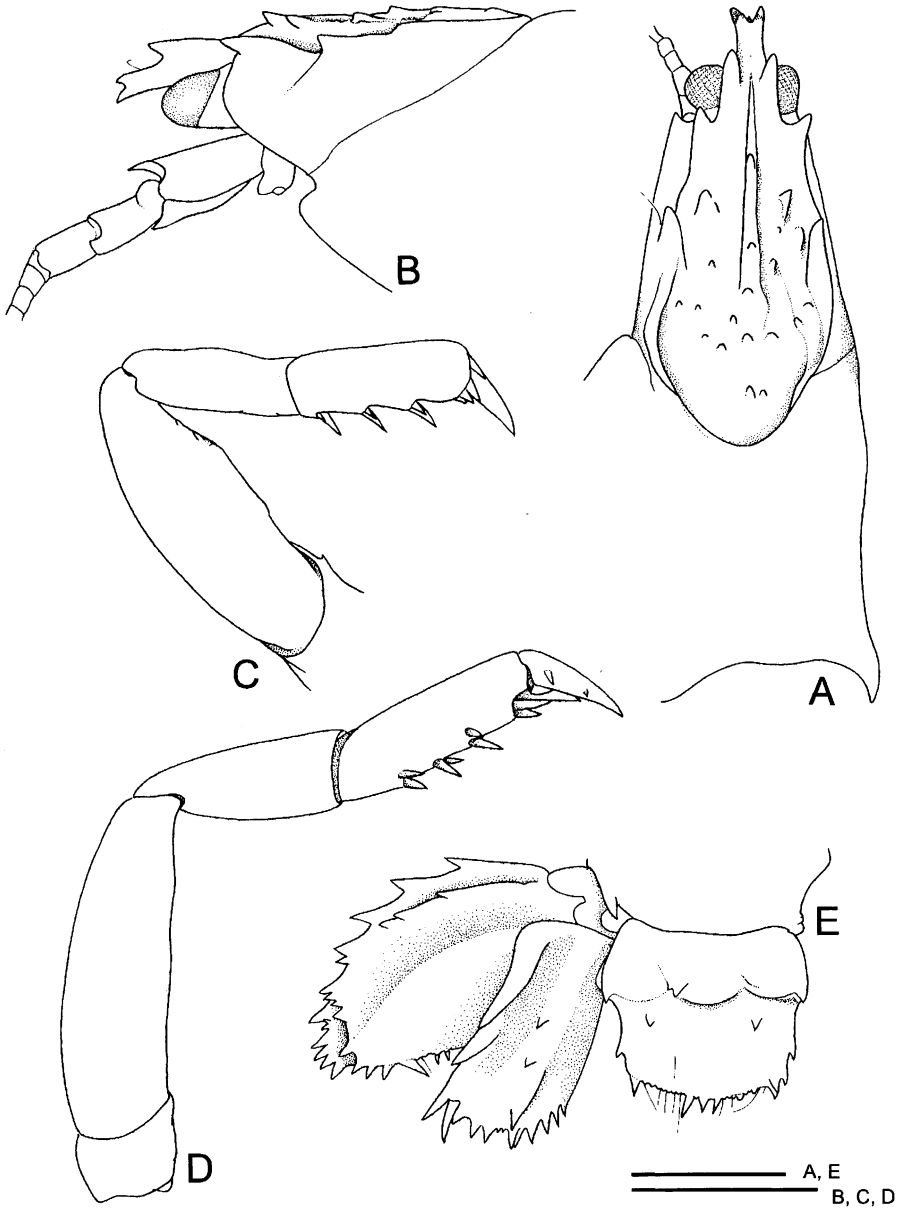

Fig. 3. *Allaxiopsis bougainvillensis* sp. nov. A, carapace, dorsal view; B, anterior part of carapace, lateral view; C, P3; D, P4; E, tail-fan. A-E, ZMB 14440, lectotype, female (TL/CL, 12.0/4.9 mm); Triop Bougainville, German New Guinea. Scales A, E, 1 mm; B, C, D, 0.5 mm.

the eyestalks reach the middle of the rostrum, the gastric region bears a median carina with three tubercles, and the lateral carinae extend to the cervical

groove, with a shield-shaped protuberance medially, whereas in *A. picteti* the eyestalks reach the tip of the rostrum, and the gastric region bears neither median nor lateral carinae, but spiniform teeth.

The present type specimens are registered as *Axiopsis* (*Axiopsis*) *picteti* var. *spinimana* De Man, 1905 in the collection of the Zoological Museum of Berlin, but they are not to be considered the type specimens of the species, because those two specimens examined are females measuring 11 mm and 12 mm in body length from Bougainville, German New Guinea, leg. H. Schoede, whereas De Man described an egg-bearing female measuring 25 mm in body length and a younger male from off the south point of Kabaëna-Island, Indonesia, "Siboga" Sta. 209, 22 m (De Man, 1905: 597; 1925d: 96). In consequence, the specimens examined are determined as a new species, *A. bougainvillensis* sp. nov.

Type locality. — Anchorage off south of Kabaena Island, Indonesia, "Siboga" Sta. 209, 22 m.

Distribution. — Indonesia — Anchorage off south of Kabaena Island, 22 m (De Man, 1905, 1925d); Papua New Guinea — Bougainville; 22 m.

Etymology. — The species name *bougainvillensis* is derived from the type locality of the specimens, Triop Bougainville, German New Guinea. It is an adjective agreeing in gender with the generic name.

Allaxiopsis picteti (Zehntner, 1894)

Paraxius Picteti Zehntner, 1894: 196, pl. 9 fig. 25.
?*Axiopsis Picteti* — Borradaile, 1903: 539.
Axiopsis (*Axiopsis*) *Picteti* — De Man, 1925d: 6 (list), 70 (key), 92, pl. 7 fig. 16-16b.
Allaxius picteti — Sakai & De Saint Laurent, 1989: 75; Kensley, 2003: 361, pls. 5, 6.

Material examined. — MHNG, holotype, female (TL/CL, 29.0/10.0 mm), Amboina, Indonesia.

Diagnosis. — Rostrum narrowly triangular and trispinose distally, bearing subdistal teeth and proximal supraocular tooth on lateral margin, and a swelling ventrally; the slender median spine of the distal three curved downward, eyestalks reaching tip of rostrum. Gastric region bears distinct tubercles, lacking lateral and median carinae, anterior extremity of gastric region narrow and triangular, reaching as far forward as supraocular spines. P1 unequal in size and dissimilar in shape; palm in both larger and smaller chelipeds with imbricated sculpture on lateral and mesial surfaces. Telson wider than long. [Cf. Zehntner, 1894: 196, pl. 9 fig. 25a.]

Type locality. — Ambon, Indonesia.

Distribution. — Indonesia — off Kabaena Island (De Man, 1925d); Ambon (Zehntner, 1894).

Allaxiopsis spinimana (De Man, 1905)

Axiopsis Picteti var. *spinimana* De Man, 1905: 597.
Axiopsis (*Axiopsis*) *Picteti* var. *spinimana* — De Man, 1925d: 6 (list), 70 (key), 96, pl. 7 fig. 17-17a.
Allaxius spinimanus — Sakai & De Saint Laurent, 1989: 75.

Diagnosis. — Rostrum narrowly triangular and trispinose at apex, eyestalks reaching tip of rostrum; gastric region bearing lateral carina with three teeth, and submedian carina with 5 teeth. Gastric median carina originating from proximal part of rostrum between supraocular teeth, running posteriorly to hepatic denticle, bearing two anterior denticles, and branched into two carinae with two denticles each. P1 unequal in size and dissimilar in shape; palm in both larger and smaller chelipeds with conical tubercles on lateral surface. Telson wider than long. [Cf. De Man, 1925d.]

Remarks. — The present species, *Allaxiopsis spinimana* is similar to *A. picteti*, however, the two species differ as follows: in *A. spinimana* the palm of the larger cheliped bears conical tubercles on the lateral surface and 7 spines on the dorsal margin (De Man, 1925b, pl. 7 fig. 17), whereas in *A. picteti* the palm of the larger cheliped bears imbricated sculpture on the lateral and mesial surfaces, and is smooth on the dorsal margin (Zehntner, 1894, pl. 9 fig. 25a).

Type locality. — "Siboga" Sta. 209, off the south point of Kabaëna-Island, Indonesia, 22 m.

Distribution. — Only known from the type locality.

Genus **Allaxius** Sakai & De Saint Laurent, 1989

Allaxius Sakai & De Saint Laurent, 1989: 73; Poore, 1994: 98 (key); Poore & Collins, 2009: 225, figs. 1-3, 37.

Diagnosis. — Rostrum triangular, with 3-5 sharp lateral teeth. Gastric region convex, bearing longitudinal rows of spinules, or irregularly arranged spinules. Anterolateral margin of carapace unarmed. Cervical groove distinct except for anterolateral part. Eyestalks subglobose; cornea pigmented. A2 scaphocerite short and horn-shaped. P1 chelate and asymmetrical; chelae unarmed on dorsal margin. No pleurobranchs. Abdominal pleura smooth on surface and unarmed on ventral margin. Male Plp1 absent; male Plp2 endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 composed of proximal segment and multiarticulate flagellum; female Plps2-5 endopods with appendix interna. Telson longer than wide, bearing 2-3

pairs of spines on dorsal surface, proximal lobe with spine on lateral margin, and median tooth on convex posterior margin. Uropodal exopod armed with teeth on lateral margin and with transverse suture. [Adapted from Sakai & De Saint Laurent, 1989.]

Remarks. — The genus *Allaxius* Sakai & De Saint Laurent, 1989, was established on the basis of *Axiopsis aethiopica* Nobili, 1904, because *A. aethiopica* is distinguishable from the type species of *Axiopsis*, *A. serratifrons*. They are fundamentally different from each other in the features of the gastric region and the A2 scaphocerite: in *Axiopsis aethiopica* the gastric region bears longitudinal rows of spinules, and the A2 scaphocerite is short and horn-shaped, whereas in *Axiopsis serratifrons* the gastric region has a horseshoe-shaped prominence bearing five longitudinal carinae with denticles, and numerous denticles scattered among those carinae, and the A2 scaphocerite is elongate.

Type species. — *Axiopsis aethiopica* Nobili, 1904, by original designation and monotypy. The gender of the current generic name, *Allaxius*, is masculine.

Species included. — *Allaxius aethiopicus* (Nobili, 1904).

Allaxius aethiopicus (Nobili, 1904)
(figs. 4, 5)

Axiopsis aethiopica Nobili, 1904: 235; Tattersall, 1921: 394; Dworschak, 1992: 215, fig. 15a-f.

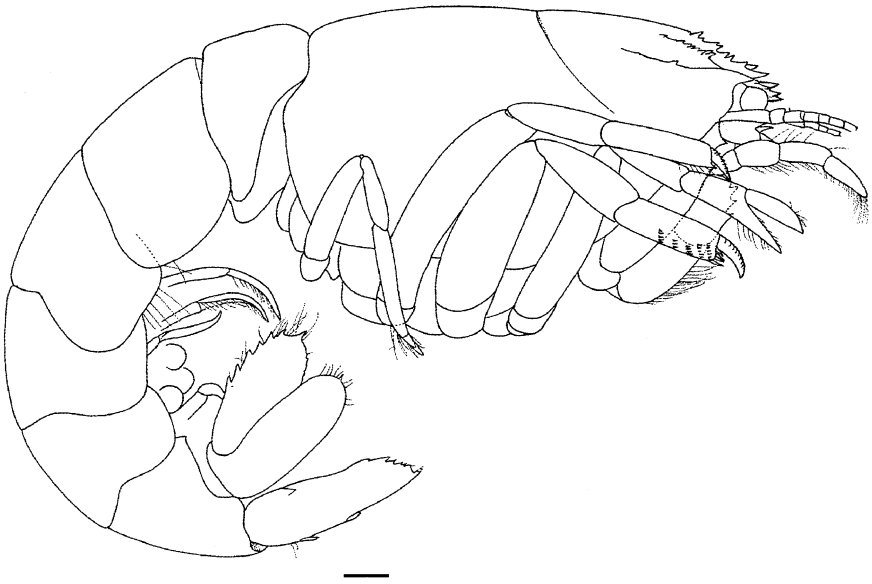

Fig. 4. *Allaxius aethiopicus* (Nobili, 1904). Whole body, lateral view. ZMB 15555, ovig. female (TL/CL, 39.0/12.0 mm), Republic of Djibouti. Scale 1 mm.

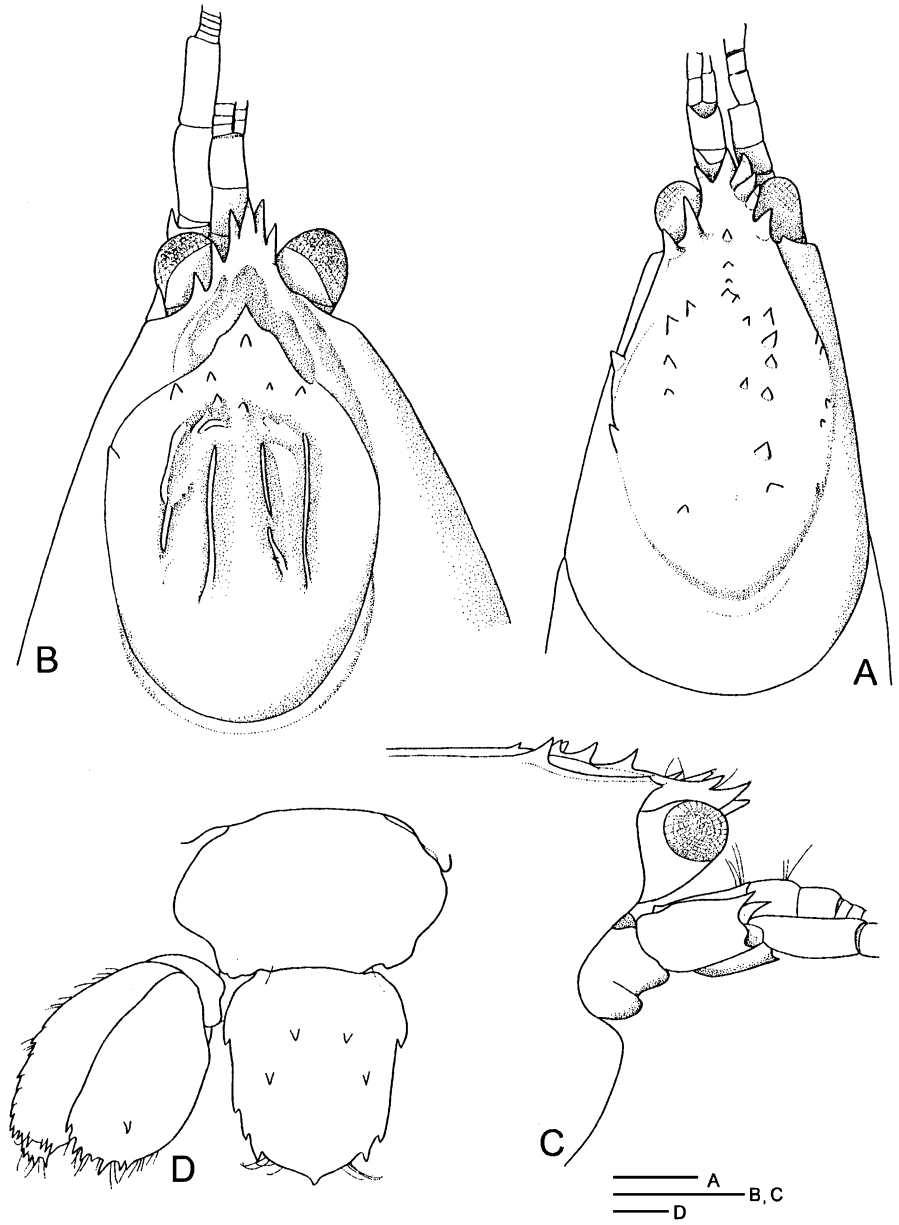

Fig. 5. *Allaxius aethiopicus* (Nobili, 1904). A, gastric region of carapace, dorsal view; B, gastric region of carapace, dorsal view; C, gastric region of carapace, lateral view; D, abdominal somite 6 and tail-fan, dorsal view. A, D, ZMB 15555, ovig. female (TL/CL, 39.0/12.0 mm), Republic of Djibouti; B, C, NHMW 6894, 1 ovig. female (TL/CL, 34.0/11.0 mm), Red Sea, 18.ii.1895, leg. Pola (?) Expedition. Scales 1 mm.

Axiopsis (*Paraxiopsis*) *aethiopica* — Nobili, 1906b: 93, pl. 6 fig. 1; Balss, 1915: 1; De Man, 1925d: 6 (list), 72 (key).
Allaxius aethiopica — Sakai & De Saint Laurent, 1989: 75.

Material examined. — MNHN Th 142, syntypes, 6 females (TL/CL, 26.0/10.0-37.0/13.0 mm), Djibouti, 1892, leg. Jousseumi; MNHN Th 143, 1 female (TL/CL, 32.0/11.0 mm), Djibouti, 1892, leg. Jousseumi; MNHN Th 471, 1 male (TL/CL, 21.0/8.5 mm); 1 ovig. female (TL/CL, 36.0/12.0 mm), Red Sea, "Calypso"; ZMB 15555, 1 ovig. female (TL/CL, 39.0/12.0 mm, lacking larger cheliped), Republic of Djibouti, biotope, ii-iii.1909, leg. Wache; ZMH-K 32030, 1 ovig. female (TL/CL, 35.0/10.9 mm), Bay of Tadjura, Republic of Djibouti, leg. E. Wache; NHMW 6894, 1 ovig. female (TL/CL, 34.0/11.0 mm), Red Sea, 18.ii.1895, leg. Pola (?) Expedition.

Diagnosis. — Rostrum triangular, with 3-5 sharp lateral spines. Gastric region convex (fig. 4), bearing either lateral carinae, two spines in place of median carina, and submedian double carina (fig. 5B), or 5 rows of spines in place of median, submedian, and lateral carinae (fig. 5A). A2 scaphocerite horn-shaped and shorter than distodorsal spine of A2 segment 2. Mxp3 merus with two sharp spines on mesial margin. P1 chelate and asymmetrical; in young male larger cheliped with broad merus, 1.8 times as long as wide, dorsal margin entire, but ventral margin denticulate proximally; carpus triangular, ventral margin protruded as truncate tooth; palm broadened, 1.5 times as long as wide and unarmed; dactylus about 3/4 length of palm; in smaller cheliped merus more than twice as long as wide; carpus 1.5 times as long as wide, and palm three times as long as wide, dactylus 2/3 times as long as palm; cutting edges of dactylus and fixed finger unarmed. In adult female cutting edge of dactylus roughly denticulate, and that of fixed finger with two distinct teeth at proximal and distal third. P2 fingers longer than propodus. P3 (fig. 4) propodus rectangular, P4 propodus elongate, Ps3-4 propodi bearing transverse rows of spines on ventrolateral margin, and dactylus bearing row of lateral spinules. Ps3-5 simple, bearing distoventral spine. Abdominal pleuron 1 narrow and slightly convergent posteroventrally; pleura 2-5 truncate ventrally, pleuron 6 triangular, with ventral spine. Male Plp1 absent; male Plp2 endopod with appendices interna and masculina at proximal third; appendix masculina longer than appendix interna. Female Plp1 composed of proximal segment and multiarticulate flagellum; female Plps2-5 endopods with appendix interna. Telson longer than wide, laterally bearing proximal lobe with spine, followed by 2-3 spines posterolaterally, two pairs of spines on dorsal surface, and median spine on distal margin (fig. 5D). Uropodal endopod bearing spines on distal margin, and another two spines on median carina, distal one of which located on posterior margin; uropodal exopod spinulate on lateral

margin, bearing transverse suture with spinules subdistally, and distal flap with spinulate distal margin.

Remarks. — Nobili (1904: 235) stated in his description that "Le rostre est pourvu de trois épines marginales sur chaque bord, et d'une épine terminale aussi longue que les deux latéroterminales; une série de spinules sur sa surface dorsale. Sur la carapace, il y a deux séries latérales (une pour chaque partie) de spinules; entre ces deux séries, il y en a deux autres plus petites". [The rostrum bears three spines on each lateral margin, and an apical spine as large as the two distolateral spines; a series of spines on the dorsal surface [= median carina]. The carapace is armed with a lateral row of spines on each side, and another two rows of spinules between the median and lateral rows of spines.] However, in the present specimens examined, the spinous rows in the gastric region are indistinct and the number and distribution of spines vary; in the female (ZMB 15555) the gastric region bears one spine anteriorly between the median and submedian rows of spines (fig. 5A), and in another female (ZMH K32030) the gastric region is convex, with a triangular protuberance at short distance from the base of the rostrum, bearing lateral carinae with a spine, no median carina but two anterior spines mediodorsally, and submedian double carinae, each followed anteriorly by 1-2 spines (NHMW 6894) (fig. 5B, C).

In the young male (MNHN Th 471, TL/CL, 21.0/8.5 mm) the dactylus is 2/3 times as long as the palm; the cutting edges of the dactylus and the fixed finger are unarmed, whereas in the adult female (NHMW 6894, TL/CL, 34.0/11.0 mm) the cutting edge of the dactylus is roughly denticulate, and that of the fixed finger is armed with two distinct teeth at the proximal and distal third.

Type locality. — Djibouti and Massawa.

Distribution. — Red Sea — Red Sea and Massawa (Nobili, 1904, 1906), Haleib (Dworschak, 1992), Daedalus Riff, Mersa Halaib, Raveiyah, Khor Dongonab. Gulf of Aden — Djibouti (Nobili, 1904, 1906).

Genus **Amakusaxius** gen. nov.

Definition. — Rostrum triangular, lateral margins with teeth. Anterolateral margin of carapace unarmed. Gastric region situated on same level as rostrum, bearing five longitudinal carinae; lateral carina consisting of two long carinate teeth, submedian carina of 5 short carinate teeth, and median carina with tubercles, reaching cervical groove; postcervical carina present. Eyestalks thick, overreaching rostrum. A2 scaphocerite short and horn-shaped. P1 chelate; larger cheliped unknown; in smaller cheliped fingers longer than

palm. Abdominal pleura smooth laterally and unarmed ventrally. Male Plps1-2 unknown. Telson subsquare, bearing posteromedian tooth. Uropodal endopod of narrow width; uropodal exopod also narrow, bearing distal flap. [Adapted from Sakai & De Saint Laurent, 1989.]

Remarks. — The present new genus is established on the base of *Calocaris* (*Calastacus*) *amakusana* Miyake & Sakai, 1967, which was included in the genus *Acanthaxius* Sakai & De Saint Laurent, 1989, because *Calocaris* (*Calastacus*) *amakusana* is similar in the features of the gastric region, smaller cheliped, and abdominal pleura to the type species of the genus *Acanthaxius*, *A. pilocheirus* (Sakai, 1987a) from Kumano-nada, off east coast of Kii Peninsula, Japan, 360 m. However, it has turned out that *Calocaris* (*Calastacus*) *amakusana* is distinctly different from *A. pilocheirus* in that the posterocervical carina is present, and is, therefore, not included in *Acanthaxius*, in which the posterocervical carina is not present. Accordingly, *Calocaris* (*Calastacus*) *amakusana* is reclassified under the new genus *Amakusaxius*, as *A. amakusanus*.

Type species. — *Calocaris* (*Calastacus*) *amakusana* Miyake & Sakai, 1967, by present designation and monotypy. The gender of the new generic name is masculine.

Species included. — *Amakusaxius amakusanus* (Miyake & Sakai, 1967).

Etymology. — The new generic name *Amakusaxius* is derived from the type locality of the type species, Amakusa, northwestern Kyushu, Japan, with the generic name *Axius* added.

Amakusaxius amakusanus (Miyake & Sakai, 1967)

Calocaris (*Calastacus*) *amakusana* Miyake & Sakai, 1967: 306, fig. 2, pl. 4B.
Axiopsis (*Axiopsis*) *amakusana* — Sakai, 1987a: 303 (list).
Acanthaxius amakusana — Sakai & De Saint Laurent, 1989: 73; Kensley, 1996b: 71 (list).

Remarks. — The holotype is a female, so it is at present impossible to describe the forms of male Plps1-2.

Type locality. — Off Tomioka, Amakusa-shoto [= Amakusa Islands], Kumamoto Pref., Japan, 20-40 m.

Distribution. — Japan — Amakusa-shoto (Miyake & Sakai, 1967); 20-40 m.

Genus **Anophthalmaxius** De Man, 1905

Anophthalmaxius De Man, 1905: 593; De Man, 1925d: 2 (key), 60; Sakai & De Saint Laurent, 1989: 14; Poore, 1994: 97 (key).

Diagnosis. — Rostrum badly damaged at distal part; lateral margins extending onto gastric region. Anterolateral margins of carapace unarmed. Gastric region situated at same level as rostrum, bearing median carina. Cervical groove discernible only on dorsal part, not extending to anterolateral part. Eyestalks flat and quadrate in dorsal view; cornea unpigmented. A2 scaphocerite simple and prominent. P1 chelate and equal; dorsal margin of chela unarmed. P2 fingers longer than palm. Ps2-4 with pleurobranchs. Abdominal pleura smooth and unarmed ventrally. Male Plp1 absent; male Plp2 biramous and broad, endopod with appendices interna and masculina; male Plps3-5 biramous and broad, endopods with appendix interna. Telson longer than wide, bearing posteromedian tooth. Uropodal exopod without distal flap. [Adapted from Sakai & De Saint Laurent, 1989.]

Type species. — *Anophthalmaxius eccoptodactylus* De Man, 1905, by original designation and monotypy. The gender of the generic name is masculine.

Species included. — *Anophthalmaxius eccoptodactylus* De Man, 1905.

Anophthalmaxius eccoptodactylus De Man, 1905
(fig. 6)

Anophthalmaxius eccoptodactylus De Man, 1905: 594; De Man, 1925d: 5 (list), 61, pl. 5 fig. 11-11d, pl. 6 fig. 11e-n; Sakai & De Saint Laurent, 1989: 15.
Anophthalmaxius enoptodactylus — Balss, 1925: 210 (miss-spelling).

Material examined. — ZMA Crust De. 202840, holotype, male (TL/CL, 16.0/6.0 mm, P1 missing on right side), Banda Sea, Indonesia, 5°46.7′S 134°0′E, “Siboga” Sta. 271, 1788 m.

Diagnosis. — Rostrum badly damaged at distal part, but supposed to be triangular and flattened dorsally as in fig. 6A-C, lateral margins extending posteriorly to middle of gastric region. Gastric region flat, bearing longitudinal median carina in anterior half, but no submedian carinae. Anterolateral margin of carapace unarmed. Cervical groove discernible. Eyestalks quadrate in dorsal view as in callianassid species. A2 segment 2 with dorsodistal spine, scaphocerite distinct. P1 missing on right side, but present on left. Male Plp1 absent; male Plp2 endopod with appendices interna and masculina; appendix interna with patch of hooklets distally and shorter than the appendix masculina, which bears distal setae (fig. 6D), male Plps3-5 endopods with appendix interna. Telson 1.5 times as long as wide, lateral margins slightly convex proximally, bearing 2-3 spinules medially; posterior margin rounded with median spine. Uropodal exopod without distal flap.

Remarks. — The male type specimen is fragile and partly damaged, lacking the distal part of the rostrum, the mouthparts on the left side, P1 on the right side, and Plp1 on the left side.

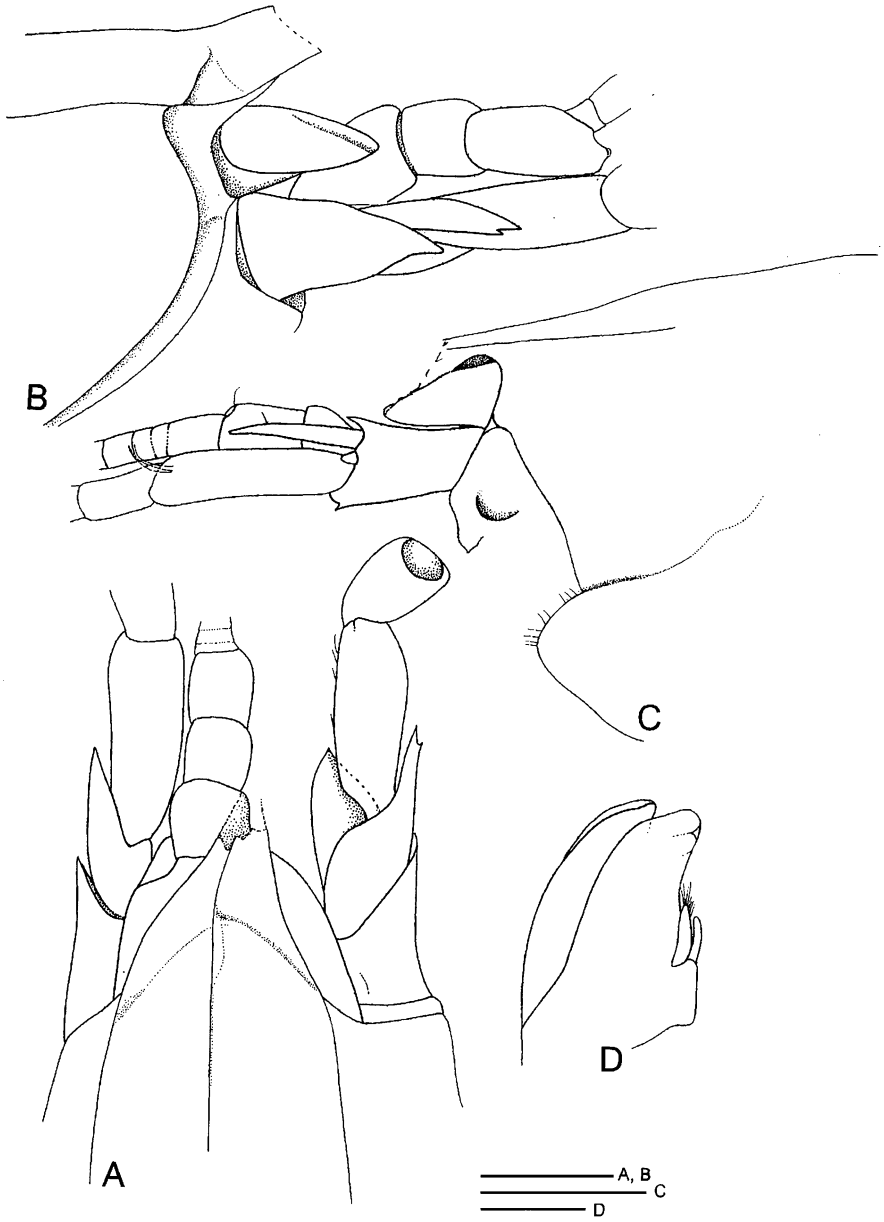

Fig. 6. *Anophthalmaxius eccoptodactylus* De Man, 1905. A, anterior part of carapace, dorsal view; B, anterior part of carapace, lateral view from right side; C, same from left side; D, male Plp2. A-D, ZMA Crust De. 202840, holotype male (TL/CL, 16.0/6.0 mm), Banda Sea, Indonesia, 5°46.7′S 134°0′E, "Siboga" Sta. 271, 1788 m. Scales 1 mm.

Type locality. — Off west coast of Aru, Indonesia, 5°46.7′S 134°0′E, "Siboga" Sta. 271, 1788 m.

Distribution. — Only known from the type locality.

Genus **Australocaris** Poore & Collins, 2009

Australocaris Poore & Collins, 2009: 238.

Diagnosis. — Rostrum styliform, elongate, denticulate laterally, three times as long as eyestalks, on level with carapace, and continuous with definite lateral gastric carinae; supraocular spines (spine at anterior end of lateral gastric carina and base of rostrum) prominent. Eyestalks cylindrical and articulating; cornea unpigmented. A2 scaphocerite with mesial spine at base and spines on ventral margin, extending beyond A2 peduncle. Carapace smooth; lateral gastric carina unarmed except for anterior supraocular spine; submedian gastric carina present, but obsolete; median gastric carina as weak ridge; postcervical carina absent; cervical groove short and weakly defined. Mxp3 exopod not clearly bent at base of flagellum. P1 symmetrical; propodus broad and laterally flattened, and carinate on dorsal and ventral margins; carpus-dactylus with strong spines on dorsal and ventral margins. Pleurobranchs absent on Ps2-4; podobranchs and arthrobranchs well developed; epipods present on Mxp2 to P4. Abdominal somite 1 pleuron produced; pleuron 2 broad, rounded anteriorly and posteriorly, and flat ventrally; pleura 3-5 rounded posteriorly. Plp3-5 appendix interna present. Male Plp1 minute. Male Plp2 without appendix masculina. Uropodal exopod with transverse suture.

Type species. — *Australocaris pinjarup* Poore & Collins, 2009, by original designation and monotypy. The gender of the generic name, *Australocaris*, is feminine.

Species included. — Only the type species, *Australocaris pinjarup* Poore & Collins, 2009, is known.

Australocaris pinjarup Poore & Collins, 2009

Australocaris pinjarup Poore & Collins, 2009: 238, figs. 11, 12, 39.

Diagnosis. — Rostrum narrow and 0.8 times length of front to cervical groove, bearing 5-6 short, oblique lateral spines anterior to supraocular spine,

continuous with lateral gastric carinae. Supraocular spines prominent. Eyestalks 0.3 length of rostrum, and cornea unpigmented. A1 peduncle reaching to midpoint of A2 segment 4; segment 1 swollen proximally, bearing small lateral spinule. A2 segment 1 unarmed; segment 2 with slender distal spine, directed slightly upwards, reaching distally to middle of A2 segment 4; scaphocerite reaching distally beyond distal margin of segment 5, with three strong spines on ventral margin, one spine on mesial margin; segment 3 with sharp mesiodistal spine on ventral margin; segment 4 about as long as segment 2 (excluding distal spine), bearing mesiodistal spine (left side only); segment 5 about half length of segment 4. Carapace smooth except for slight rugosity at base of rostrum, bearing few setae on gastric region and rostrum; lateral gastric carina unarmed; submedian gastric carina obsolete and curved mesially between supraocular spines; median gastric carina sharp on rostrum, and unarmed. Mxp3 coxa and basis with distal spine on each ventral margin; ischium unarmed; crista dentata with about 20 teeth; merus with two spines; carpus with spine.

P1 symmetrical, flattened, and carinate; coxa with two spines on ventral margin; basis with spine on ventral margin; ischium with two spines on ventral margin; merus with three distal spines on barely convex dorsal margin, and 7 spines on ventral margin, lateral and mesial faces smooth; carpus with 6 spines on dorsal margin, and three spines laterally on ventral margin, mesial face smooth; propodus with row of 4 spines on dorsal margin, and 9 spines on convex ventral margin, lateral face tuberculate and mesial face smooth; fixed finger 1.2 times as long as dorsal palm, and cutting edge convex, bearing about 15 irregular, triangular teeth; dactylus with 4 spines on proximal half of dorsal margin, lateral and mesial faces smooth; cutting edge denticulate; both fingers bearing setae. P2 ischium and merus unarmed on ventral margin; carpus 0.7 length of chela; propodus dorsal margin 0.5 length of dactylus. P3 or 4 merus with spine on ventral margin; propodus half as long as dactylus. P5 missing. Abdominal somite 1 with pleuron truncate ventrally; pleuron 2 asymmetrical and rounded posteriorly; pleura 3-6 rounded. Plp1 minute and cylindrical. Plp2 without appendix masculina; appendix interna one-third length of endopod. Telson 1.2 times as long as wide, widest proximally, then approximately parallel-sided, bearing no spines on lateral margin and at rounded posterolateral angle, but median spine on truncate-convex posterior margin; dorsal surface without oblique ridges or spines. Uropodal endopod 1.5 times as long as wide, bearing longitudinal median ridge with 4 spines (none marginal) on dorsal surface, but no lateral spines. Uropodal exopod 1.6

times as long as wide, bearing 6 obscure spines on distal half of lateral margin, and one fixed spine and one robust seta at posterolateral angle; dorsal surface with unarmed transverse suture, but no longitudinal ribs. [Adapted from Poore & Collins, 2009.]

Type locality. — Off Bumbury, Western Australia; 423-397 m.

Distribution. — Only known from the type locality.

Genus **Axiopsis** Borradaile, 1903

Axiopsis Borradaile, 1903: 538; Nobili, 1906b: 91; Schmitt, 1921: 110; De Man, 1925d: 2 (key), 66; Vinogradov, 1950: 223; Balss, 1957: 1579; Poore & Griffin, 1979: 224; Sakai, 1986: 11; Sakai, 1987a: 303 (list); Sakai & De Saint Laurent, 1989: 76; Sakai, 1992a: 173; Poore, 1994: 98 (key); Sakai, 1994: 198; Kensley, 1996e: 469; Poore & Collins, 2009: 241.

Axiopsis s. str., De Man, 1925d: 2 (key), 68; Balss, 1957: 1579.

Not: *Axiopsis*, Poore, 2004: 173 (= *Michelaxiopsis* Poore & Collins, 2009 and *Leonardsaxius* gen. nov.).

Diagnosis. — Rostrum triangular and pointed at apex; lateral margins armed with denticles, extending onto gastric region. Gastric region forming horseshoe-shaped prominence with 5 longitudinal carinae or rows of denticles. Anterolateral margin of carapace unarmed. Cervical groove present at full length. Eyestalks subglobose; cornea pigmented. A2 scaphocerite strongly protruded forward. P1 unequal and vertically positioned; chelae unarmed on dorsal margin. P2 chelate. No pleurobranchs. Abdominal pleura smooth on surface, pleuron 2 broadly truncate ventrally, and pleuron 6 triangular. Male Plp1 absent; male Plp2 biramous and narrow, endopod with appendices interna and masculina at proximal third, appendix masculina longer than appendix interna; male Plps3-5 endopods with appendix interna. Telson subsquare, bearing median tooth on posterior margin. Uropodal exopod with transverse suture. [Adapted from Sakai & De Saint Laurent, 1989.]

Remarks. — Poore (2004: 173) included two Australian species, *Axiopsis australiensis* De Man, 1925 and *Axiopsis werribee* (Poore & Griffin, 1979) in *Axiopsis*. However, the former species is here classified as *Michelaxiopsis australiensis* (De Man, 1925), and the latter as *Leonardsaxius werribee* (Poore & Griffin, 1979). This is because *Axiopsis* differs from both *Michelaxiopsis* and *Leonardsaxius* in major external morphological characteristics, as shown

in the scheme below:

	Axiopsis	*Michelaxiopsis*	*Leonardsaxius* gen. nov.
Gastric region	Gastric region forming horseshoeshaped prominence with 5 longitudinal carinae or rows of denticles	Gastric region forming convex platform, bearing tuberculate lateral, submedian, and median carinae, and additionally a short row of tubercles between median and submedian carinae	Gastric region convex, bearing median carina with 1-3 teeth originating from base of rostrum, and smooth submedian and lateral carinae
Male Plps1-2	Male Plp1 absent; male Plp2 endopod with appendices interna and masculina at proximal third	Male Plp1 absent; male Plp2 endopod with appendix interna, but without appendix masculina	Male Plp1 uniramous and bisegmented, distal segment triangular; male Plp2, endopod with appendices interna and masculina

Type species. — *Axius affinis* De Man, 1888b, by original designation. [Synonym of *Axia serratifrons* A. Milne-Edwards, 1837]. The gender of the current generic name, *Axiopsis*, is feminine.

Species included. — *Axiopsis baronai* Squires, 1977; *A. consobrina* (De Man, 1905) [=*A. irregularis* Edmondson, 1930; *A. tsushimaensis* Sakai, 1992a]; *A. serratifrons* (A. Milne-Edwards, 1873); *A.* sp., Sakai, 1992a. [*A. eximia* Kensley & Williams, 1990 is not considered here, as it is a fossil species.]

KEY TO THE SPECIES OF THE GENUS *AXIOPSIS*

1 – Eyestalks robust ..... *A.* sp., Sakai, 1992
– Eyestalks subglobose 2

2 – In larger and smaller chelipeds carpi and chelae thickly setose and tuberculate on lateral surface, and fingers longer than palm; P2 fingers longer than palm ..... *A. baronai*
– In larger and smaller chelipeds carpi and chelae not setose, but smooth, or roughly scattered with flattened tubercles on lateral surface 3

3 – Merus of larger cheliped unarmed dorsally; palm of larger cheliped roughly scattered with flattened tubercles on lateral surface ..... *A. serratifrons*
– Merus of larger cheliped armed with subdistal spine dorsally; palm of larger cheliped smooth on lateral surface ..... *A. consobrina*

Axiopsis baronai Squires, 1977

Axiopsis (*Axiopsis*) *baronai* Squires, 1977: 1885, 4 text-figs., 1 table.

Axiopsis baronai — Sakai & De Saint Laurent, 1989: 78; Lemaitre & León, 1992: 44; Hendrickx, 1995: 390 (list), 393, 395, figs.; Kensley, 1996e: 469 (list); Hendrickx et al., 2005: 171.

Material examined. — USNM 152653, holotype, male (TL/CL, 74.0/24.0 mm), Togoroma, Colombia, Pacific Ocean, 04°22′N 77°26.5′W, 7 m, 8.vi.1971, leg. H.J. Squires; USNM 152655, paratype, female (TL/CL, 115.0/39.0 mm), Pizarro, Colombia, Pacific Ocean, 05°11′N 77°26′W, 9 m, 11.vi.1971, leg. H.J. Squires.

Remarks. — Squires (1977: 1888) described the male Plp1 as missing. However, considering that the males of all species included in *Axiopsis* bear no Plp1, the absence of the male Plp1 may safely be considered as one of the characteristics of *Axiopsis*.

Type locality. — Togorama, Colombia.

Distribution. — Colombia — Togorama (Squires, 1977).

Axiopsis consobrina De Man,1905 (fig. 7)

Axiopsis consobrina De Man, 1905: 595 (partim, not specimen from Sulu Archipelago); Balss, 1925: 209; Sakai & De Saint Laurent, 1989: 77; Sakai, 1994: 198, 201 (key), fig. 14; Kensley, 1996e: 469 (list); Komai et al., 2002: 29; Poore & Collins, 2009: 241.

Axiopsis (*Axiopsis*) *consobrina* — De Man, 1925d: 5 (list), 69 (key), 80, pl. 6 fig. 13-13c; Estampador, 1937: 500; Ngoc-Ho, 2005: 55, fig. 4.

Axiopsis (*Axiopsis*) *irregularis* Edmondson, 1930: 10, fig. 4, pl. 1A. [Type locality. — Pearl and Hermes Reef, Hawaiian Islands, shallow waters.]

Axiopsis (*Axiopsis*) aff. *serratifrons* — Sakai, 1970a: 37, fig. 1a-b; Sakai, 1987a: 303 (list); Poore & Collins, 2009: 242.

Axiopsis irregularis — Sakai & De Saint Laurent, 1989: 78.

Axiopsis tsushimaensis Sakai, 1992a: 173, figs. 14, 15; Kensley, 1996e: 469 (list); Komai et al., 2002: 21, figs. 1-3, tables 1, 3. [Type locality. — Fukuoka, Korea Strait, 34°11′N 130°2′E, 102 m.]

Not: *Axiopsis* (*Axiopsis*) *consobrina* — Poore & Griffin, 1979: 230, fig. 4 (=*Axiopsis serratifrons* A. Milne-Edwards, 1873 and *Pseudoaxiopsis carpentariaensis* sp. nov.).

Not: *Axiopsis* (*Axiopsis*) *consobrina* — Tirmizi, 1983: 91, fig. 4 (=*Axiopsis serratifrons* A. Milne-Edwards, 1873).

Material examined. — ZMA Crust. De. 102672, paralectotype female (TL/CL, 31.0/10.2 mm), Indonesia, 4°20′S 122°58′E, between islands of Wowoni and Buton, northern entrance of Button Strait, 75-94 m, sand with dead shells [“Buton” or “Button” = Butung]; ZMB 13853, 1 juv. (TL/CL, 12.0/4.1 mm), Banda Sea, R/V “Planet”, 27.viii.1909, leg. Graef; SMF. 32778, 1 ovig. female (TL/CL, 64.0/22.2 mm), Suruga-Bay, fisher trawling boat “Seishin-maru”, 27.ix.1977, leg. S. Ohta.

Diagnosis. — Rostrum (fig. 7A, B) triangular and acuminate, projecting downward distally, reaching anteriorly middle of A1 penultimate segment, lateral margins with 3-5 teeth, extending posteriorly onto gastric region as lateral carinae with 8-9 denticles; submedian rows of 8-9 denticles; median carina with 15 denticles including hepatic tubercle; no tubercles between submedian

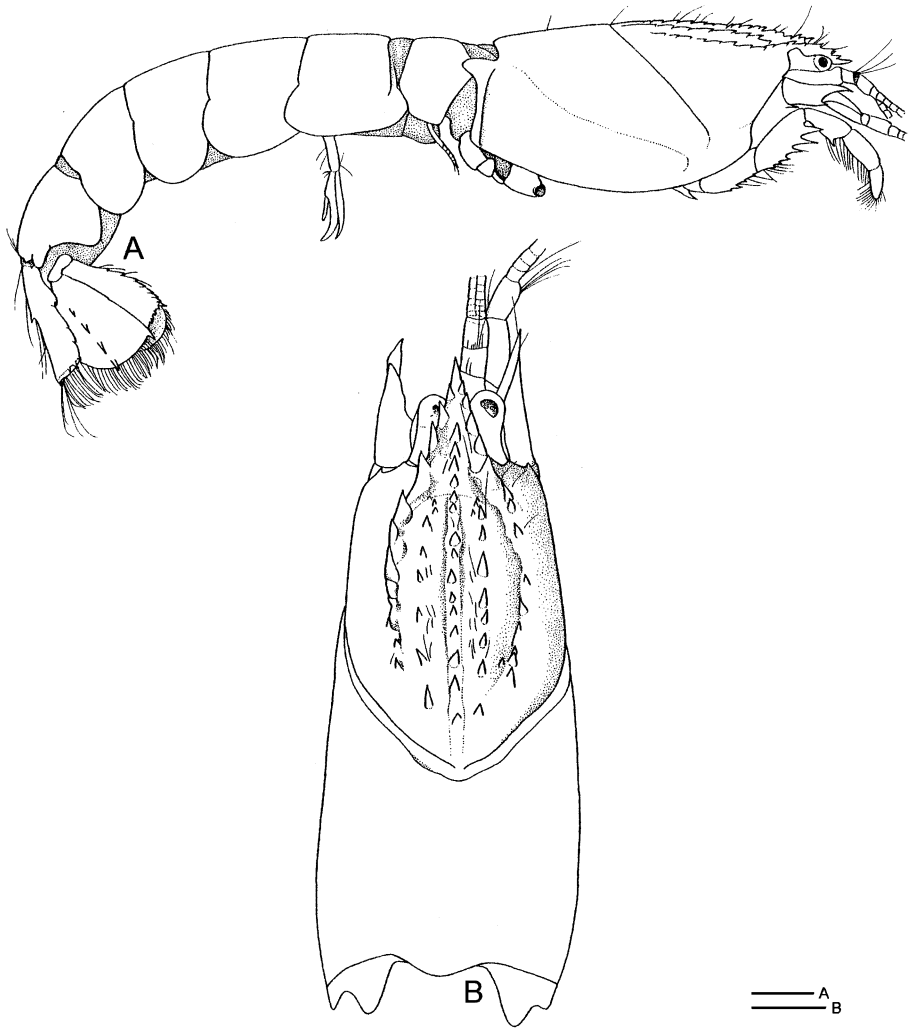

Fig. 7. *Axiopsis consobrina* De Man, 1905. A, whole body, lateral view; B, carapace, dorsal view. A, B, *Axiopsis consobrina*, ZMA Crust. De. 102672, paralectotype female (TL/CL, 31.0/10.2 mm), Indonesia, 4°20′S 122°58′E, between islands of Wowoni and Buton, northern entrance of Button Strait, 75-94 m ["Buton" or "Button" = Butung]. Scales 1 mm.

rows and median carina. Cervical groove strong and clearly defined. Postcervical carina absent. Male Plp1 absent; male Plp2 endopod bearing appendices interna and masculina with distal setae; male Plps3-5 endopods with appendix interna.

Remarks. — The present species, *Axiopsis consobrina* is similar to *Axiopsis serratifrons* A. Milne-Edwards, 1873, but they differ from each other as

follows. In *A. consobrina* the merus of the larger cheliped is armed with a subdistal spine on the dorsal margin, the gastric region bears lateral carinae with 8-9 denticles, submedian rows of 8-9 denticles, and a median row of 15 denticles including a hepatic tubercle, but no tubercles between the submedian and median rows, and the palm of the male larger cheliped is smooth on the lateral surface. In *A. serratifrons*, the merus of the larger cheliped is unarmed on the dorsal margin, the gastric region bears lateral carinae with 16 tubercles, a median row of tubercles including a hepatic one, submedian rows of 12-13 tubercles, and numerous tubercles between the median and submedian rows of tubercles, and the palm of the male larger cheliped is roughly scattered with flattened tubercles on the lateral surface.

The juvenile specimen from the Banda Sea (ZMB 13853) is identified as *A. consobrina*, because no denticles are observed between the median and submedian rows of denticles in the gastric region.

Axiopsis (*Axiopsis*) *irregularis* Edmondson, 1930 from Hawaii, is synonymous with the present species, *Axiopsis consobrina*, because the gastric region bears no denticles between the median and submedian rows of spines (Edmondson, 1930, fig. 4a, b), and the merus of the larger cheliped is armed with a subdistal spine on the dorsal margin, as in *A. consobrina* (cf. Sakai, 1994, fig. 14).

Poore & Griffin (1979: 230) described *A. consobrina* based on a specimen from the Gulf of Carpentaria, Queensland, Australia, however, it is found that the female specimen (Poore & Griffin, 1979, fig. 4e) is not *A. consobrina* but *A. serratifrons*, because the merus of the larger cheliped bears no subdistal spine on the dorsal margin, though this female specimen is now considered lost (G.C.B. Poore, in litt.). The same was found when examining the male specimen (AM P16308), which is not to be assigned to *A. consobrina* but to *Pseudoaxiopsis carpentariaensis* sp. nov. (see p. 178), because in the former the gastric region bears a simple median row of spines, and the dorsal surface of the abdomen is smooth, whereas in the latter the gastric region bears a tuberculate median carina with short double carina with tubercles in the middle, running from the middle of the rostrum nearly to the cervical groove (fig. 7A, B; Poore & Griffin, 1979, fig. 4a), and the abdominal somites 1-6 are provided with a characteristic dorsal pattern of carinae arranged as longitudinal stripes.

Tirmizi (1983) assigned a female from Bali, Indonesia to *A. consobrina*. However, Sakai (1994: 199) rejected the identification, because the gastric region is scattered with denticles between the median and submedian carinae,

unlike that of the type specimen of *A. consobrina*. In the present revision, it is found by examination of the lectotype of *A. serratifrons* that her specimen may safely be assigned to *A. serratifrons*.

Axiopsis tsushimaensis Sakai, 1992a was established from a young female specimen from the Tsushima Islands, Fukuoka, Korean Strait, and distinguished from *Axiopsis consobrina*, because *A. tsushimaensis* is characterized by its simple A2 scaphocerite, versus *A. consobrina* by its proximally bifurcate A2 scaphocerite. However, it would be better to regard *A. tsushimaensis* as synonymous with *A. consobrina*, taking into consideration that the two species are almost the same in all other characteristics, and *A. tsushimaensis* is young and small (TL/CL, 18.0/5.8 mm) and its A2 scaphocerite is safely considered to be undeveloped; even in the larger specimen of *A. consobrina* from Suruga Bay, the scaphocerite is poorly developed and not as distinctly bifurcate as in the type specimen of *A. consobrina*.

It is also noted that in *A. consobrina* another morphological transformation is observed with growth. In the smaller specimens, pleuron 1 is armed with a spinule ventrally, pleura 3-5 with an anteroventral spinule, and pleuron 6 with a spinule ventrally, whereas in the larger specimen from Suruga Bay, pleura 1-3 are ventrally unarmed, pleura 4-5 bear no spinule but an anteroventral tubercle, and pleuron 6 is unarmed.

Komai et al. (2002) made reference to the podobranchs on the thoracic somites of *A. consobrina* under the name of *A. tsushimaensis*, and described that they are present as rudimentary structures on thoracic somites 2-6. However, in *A. consobrina* they are not present as rudimentary ones but as small structures on thoracic somites 3-6 (table II).

Type locality. — Solor Strait, Indonesia, “Siboga” Sta. 305, 113 m.

Distribution. — Hawaiian Islands — Pearl and Hermes Reef (Edmondson, 1930); Indonesia — Buton [= Butung] Strait and Solor Strait (De Man, 1905, 1925); Australia — North West Shelf 75-275 m (Sakai, 1994; Poore & Collins,

TABLE II

Axiopsis consobrina (De Man, 1905), gill formula (SMF 32778, from Suruga Bay, Japan)

	Maxillipeds			Pereiopods				
	1	2	3	1	2	3	4	5
Epipods	1	1	1	1	1	1	1	–
Podobranchs	–	–	1	1	1	1	–	–
Arthrobranchs	–	1	2	2	2	2	2	–
Pleurobranchs	–	–	–	–	–	–	–	–

2009); Tahiti, Society Is., French Polynesia; Japan — Tsushima (Sakai, 1970a), Fukuoka, Korean Strait (Sakai, 1992a); N.E. of Iki Island, 33°57.23′N 129°54.24′E, 86 m, Yamaguchi Pref. (Komai et al., 2002); Suruga Bay, Shizuoka Pref.

Axiopsis serratifrons A. Milne-Edwards, 1873
(figs. 8-9)

Axia serratifrons A. Milne-Edwards, 1873: 263, pl. 13 (not 2), figs. 6, 6a.
Axius serratifrons — Rathbun, 1906: 895; Edmondson, 1923: 27.
Axiopsis serratifrons — Sendler, 1923: 44, pl. 21 fig. 10 (not 9); Sakai & De Saint Laurent, 1989: 76; Werding & Müller, 1989: 251; Manning & Chace, 1990: 31, figs. 16, 17; Dworschak, 1992: 215; Lemaitre & León, 1992: 44; Lemaitre & Ramos, 1992: 346, figs. 2, 3; Sakai, 1992a: 173; Dworschak & Ott, 1993: 280; Hendrickx, 1995: 390 (list); Kensley, 1996e: 469 (list); Rodrigues et al., 1998: 379; Debelius, 1999: 226, fig.; Melo, 1999: 312, figs. 209-210; Vargas & Cortés, 1999b: 905; Abed-Navandi, 2000: 295; Komai, 2000b: 344 (list); Ngoc-Ho, 2002b: 224, fig.; Kensley, 2003: 366, pls. 2, 8, table 1; Ngoc-Ho, 2005: 53, fig. 3 (not holotype); Dworschak, 2004: 15, fig. 5; Komai & Tachikawa, 2008: 20-22, fig. 1; Poore & Collins, 2009: 241; Robles et al., 2009: 316.
?*Axiopsis serratifrons* — Borradaile, 1903: 538.

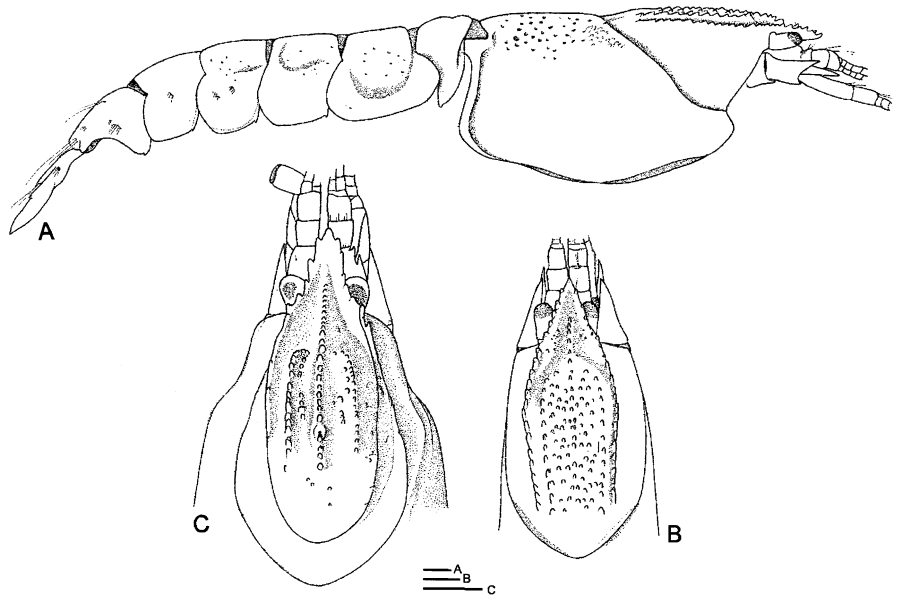

Fig. 8. *Axiopsis serratifrons* (A. Milne-Edwards, 1873). A, whole body, lateral view; B, C, gastric region, dorsal view. A, B, ZMH K 8405 (Mus. Godeffroy 1723), lectotype, female (TL/CL, 31.0/11.2 mm), Upolu, Samoa; C, MNHN Th 147, paralectotype, male (dried) (CL, 11.5; abd + telson 19.5 mm). Scales 1 mm.

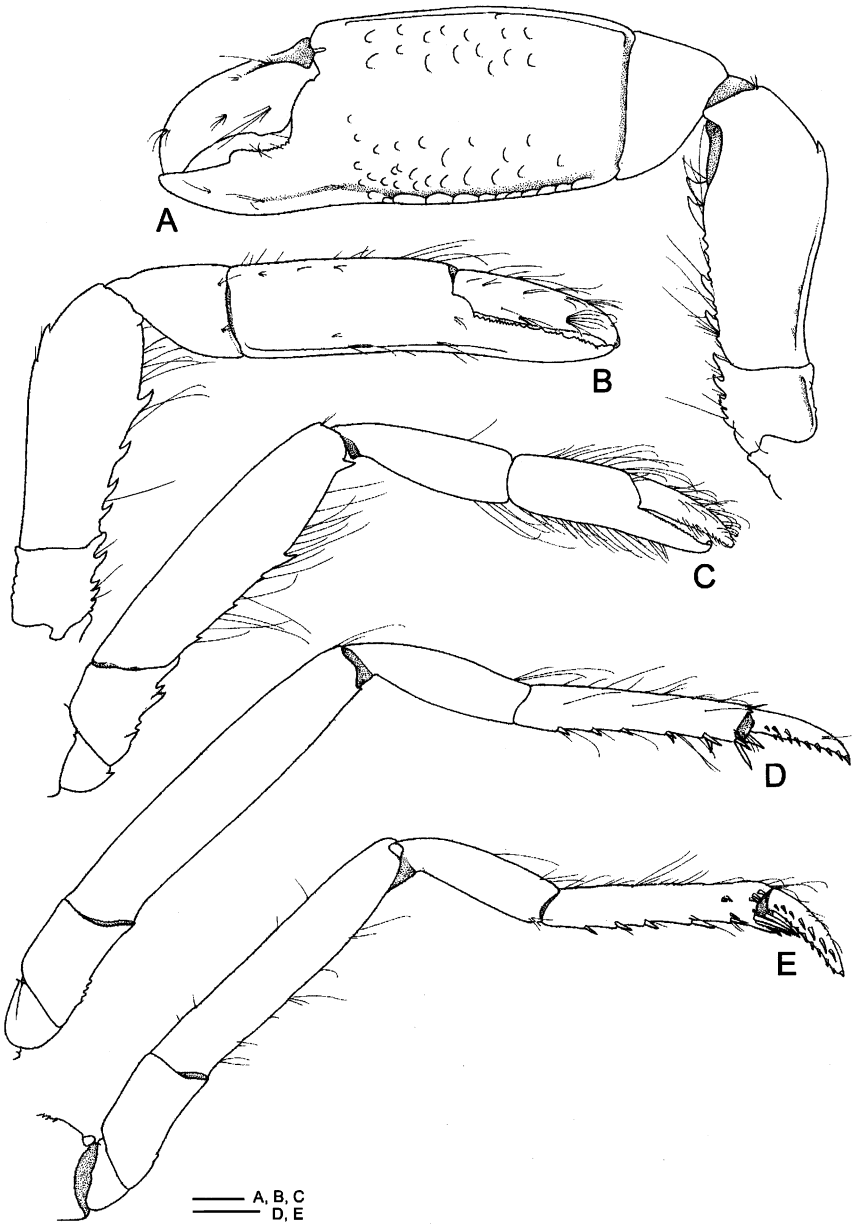

Fig. 9. *Axiopsis serratifrons* (A. Milne-Edwards, 1873). A, larger cheliped, lateral view; B, smaller cheliped, lateral view; C, P2, lateral view; D, P3, lateral view; E, P4, lateral view. A-E, ZMH K 8405 (Mus. Godeffroy 1723), lectotype, female, Upolu, Samoa. Scales 1 mm.

Axiopsis (*Axiopsis*) *serratifrons* — De Man, 1925d: 6 (list), 68 (key), 72, pl. 6 fig. 12-12i; Holthuis, 1953b: 51; Kensley, 1981a (not 1980): 1253, figs. 1-5; Rodrigues, 1983: 18, figs. 1-22.

Axius spinipes De Man, 1888b: 464, pl. 19 fig. 6; Zehntner, 1894: 195. [Type locality. — Noordwachter (North Light House), nearest town or city, Tanjungpandan, Indonesia, 5°12.24′S 106°27.36′E.]

Axius affinis De Man, 1888b: 469, pl. 20 fig. 1 (fig. P1, cheliped). [Type locality. — Amboina, Indonesia.]

Axiopsis spinipes — Borradaile, 1903: 538; Nobili, 1906b: 91; Borradaile, 1910: 262.

Axiopsis affinis — Borradaile, 1903: 538; Borradaile, 1904: 752; Nobili, 1906b: 92; Makarov, 1938: 47.

Axiopsis sculptimana Ward, 1942: 62. [Type locality. — Diego Garcia, Chagos Archipelago.]

Axiopsis sp. D, Coelho, 1971: 231.

Axiopsis (*Axiopsis*) sp. D, Coelho & Ramos, 1972: 161.

Allaxius sculptimanus — Sakai & De Saint Laurent, 1989: 75.

Axiopsis brasiliensis — Coelho & Ramos-Porto, 1985: 73, fig. 3; Melo, 1999: 310, figs. 207-208; Coelho et al., 2007: 6, tab. 2.

Axiopsis pica Kensley, 2003: 361, figs. 1, 2, pl. 1, table 1; Ngoc Ho, 2005: 51, fig. 2. [Type locality. — Anae Island, Guam.]

Axiopsis consobrina — Tirmizi, 1983: 91, fig. 4; Ngoc-Ho, 1995: 55, fig. 4.

Material examined. — Indo-West Pacific region. — ZMH K 8405 (Mus. Godeffroy 1723), lectotype, female (TL/CL, 31.0/11.2 mm), Upolu, Samoa; ZMH K 8385 (Museum Godeffroy 16193), 1 male (TL/CL, 39.0/14.3 mm), 2 ovig. females (TL/CL, 49.0/17.1; 76.0/23.9 mm), Tahiti; ZMH K 8389 (Museum Godeffroy 16367), 1 male (TL/CL, 65.0/19.8 mm), Caroline Is.; ZMH K 24556, 1 male (TL/CL, 49.0/16.2 mm), Bismarck Archipelago, Südsee-Expedition, no. 90, 10.viii-25.ix.1908, leg. Dr. Dunker; ZMB 8904, 1 male (TL/CL, 53.0/16.0 mm), 1 ovig. female (TL/CL, 65.0/22.0 mm), 1 female (TL/CL, 62.0/23.0 mm), Jaluit Island, Marshall Islands; MNHN Th 147, paralectotype, 1 male, (TL/CL, 23.0/11.5 mm), Hawaii, Sandwich Islands, det. Nobili, 1905; MNHN Th 691, male (TL/CL, 67.0/22.5 mm), Île des Pins, New Caledonia, 19.xii.1961; MNHN Th 864, 1 male (TL/CL, 39.0/12.2 mm), Japan, leg. K. Sakai; MNHN Th 690, 1 male (TL/CL, 26.0/8.5 mm), Calypso "Aldara, 1954", det. De Saint. Laurent; MNHN Th 4179 (= UF 2782), 1 ovig. female (TL/CL, 48.0/16.0 mm), Mariana Islands, Guam Is., Apra Harbour; MNHN Th 1426, 1 male (TL/CL, 17.0/6.0 mm), Tahiti, Society Islands, French Polynesia, 2.5 m, 17.i.1995 (Ngoc-Ho, 2005: 55, fig. 4, identified as *A. consobrina*); NHM 1973: 629: 2, 1 male (TL/CL, 49.0/15.1 mm), 1 ovig. female (TL/CL, 52.0/17.4 mm), Dar es Salaam, Tanzania, leg. R.G. Hartnoll; RMNH D 1168, 1 male (TL/CL, 21.0/6.5 mm), "Siboga" Exp. vii.1929; RMNH D 50168, 1 male (TL/CL, 46.0/14.7 mm), Indonesia, S.W. Sulawesi, Spermonde Archipelago, west side of Badi Island, 22 m, 26.v.2001, leg. et don. A. Gittenberger.

Atlantic Ocean. — ZMB 26887, 1 male (TL/CL, 56.0/18.0 mm), Karibik coast, Punte de Betin, Santa Marta, Colombia, 1-2 m, 26.iii.1977, leg. L. Werding, det. Müller; DOUFPe 314, holotype, male, 5°15′S 34°59′W, 69 m, det. as *Axiopsis braziliensis*; DOUFPe 311, paratype, female (broken), Recife, PE, Brazil, det. as *Axiopsis braziliensis*; DOUFPe 8584, 7°52′S 34°32′W, 45.5 m, det. as *Axiopsis braziliensis*; DOUFPe 1873, 1 male (TL/CL, 64.0/22.6 mm), 1 ovig. female (TL/CL, 54.0/19.6 mm), 1 female (TL/CL, 53.0/18.7 mm), Atol das Rocas, RN, Brazil, 19.vii.1992, det. as *Axiopsis braziliensis*; DOUFPe 8583, Atol das Rocas, RN, Brazil, 20.viii.1992, det. as *Axiopsis braziliensis*.

Description of lectotype. — Rostrum (fig. 8B, C) stoutly triangular, with 5-6 teeth on lateral margins extending posteriorly onto gastric region as lateral

carinae; gastric region bearing lateral carinae with 16 tubercles, median row of tubercles including hepatic one, submedian rows of 12-13 tubercles, and numerous tubercles between median and submedian rows. Cervical groove strong and distinct. Surface of carapace posterodorsally pitted, lacking postcervical carina. P1 unequal; in left larger cheliped (fig. 9A), ischium with five teeth on ventral margin; merus with four distinct teeth on mesioventral margin, series of small teeth on ventrolateral margin, and unarmed on dorsal margin; carpus unarmed; palm 1.7 times as long as wide, carinate and unarmed dorsolaterally, and flattened tubercles on lateral surface and along ventral margin; cutting edge of fixed finger with proximal fine denticulation followed by median tooth, and smooth distally; dactylus largely concave on cutting edge. In right smaller cheliped (fig. 9B), ischium obtusely denticulate on dorsal margin, and armed with 5 teeth on ventral margin; merus with 4 sharp teeth on ventral margin and two subdistal teeth on dorsal margin; carpus unarmed; palm twice as long as wide, and distinctly carinate on ventral and dorsal margins; fixed finger denticulate on cutting edge, and dactylus unarmed on cutting edge. P2 (fig. 9C) merus with 4 teeth on ventral margin; fingers slightly shorter than palm. Ps3-4 (fig. 9D, E) propodi elongate, bearing short vertical rows of 1-3 spinules ventrolaterally. Abdominal pleuron 1 (fig. 8A) narrow ventrally; pleuron 2 broad, and rounded at antero- and posteroventral angles; pleura 3-6 truncate ventrally, bearing small tooth on anteroventral angle; pleuron 6 narrow and rounded, with small tooth ventrally. Lateral surfaces of pleura 2-4 pitted dorsolaterally. Male Plp1 absent; male Plp2 endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 consisting of proximal segment and multiarticulate flagellum. Plps2-5 leaf-like, endopods with appendix interna. Telson longer than wide, bearing proximal lobe with spine, followed posteriorly by tooth on lateral margin, three spinules at posterolateral angle, median tooth on posterior margin, and two pairs of spines medially on dorsal surface. Uropodal endopod oval, bearing three spines including distolateral one, and longitudinal row of 5 spines medially on dorsal surface. Uropodal exopod broadened, bearing 4-5 spines on distolateral margin, a submarginal row of three spines distolaterally, and a transverse suture with spinules.

Remarks. — A. Milne-Edwards (1873a) published two type localities for the two syntypes of the present species, *Axiopsis serratifrons* A. Milne-Edwards, 1873, i.e., Upolu, Samoa, and Sandwich Islands, Hawaii, in the Journal of the Museum Godeffroy. One of the syntypes from Upolu, Samoa is preserved in good condition in the Zoological Museum of Hamburg, under catalogue number ZMH K 8405 (Mus Godeffroy 1723) (fig. 8A), and the

other from the Sandwich Islands, Hawaii is preserved as the "Holotype", designated without righteous reasons (Ngoc-Ho, 2005: 53), in the Muséum national d'Histoire naturelle, Paris, under catalogue number MNHN Th 147. According to the ICZN, 2000, calling a syntype "Holotype" after 1999 does not imply its automatic designation as Lectotype (Segment 74.7) as in the cases before 2000 (Art. 74.6). Therefore, the two specimens have still to be regarded as syntypes, and the present author herewith selects the female specimen from Upolu, Samoa in the Hamburg collection (ZMH K 8405) as the lectotype of the species. This brings the name-bearing type back to the institution to which the Godeffroy collection has always belonged. The remaining male syntype from the Sandwich Islands, Hawaii, preserved in the Muséum national d'Histoire naturelle, Paris, under catalogue no. MNHN Th 147, is, therefore, herewith defined as the paralectotype.

The reasons why the female specimen is selected as the lectopype are as follows. The figures of the type specimen published by A. Milne-Edwards (1873a, pl. 13 fig. 6 and 6a) show that the type specimen bears a larger cheliped on the left side, which suggests that the type specimen he figured is the female preserved in the collection of the Zoological Museum in Hamburg (Panning, 1956), but not the male that was deposited by A. Milne-Edwards, and has been preserved, in the Muséum national d'Histoire naturelle in Paris, and which was misdescribed by Ngoc-Ho (2005) as the "holotype" of *Axiopsis serratifrons* (MNHN Th 147) (fig. 8C). So, the female type specimen can safely be defined as the lectotype of *Axiopsis serratifrons*, and the male type specimen as the paralectotype.

The female lectotype from Upolu, Samoa is characterized, through careful examination, as follows. The gastric region bears lateral carinae with numerous tubercles, median and submedian rows of tubercles, and numerous tubercles between these; the palm of the left, larger cheliped is scattered with flattened tubercles on the lateral surface except for the median part, the dorsal margin is carinate and unarmed (fig. 9A); the fixed finger bears one tooth medially on the cutting edge, the palm of the smaller cheliped is not scattered with flattened tubercles but smooth.

Kensley (2003: 361) described a new species, *Axiopsis pica*. However, the male holotype of *Axiopsis pica* Kensley, 2003 from Guam, is almost the same in characteristics as *Axiopsis serratifrons*, except that it has a different colour pattern. This difference, however, is not sufficiently decisive to distinguish the two species, and is to be regarded as a variation at species level, because there are also other differences regarded as mere variations between the two

species, such as the number of the median teeth on the cutting edge of the larger cheliped, and the presence or absence of flattened tubercles on the lateral surface of the larger and smaller chelipeds. Even though he (Kensley, 2003) described in his remarks, citing Knowlton's notes, that "in several groups, while shade and intensity of color may vary, the actual pattern of pigmentation is consistent and can be used to separate morphologically very similar species". Therefore, *A. pica* is considered to be symonymous with *A. serratifrons*.

Ngoc-Ho described *Axiopsis pica* Kensley, 2003 based on specimens from the Tuamotu Archipelago, French Polynesia, and Mariana Island (Ngoc-Ho, 2005, fig. 2C), showing that the larger cheliped is scattered with flattened tubercles on the mesial and lateral surfraces of the P1 palm. However, the feature agrees, though the colour is different, with that of the female lectotype of *Axiopsis serratifrons* (fig. 9A), and in the male and female specimens of *A. serratifrons* (ZMH K 8385 (Museum Godeffroy 16193), 1 male (TL/CL, 39.0/14.3 mm), 2 ovig. females (TL/CL, 49.0/17.1; 76.0/23.9 mm), Tahiti; NHM 1973: 629: 1 ovig. female (TL/CL, 52.0/17.4 mm), Dar es Salaam, Tanzania), it is observed that the P1 palms of the larger and smaller chelipeds are scattered with flattened tubercles on both lateral and mesial surfaces. Lemaitre & Ramos (1992, fig. 2) described *A. serratifrons* from a juvenile female specimen from Gorgona Island, Pacific coast of Colombia, in which the palms of both larger and smaller chelipeds are scattered with flattened tubercles on the lateral surface as in the specimen of *A. serratifrons* from Kur Island, Indonesia (De Man, 1925d, pl. 6 fig. 12h, i) and the holotype of *Axiopsis pica* from Guam (Kensley, 2003). The number of the tubercles on the gastric region also varies conspicuously among the specimens of *A. serratifrons*, as observed in the female lectotype (ZMH K 8405) (fig. 8B) and the male paralectotype (MNHN Th 147) (Ngoc-Ho, 2005, fig. 3B), which suggests that *A. pica* described by Ngoc Ho (2003) should be synonymous with *A. serratifrons*.

The type specimen of *Axiopsis sculptimana* Ward, 1942 is beyond my access, which makes it difficult to review Ward's species. Ward (1942) described that "this species is allied to *Axiopsis serratifrons* (A. M.-Edwards, 1873) but they differ; (1) The distal surfaces of both chelae are strongly sculptured, having coarsely flattened tubercles appearance in *A. sculptimana*, (2) The whole surface of *A. serratifrons* is covered with short stiff setae, (3) The sculpture on the gastric region is different. In sculpture there are two outer lines of spines, but the median portions are covered with spines

irregularly arranged in *A. sculptimana*, whereas they are laid out in rows in *A. serratifrons*". However, he made errors and confused descriptions of the differences between the two species, because in *A. serratifrons* the whole surface of the body is not covered with short stiff setae, and tubercles (not spines) are not always laid out in rows except for lateral rows of tubercles on the gastric region, because the gastric region is usually covered with tubercles irregularly arranged between the lateral rows (fig. 8A). This shows that he failed to perform a careful examination of *A. serratifrons*, and gave misdescriptions of its characteristics. Judging from the characteristics of *A. sculptimana* described by Ward (1942), his species is sufficiently similar to be synonymous with *A. serratifrons*.

It is here confirmed that *Axiopsis brasiliensis* Coelho & Ramos-Porto, 1985 is a junior synonym of the present species, *Axiopsis serratifrons*, as suggested by Coelho (1997). In the female specimen (DOUFPe 1873) the palm of the smaller cheliped is tuberculate on the lateral and mesial surfaces, whereas in the male (DOUFPe 1873) it is not tuberculate but smooth on both surfaces. Taking all this into consideration, the presence or absence of the tubercles on the palm of the smaller cheliped depends on the individual, and hence cannot be regarded as a species-specific character.

Type locality. — Upolu, Samoa.

Distribution. — Bermuda — North Rocks (Kensley, 1981a); Isla San José, Islas Murciélago, Guanacaste; Punta Esmeralda, Bahia Culebra, Costa Rica (Vargas & Cortés, 1999b: 905); Florida — Pigeon Key, Monroe County (Kensley, 1981a); Belize — Carrie Bow Cay (Kensley, 1981a; Dworschak, 1992); Colombia — Gorgonia Island (Lemaitre & Ramos, 1992); Punta de Betin, Santa Marta, (present data); Brazil — Rio Grande do Norte; Camocim; Fortaleza; Ceará, Recife; Pernambuco; Porto de Pedras, Alagoas; Cape Verde Islands (Abed-Navandi, 2000); Ascension Island (Manning & Chace, 1990).

South Africa — Sodwana Bay, Zululand (Kensley, 1981); Madagascar — Tuléar (Sakai & De Saint Laurent, 1989); Kenya — Mombasa (Sakai & De Saint Laurent, 1989); Aldabra Island (Sakai & De Saint Laurent, 1989); Seychelles (Sakai & De Saint Laurent, 1989); Red Sea (Nobili, 1906b); Gulf of Aden — Obock (Nobili, 1906b; Sakai & De Saint Laurent, 1989); Maldives — Male Atoll (Borradiale, 1904); Chagos Archipelago — Salomon Atoll (Borradaile, 1910); Sri Lanka — Colombo (Manning & Chace, 1990); Indonesia — Noordwachter Island (De Man, 1888b), Ambon (De Man, 1888b, 1925; Zehntner, 1894), Obi Island, Damar Island, Salayar Island, Kepulauan Lucipara, Kur Island, and Roti Island (De Man, 1925d), Kei Islands

(Sakai, 1992a); Palau Is. (Sendler, 1923); Australia — Gulf of Carpentaria, Queensland (Poore & Collins, 2009); Marshall Islands — Narnu Island, Bikini Atoll (Kensley, 1981a), Jaluit; Gilbert Islands — Onotoa (Kensley, 1981a); New Caledonia (Sakai & De Saint Laurent, 1989); Upolu, Samoa (A. Milne-Edwards, 1873); north of South China (Liu & Zhong, 1994); Hawaiian Islands (A. Milne-Edwards, 1873; Sakai & De Saint Laurent, 1989); Tabuaeran (Edmondson, 1923); Bonin Islands — Chichi-jima, Miyano-hama; Washington Beach (Komai & Tachikawa, 2008).

Axiopsis sp., Sakai, 1992

Axiopsis sp., Sakai, 1992a: 174, fig. 16.

Distribution. — Kenya — off Mombasa (Sakai, 1992a); 40 m.

Genus **Axiorygma** Kensley & Simmons, 1988

Axiorygma Kensley & Simmons, 1988: 657; Sakai & De Saint Laurent, 1989: 92; Poore, 1994: 98 (key).

Diagnosis. — Rostrum narrowly triangular and pointed at apex; lateral margins each armed with 5 teeth, extending onto gastric region as unarmed lateral carinae. Gastric region convex, bearing unarmed median carina originating from midlength of rostrum and reaching midway to cervical groove, and unarmed submedian carinae starting posterior to rostrum and reaching midway to cervical groove. Cervical groove present at whole length; postcervical carina absent. Anterolateral margins of carapace unarmed. Eyestalks elongate. A2 scaphocerite elongate. P1 unequal in male, merus inflated dorsally, bearing 4 sharp spines ventrally; palms with cluster of setae at dorsoproximal angle, in larger cheliped palm robust, and in smaller cheliped palm slender; female having slender chelipeds subequal in length and shape. Ps2-5 slender; Ps3-4 propodi elongate, without transverse rows of spines on ventrolateral margin. No pleurobranchs. Abdominal pleura 3-5 with small bundle of setae, and rounded on ventral margin. Male Plp1 absent; male Plp2 biramous, endopod and exopod slender and leaf-like, endopod with appendix interna, but without appendix masculina, male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and slender, female Plps2-5 endopods with appendix interna. Telson subsquare with median tooth on posterior margin. Uropodal exopod with transverse suture.

Type species. — *Axiorygma nethertoni* Kensley & Simmons, 1988, by original designation and monotypy. Gender of the generic name, *Axiorygma*, feminine.

Species included. — *Axiorygma nethertoni* Kensley & Simmons, 1988.

Axiorygma nethertoni Kensley & Simmons, 1988

Axiorygma nethertoni Kensley & Simmons, 1988: 658, figs. 4-7; Sakai & De Saint Laurent, 1989: 92; Melo, 1999: 314, figs. 211-212.

Material examined. — USNM 211440, holotype, male (TL/CL, 21.0/7.0 mm); allotype, ovig. female (TL/CL, 24.0/7.5 mm), Key Largo Marine Sanctuary, Florida, leg. S. Simmons, det. B. Kensley.

Diagnosis of male holotype. — Rostrum narrowly triangular and pointed at apex; lateral margins denticulate, extending onto gastric region. Anterolateral margins of carapace with two triangular protrusions. Gastric region convex; postrostral carina continued to gastric median carina, submedian and lateral carinae not serrated but smooth. Cervical groove present at full length; postcervical carina absent. Eyestalks elongate, reaching level of rostral apex. A2 scaphocerite elongate. P1 unequal, in both chelipeds ischium with slender sharp spine on ventral margin; merus inflated, rounded on dorsal margin and straight on ventral margin, bearing three slender sharp spines proximally on ventral margin; in left larger cheliped palm thick, slightly less than twice as long as wide, bearing two clusters of branched setae at dorsoproximal corner (missing at present examination), fixed finger bearing strong triangular spine midway on cutting edge, and dactylus largely gaped in proximal half of cutting edge, while in right smaller cheliped palm slender, twice as long as wide, bearing two clusters of branched setae at dorsoproximal corner, fixed finger bearing tooth at proximal third, and dactylus regularly denticulate on each cutting edge. P2 slender, fingers shorter than palm; Ps3-4 propodi elongated, bearing no transverse rows of spines on ventrolateral margins. No pleurobranchs. Abdominal pleura 3-5 rounded on ventral margin, bearing small bundle of setae. Male Plp1 absent. Male Plp2 biramous, endopod and exopod slender and leaflike, endopod with appendix interna, but without appendix masculina. Plps3-5 endopods with appendix interna. Telson subsquare, bearing proximal lobe followed by four spines on lateral margin, and median tooth on posterior margin. Uropodal exopod with transverse suture.

Diagnosis of female. — Female Plp1 uniramous and slender. Plps2-5 endopods with appendix interna.

Type locality. — Key Largo National Marine Sanctuary, Florida, 30 m.

Distribution. — West coast of Florida (Kensley & Simmons, 1988; Sakai & De Saint Laurent, 1989), Gulf of Mexico; 30-58.6 m.

Genus **Axius** Leach, 1815

Axius Leach, 1815: 343; Leach, 1816 (no number of page); Latreille, 1817: 35; Bell, 1846: 227; Dana, 1852a: 13; Dana, 1852b: 509; Norman, 1868: 177; Meinert, 1877: 212; Boas, 1880:

98; Stebbing, 1893: 187; Borradaile, 1903: 536; Balss, 1914: 85; Selbie, 1914: 88 (key), 89; De Man, 1925d: 1 (key), 8; Rathbun, 1929: 25; Bouvier, 1940: 93; Zariquiey Alvarez, 1946: 95 (key), 103; Zariquiey Alvarez, 1968: 223; Poore & Griffin, 1979: 235; Sakai, 1987a: 303 (list); Sakai & De Saint Laurent, 1989: 26; Squires, 1990: 333; Sakai, 1992a: 165; Poore, 1994: 97 (key); Ngoc-Ho, 2003: 447; Ingle & Christiansen, 2004: 77; Poore & Collins, 2009: 242.

Axia H. Milne Edwards, 1837a: 310; H. Milne Edwards, 1837b: 150.

Axius s. str., Borradaile, 1903: 537; De Man, 1925d: 1 (key), 11 (key).

Diagnosis. — Rostrum triangular, bearing median carina, lateral margins armed with denticles, extending onto gastric region. Gastric region convex. Anterolateral margin of carapace unarmed. Cervical groove present at full length. Eyestalks subglobose; cornea pigmented. A2 scaphocerite prominent. P1 subequal in length and dissimilar in shape, and vertically positioned. P3 propodus broadened, lacking transverse rows of spines ventrolaterally, but setose on ventral margin; P4 propodus elongate, bearing median and ventral rows of setae on lateral surface; dactylus bearing median row of spines on lateral surface. P5 subchelate. Pleurobranchs on Ps2-4. Abdominal pleura 3-5 with tuft of soft setae laterally, and truncate or rounded on ventral margin. Male Plp1 uniramous and bisegmented; distal segment narrower than proximal one, tapering distally; male Plp2 biramous, endopod with appendices interna and masculina; and male Plps3-5 biramous, broad and lamellar with marginal tufts of soft setae, and endopods with appendix interna. Female Plp1 uniramous and bisegmented, consisting of proximal segment and multiarticulate flagellum; Plps2-5 biramous, broad and lamellar with marginal tufts of soft setae, endopods with appendix interna. Telson longer than wide, bearing pair of spinules on dorsal surface and median tooth on posterior margin. Uropodal exopod with transverse suture.

Remarks. — In the type species of the genus *Axius*, *A. stirhynchus*, the uropodal exopod bears a transverse suture near the posterior margin, but sometimes that is inconspicuous, as mentioned by Sakai & De Saint Laurent (1989). It was found through present examination of the specimens of *A. serratus* that the transverse suture is distinct in the smaller specimens from Georges Bank, North America (NHM 1898.5.7.833-4, 2 ovig. females, TL 80.0; 87.0 mm), but is inconspicuous in the larger specimen (NHM 1898.5.7.832, 1 female, TL 92.0 mm) from the same locality, although Kensley (2001b: 961, table I) described for *A. serratus* based on his specimens that the transverse suture is absent.

Type species. — *Axius stirhynchus* Leach, 1815, by original designation and monotypy. The gender of the generic name, *Axius*, is masculine.

Species included. — *Axius armatus* Smith, 1881; *A. mediterraneus* (Caroli, 1921); *A. serratus* Stimpson, 1852; *A. stirhynchus* Leach, 1815.

KEY TO THE SPECIES OF THE GENUS *AXIUS*

1 – Rostrum serrate on lateral margin, distributed in western Atlantic 2
– Rostum armed with teeth with rounded apex on lateral margin, distributed in eastern Atlantic and Mediterranean 3

2 – Gastric median carina with two spines . . . . . *A. armatus*
– Gastric median carina unarmed . . . . . *A. serratus*

3 – Gastric median carina distinct, running from rostral median carina to cervical groove except for interrupted median part; gastric lateral carinae linear, extending to cervical groove . . . . . *A. stirhynchus*
– Gastric median carina thick and distinct; gastric lateral carinae present anteriorly . . . . . *Axius mediterraneus*

Axius armatus Smith, 1881

Axius armatus Smith, 1881: 433; Kensley, 2001a: 951, figs. 1, 2, 4; Heard et al., 2007: 18, fig. 15.
Axius (*Paraxius*) *armatus* — Borradaile, 1903: 538.
Axius (*Axius*) *armatus* — De Man, 1925d: 3 (list), 9, 11 (key).
?*Calocarides armata* — Sakai & De Saint Laurent, 1989: 79.
Glypturus acanthochirus — Manning, 1987 [fig. 4 = *G. armata*, after A. Milne-Edwards, 1870; fig. 5 after Kensley, 1975].

Material examined. — USNM 35391, syntype, female (CL, 16.0; abdomen and telson, 33.0 mm), off Martha's Vineyard, off Newport, R/V "Fish Hawk", Sta. 878, 142 fms (259.7 m), 13.ix.1880.

Remarks. — Smith (1881: 433) described as follows "The rostrum is narrow, acuminate, spiniform at the tip and armed along each edge with four or five slender, acute, and spiniform teeth, directed forward and slightly upward". Those characteristics of the rostrum seem to be similar to those of the rostrum of *Axius serratus* Stimpson, 1852 (USNM 80514) from Sheepscot River, Barters Is., Maine (fig. 11). However, Smith (1881: 435) also mentioned that "This species is distinguished from *A. stirhynchus* and *A. serratus* by the narrower and acuminate rostrum, the teeth on the dorsal carina, the form of the chelipeds, and the more slender second, third, and fourth pairs of legs".

Kensley (2001b, fig. 2) distinguished those three species by the form of the sternal plate between the P4 coxae; in *A. armatus* the sternal plate is rounded; in *A. serratus* it is rectangular, bearing a pair of lateral spines; and in *A. stirhynchus* it is rectangular, lacking a pair of lateral spines.

Type locality. — South coast of New England, 180-259 m.

Distribution. — Massachusetts to South Carolina, 108-260 m (from Kensley, 2001b).

Axius mediterraneus (Caroli, 1921)
(fig. 10)

Axiopsis mediterranea Caroli, 1921b: 254, fig. 1, pl. 9 figs. 1-4, pl. 10 figs. 5-16.
Axiopsis (*Axiopsis*) *mediterranea* — De Man, 1925d: 6 (list), 70 (key).

Material examined. — RMNH D 31798, holotype male (TL/CL, 60.0/20.3 mm, missing Plp1), Posillipo, Naples, Italy, 17.xii.1915, leg. E. Caroli.

Remarks. — The male holotype of the present species (RMNH D 31798) is similar to *A. stirhynchus* in both chelipeds and other parts (fig. 10B, C, D, E), but they differ in that in *A. mediterraneus* the gastric median carina is thick and distinct at full length (fig. 10A), whereas in *A. stirhynchus* the gastric median carina, extending to the cervical groove, is interrupted in the median part of the gastric region (fig. 12C).

Type locality. — Posillipo, Naples, Italy.

Distribution. — Posillipo, Naples, Italy.

Axius serratus Stimpson, 1852
(fig. 11)

Axius serratus Stimpson, 1852: 222; Smith, 1879: 55, pl. 10 figs. 4, 4a; Smith, 1881: 435; Fowler, 1911: 571; Rathbun, 1929: 25, fig. 32; Williams, 1974b: 17, fig. 46A, B; Pemberton et al., 1976: 790; Williams & Wigley, 1977: 3, 4, 5, 8, 16; Williams, 1984: 185, 187, fig. 130; Sakai & De Saint Laurent, 1989: 28; Squires, 1990: 333, figs. 175-177; Kensley, 2001b: 955, figs. 3, 4.
Axius armatus Smith, 1881: 433.
Axius (*Paraxius*) *serratus* — Borradaile, 1903: 538.
Axius (*Axius*) *serratus* — De Man, 1925d: 3 (list), 11 (key).

Material examined. — NHM 1976: 320, 2 ovig. females (TL/CL, ca. 89.0/27.2, carapace broken — 28.3/31.3 mm), Nantucket, Massachusetts, Atlantic Ocean, ii.1928, leg. C. Biroseye, det. W.L. Schmitt; NHM 1898.5.7.832, 1 female (TL/CL, 92.0/32.3 mm), Georges Bank, North America, leg. Norman; NHM 1898.5.7.833-4, 2 ovig. females (TL/CL, 80.0/24.3; 87.0/25.6 mm), 1 female (TL/CL, 51.0/17.4 mm), ?Georges Bank, leg. Norman; USNM 80514, 1 ovig. female (TL/CL, 10.7/3.3 mm), Sheepscot River, Barters Island, Lincoln County, Maine, leg. L.W. Scattergood, 24.x.1941, id. by W.L. Schmitt; USNM 213546, 1 ovig. female (TL/CL, 80.0/30.0 mm, lacking telson), Baltimore Canyon, United States, 1984, leg. A.B. Williams; USNM 31451, 1 male (42.0/15.0 mm), Long Island Sound, 15 1/3 fms (28 m), leg. U.S. Fish Commission, “Albatross” Sta. 1804.

Remarks. — The present species is closely similar to *Axius stirhynchus* Leach, 1815, but differs as follows. In *Axius serratus*, the gastric lateral and submedian carinae are short (fig. 11); the maxilla 2 scaphognathite bears one long whip, whereas in *A. stirhynchus* the gastric lateral carinae are linear, extending to the cervical groove; and the maxilla 2 scaphognathite has two long whips (Ngoc-Ho, 2003, fig. 1G). It is to be noted that in the large female specimen (TL/CL, 51.0/17.4 mm) (NHM 1898.5.7.833-4), the

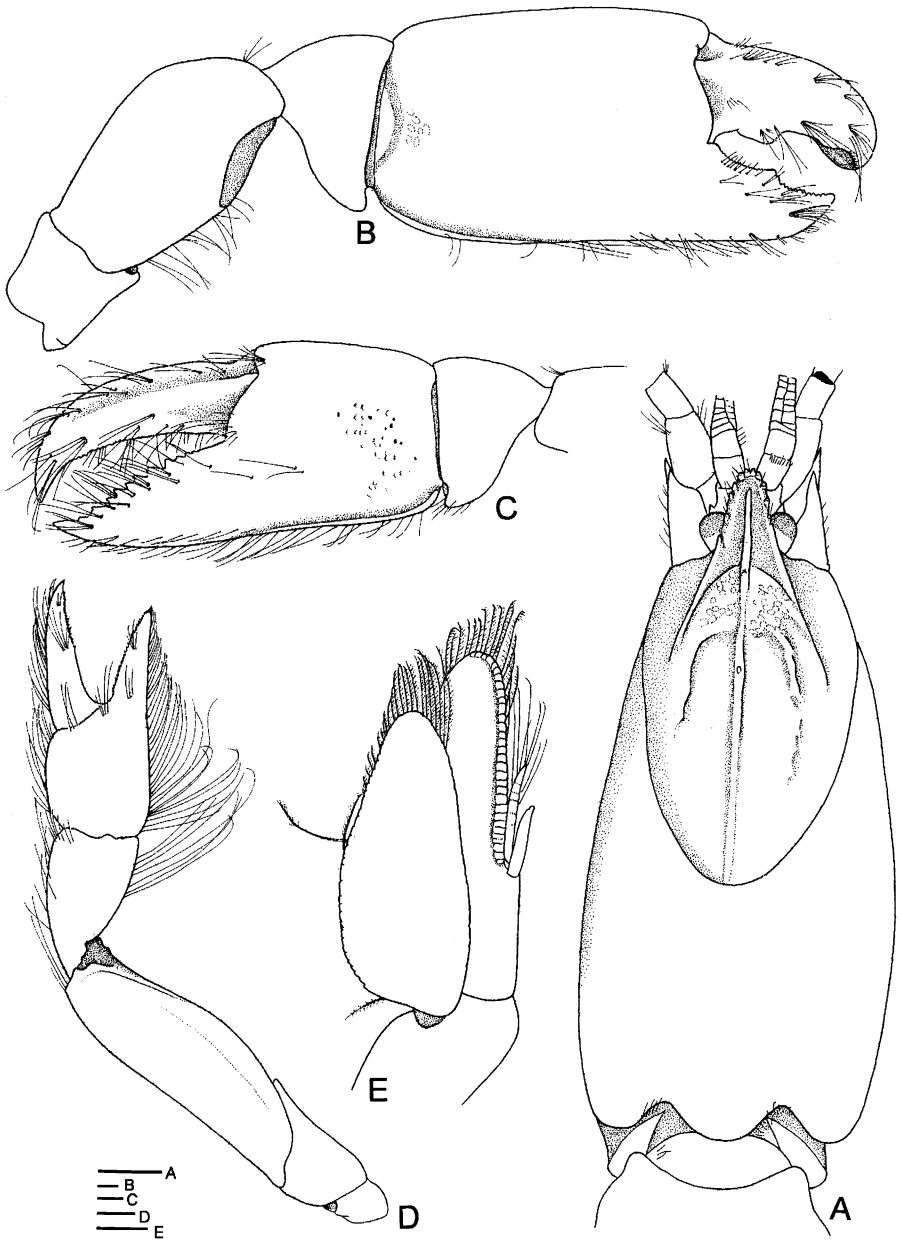

Fig. 10. *Axius mediterraneus* (Caroli, 1921). A, carapace, dorsal view; B, larger cheliped, lateral view; C, smaller cheliped, on left side, lateral view; D, P2, lateral view; E, male Plp2. A-E, RMNH D 31798, holotype, male (TL/CL, 60.0/20.3 mm), Posillipo, Naples, Italy. Scales A, 2 mm; B, 0.8 mm; C, D, E, 1 mm.

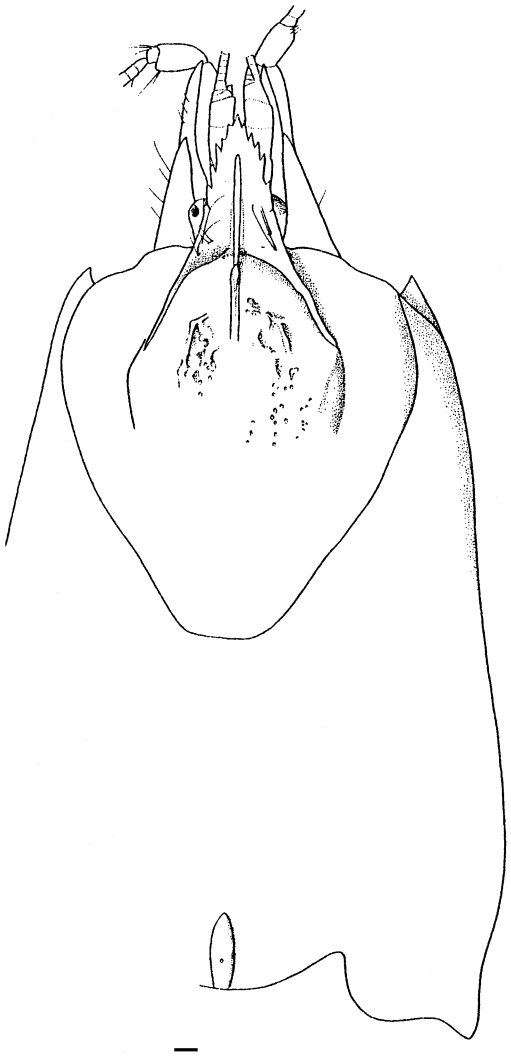

Fig. 11. *Axius serratus* Stimpson, 1852. Carapace, dorsal view. USNM 80514, 1 ovig. female (TL/CL, 10.7/3.3 mm), Sheepscot River, Barters Island, Lincoln County, Maine. Scale 1 mm.

uropodal exopod bears a transverse suture, whereas in the far larger female specimen (TL/CL, 92.0/32.3 mm) (NHM 1898.5.7.832) it bears no transverse suture.

Type locality. — Scituate, Massachusetts Bay.

Distribution. — North America — Canada — Bay of Fundy to Long Island Sound (Rathbun, 1929); U.S.A. — Massachusetts Bay (Stimpson, 1852), Cape Ann (Smith, 1879), Scituate and George's Banks, Massachusetts, Narragansett

Bay, Rhode Island, off Stratford Point and Norwalk, Connecticut, 18-36 m. Nova Scotia to Maryland, 18-220 m (Kensley, 2001b).

Axius stirhynchus Leach, 1815
(fig. 12)

Axius stirynchus Leach, 1815: 343; Leach, 1816, pl. 33; Bell, 1846: 228, fig. 1; White, 1847: 70; White, 1850: 32; Stebbing, 1893: 187; Sinel, 1907: 217; Poulsen, 1940: 236 (key); Holthuis, 1962: 252; Zariquiey Alvarez, 1968: 223, fig. 88a.

Axius stirhynchus — Desmarest, 1825: 207, pl. 36 fig. 1; H. Milne Edwards, 1837a: 311; H. Milne Edwards, 1837b: 131, pl. 48 fig. 2; White, 1857: 25; Norman, 1868: 177; Carus, 1885: 490; Lovett, 1885: 16; Koehler, 1886: 59; Gourret, 1888: 40; Norman & Scott, 1906: 13; Norman, 1907: 357; Sinel, 1907: 217; Schlegel, 1912: 237; Selbie, 1914: 89, pl. 14 figs. 1-4; Caroli, 1921a: 241; Caroli, 1921b: 254; Webb, 1921: 406, pl. 3 figs. 3, 6; Williamson, 1927: 554, fig. 208a, b, c; Perrier, 1929: 197; Monod, 1931: 119, 123, fig. 6E; Delphy & Magne, 1938: 84; Bouvier, 1940: 93, fig. 65; Zariquiey Alvarez, 1946: 103, fig. 131; Drensky, 1951: 213; Kurian, 1956: 72, fig. 141; Gordon, 1957: 249; Bourdillon-Casanova, 1960: 99, fig. 35; Holthuis, 1962: 247; O'Céidigh, 1962: 163; ICZN, 1964: 341; Bourdon, 1965: 15; Allen, 1967: 17, 57 (key), 89, fig.; Števčić, 1969: 128; Thiriot, 1976: 349, 367; Holthuis, 1977: 57, pl. 5 fig. a; Beaubrun, 1979: 69, fig. 44; Moncharmont, 1979: 69; d'Udekem d'Acoz, 1986: 101, fig. 1; Sakai & De Saint Laurent, 1989: 27, fig. 7; d'Udekem d'Acoz, 1989: 175; Moyse & Smaldon, 1990: 517, fig. 10.12; Števčić 1990: 214; Dworschak, 1992: 214; Koukouras et al., 1992: 223; Froglia, 1995: 7; Hayward et al., 1995: 432, fig. 8.51 (partim); d'Udekem d'Acoz, 1995: 47, fig. 1; Barnich, 1996: 130, figs. 28, 66; Falciai & Minervini, 1996: 143, 1 fig.; Astall et al., 1997: 668; Pin et al., 1999a: 103, fig. 1H, 2A; Pin et al. 1999b: 1461, figs. 1B, 4, tabs. 1-6; d'Udekem d'Acoz, 1999: 153, cover fig.; Costello et al., 2001: 289; González-Gordillo et al., 2001: 279; Livory, 2001: 30; Martin, 2001: 75, 1 fig.; Türkay, 2001: 289; Ngoc-Ho, 2003: 447, figs. 1, 2; Ingle & Christiansen, 2004: 78, figs. 59, 62; Sakai & Sawada, 2006: 1357, figs. 9, 10.

Callianassa bisulcata Risso, 1844: 94; Monod, 1931: 119, 123, fig. 6E. [Nomen nudum.]

Axius Stirhynchus — Hope, 1851: 14.

Axius (*Axius*) *stirhynchus* — Borradaile, 1903: 537; De Man, 1925d: 3 (list), 11 (key).

Axia stirhynchus — ?Gibert I Olive, 1920: 51, 1 fig.; Ngoc-Ho, 2003: 447.

Axius Bisculcata Risso, no date: MS, figure (f); Holthuis, 1977: 57; Ngoc-Ho, 2003: 447.

Material examined. — NHM, 1950: 9.29.9-10, 2 males (TL/CL, 64.0/18.8, 59.0/17.4 mm), Dusaihe Bay, Jersey, leg. R. Pike; NHM 82.15, 1 male (TL/CL, 67.0/20.3 mm), southern British coast; NHM 2005.397, 1 male (TL/CL, 60.0/18.7 mm), Plymouth Laboratory, Wembury Chued reef, 23.iii.1940, leg. R. Ingle; NHM 1910.2.48 8, 1 ovig. female (TL/CL, 85.0/24.3 mm), Jersey, 1883, leg. Norman; NHM 1968: 52, 1 juv. (TL/CL, 14.0/4.4 mm), Ponlock Bay, leg. J. Crothees Nettlecomke; NHM 1911.11.8.1038, 1 male (TL/CL, 39.0/12.6 mm), Seaford, Sussex, U.K., leg. Norman; NHM 1992.1344, 1 male (TL/CL, 49.0/15.5 mm), Iles Chansey, Atlantic coast of France, W. of Grand Ile, under rocks, 28.viii.1992, leg. A. Ceoguiee; ZMB 17127, 1 female (TL/CL, 57.0/17.5 mm), Nice, leg. Peters; ZMB 4878, 1 female (TL/CL, 55.0/17.0 mm), Venice, Italy, leg. Peter; MNHN Th 202, 1 male (TL/CL, 66.0/20.0 mm), locality unknown, det. De Saint Laurent.

Diagnosis. — Rostrum stoutly triangular and obtuse at apex (fig. 12A-C), lateral margins each with 4-7 teeth with rounded apex, extending posteriorly to

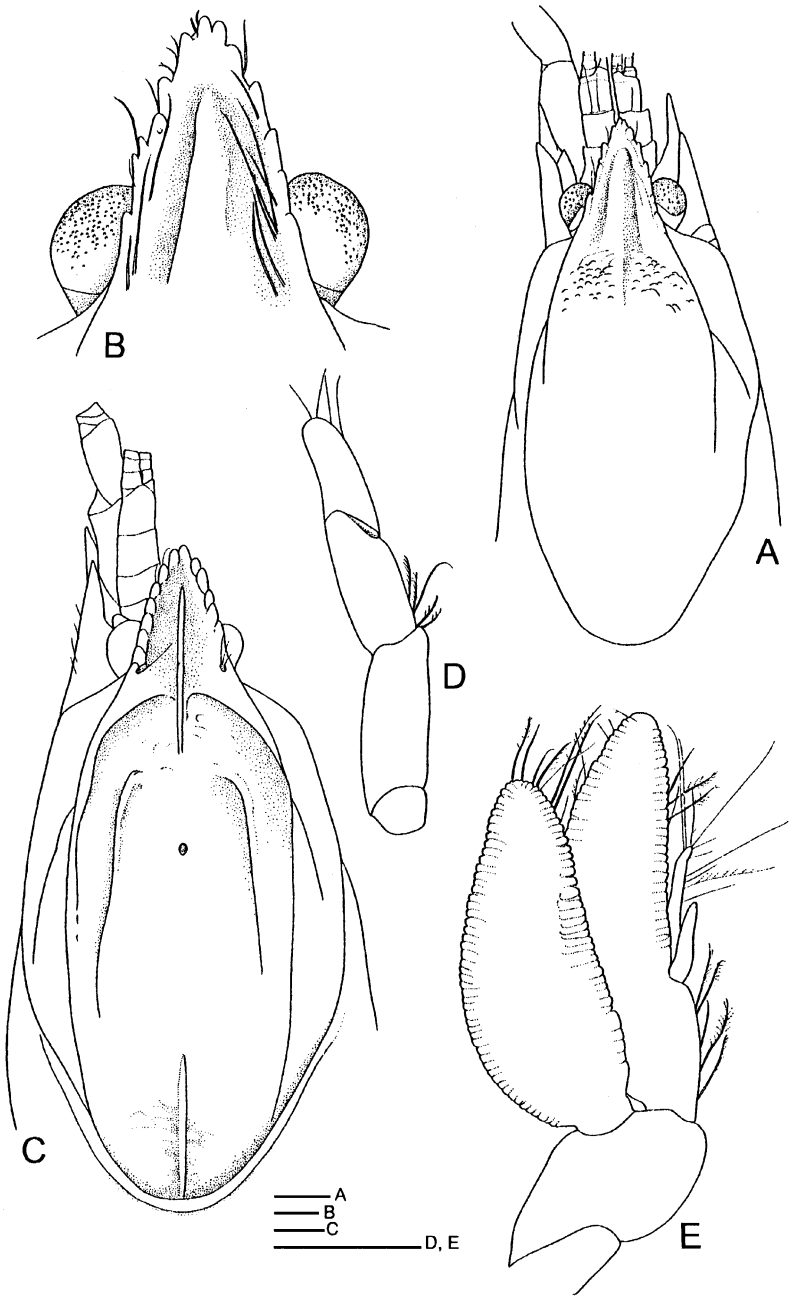

Fig. 12. *Axius stirhynchus* Leach, 1815. A, C, carapace, dorsal view; B, rostrum, dorsal view; D, male Plp1; E, male Plp2. A, B, ZMB 17127, female (TL/CL, 57.0/17.5 mm), Nice; C, D, E, MNHN Th 202, male (TL/CL, 66.0/20.0 mm), locality unknown, det. De Saint Laurent. Scales 1 mm.

cervical groove as gastric lateral carinae. Gastric region convex, bearing submedian carinae, and median carina continued from rostral median carina extending posteriorly to cervical groove, except for interrupted median part with hepatic pit of gastric region. Anterolateral margin of carapace unarmed. Cervical groove present at full length. Eyestalks subglobose; cornea pigmented. A1 peduncle reaching level of distal margin of A2 penultimate segment. A2 scaphocerite prominent. P1 subequal in length, but dissimilar in shape, and vertically positioned. P2 chelate. P3 propodus broadened, bearing setae on ventral margin. P4 propodus elongate, bearing irregularly arranged spines ventrally on lateral surface. P5 subchelate. Pleurobranchs on Ps2-4. Abdominal pleuron 1 triangular ventrally; pleura 1-5 smooth laterally, pleura 3-5 rounded, with marginal tufts of soft setae ventrally. Male Plp1 uniramous and trisegmented; distal segment short, tapering distally (fig. 12D); male Plp2 biramous, endopod with appendices interna and masculina at proximal third (fig. 12E); Plps3-5 biramous, and broad and lamellar, endopods bearing appendix interna, with marginal setae. Female Plp1 uniramous and bisegmented, consisting of proximal segment and multiarticulate flagellum; Plps2-5 biramous, and broad and lamellar, bearing marginal setae, endopods with appendix interna. Telson longer than wide, bearing median tooth on posterior margin. Uropodal exopod with transverse suture.

Remarks. — Ngoc-Ho (2003: 447, fig. 2E) described for this species that the male Plp1 is small and unsegmented. However, it was confirmed through the present observation that it is uniramous and bisegmented, and it was also observed that the younger specimens bear plumose, thick setae on the margins of the pleura, pleopods, and tail-fan.

Axius stirhynchus from Europe is closely similar to *Axius serratus* from North America, as Smith (1879: 55) mentioned that *A. serratus* Stimpson, 1852 is very likely to be identical with the European *S.* [misspelled by Smith for *A.*] *stirhynchus*. However, they differ from each other as follows. In the type specimen of *A. serratus*, the rostrum is armed with sharp teeth on the lateral margins (fig. 11), whereas in *A. stirhynchus* the rostrum is armed with distinct teeth with a rounded apex on the lateral margins (fig. 12A-C).

De Man (1925d: 11) separated those two species, *Axius stirhynchus* from Europe and *Axius serratus* from the western Atlantic, in his key as "Abdomen less broad than carapace. Upper border of the palm in both chelipeds of 1st pair thick and rounded, . . . in *Axius stirhynchus*" and "Abdomen broad and depressed, expanding laterally in the middle, much broader than the carapace. Upper border of the palm in both chelipeds of 1st pair thin and strongly

carinated, in *Axius serratus*". However, it has turned out through careful observations that no difference is found in the morphology of the abdomen and the palms of both chelipeds between these two species, though they are distinguishable from each other by the difference in shape of the lateral teeth of the rostrum.

The rostrum is variable in shape; in the female specimen (ZMB 17127), it is acutely triangular.

Type locality. — Sidmouth, England.

Distribution. — England — Sidmouth (Leach, 1815; Sakai & De Saint Laurent, 1989), Weymouth (Sakai & De Saint Laurent, 1989), Cornwall, Falmouth, Polperro, Plymouth, Seaford; Ireland (Selbie, 1914); Channel Islands; France — coasts of France (Sakai & De Saint Laurent, 1989), Roscoff; Mediterranean — Marseille (Bouvier, 1940), Nice, Gulf of Naples (Caroli, 1921a), Tarragona (Zariquiey Alvarez, 1968); Adriatic Sea — Piran (Dworschak, 1992); shallow water, in sand.

Genus **Balssaxius** gen. nov.

Diagnosis. — Rostrum acutely triangular and pointed at apex; lateral margins armed with teeth, extending posteriorly onto gastric region. Anterolateral margin of carapace usually unarmed. Gastric region convex, bearing five carinae; median carina smooth, and submedian and lateral carinae serrated. Cervical groove distinct at full length. Eyestalks subglobose; cornea pigmented or not. A2 scaphocerite elongate. Pl unequal; carpi and chelae characteristically tuberculate on lateral surface, and dorsal margin denticulate or tuberculate. P2 fingers longer than palm. Abdominal pleura smooth on surface, and convex to rounded ventrally. No pleurobranchs. Male Plps1-2 unknown. Female Plp1 uniramous, lacking distal flagellum. Plps 2-5 biramous, similar, and slender; endopods with appendix interna. Telson longer than wide, bearing median tooth on posterior margin. Uropodal exopod with transverse suture. Gonochoristic.

Remarks. — *Axius habereri* Balss, 1913, was included in *Axiopsis* by De Man (1925d), and later in *Calocarides* by Sakai & De Saint Laurent (1989). However, it does not belong to *Calocarides* either, because a distinct difference is found between the species *A. habereri* and the species of *Calocarides*. In *Axius habereri*, the carapace bears a sharp postcervical carina, whereas in *Calocarides coronatus* (Trybom, 1904), the type species of *Calocarides*, the carapace bears no postcervical carina, though they are similar in that the rostrum is acutely triangular with denticulate lateral margins, and abdominal

pleura 2-5 are rounded ventrally. Therefore, *Axius habereri* Balss, 1913 is reclassified under the new genus *Balssaxius* as *B. habereri* (Balss, 1913).

Type species. — *Axius habereri* Balss, 1913, by present designation and monotypy. The gender of the generic name, *Balssaxius*, is masculine.

Species includes. — *Balssaxius habereri* (Balss, 1913).

Etymology. — Balss is added as a prefix to the generic name *Axius*, in honour of Heinrich Balss, German carcinologist in Munich, who described *Axius habereri*.

Balssaxius habereri (Balss, 1913)
(fig. 13A, B)

Axius habereri Balss, 1913: 238; Nakazawa, 1927: 1036, fig. 1995; Yokoya, 1933: 49.
Axius Habereri — Balss, 1914: 85, figs. 46-47.
Axiopsis (*Axiopsis*) *Habereri* — De Man, 1925d: 5 (list), 70 (key).
Axiopsis (*Axiopsis*) *habereri* — Miyake, 1982: 89, pl. 30 fig. 3; Sakai, 1987a: 303 (list).
?*Calocarides habereri* — Sakai & De Saint Laurent, 1989: 83.

Material examined. — ZSM A20061782, lectotype female (TL/CL, 44.0/15.7 mm, larger cheliped on left side missing), Fukuura, Sagami Bay, Japan, iii.1903, leg. Haberer, det. H. Balss; ZLKU 9619, 1 female (TL/CL, 43.0/15.0 mm), Yellow Sea, 35°02′N 121°56′E, 50 m, by trawl-net, 19.x.1962, leg. H. Yamashita.

Diagnosis of female lectotype. — Rostrum acutely triangular, reaching middle of A1 penultimate segment, and denticulate on lateral margins; gastric region with five carinae; median carina distinct, with spine anteriorly, submedian carinae denticulate, and lateral carinae smooth (fig. 13A); postcervical carina present, extending to posterior margin of carapace, on which a pair of posterior protrusions is present. Eyestalks subglobose, overreaching middle of rostrum; cornea pigmented. A2 scaphocerite slenderly elongate, reaching distal third of penultimate segment. A1 peduncle reaching middle of A2 penultimate segment. P1 unequal; in larger left cheliped, merus robust in shape, bearing two subdistal denticles dorsally and 4 sharp teeth on ventromesial margin. Carpus short and rounded on dorsal margin, and sharply pointed distoventrally. Palm sharp on dorsal and ventral margins, convex and smooth on lateral surface. Fixed finger bearing a row of tubercles laterally, and dactylus denticulate on dorsal margin, bearing a row of spines on lateral surface; both fingers incurved distally (Balss, 1914, fig. 46). Smaller cheliped (fig. 13B) on right side different in shape from larger one on the left; in smaller right cheliped merus two times as long as wide, bearing two subdistal spines on dorsal margin and 6 sharp teeth on ventral margin; carpus triangular; chela setose along dorsal

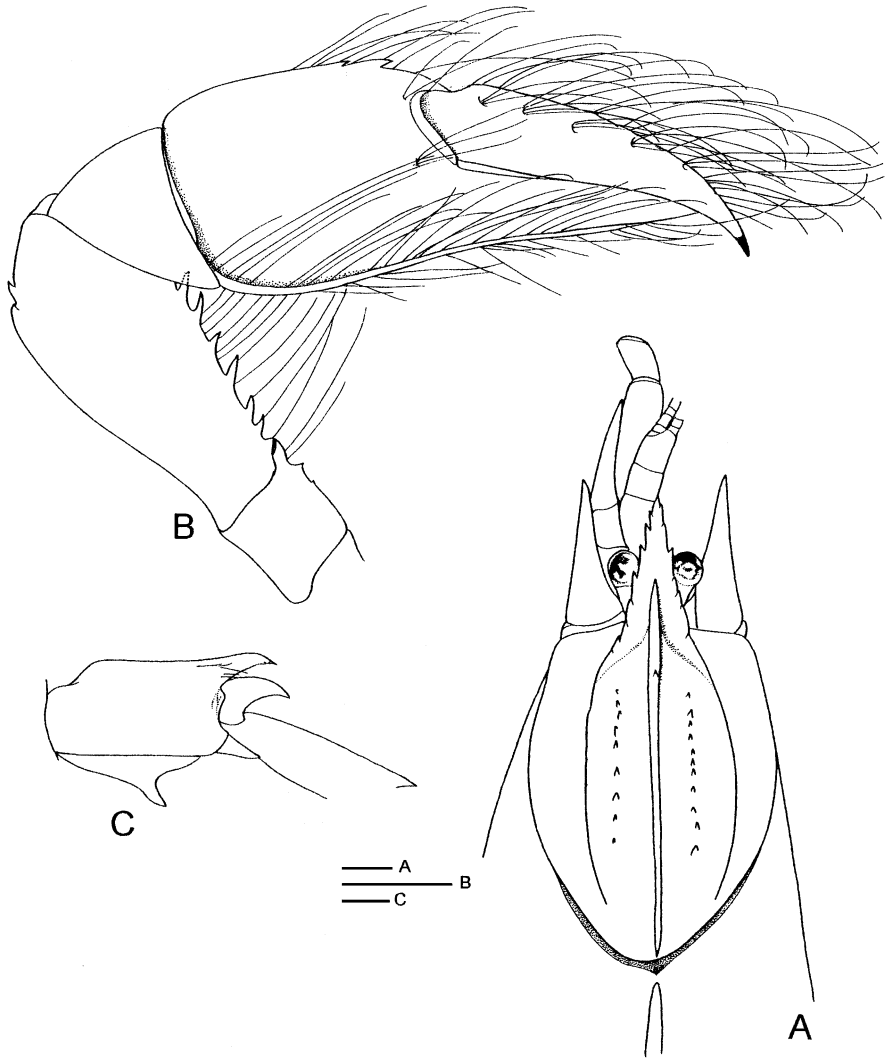

Fig. 13. *Balssaxius habereri* (Balss, 1913) and *Boasaxius princeps* (Boas, 1880). A, anterior part of carapace, dorsal view; B, smaller cheliped; C, A2 peduncle. A, B, *Balssaxius habereri*, ZSM A20061782, lectotype female (TL/CL, 44.0/15.7 mm, larger cheliped on left side missing), Fuku-ura, Sagami Bay, Japan; C, *Boasaxius princeps*, ZMM N2732, male (TL/CL, 114.0/36.4 mm), Peter the Great Bay.

and ventral margins; palm slightly longer than wide, bearing two small subdistal spines on dorsal margin; fingers longer than palm and crossed with each other distally. Abdominal pleuron 1 narrow and triangular, with curved anteroventral and straight posteroventral margins, pleuron 2 long, and straight

ventrally, with rounded antero- and posteroventral angles, pleura 3-5 moderately long, and rounded ventrally. Telson longer than wide, bearing proximal lobe with spine, followed by denticles on lateral margins, but no median tooth on rounded posterior margin. Uropodal exopod with transverse suture.

Type locality. — Fukuura, Sagami Bay, Japan.

Distribution. — Japan — Sagami Bay (Balss, 1913, 1914; Yokoya, 1933; Sakai & De Saint Laurent, 1989), off Sioya-zaki (Yokoya, 1933), Aomori Prefecture, Maizuru; Korea — off Pusan (Yokoya, 1933); Yellow Sea.

Genus **Boasaxius** gen. nov.

Diagnosis. — Body covered with tufts of setae. Rostrum triangular and upturned anteriorly, bearing 3-4 teeth on each lateral margin. Gastric region with deep inverted U-shape surrounded by smooth lateral carinae extending posteriorly to near cervical groove; median and submedian carinae denticulate; postcervical carina absent. Eyestalks subglobular, cornea pigmented, overreaching middle of rostrum. A2 scaphocerite horn-shaped (fig. 13C). Mxp3 ischial crest denticulate and protruded distally. P1 unequal and large, covered with tufts of soft setae, fingers longer than palm in both larger and smaller chelipeds. P2 chelate. Ps3-5 simple. P3 propodus rectangular, armed with transverse rows of spines on ventrolateral surface, dactylus with spines on lateral surface. Ps4-5 propodi elongate, armed with transverse rows of spines on ventrolateral surface; dactyli with spines on lateral surface. Abdominal somites setose laterally and smooth ventrally. Male Plp1 uniramous, unsegmented, and crenulate, terminating in narrow distal protrusion (fig. 14A); male Plp2 biramous, endopod with appendices interna and masculina (fig. 14B); male Plps3-5 biramous, endopods with appendix interna. Telson longer than wide, bearing proximal lobe with spine followed by 1-2 spines on lateral margin, and median spine on rounded posterior margin. Uropodal endopod with distinct spines laterally, bearing median carina with teeth. Uropodal exopod armed with sharp teeth laterally and distinct, movable spine at posterolateral angle, bearing transverse suture with spinules, and distal flap with distinct spine, and median carina with spines on dorsal surface.

Remarks. — *Axius princeps* Boas, 1880 was once included in *Axiopsis* by Borradaile (1903), and later included in *Allaxius* by Sakai & De Saint Laurent (1989). However, it does not belong in *Allaxius* either, because *Axius princeps* is clearly different from the type species of *Allaxius*, *A. aethiopicus* (Nobili, 1904). In *Axius princeps* the male Plp1 is present, and conspicuously sinuate

in shape (fig. 14A), whereas in *Allaxius aethiopicus* it is absent. Hence, *Axius princeps* is reclassified under the new genus *Boasaxius* as *B. princeps*.

Type species. — *Axius princeps* Boas, 1880, by present designation and monotypy. The gender of the name, *Boasaxius*, is masculine.

Species included. — *Boasaxius princeps* (Boas, 1880).

Etymology. — The generic name *Boasaxius* is dedicated to Johan Erik Vesti Boas, Danish carcinologist, who published various carcinological studies in the latter half of the 19th century.

Boasaxius princeps (Boas, 1880)
(figs. 13C, 14A, B)

Axius princeps Boas, 1880: 98, pl. 7 figs. 214-217; Balss, 1914: 88.
Axiopsis princeps — Borradaile, 1903: 538; Makarov, 1938: 48, fig. 15; Vinogradov, 1950: 223; Komai et al., 1992: 196.
Axiopsis (*Axiopsis*) *princeps* — De Man, 1925d: 6 (list), 69 (key); Miyake, 1982: 90, pl. 30 fig. 4; Sakai, 1987a: 303 (list).
Allaxius princeps — Sakai & De Saint Laurent, 1989: 74.

Material examined. — ZMM N2732, 1 male (TL/CL, 114.0/36.4 mm), Peter the Great Bay, 1977, det. Zarenkov; ZLKU, 12084, 1 male (TL/CL, 95.0/35.0 mm), off Yoichi, Hokkaido,

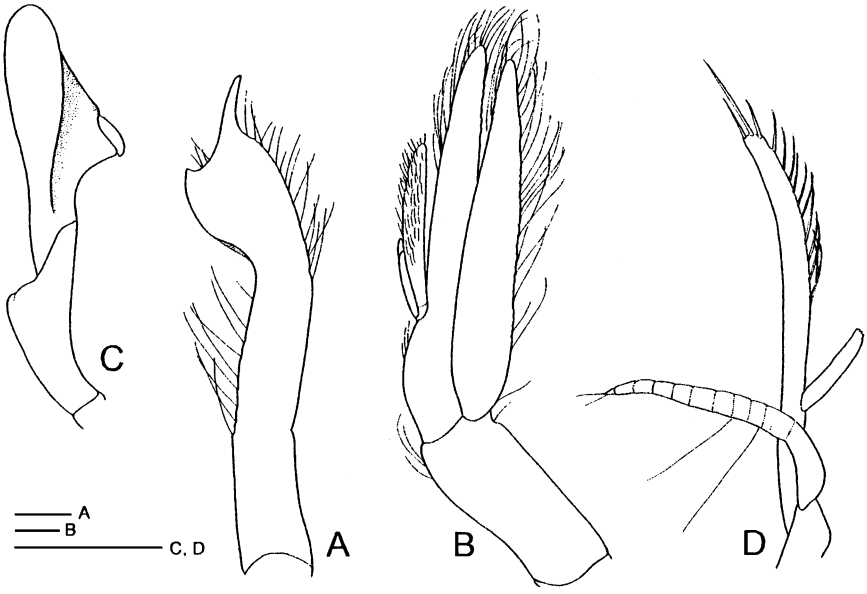

Fig. 14. *Boasaxius princeps* (Boas, 1880) and *Bouvieraxius rudis* (Rathbun, 1906). A, C, male Plp1; B, D, male Plp2. A, B, *Boasaxius princeps*, ZMM N2732, male (TL/CL, 114.0/36.4 mm), Peter the Great Bay; C, D, *Bouvieraxius rudis*, MNHN Th 1004, male (TL/CL, 32.0/11.5 mm), New Caledonia, 25°15.40′S 159°54.80′E, 280-295 m. Scales 1 mm.

7.iii.1959, leg. H. Kurata; ZLKU 12085, 1 female (TL/CL, 49.2/19.7 mm), off Manazuru, Sagami Bay, leg. T. Sakai; ZLKU 12084, 1 male (TL/CL, 95.0/35.0 mm), off Yoichi, Hokkaido, 10-30 m, by gill-net for flat fish, 7.iii.1956, leg. H. Kurata; ZLKU 12085, 1 ovig. female (TL/CL, 49.2/19.7 mm), off Manazuru, Sagami Bay, Kanagawa Prefecture, leg. T. Sakai; SMF 32728, 1 female (TL/CL, 130.0/40.6 mm), East fishery-harbour, Okirai, Sanriku-cho, Ohfunato-city, Iwate Prefecture, Pacific side, gill-net, 140 m, 23.iv.1981, leg. H. Mukai.

Diagnosis. — Body covered with tufts of setae. Rostrum triangular and upturned anteriorly, bearing smooth median carina dorsally and 3-4 teeth on each of lateral margins extending onto gastric region. Gastric region bearing deep inverted U-shape surrounded by smooth lateral carinae extending posteriorly to near cervical groove, median carina with 4 denticles anteriorly, divided in middle into two carinae with 2-4 denticles each, then meeting together posteriorly into a single carina with 7 denticles, and submedian rows of denticles. A2 scaphocerite horn-shaped, overreaching dorsodistal spine of segment 2 (fig. 13C). P1 unequal; in male larger cheliped palm convex with denticles on distal margin, bearing 6 spines dorsally, fixed finger roughly provided with obtuse teeth on cutting edge, dactylus also roughly provided with obtuse teeth on cutting edge; in smaller cheliped fingers longer than palm; dactylus finely denticulate on cutting edge, fixed finger irregularly denticulate on cutting edge. P2 chelate, fingers about as long as palm. P3 propodus rectangular, armed with transverse rows of spines on ventrolateral surface, dactylus with row of spines on lateral surface. Ps4-5 propodi elongate, armed with transverse rows of spines on ventrolateral surface; dactylus with a row of spines on lateral surface. Abdominal pleuron 1 narrow, and rounded ventrally, pleuron 2 long, and straight with rounded angles ventrally, pleuron 3 moderately long, and straight ventrally with rounded angles; pleura 4-5 moderately broad and straight ventrally, with rounded anteroventral and angulate posteroventral angles; pleuron 6 triangular ventrally. Male Plp1 uniramous, unsegmented, and sinuate, terminating in narrow distal protrusion (fig. 14A); male Plp2 biramous, endopod with appendices interna and masculina (fig. 14B); male Plps3-5 endopods with appendix interna. Telson longer than wide, bearing proximal lobe with spine followed by 1-2 spines on lateral margin, and median spine on rounded posterior margin. Uropodal endopod with distinct spines laterally, bearing median carina with spines dorsally. Uropodal exopod armed with sharp teeth laterally and distinct, movable spine at posterolateral angle, bearing transverse suture with spinules, and distal flap with distinct spine; with median carina with spines on dorsal surface.

Type locality. — Vladivostok.

Distribution. — Vladivostok (Boas, 1880; Balss, 1914); Japan — off Yoichi, Hokkaido, Sagami Bay (Sakai & De Saint Laurent, 1989), Oga Peninsula (Miyake, 1982); 300 m.

Genus **Bouvieraxius** Sakai & De Saint Laurent, 1989

Bouvieraxius Sakai & De Saint Laurent, 1989: 45; Sakai, 1992a: 165; Poore, 1994: 97 (key); Sakai, 1994: 176; Poore, 2007: 161; Poore & Collins, 2009: 244.
Posthonocaris Kensley, 1989: 964.

Diagnosis. — Rostrum elongate and acutely triangular with or without lateral spine, bearing a pair of supraocular teeth at base. Gastric region convex, bearing smooth lateral carinae extending posteriorly to anterior half, submedian rows of 3-4 spines, and smooth median carina with hepatic tubercle only. Anterolateral margin of carapace unarmed. Cervical groove distinct at full length. Eyestalks subglobose; cornea pigmented. A2 scaphocerite distinctly protruded. P1 subequal; palm tuberculate on dorsal margin, bearing small dorsodistal spine. Ps3-4 propodi with transverse rows of spines ventrolaterally; dactyli with spines ventrally. P5 propodus with spinules at ventrodistal corner. Abdominal pleura smooth on lateral surface, and truncate ventrally. Male Plp1 uniramous and bisegmented; distal segment rounded apically, proximally bearing mesial lobe with patch of hooklets; male Plp2 biramous; endopod bearing appendix interna and elongate appendix masculina at proximal third, or endopod bearing appendix interna, but no appendix masculina, or endopod without appendices interna and masculina; male Plps3-5 endopods without appendix interna. Telson longer than wide, bearing proximal lobe on lateral margin, and median spine on posterior margin. Uropodal endopod bearing spines on lateral margin and median carina with spines on dorsal surface. Uropodal exopod bearing transverse suture with strong, movable spine at posterolateral angle. Hermaphroditic.

Remarks. — The present genus *Bouvieraxius* is hermaphroditic, because the Ps3 and 5 coxae bear genital pores. However, it was observed that there is difference in the form of Plp2 between males and females (Sakai, 1992a, fig. 8E), namely, this genus has three types of male Plp2 endopod: (1) Plp2 endopod with appendices interna and masculina as in *B. longipes* (Bouvier, 1905); (2) Plp2 endopod with appendix interna, but without appendix masculina as in *B. rudis* (Rathbun, 1906); (3) Plp2 endopod without appendices interna and masculina as in *B. springeri* Kensley, 1996. The present genus is characteristic also in that Plps3-5 endopods bear no appendix interna as in *Paratrichocheles* gen. nov. (see below).

Type species. — *Axius longipes* Bouvier, 1905, by original designation. The gender of the generic name, *Bouvieraxius*, is masculine.

Species included. — *Bouvieraxius keiensis* Sakai, 1992a; *B. longipes* (Bouvier, 1905); *B. michelae* Poore, 2008; *B. rudis* (Rathbun, 1906); *B. springeri* Kensley, 1996e.

KEY TO THE SPECIES OF THE GENUS *BOUVIERAXIUS*

1 – Rostrum bearing 4 spines on each lateral margin including supraorbital spine 2
– Rostrum with one spine or none on lateral margin, except for supraorbital spine 3

2 – Gastric submedian carina with 3 spines; A2 article 2 armed with two ventral spines . . . . . *B. longipes*
– Gastric submedian carina with 4 spines; A2 article 2 unarmed ventrally . . . *B. michelae*

3 – Rostrum without lateral spine except for supraorbital spine . . . . . *B. springeri*
– Rostrum with lateral spine except for supraorbital spine 4

4 – Gastric submedian carina with row of 4 spines . . . . . *B. keiensis*
– Gastric submedian carina with row of 3 spines . . . . . *B. rudis*

Bouvieraxius keiensis Sakai, 1992

Bouvieraxius keiensis Sakai, 1992a: 166, figs. 8, 9; Kensley, 1996e: 472 (list); Poore & Collins, 2009: 245, figs. 15, 16, 41.

Type locality. — Kei Island, 5°37′S 132°23′E, 245 m, sand.

Distribution. — Mauritius (Sakai, 1992a); Indonesia — Kei Islands (Sakai, 1992a); 73-245 m; Australia — North West Shelf to Shark Bay, Western Australia (Poore & Collins, 2009); 80-100 m.

Bouvieraxius longipes (Bouvier, 1905)

Axiopsis longipes Bouvier, 1905: 804; Balss, 1925: 209; Bouvier, 1925: 466, figs. 26, 27, pl. 9 fig. 5, pl. 10 fig. 5.
Axiopsis (*Axiopsis*) *longipes* — De Man, 1925d: 6 (list), 70.
Bouvieraxius longipes — Sakai & De Saint Laurent, 1989: 45; Kensley, 1996e: 472 (list).

Diagnosis. — Rostrum with 4 spines on each lateral margin. Gastric region with submedian carina with 3 elongate spines. Male Plp1 uniramous and bisegmented, distal segment rounded distally, bearing mesial lobe; male Plp2 biramous, endopod with appendices interna and masculina (Bouvier, 1925, fig. 27).

Type locality. — Barbados, 225 m.

Distribution. — Porto Rico; Barbados (Bouvier, 1925).

Bouvieraxius michelae Poore, 2008

Bouvieraxius michelae Poore, 2008: 162, fig. 1.

Diagnosis. — Rostrum with 4 spines on each lateral margin. Gastric submedian carina with 4-5 spines. Male Plp1 a broad blade, dilated distally, with oblique apex ending in two lobes with three minute coupling hooks; Plp2 endopod with appendices interna and masculina at proximal two-thirds. Telson longer than wide, bearing three spines on each lateral margin, and a posterior spine that is longer and movable on posterolateral angle; with median tooth on posterior margin. Uropodal endopod broadened, bearing 3 teeth on lateral margin and median carina with 4 teeth on dorsal surface. Uropodal exopod bearing two teeth on lateral margin, a distinct, movable spine at posterolateral angle, and a transverse suture with spinules dorsally. [Adapted from Poore, 2008.]

Type locality. — Timor Sea, 18 m.

Distribution. — Only known from the type locality.

Bouvieraxius rudis (Rathbun, 1906)
(fig. 14C, D)

Axius rudis Rathbun, 1906: 894, fig. 51; Balss, 1925: 209.
Axiopsis (*Axiopsis*) *rudis* — De Man, 1925d: 6 (list), 70 (key).
Bouvieraxius rudis — Sakai & De Saint Laurent, 1989: 46, figs. 12-14; Sakai, 1994: 177, 200 (key); Kensley, 1996e: 472 (list).
Lophaxius rudis — Kensley, 1989: 964.

Material examined. — USNM 30535, lectotype, female (TL/CL, 22.0/6.5 mm), S. coast of Molokai Is., Hawaii, 4.iv.1902, leg. "Albatross" Sta. 3838, 92-212 fms (168.2-387.7 m), det. M. Rathbun; MNHN Th 445, 1 female (TL/CL, 55.0/23.0 mm), Madagascar, 8.xi.1972, leg. A. Crosnier; MNHN Th 1004, 1 male (TL/CL, 32.0/11.5 mm), New Caledonia, 25°15.40′S 159°54.80′E, MUSORSTOM V, Sta. 0255, 280-295 m.

Diagnosis. — Male Plp1 (fig. 14C) uniramous and bisegmented, proximal segment foliaceous, distal segment ovate distally, mesially bearing triangular protrusion without cluster of hooklets; male Plp2 (fig. 14D) biramous, endopod slender, distally bearing rod-shaped appendix interna with cluster of hooklets at proximal third, but no appendix masculina; male Plps3-5 biramous, endopods without appendix interna. Female Plp1 uniramous and bisegmented, consisting of stem-like proximal segment and multiarticulate flagellum. Female Plps2-5 biramous, endopods without appendix interna.

Type locality. — Molokai Island, Hawaiian Islands, 168-388 m.

Distribution. — Madagascar (Sakai & De Saint Laurent, 1989); Western Australia (Sakai, 1994); New Caledonia (Sakai & De Saint Laurent, 1989);

Hawaiian Islands — Molokai Island and Kauai Island (Rathbun, 1906); 72-419 m.

Bouvieraxius springeri Kensley, 1996

Bouvieraxius springeri Kensley, 1996e: 472, figs. 2, 3, table 2; Kensley, 2003: 366, pl. 4.

Material examined. — USNM 252832, 1 herm. (TL/CL, 49.0/17.0 mm), N. Alutom Island, Agat Bay, Guam, 2.5-6 m, 29.xi.2000, leg. H. Conley; USNM 296339, 1 herm. (TL/CL, 45.0/15.1 mm), Piti Reef, Guam Is., 1.5-2.5 m, ix.1998, leg. H.T. Conley; USNM 296398, 1 herm. (TL/CL, 50.0/17.7 mm), breakwater, Apra Harbor, Guam, 5.9 m, 21.vi.1998, leg. H.T. Conley.

Remarks. — This species is hermaphroditic, because the Ps3 and 5 coxae have genital pores. In the specimen USNM 252832, the Plp2 endopod has appendices interna and masculina, and the appendix masculina is much longer than the appendix interna. However, in the other specimens (USNM 296339; 296398) the Plp2 endopod lacks appendices interna and masculina as in the Plps3-5 endopods, which was also indicated by Kensley (2003: 367), who described in his remarks that "*B. springeri* is a functionally hermaphroditic species, but whether protandrous or protogynous, it is not yet possible to establish".

Type locality. — Sulu Sea, 10°52′30″N 120°56′00″E, 0-14 m.

Distribution. — Sulu Sea (Kensley, 1996e); 0-14 m.

Genus **Bruceaxius** gen. nov.

Diagnosis. — Body covered with setae. Rostrum narrow and elongate, acutely triangular and deflected downward anteriorly, bearing spines on lateral margins. Gastric region slightly convex, bearing lateral, submedian, and median carinae, each with denticles almost in parallel with one another. Postcervical carina present. Anterolateral margin of carapace with spine. Cervical groove distinct at full length. Eyestalks subglobose; cornea pigmented. A2 scaphocerite horn-shaped and directed outside dorsodistal spine of A2 segment 2. P1 unequal; chelae obliquely positioned, surface covered with thick setae and unarmed on dorsal margin; fingers of larger cheliped shorter than palm, but those of smaller cheliped distinctly longer than palm. No pleurobranchs. Abdominal somites 1-5 each with longitudinal carina between tergum and pleuron. Pleuron 1 narrow, pleura 2-5 truncate or rounded at ventral margin. Male Plp1 uniramous and bisegmented, distal segment digitiform, male Plp2 biramous and elongate, endopod with appendices interna and masculina at proximal third; male Plps3-5 biramous, endopods with appendix interna.

Female Plp1 uniramous and bisegmented, composed of proximal segment and multiarticulate flagellum; female Plps2-5 endopods with appendix interna. Telson longer than wide, bearing proximal lobe with spine on each lateral margin, and median tooth on posterior margin. Uropodal endopod broadened, bearing two teeth on lateral margin and median carina with three teeth on dorsal surface. Uropodal exopod bearing 5-6 teeth on lateral margin and distinct, movable spine at posterolateral angle, and transverse suture with spinules. Gonochoristic.

Remarks. — *Acanthaxius polychaetes* Sakai, 1994 is closely similar to *Acanthaxius pilocheirus* Sakai, 1987a, the type species of *Acanthaxius*. However, they differ in that in the *A. polychaetes* male, Plp1 is uniramous and bisegmented, and the distal segment is digitiform; the anterolateral margin of the carapace is armed with a spine; the postcervical carina is present; in P1 chelae, the lateral surfaces are covered with thick setae, and unarmed on the dorsal margin; the fingers of the larger cheliped are shorter than the palm, but those of the smaller cheliped are distinctly longer than the palm, and abdominal somites 1-5 bear a longitudinal carina between the tergum and the pleuron. In *A. pilocheirus*, the male Plp1 is absent; the anterolateral margin of the carapace is unarmed, the postcervical carina of the carapace is absent; in the P1 chelae the lateral surfaces are covered with tubercles and armed with sharp teeth on the dorsal margin; the fingers of both chelipeds are longer than the palm, and abdominal somites 1-5 bear no longitudinal carina between tergum and pleuron. Those differences show that they are distinctly different from each other at the generic level, which suggests that *A. polychaetes* should be reclassified under the new genus *Bruceaxius* as *B. polychaetes*.

Type species. — *Acanthaxius polychaetes* Sakai, 1994, by present designation and monotypy. The gender of the new name, *Bruceaxius*, is masculine.

Species included. — *Bruceaxius polychaetes* (Sakai, 1994).

Etymology. — The new genus is named *Bruceaxius* in honour of Dr. A.J. Bruce of the Northern Territory Museum, Port Darwin, Australia, who sent me this interesting species for study in 1994, by adding his name as a prefix to the generic name *Axius*.

Bruceaxius polychaetes (Sakai, 1994)

Acanthaxius polychaetes Sakai, 1994: 193, 200 (key), figs. 11-13; Kensley, 1996b: 71 (list); Poore & Collins, 2009: 237.

Diagnosis. — Male Plp1 uniramous and bisegmented, proximal segment rod-like, distal segment digitiform; male Plp2 biramous; both endopod and

exopod slenderly foliaceous, endopod with appendices interna and masculina at proximal two-thirds, appendix masculina longer than appendix interna.

Type locality. — Great Barrier Reef, eastern Australia, 17°57.5′S 147°03.5′E, 259-260 m.

Distribution. — Queensland, eastern Australia (Sakai, 1994); continental slope, 259-260 m.

Genus **Calaxius** Sakai & De Saint Laurent, 1989

Calaxius Sakai & De Saint Laurent, 1989: 84; Poore, 1994: 97 (key); Sakai, 1994: 192.
Manaxius Kensley, 2003: 367 [sensu nov.]; Clark et al., 2007: 64; Poore & Collins, 2009: 248.

Diagnosis. — Rostrum elongate and acutely triangular, with 4-5 sharp lateral spines including supraorbital spine, lateral margins extending posteriorly onto gastric region as lateral carinae, with at least 1-2 distinct, buttressed teeth; median carina originating from near tip of rostrum, running to cervical groove; submedian rows of teeth; postcervical carina present. Anterolateral margin of carapace with protrusion or spine. Cervical groove distinct at full length. Eyestalks stout or elongate; cornea pigmented. A2 scaphocerite protruded straight forward. P1 subequal; palm armed with 3-4 interspaced, strong teeth on dorsal margin; fingers longer than palm. P2 fingers shorter than palm. P2-4 with pleurobranchs. Abdominal somites with or without longitudinal carina between terga and pleura, pleura sharply pointed ventrally. Male Plp1 absent; male Plp2 biramous, endopod with appendices interna and masculina at proximal third; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and bisegmented, consisting of proximal segment and flagellum; female Plps2-5 endopods with appendix interna. Telson longer than wide, bearing proximal lobe on lateral margin and no median tooth on rounded posterior margin. Uropodal exopod with transverse suture.

Remarks. — The type species of the genus *Calaxius*, *C. acutirostris* Sakai & De Saint Laurent, 1989, is similar to *Eutrichocheles modestus* (Herbst, 1796) in that the abdominal pleura are triangular or sharply pointed on the ventral margin. However, they are utterly different from each other in Plps1-5. In *C. acutirostris*, the male Plp1 is absent, the male Plp2 endopod bears appendices interna and masculina at its proximal third, and male Plps3-5 endopods bear an appendix interna. In contrast, in *E. modestus* the male Plp1 is present as a stubby protrusion, the male Plp2 endopod bears an appendix interna but no appendix masculina, and male Plps3-5 endopods lack an appendix interna.

Type species. — *Calaxius acutirostris* Sakai & De Saint Laurent, 1989, by original designation. The gender of the generic name, *Calaxius*, is masculine.

Species included. — *Calaxius acutirostris* Sakai & De Saint Laurent, 1989 [= *C. tungi* Zhong, 2000; *C. manningi* Kensley, Lin & Yu, 2000]; *Calaxius* sp. Robles et al., 2009.

Calaxius acutirostris Sakai & De Saint Laurent, 1989

Calaxius acutirostris Sakai & De Saint Laurent, 1989: 86, figs. 23-25; Sakai, 1994: 192, 200 (key), fig. 10; Komai, 2000b: 344 (list); Kensley & Hickman, 2001: 487; Poore & Collins, 2009: 250, figs. 18-20, 43.

Calaxius tungi Zhong, 2000: 33, figs. 1-11. [Type locality. — Northern continental slope of the South China Sea, 367-402 m.]

Calaxius manningi Kensley, Lin & Lu, 2000: 207, figs. 2, 2, 7A; Tsang et al., 2008: 218, 219; Chu et al., 2008. [Type locality. — Tai-Shi, N.E. Taiwan, 500 m.]

Material examined. — MNHN Th 447, holotype male (TL/CL, 46.0/19.0 mm), Madagascar, leg. A. Crosnier; MNHN Th 449, 1 male (TL/CL, 60.0/24.0 mm), 15°19.1′S 46°11.8′E, P4 chalutage 46, 400 m, 7.xi.1972, leg. A. Crosnier; MNHN Th 1176, 1 male (TL/CL, 23.0/8.5 mm), Guinea, Guinea Trawling Survey, Sta. 11, 25.viii.1966 (paratype of *Calaxiopsis serrata*).

Diagnosis. — Male Plp1 absent; male Plp2 endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Ps3 and 5 coxae with genital pores. Hermaphroditic.

Remarks. — Kensley et al. (2000: 209) mentioned that "*Calaxius acutirostris* (from the Philippines) appears to differ from *C. manningi* in having 4 spines on the posterior (= ventral) meral margin of pereiopod, the lateral margin of the inner uropodal ramus bears three spines [though 1-2 spines in Sakai, 1989, fig. 25], while the telson margins are serrate". However, those differences found between the two species are not to be regarded as differences that are decisive to distinguish one species from the other, but as acceptable morphological variations at the species level. They may have been caused by sexual difference, considering that the holotype specimen of *C. acutirostris* is a male and that of *C. manningi* is a female, and they are almost of the same size.

The male holotype of *Calaxius tungi* Zhong, 2000 (TL/CL, 59.5/23.0 mm) from the northern continental slope of the South China Sea, 367-402 m, which is larger than the male holotype of *C. acutirostris* (TL/CL, 46.0/19.0 mm) and the female holotype of *C. manningi* (CL, 19 mm), is characterized as follows. The ventral margin of the P1 merus is armed with 3-4 spinules, the lateral margin of the uropodal endopod bears two spines, and the telson bears one lateral spine. The difference in the number of spines or teeth among *C. tungi*, *C. manningi*, and *C. acutirostris* (see table III) is considered acceptable as a variation, which safely suggests that *C. manningi* and *C. tungi* should be regarded synonymous with *C. acutirostris*.

TABLE III
Comparison of relevant characters in three nominal species of the genus *Calaxius*

	C. acutirostis Sakai & De Saint Laurent, from Madagascar	*C. manningi* Kensley, Lin & Lu, from N.E. Taiwan	*C. tungi* Zhong, from the South China Sea
Uropodal endopod lateral margin	with 2-3 spines including distolateral one	with 1 distolateral spine	with 2 spines including distolateral one
Telson lateral margins	with 2-3 denticles	with 2 spines	with 2 spines
P1, palm of larger chela anterior margin	unarmed (holotype male, MNHN Th 447) (left chela), or with 1 triangular tooth (male, MNHN Th 944) (left chela)	with tubercles (left chela)	with 2 triangular teeth
P1, palm of larger chela dorsal margin	with 3 spines	with 3 spines	with 1 spine
P1, merus of larger chela ventral margin	with 3-4 spines	with 3-4 spines	unarmed

Type locality. — Madagascar.

Distribution. — East Africa (Sakai & De Saint Laurent, 1989); Madagascar (Sakai & De Saint Laurent, 1989); Australia — northern and eastern Australia (Sakai, 1994); northern continental slope of the South China Sea, 367-402 m (Zhong, 2000); Philippines — south of Mindoro and Tablas Strait (Sakai & De Saint Laurent, 1989); Tai-Shi, N.E. Taiwan, 500 m (Kensley et al., 2000).

Calaxius sp., Robles et al., 2009

Calaxius sp. Robles et al., 2009: 316.

Genus **Calocarides** Wollebæk, 1908

Euconaxius Trybom, 1904: 383.
Calocaris (*Calocarides*) Wollebæk, 1908: 3, 23.
Axiopsis (*Calocarides*) — De Man, 1925d: 1, 2 (key), 6, 67, 71; Balss, 1957: 1579.
Calocarides — Bouvier, 1940: 97; Sakai & De Saint Laurent, 1989: 4, 78; Sakai, 1992a: 176; Poore, 1994: 98 (key); Kensley, 1996a: 53; Ngoc-Ho, 2003: 451; Ingle & Christiansen, 2004: 81.

Diagnosis. — Rostrum triangular and pointed at apex; lateral margins armed with teeth, extending posteriorly onto gastric region. Anterolateral margin of

carapace usually unarmed. Gastric region convex, bearing median and lateral carinae with teeth, and submedian carina with or without teeth. Cervical groove distinct at full length. Eyestalks subglobose; cornea pigmented or not. A2 scaphocerite elongate. Pl unequal; carpi and chelae characteristically tuberculate on lateral surfaces, and their dorsal margins denticulate or tuberculate. P2 chelae longer than palm. Abdominal pleura smooth on lateral surface and convex to rounded ventrally. No pleurobranchs. Male Plp1 absent; male Plp2 biramous, endopod with appendices interna and masculina at proximal third, appendix interna slender and longer than appendix masculina; male Plps3-5 biramous and slender, endopods with appendix interna. Telson longer than wide and oblong, bearing median tooth on posterior margin. Uropodal exopod with transverse suture. Gonochoristic. [Adapted from Sakai & de Saint Laurent, 1989.]

Type species. — *Euconaxius coronatus* Trybom, 1904, by subsequent designation by Sakai & De Saint Laurent (1989). The gender of the generic name, *Calocarides*, is masculine.

Species included. — *Calocarides capensis* Kensley, 1996a [= *C. longispinis* Stebbing, 1910]; *C. chani* Kensley, Lin & Yu, 2000; *C. coronatus* (Trybom, 1904) [= *C. crassipes* (Trybom, 1904)]; *C. laevis* (Bouvier, 1915a); *C. lev* (Zarenkov, 1989); *C. longispinis* (McArdle, 1901); *C. macphersoni* Kensley, 1996a; *C. okhotskensis* sp. nov.; *C. quinqueseriatus* (Rathbun, 1902); *C. rostriserratus* (Andrade & Báez, 1977); *C. rudolfi* (Zarenkov, 1989); *C. soyoi* (Yokoya, 1933); *C. tenuicornis* (De Man, 1905); *C. vigilus* Sakai, 1992c.

KEY TO THE SPECIES OF THE GENUS *CALOCARIDES*

1 – A2 scaphocerite short; gastric submedian carinae without teeth; telson 1.7 times as long as wide ..... *C. laevis*
– A2 scaphocerite elongate; gastric submedian carinae with teeth; telson less than 1.5 times as long as wide 2

2 – A2 scaphocerite failing to reach end of A2 penultimate segment 3
– A2 scaphocerite reaching or overreaching A2 penultimate segment 10

3 – P1 palm finely tuberculate on dorsal margin 4
– P1 palm roughly denticulate on dorsal margin 5

4 – P1 meri with one subdistal spine dorsally ..... *C. chani*
– P1 meri serrate on distal half of dorsal margin ..... *C. soyoi*

5 – Carapace shorter than length of abdominal somites 1-5 ..... *C. okhotskensis* sp. nov.
– Carapace equal to length of abdominal somites 1-5 6

6 – P1 fingers as long as palm ..... *C. quinqueseriatus*
– P1 fingers shorter than palm 7

7 – Gastric median carina with strong spine anterior to hepatic tubercle 8

– Gastric median carina without strong spine 9

8 – A2 scaphocerite reaching distal third of A2 penultimate segment ..... *C. longispinis*
– A2 scaphocerite reaching distal end of A2 penultimate segment..... *C. macphersoni*

9 – Telson unarmed on lateral margins ..... *C. rudolfi*
– Telson with proximal lobe followed by 1-2 spinules laterally..... *C. rostriserratus*

10 – Gastric submedian carinae with 1-2 spines..... 11
– Gastric submedian carinae with more than 4 spines..... 12

11 – Gastric median carina unarmed..... *C. capensis*
– Gastric median carina armed with 1-2 spines anteriorly 13

12 – In larger cheliped carpus with two subdistal spines on dorsal margin; cutting edge of dactylus concave in proximal half, bearing subproximal protrusion ..... *C. coronatus*
– In larger cheliped carpus denticulate on subdistal part of dorsal margin; cutting edge of dactylus concave in proximal half, lacking subproximal protrusion ..... *C. lev*

13 – Gastric median carina denticulate; gastric submedian carinae with a row of 7 spines.. ..... *C. vigilus*
– Gastric median carina with 4 interspaced spines; gastric submedian carinae with a row of 3-4 spines ..... *C. tenuicornis*

KEY TO THE SPECIES OF *CALOCARIDES* BY GEOGRAPHICAL DISTRIBUTION

Indo-West Pacific species. — *C. chani*; *C. longispinis*; *C. okhotskensis* sp. nov.; *Calocarides soyoi.*

West Atlantic species. — *C. capensis*; *C. coronatus*; *C. laevis*; *C. macphersoni*; *C. rudolfi*; *C. tenuicornis*; *C. vigilus*.

East Pacific species. — *C. lev*; *C. quinqueseriatus*; *C. rostriserratus*.

Calocarides capensis Kensley, 1996

Calastacus longispinis Stebbing, 1910: 367 [not McArdle, 1901] [Type locality. — [Off] Table Mountain, 457 m.]

Calocaris (*Calastacus*) *longispinis* — Barnard, 1950: 502 (key), 503, fig. 93d-f [not McArdle, 1901].

Calocaris longispinis — Kensley, 1981b: 30 [not McArdle, 1901]; Bianchi et al., 1993: 34.

Calocarides capensis Kensley, 1996a: 54 (list), 55, fig. 2 [not Trybom, 1904].

Calocarides coronatus — Sakai & De Saint Laurent, 1989: 80, fig. 20 (not 21).

Material examined. — USNM 243561, holotype, male (TL/CL, 74.0/24.0 mm), South Atlantic Ocean, Namibia, N.W. of Swakopmund, 20°55′S 12°23′E, 475-480 m, 9.ix.1980, R/V "Benguela II", Sta. 66, det. as *Calastacus longispinis* Stebbing, 1910; MNHN Th 1044, 1 male (TL/CL, 72.5/23.5 mm); MNHN Th 1045, 1 male (TL/CL, 68.0/23.0 mm), 26°26′S 14°25′W, 300 m, 1981, leg. R/V "Benguela IV" (Sakai & De Saint Laurent, 1989: 80, fig. 20, det. as *Calocarides coronatus* (Trybom, 1904)).

Diagnosis. — Rostrum acutely triangular, bearing 5-6 lateral teeth. A2 scaphocerite slightly overreaching distal margin of penultimate segment. Gastric median carina distinct, with hepatic tubercle, extending posteriorly from middle of rostrum; gastric submedian rows of 1-2 buttressed spines;

lateral carinae with 3-4 spines. In larger cheliped merus with five distal spines on dorsal margin and one distinct spine on ventral margin; palm with about 11 strong spines on dorsal margin; in smaller cheliped, merus with three spines on dorsal margin and one distinct spine on ventral margin, and palm with about 11 strong spines on dorsal margin. Telson bearing 3-4 movable denticles at posterolateral corner and a pair of spines on dorsal surface; posterior margin gently convex with median spine. [Synopsis from Kensley, 1996a.]

Type locality. — Forty (40) miles N 79°E of Table Mountain, Cape of Good Hope, South Africa, 1280 m.

Distribution. — Tropical west Africa (Sakai & De Saint Laurent, 1989); Namibia — off Lüderitz (Sakai & De Saint Laurent, 1989); South Africa — off Table Mountain (Stebbing, 1910; Kensley, 1996a).

Calocarides chani Kensley, Lin & Yu, 2000

Calocarides chani Kensley et al., 2000: 209, figs. 3, 4, 7B-D; Tsang et al., 2008: 218, 219; Chu et al., 2008.

Type locality. — Tai-Shi fishing port, I-Lan County, N.E. Taiwan, 400 m.

Distribution. — I-Lan County, N.E. Taiwan; 300-600 m.

Calocarides coronatus (Trybom, 1904)

Euconaxius coronatus Trybom, 1904: 384, pl. 20 figs. 1-10, 13-14, pl. 21 figs. 1-8; Lagerberg, 1908: 48, pl. 2 fig. 7.

Euconaxius crassipes Trybom, 1904: 390, pl. 20 figs. 11, 12. [Type locality. — Norway, Kosterfjord.]

Calocaris (*Calocarides*) *coronatus* — Wollebæk, 1908: 3, 5, 13, 23.

Calocaris (*Calocarides*) *crassipes* — Wollebæk, 1908: 3, 23, pls. 1-7.

Calocarides coronatus — Wollebæk, 1909a: 3; Björck, 1913: 7; Balss, 1925: 209; Balss, 1926: 26; Grieg, 1927: 43; Bouvier, 1940: 97; Poulsen, 1940: 208, 216, fig. 4; Christiansen, 1955: 1; Elofsson, 1959: 1, figs. 1-20; Brattegard, 1966: 45, 1 text-fig., 2 tables; Allen, 1967: 57 (key), 89 (fig.); Christiansen, 1972: 40, fig. 45; Noël, 1992: 79; Cates et al., 1994: 137; García Raso, 1996: 738: 56; Kensley, 1996a: 54 (list), 56; Brattegard & Christiansen, 1997: 220; d'Udekem d'Acoz, 1999: 153; Christiansen, 2000: 231; Costello et al., 2001: 289; González-Gordillo et al., 2001: 279; Türkay, 2001: 289; Ngoc-Ho, 2003: 451, figs. 2, 3; Ingle & Christiansen, 2004: 81, figs. 60, 63.

Axiopsis (*Calocarides*) *coronata* — De Man, 1925d: 6 (list), 67, 71 (key).

Non: *Calocarides coronatus* — Sakai & De Saint Laurent, 1989: 80, fig. 20 (not 21) [= *Calocarides capensis* Kensley, 1996a: 55].

Material examined. — SMF 29463, 1 male (TL/CL, 60.0/18.8 mm), 2 females (TL/CL, 54.0/18.7-57.0/18.6 mm), North Sea, Skagerrak, S. LarvikG-101 Ku (58°26.35′N 10°40.6′E), 164.3-179.3 m, 05.vi.1986, RV "Gauss"; SMF 19774, 1 ovig. female (TL/CL, 64.0/20.6 mm), North Sea, N. Skagen, Skagerrak, Alk87-10VV (58°03.11′N 09°40.06′E), 320 m, 22.vii.1987, R/V "Alkor"; SMF 11835, 2 males (TL/CL, 37.0/11.8-39.0/13.2 mm), 1 ovig. female (TL/CL,

48.0/16.1 mm), 3 females (TL/CL, 47.0/12.1, rostrum broken – 40.0/12.6 mm), Norway, Nordfjord (61°55.4′N 05°25.3′E), 556-578 m, 18.vi.1983, leg. T. Brattegard; SMF 25687, 1 male (TL/CL, 49.0/14.3 mm), North Sea, Skagerrak, S. Arendal, V53-115Ku (58°08.940′N 08°53.370′E – 58°08.890′N 08°54.190′E), 441-448 m, 25.ii.1987, R/V "Valdivia"; SMF 29464, 1 female (TL/CL, 48.0/15.9 mm), North Sea, Skagerrak, S. Kristiansand G-103 Ku (57°59.58′N 7°55.67′E – 57°58.9′N 7°53.18′E), 189.3-226.8 m, 06.vi.1986, R/V "Gauss"; SMF 29465, 1 male (TL/CL, 45.0/15.7 mm), North Sea, Skagerrak, S. Larvik G-101 Ku (58°26.35′N 10°40.04′E – 58°28.01′N 10°40.66′E), 164.3-179.3 m, 05.vi.1986, R/V "Gauss"; RMNH D 17319, 1 female (TL/CL, 19.0/4.4 mm), Langenuen, S. of Bergen, Norway (60°4′N 5°20′E), 570 m, Agassiz trawl, 7.ix.1961.

Diagnosis. — Male Plp1 absent; male Plp2 biramous, endopod and exopod slender, endopod with appendices interna and masculina; male Plps3-5 biramous, endopods and exopods slender, endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 similar and narrow, endopods with appendix interna.

Type locality. — Skagerrak, North Sea, 500 m.

Distribution. — Norway — Kosterfjord (Trybom, 1904), Sorfjord, Kvinnheradfjord, Osafjord, Alfjord, Fusafjord, and Bomlafjord (Kensley, 1996a), Hjoerund Fjord, Byfjord; Skagerrak (Trybom, 1904; Poulsen, 1940); 80-700 m.

Calocarides laevis (Bouvier, 1915)

Axius laevis Bouvier, 1915a: 182.
Axius (*Neaxius*) *laevis* — De Man, 1925d: 4 (list), 9, 11, 13 (key).
Axius laevis — Sakai & De Saint Laurent, 1989: 80.
Eiconaxius laevis — Sakai & De Saint Laurent, 1989, fig. 21.

Remarks. — The present species was once considered a synonym of *Calocarides coronatus* (Trybom, 1904) by Sakai & De Saint Laurent (1989: 80), who studied the type specimen of *Calocarides laevis*. However, it has turned out through the present reconsideration that those two species are different. In *C. laevis*, the telson is distinctly longer than wide, and the gastric median carina bears three distinct teeth, whereas in *C. coronatus* the telson is slightly longer than wide, and the gastric median carina bears two interspaced spinules.

Type locality. — West Africa, 698 m.

Distribution. — Only known from the type locality.

Calocarides lev (Zarenkov, 1989)

Calocaris lev Zarenkov, 1989: 24, fig. 1.

Calocarides lev — Kensley, 1996a: 54 (list).

Diagnosis. — Rostrum acutely triangular, lateral margins with 4 teeth each, extending posteriorly onto anterior half of gastric region as lateral carinae. Gastric region bearing lateral carinae with two sharp spines, median carina with two spines in anterior part, and another spine submedially on each side of median carina. A2 scaphocerite strong, reaching distal margin of A2 penultimate segment. P1 chelate and unequal; in larger left cheliped fingers shorter than palm; in smaller right cheliped carpus and chela granulate on lateral surfaces, fingers slightly longer than palm. P2 fingers slightly longer than palm. Female Plp1 uniramous and elongate; female Plp2 biramous, endopod slender, bearing appendix interna at middle. [Adapted from Zarenkov, 1989: 24, fig. 1.]

Remarks. — Zarenkov's (1989) fig. 1, m2, shows that the maxilla 2 scaphognathite bears no posterior whip, which was probably misfigured, because the maxilla 2 scaphognathite with a posterior whip is a distinct feature of *Calocarides*.

Type localities. — Gulf of California, Sta. Cr. 1541, 27°02′.7N 111°22′.8W, 2000 m; Cr. 1551, 27°00.3N 111°25′.2W, 2023-2026 m; Sta. 1572, 27°00′.3N 111°25′.3W, 2025-2036 m.

Distribution. — Gulf of California; 2000-2036 m.

Calocarides longispinis (McArdle, 1901)

Calastacus longispinis McArdle, 1901: 522; Alcock & McArdle, 1902, pl. 57 fig. 2, 2a; MacGilchrist, 1905: 239; De Man, 1925d: 8 (partim), 118; Balss, 1925: 209 (list).
Calocaris (*Calastacus*) *longispinis* — Borradaile, 1903: 539.
Calocarides longispinis — Sakai & De Saint Laurent, 1989: 79; Kensley, 1996a: 54 (list).
Not: *Calocaris* (*Calastacus*) *longispinis* — Barnard, 1950: 503, fig. 93d-f [= *Calocarides capensis* Kensley, 1996a: 55].
Not: *Calastacus longispinis* — Stebbing, 1910: 367 [= *Calocarides capensis* Kensley, 1996a: 55].
Not: *Calocaris longispinis* — Kensley, 1981b: 30 [= *Calocarides capensis* Kensley, 1996a].
Not: *Calocarides longispinis* — Macpherson, 1983: 45, fig. 26; Macpherson, 1991: 405 [= *Calocarides macphersoni* Kensley, 1996a].

Diagnosis. — Rostrum with 5 lateral spines. Eyestalks reaching almost middle of rostrum. A2 scaphocerite reaching distal third of A2 penultimate segment. Gastric median carina with 2 spines followed posteriorly by low blunt tubercle; gastric region with submedian rows of two spines on left and 4 spines on right. [Adapted from De Man, 1925d: 118.]

Remarks. — Kensley (1996a: 60) compared *Calastacus longispinis* McArdle, 1901 from the Arabian Sea, with the *Calastacus longispinis* specimen of

Macpherson (1983) from Namibia, and he considered the latter a misidentification, so that Macpherson's (1983) *C. longispinis* was renamed *Calocarides macphersoni* Kensley, 1996a.

Type locality. — Arabian Sea, "Investigator" Sta. 279, 300 fath. (549 m).

Distribution. — Arabian Sea (McArdle, 1901); Gulf of Oman (MacGilchrist, 1905); 549-1280 m.

Calocarides macphersoni Kensley, 1996
(fig. 15)

Calocarides longispinis — Macpherson, 1983: 45, fig. 26; Macpherson, 1991: 405. [Not McArdle, 1901.]
Calocarides macphersoni Kensley, 1996a: 54 (list), 58, fig. 3.

Material examined. — USNM 243561, holoytype, male (TL/CL, 74.0/24.0 mm), South Atlantic Ocean, Namibia, NW of Swakopmund, 20°55′S 12°23′E, 475-480 m, 9.ix.1980, R/V "Benguela II", Sta. 66, det. Stebbing, 1910 as *Calastacus longispinis*; USNM 243562, paratype, male (TL/CL, 54.0/21.0 mm), same data as holotype, det. Kensley, 1996a as *Calocarides macphersoni*.

Diagnosis. — Rostrum (fig. 15) sharply triangular, with four lateral teeth; gastric region bearing median carina with a single tooth and hepatic tubercle, running from rostrum to cervical groove, submedian carinae poorly defined, with 2-3 teeth, and lateral carinae with 5 teeth including supraocular spine. A2 scaphocerite reaching end of A2 penultimate segment. Mxp3 basis with obtuse subdistal tooth ventrally; ischium unarmed; merus with three strong ventral spines, carpus with small ventrodistal spine. In larger cheliped, merus roughly denticulate on dorsal and ventral margins; carpus evenly tuberculate on lateral and mesial surfaces, and dorsal and ventral margins. Palm about 1.5 times as long as fingers, entire surface evenly and fairly densely tuberculate, fingers widely gaping proximally and meeting distally. In smaller cheliped, merus roughly denticulate on dorsal and ventral margins; carpus densely tuberculate; palm about as long as fingers and tuberculate, bearing scanty tubercles on distal margin; cutting edges of fixed finger and dactylus slightly concave proximally, bearing small, regularly spaced teeth medially to distally.

Abdominal pleuron 1 narrow and rounded ventrally, pleura 2-6 broadly rounded ventrally, pleura 3-6 with small spine anteroventrally. Male Plp1 absent; male Plp2 biramous, endopod and exopod slender, endopod with appendices interna and masculina; male Plps3-5 biramous, endopods and exopods slender, endopods with appendix interna. Telson bearing proximal lobe with spine followed by 3-4 spinules on lateral margins, and median spine on rounded posterior margin; dorsal surface with a pair of spinules

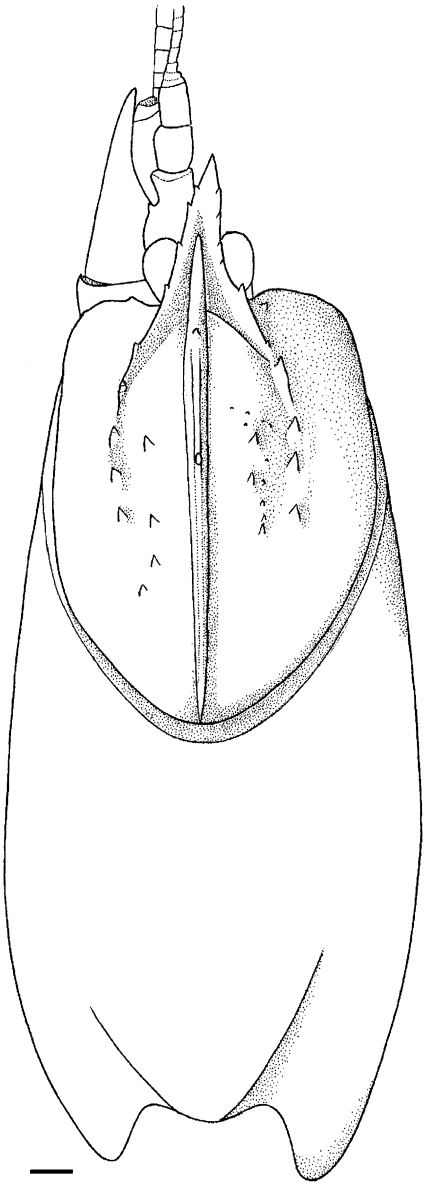

Fig. 15. *Calocarides macphersoni* Kensley, 1996. Carapace, dorsal view. USNM 243561, holoytype, male (TL/CL, 74.0/24.0 mm), South Atlantic Ocean, Namibia, N.W. of Swakopmund, 20°55′S 12°23′E, 475-480 m, 9.ix.1980, R/V "Benguela II", Sta. 66. Scale 1 mm.

centrally, and a row of 3-4 spinules at each posterolateral angle. Uropodal endopod bearing a single posterolateral spine, and dorsal carina with about 4 spinules. Uropodal exopod bearing 2-3 distal spinules on lateral margin, a

single movable spine at posterolateral angle, and a transverse suture with 13-15 spinules.

Type locality. — Off Namibia, 20°55′S 12°23′E, 475-480 m.

Distribution. — Off Namibia (Macpherson, 1983; Kensley, 1996a); 300-480 m.

Calocarides okhotskensis sp. nov.

Calastacus quinqueseriatus — Kobjakova, 1937: 142, pl. 2 fig. 8; Komai, 2000a: 229.

Material examined. — ZIASP, 1 specimen, holotype, Sea of Okhotsk, 1150 m, Sta. 229, 07.viii.1932, leg. P.V. Ushakov:

"At one deep water station in the Sea of Okhotsk, there was a chance to find a peculiar representative of the Pacific fauna identified as *Calastacus quinqueseriatus* [= *Calocarides okhotskensis*]. Unfortunately, this single specimen was somewhat damaged, which makes me unable to make a full comparison with Rathbun's description. It was possible to find some differences from the typical form, although those differences are not essential and probably fall under intraspecific variability. They are shown as follows: (1) the carapace length is shorter than the length of 5 abdominal somites (according to Rathbun it is equal to the length of 5 abdominal somites); (2) the rostrum is slightly shorter and reaches the mid-length of the 2nd segment of the antennular peduncle; (3) intermediate ridge beween the lateral and median ones is armed with two spines (2-3 spines according to Rathbun) and begins at the level of the 3rd spine of the dorsal ridge (in typical specimen this ridge is more extended forward as Rathbun's figures indicate); (4) fourth pereiopods are nearly equal but the left is markedly stronger than the right one (according to Rathbun, they are not equal); (5) chela and all segments of second pair of legs without setae on margins (according to Rathbun, all margins are beset with setae); (6) the lateral carinae on the telson extending toward posterior margin and terminated with spinules are missing in our specimen. Further records of this species from the Sea of Okhotsk will make it possible to clear up its taxonomic status. The occurrence of the species in the Sea of Okhotsk is no doubt related to the penetration of the warm Pacific waters, and is, therefore, of considerable interest". [Translated from the Russian by V. Spiridonov.]

Remarks. — Kobjakova (1937) described *Calastacus quinqueseriatus* Rathbun, 1902, based on a specimen from the Sea of Okhotsk, 1150 m. However, it was later identified as *Calocarides quinqueseriatus* by Sakai & De Saint Laurent (1989), because her species does not belong to *Calastacus*; the species is different in characteristics from the type species of *Calastacus*, *C. stilirostris*

Faxon, 1893, though she adopted the generic name from Rathbun's original description. The type specimen from the Sea of Okhotsk is inaccessible at present, which prevents me from making its characteristics clear, but it seems that Kobjakova's *Calocarides quinqueseriatus* is geographically and morphologically different from Rathbun's *Calocarides quinqueseriatus* from eastern North America, 288-700 m. In Kobjakova's species the palm of the larger cheliped is about 1.5 times as long as wide, and the dactylus is curved downward in the distal half of the cutting edge, and slightly shorter than the palm (Kobjakova, 1937, pl. 2 fig. 8). In Rathbun's species, however, the palm of the larger cheliped is more than twice as long as wide, and the dactylus is straight, and distinctly shorter than the palm. Therefore, Kobjakova's *Calocarides quinqueseriatus* is here defined as a new species of *Calocarides*, *Calocarides okhotskensis*.

Type locality. — Sea of Okhotsk, 1150 m.

Distribution. — Only known from the type locality.

Etymology. — The new species is named *okhotskensis* after the type locality, the Sea of Okhotsk, with the Latin suffix "ensis", indicating a geographic region. The name is an adjective agreeing in gender with the generic name.

Calocarides quinqueseriatus (Rathbun, 1902)

Calastacus quinqueseriatus Rathbun, 1902: 887; Rathbun, 1904: 151, fig. 92; Schmitt, 1921: 113, fig. 76; Balss, 1925: 209; Hart, 1982: 50, fig. 11.

Calocaris (*Calastacus*) *quinqueseriata* — Borradaile, 1903: 539; De Man, 1925d: 8 (list), 118 (key).

Calocarides quinqueseriatus — Sakai & De Saint Laurent, 1989: 79; Hendrickx, 1995: 390 (list), 393, 396, figs.; Kensley, 1996a: 54 (list), 61, figs. 4, 5; Hendrickx et al., 2005: 171.

Material examined. — USNM 25240, holotype, male (TL/CL, 74.0/25.0 mm), San Luis Obispo Bay, California, 5.iv.1890, "Albatross" Sta. 3196, 200 fms (365.8 m), det. M. Rathbun.

Diagnosis. — Male Plp1 absent; male Plp2 biramous, endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna.

Remarks. — Kensley (1996a: 54) remained uncertain of including *Calastacus quinqueseriatus* Rathbun, 1902 in the present genus *Calocarides*. However, it is safely included in *Calocarides* by the forms of male pleopods 1 and 2.

Type locality. — Off San Luis Obispo Bay, South California, "Albatross" Sta. 3196, 360 m.

Distribution. — Southern California — off San Luis Obispo Bay, Point Sur, San Simeon Bay, Point Conception, Santa Barbara Channel, and Anacapa

Island (Rathbun, 1902, 1904), off Point Sur, off San Simeon Bay, off San Luis Obispo Bay, off Point Conception, Santa Barbara Channel, off Anacapa Island, off San Nicolas Island (Schmitt, 1921), California coast and Oil Island (Sakai & De Saint Laurent, 1989), off San Luis Obispo Bay, Santa Barbara Channel, San Miguel Island, off Point Conception, off Point Sur, off San Simeon Bay, off Anacapa Island, off San Nicolas Island, off San Diego, off Santa Rosa Island, N.E. of Point Loma, San Cristobal Bay, and mouth of Columbia River (Kensley, 1996a); 292-2013 m.

Calocarides rostriserratus (Andrade & Báez, 1977)

Calastacus rostriserratus Andrade & Báez, 1977: 65, fig. 1.
Calocarides rostriserratus — Kensley, 1996a: 54 (list), 64, fig. 6.

Type locality. — Pichidangui, Chile, 32°08′S 71°50′W, 320-400 m.

Distribution. — Gulf of Panama (Kensley, 1996a); Peru — off Tumbes (Kensley, 1996a); Chile — Pichidangui (Andrade & Báez, 1977); 320-825 m.

Calocarides rudolfi (Zarenkov, 1989)

Calocaris rudolfi Zarenkov, 1989: 27, fig. 3.
Calocarides rudolfi — Kensley, 1996a: 54 (list).

Diagnosis. — Rostrum triangular with acute tip, lateral margins with 3-4 teeth, extending posteriorly onto middle of gastric region. Gastric region bearing lateral carinae with supraorbital spine, followed posteriorly by 2-4 sharp spines; median carina unarmed; and submedian carinae with 3-4 spines. Postcervical carina absent. A2 scaphocerite strong, reaching near distal margin of A2 penultimate segment. Mxp3 merus with 1-2 small and 3 sharp spines on ventral margin; merus with subterminal spine on ventral margin. P1 chelate and unequal; in larger (left) cheliped merus with two sharp spines on ventral margin, and two sharp spines followed distally by another two spinules on dorsal margin; carpus and chela granulate on lateral surface, fingers shorter than palm. P2 fingers longer than palm. Plp1 unknown. Plp2 biramous, endopod slender, bearing appendices interna and masculina at middle part. Telson almost square, lateral margins unarmed, posterior margin slightly convex with median tooth, and dorsal surface with a pair of spinules proximally and two pairs of spines in distal half. Uropodal endopod with 5 spines on median carina. Uropodal exopod with serrated transverse suture. [Adapted from Zarenkov, 1989: 29, fig. 3.]

Remarks. — Zarenkov (1989) described a male specimen without referring to male Plp1, but he showed in his fig. 3 that the Plp2 endopod bears

appendices interna and masculina mesiomedially, which suggests that this male specimen is not included in *Calocaris*, but in *Calocarides*. Accordingly, the present species is reclassified under the genus *Calocarides* as *C. rudolfi*.

Type locality. — Off Angola, 490-510 m.

Distribution. — Only known from the type locality.

Calocarides soyoi (Yokoya, 1933)

Axius soyoi Yokoya, 1933: 49, fig. 25; Horikoshi et al., 1982: 30, 33, 38, 39, 120, 145, 168.
Axiopsis (*Axiopsis*) *soyoi* — Sakai, 1987a: 303 (list).
Calocarides soyoi — Sakai & De Saint Laurent, 1989: 4 (list), 83, tab. 3; Kensley & Komai, 1992: 81, fig. 1, tabs. 1-2; Kensley, 1996a: 54 (list), 66.
Axiopsis soyoi — Takeda, 1997: 250 (list).

Material examined. — SMF-32430, 1 male (TL/CL, 76,0/26.0 mm), Japan, off Heta, Suruga Bay, 380-400 m, bottom trawl, 6.ii.1992, leg. H. Mukai & K. Sakai; SMF-32431, 1 male (TL/CL, 62.0/20.5 mm), Japan, off Heta, Suruga Bay, 200-400 m, bottom trawl, 29.iii.1983, leg. H. Mukai; SMF-32432, 1 ovig. female (TL/CL, 60.0/19.5 mm, missing both chelipeds), Japan, off Heta, Suruga Bay, 200-400 m, bottom trawl, 29.iii.1983, leg. H. Mukai; SMF-32433, 1 male (TL/CL, 61.0/21.7 mm), Japan, off Heta, Suruga Bay, 200-400 m, bottom trawl, 29.iii.1983, leg. H. Mukai; SMF-32434, 1 male (TL/CL, 59.0/19.1 mm, missing larger cheliped), Japan, off Heta, Suruga Bay, 200-400 m, bottom trawl, 29.iii.1983, leg. H. Mukai; SMF-32435, 1 male (TL/CL, 60.0/20.1 mm, missing larger cheliped), Japan, off Heta, Suruga Bay, 200-400 m, bottom trawl, 29.iii.1983, leg. H. Mukai; SMF-32436, 1 male (TL/CL, 82.0/25.2 mm, missing larger cheliped) Japan, off Heta, Suruga Bay, 200-400 m, bottom trawl, 29.iii.1983, leg. H. Mukai; SMF-32437, 1 male (TL/CL, 73.0/22.8 mm), Japan, N. Japan, Iwate Pref., off Otsuchi (39°22.99′N 142°03.19′E – 39°22.82′N 142°03.14′E), 118-120 m, 1 m, dredge, R/V "Tansei-maru", KT-93-15 Sta. 01 CB, 12-16.xi.1993, leg. K. Sakai & S. Ohta; SMF-32438, 1 male (TL/CL, 79.0/25.5 mm), Japan, Iwate, off Otsuchi, 128 m (70 fathoms), gill-net, leg. H. Mukai; SMF-32439, 1 male (TL/CL, 71.0/22.5 mm), Japan, off Heta, Suruga Bay, 380-400 m, bottom trawl, 6.ii.1992, leg. H. Mukai & K. Sakai.

Remarks. — *Calocarides soyoi* from Japan is similar to *Calocarides chani* from Taiwan in the carapace spination and the shape of the first pereiopods, as Kensley et al. (2000: 210) mentioned, but still differs in several features. In *C. soyoi* the carapace length is 12.0-18.0 mm; the chela of the larger cheliped is three times as long as wide; the P1 merus is denticulate both on the distal half of the dorsal margin and on the whole ventral margin, the P1 carpus has numerous tubercles on the lateral surface; and the uropodal endopod bears six spines on the longitudinal carina. In *C. chani* the carapace length is 10.2-12.2 mm; the chela of the larger cheliped is 2.2 times as long as wide; the P1 merus bears a single spine on the dorsal margin and about three spines on the ventral margin; the P1 carpus has tubercles along the dorsal margin; and the uropodal endopod bears 5 spines on the longitudinal carina.

Type locality. — South of Shioya-zaki, Fukushima Pref., Japan, 142 m.

Distribution. — Suruga Bay (Takeda, 1997); 120-270 m; Inubo-zaki, off Shioya-zaki, Kii Strait, off Satsuma, and Tsushima (Yokoya, 1933), off Fukushima Prefecture and off Hachinohe (Kensley & Komai, 1992; Kensley, 1996a).

Calocarides tenuicornis (De Man, 1905)

Axiopsis tenuicornis De Man, 1905: 596; Balss, 1925: 209.
Axiopsis (*Axiopsis*) *tenuicornis* — De Man, 1925d: 6 (list), 69 (key), 84, pl. 7 fig. 14-14l.
?*Calocarides tenuicornis* — Sakai & De Saint Laurent, 1989: 83.

Material examined. — ZMA Crust. De. 202874, lectotype, female (dissected, CL, 7.4 mm, abdomen somite 5-tail-fan missing).

Remarks. — It is confirmed by examining the female holotype of the present species, *Axiopsis tenuicornis* De Man, 1905, and referring to De Man's figures (De Man, 1925d, pl. 7 fig. 14-14l), that this female type specimen is what he really figured as holotype, though it is separated into several parts (cephalothorax, thoracic somites and abdomen, and first chelipeds).

The present species *C. tenuicornis* is closely similar to *C. vigilus* Sakai, 1992c, because in both species the A2 scaphocerite is elongate and protruded forward; P1 carpus and chela are not tuberculate on the lateral surfaces; the P1 fingers are longer than the palm in the smaller cheliped; and the lateral carinae of the gastric region bear distinct spines. However, the present species is distinguished from *C. vigilus*, because in *C. tenuicornis* the gastric region bears a median carina with 4 spinules, and submedian rows of 3-4 spinules, whereas in *C. vigilus* the gastric region bears a spinulate median carina and submedian rows of 7-8 spinules.

Type locality. — Java Sea, 7°46′S 114°30.5′E, "Siboga" Sta. 5, 330 m.

Distribution. — Indonesia — Java Sea; 330 m.

Calocarides vigilus Sakai, 1992

Calocarides vigila Sakai, 1992a: 176, figs. 17, 18; Kensley, 1996a: 54 (list).

Diagnosis. — Male Plp1 absent, male Plp2 biramous, endopod with appendices interna and masculina (Sakai, 1992a: 177, fig. 18G).

Type locality. — Hawke Bay, New Zealand, 39°36′S 177°42′E, 126 m.

Distribution. — New Zealand — Hawke Bay and Cook Strait; 60-146 m.

Genus **Coelhocalaxius** gen. nov.

Diagnosis. — Rostrum elongate and narrow, with 4-5 sharp spines on each lateral margin, extending posteriorly onto gastric region as lateral carinae with

two distinct buttressed teeth. Gastric region with median carina bearing tooth and hepatic tubercle, originating from base or from near tip of rostrum to cervical groove, and submedian rows of teeth; postcervical carina present, posteriorly bearing intestinal ridge. Anterolateral margin of carapace with triangular tooth. Cervical groove distinct at full length. Eyestalks elongate but slightly shorter than rostrum; cornea dilated. A1 peduncle overreaching rostral tip. A2 scaphocerite protruded straight forward. P1 subequal; palm armed with 4 interspaced strong teeth on dorsal margin; fingers longer than palm. P2 fingers shorter than palm. Abdominal somites 2-5 with broadened dorsal carina and lateral carina between tergum and pleuron, pleura sharply pointed ventrally. Male Plps1-2 unknown. Female Plp1 uniramous and bisegmented, consisting of proximal segment and flagellum; female Plps2-5 endopods with appendix interna. Telson longer than wide, bearing proximal lobe with spine on lateral margin, but no median tooth on rounded posterior margin. Uropodal exopod with transverse suture.

Remarks. — *Calaxius spinosus* Coelho, 1973 is similar to the type species of *Calaxius*, *C. acutirostris* Sakai & De Saint Laurent, 1989, in the pleura, which are sharply pointed ventrally. But it is distinguished from *Calaxius* at the generic level, because in *C. spinosus* the rostrum is elongate and narrow; the postcervical carina is present, posteriorly bearing an intestinal ridge; the eyestalks are elongate but slightly shorter than the rostrum; the cornea is dilated; abdominal somites 2-5 bear a broadened dorsal carina and a longitudinal lateral carina between tergum and pleuron. In *C. acutirostris* in contrast, the rostrum is elongate and triangular; the postcervical carina is absent; the eyestalks are stout and short; the cornea is pigmented; and abdominal somites 2-5 bear a longitudinal lateral carina between tergum and pleuron, but are smooth dorsally. Therefore, a new genus, *Coelhocalaxius* gen. nov., is erected for *Calaxius spinosus* Coelho, 1973.

Type species. — *Calaxius spinosus* Coelho, 1973, by present designation and monotypy. The gender of the generic name, *Coelhocalaxius*, is masculine.

Species included. — *Coelhocalaxius spinosus* (Coelho, 1973).

Etymology. — The new generic name *Coelhocalaxius* is dedicated to Dr. P.A. Coelho, Universidade Federal de Pernambuco, PE, Brazil, who described the present species under the genus *Calaxius*.

Coelhocalaxius spinosus (Coelho, 1973)
(fig. 16)

Axiopsis sp. C, Coelho, 1971: 231.

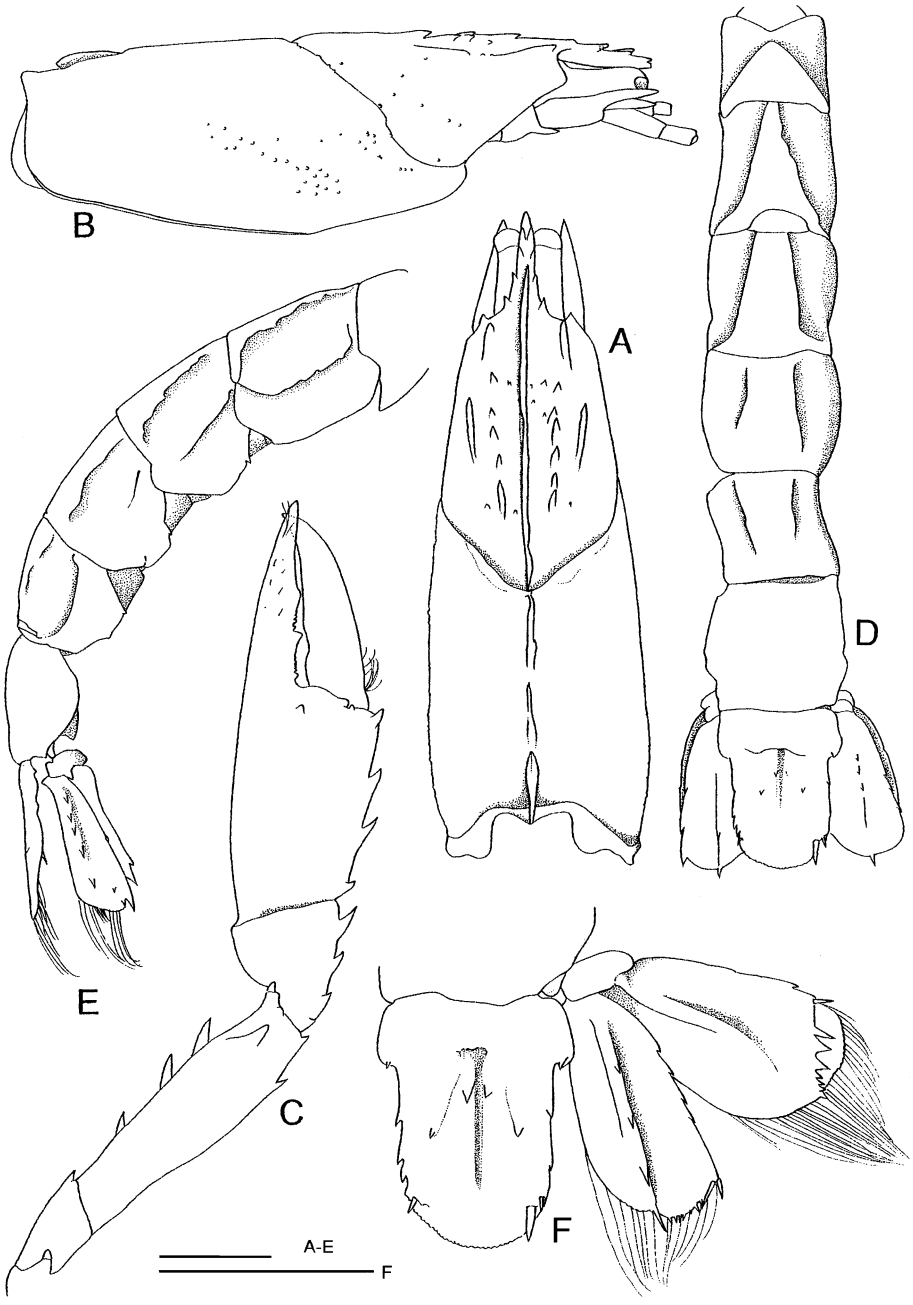

Fig. 16. *Coelhocalaxius spinosus* (Coelho, 1973). A, carapace, dorsal view; B, carapace, lateral view; C, cheliped on left side, lateral view; D, abdomen and tail-fan, dorsal view; E, abdomen and tail-fan, lateral view; F, telson and uropod on right side. A-F, DOUFPe 1870, holotype, female (TL/CL, 19.0/7.4 mm), W. [of] Amapá, Brazil. Scales 1 mm.

Calocaris (*Calastacus*) sp., Coelho & Ramos, 1973: 161.
Calastacus spinosus Coelho, 1973: 345; Coelho & Ramos-Porto, 1983: 82, fig. 9; Rodrigues et al., 1998: 382; Melo, 1999: 330, figs. 223-224.
Calocaris (*Calastacus*) *oxypleura* Williams, 1974a: 457, figs. 11-18. [Type locality: Straits of Florida W. of Riding Rocks, 25°15′N 79°13′W, 365 m.]
Axiopsis oxypleura — Rabalais et al., 1981: 98.
Calaxius oxypleura — Sakai & De Saint Laurent, 1989: 86; Kensley & Hickman, 2001: 487; Clark et al., 2007: 72.
Calaxius spinosus — Coelho et al., 2007: 4.

Material examined. — DOUFPe 1870, holotype, female (TL/CL, 19.0/7.4 mm), 3°37′S 50°01′W, Amapá, Brazil, 75, 82-94 m; RMNH D 41760, 1 male (TL/CL, 33.0/11.7 mm), Pillsbury Sta. p-1367, 18°21.4′N 69°08.7′W, 165 m, ottertrawl, 9.vii.1971, USNM Acc. No. 381702; RMNH D 41761, 1 male (TL/CL, 33.0/11.7 mm), Pillsbury Sta. p-756, 11°33.1′N 69°12.6′W 11°34.5′N, 69°11′W, 9-21 fms (= 16.5-38.4 m), 10′ ottertrawl, 27.vii.1968, USNM Acc. No. 381702, det. B. Kensley; USNM 151211, paratype, 1 male (TL/CL, 50.0/19.0 mm), Quita Sueno Bank, Nicaragua, Caribbean Sea, 14°12.00′N 81°57.30′W, 146 m, trawl, 02.xii.1967, det. A.B. Williams.

Diagnosis. — Integument minutely (i.e., microscopically) granulated. Rostrum slenderly elongate, bearing 4-5 spines on each lateral margin, extending onto gastric region; anterolateral margin of carapace with triangular tooth. Gastric region bearing lateral rows of two interspaced buttressed teeth, submedian rows of three interspaced teeth, and median carina with anterior spine and hepatic tubercle. Postcervical carina present, posteriorly bearing intestinal ridge (fig. 16A, B).

Eyestalks elongate and slightly shorter than rostrum; cornea dilated. A1 peduncle overreaching rostral tip. A2 penultimate segment extending beyond A1 peduncle; segment 1 with short distoventral spine; segment 2 with strong dorsolateral spine; scaphocerite slender and curved slightly downward, exceeding distodorsal spine of segment 2; segment 3 with small mesioventral spine; distal segment half length of penultimate segment. Mxp3 pediform, densely setigerous ventrally and mesially, a few long setae on carpus and merus laterally; coxa with ventral spine; ischium with two spinules on ventral margin, and along mesial margin a prominent crest with about 16 teeth, terminating in enlarged distal spine curved mesially; merus with three ventral spines increasing in size and acuteness distally; carpus with small distoventral spine laterally; dactylus unarmed.

P1 strong and asymmetrical, chelae elongate; in larger cheliped chela subequal in length to palm, whereas in smaller cheliped chela longer than palm. P2 chelate. Ps3-4 simple, propodi elongate, bearing transverse rows of spinules ventrolaterally. P5 subchelate, propodus with small, rounded distoventral protrusion.

Abdominal somites uniformly arched dorsally, abdominal somite 1 short and drawn ventrally to acuminate tip, bearing low longitudinal carina laterally; abdominal somites 2-5 with broadened dorsal carina (fig. 16D), and acutely angulate posteroventrally (Coelho & Ramos-Porto, 1973, fig. 9), bearing longitunal carina laterally; abdominal somites 3-5 with a single spine in middle on anteroventral margin; abdominal somite 6 triangular ventrally, with tiny blunt spine anterior to tip of pleuron.

Male Plp1 absent; male Plp2 biramous, endopod bearing appendices interna and masculina mesiomedially; Plps3-5 biramous and slender, endopods with appendix interna. Female Plp1 uniramous and bisegmented; Plps2-5 slender and biramous, endopods bisegmented, bearing appendix interna at proximal margin of distal segment.

Telson longer than wide, bearing proximal lobe with spine followed by another two spines on lateral margin, two pairs of spines on dorsal surface (fig. 16F), but no median spine on rounded posterior margin; dorsal surface with two pairs of spines in proximal half around fairly broad longitudinal median sulcus, and transverse row of three spines each at posterolateral corner. Uropodal endopod as long as telson, bearing thick longitudinal median ridge with 4 nearly equidistant spines; lateral margin with 4 spines including strong one at posterolateral angle; uropodal exopod with transverse suture with spinules; two thick longitudinal carinae centrally on dorsal surface; lateral margin with 1-4 unevenly spaced spines, distalmost flanked mesially by submarginal movable spine.

Remarks. — *Calastacus spinosus* Coelho, 1973 from Amapá, Brazil is closely similar to *Calocaris* (*Calastacus*) *oxypleura* Williams, 1974 from Florida, though the type specimen of *C. spinosus* is a female and small in size, measuring 19.0 mm in total length. In both species the A2 scaphocerite is slender and curved slightly downward, exceeding the distodorsal spine of segment 2 and reaching the distal third of the A2 penultimate segment; the eyestalks are elongate and reach nearly to the distal end of the rostrum; abdominal somites 2-5 bear broadened dorsal carinae (Wiliams, 1974, fig. 11). Therefore, *Calocaris* (*Calastacus*) *oxypleura* is safely synonymized with *Calastacus spinosus*, which is here reclassified under the new genus *Coelhocalaxius*.

Type locality. — Amapá, Brazil, 75, 82-94 m.

Distribution. — U.S.A. — Florida (Williams, 1974a), Texas (Rabalais et al., 1981); Nicaragua — Quita Sueño Bank (Williams, 1974a); 65-365 m; Amapá, Brazil, 75, 82-94 m (Coelho, 1973).

Genus **Colemanaxius** gen. nov.

Diagnosis. — Rostrum trispinose and carinate on lateral margins, with distinct supraorbital spines proximally, extending posteriorly onto gastric region as lateral carinae with tooth. Gastric region convex, bearing median carina with three tubercles, and submedian carinae with two tubercles. Cervical groove distinct. Eyestalks subglobose; cornea pigmented. A2 scaphocerite horn-shaped. P1 unequal; in larger cheliped merus denticulate on ventral margin, carpus and chela smooth on lateral surface; palm with irregularly denticulate double carina on dorsal margin, and stout distodorsal tooth. P2 fingers longer than palm. Ps3-4 propodi with transverse rows of spines on ventrolateral surface. Abdominal pleura smooth on surface, and convex to rounded ventrally. Male Plps1-2 unknown. Female Plp1 unknown; female Plps2-5 biramous, endopods with appendix interna. Telson convergent posteriorly, lacking posteromedian tooth. Uropodal exopod with transverse suture. Gonochoristic.

Remarks. — *Axiopsis* (*Axiopsis*) *pitatucensis* De Man, 1925b is not included in *Axiopsis*, because *A.* (*A.*) *pitatucensis* is different from the type species of *Axiopsis*. It differs from *Axiopsis serratifrons* (A. Milne-Edwards, 1873) in the features of rostrum, gastric region, chela of larger cheliped, and telson, so that *A.* (*A.*) *pitatucensis* is reclassified here under the new genus *Colemanaxius* as *C. pitatucensis* (De Man, 1925b).

Kensley (2003: 368) described from specimens originating from Agana, Guam, along with a corresponding figure, that "the strong setation on the upper surface of the chelae of pereopod 1, the strong spine on the lateral palmar surface at the base of the dactylus, and the articulated submarginal spine at the first lateral spine of the telson are the features that distinguished this genus from all the other axiid genera described", and defined his specimens amiss as *Manaxius pitatucensis* (De Man, 1925b), without examining De Man's type specimen of *Axiopsis* (*Axiopsis*) *pitatucensis* De Man, 1925b, and made it the type species of his new genus *Manaxius*. However, Kensley's *pitatucensis* from Agana, Guam is clearly different from De Man's *pitatucensis*. In Kensley's *pitatucensis* the rostrum is acutely triangular, the lateral margins are armed with 2-4 teeth and a supraorbital tooth, the gastric region bears lateral carinae with 1-5 buttressed teeth, and median and submedian carinae with denticles; the anterolateral margin of the carapace is unarmed; and abdominal pleura 2-6 are triangular ventrally. By contrast, in De Man's *pitatucensis*, the rostrum is trispinose, bearing no teeth but a distinct supraorbital spine proximally on the lateral margins, extending posteriorly onto the gastric region as lateral carinae with a buttressed tooth, and reaching to near the cervical groove

(fig. 17C; De Man, 1925b, fig. 5); the gastric region bears a median carina with three tubercles including the hepatic one, and medially interrupted submedian carinae with two tubercles; the anterolateral margin of the carapace is armed with a small spine; and abdominal pleura 2-6 are broadly or simply rounded ventrally. Those differences between De Man's *Axiopsis* (*Axiopsis*) *pitatucensis* (= *Colemanaxius pitatucensis* (DeMan, 1925b)) and Kensley's *Manaxius pitatucensis* suggest, that they are utterly different, not only at the species level but also at the generic level. Therefore, Kensley's *Manaxius pitatucensis* is a junior homonym of *Colemanaxius pitatucensis* (De Man, 1925b), and the generic name *Manaxius* is invalid. His species is to be renamed herein (see below) as *Manaxius aganaensis* **nom. nov.**, as the type species of the genus *Manaxius* Kensley (**sensu nov.**).

Type species. — *Axiopsis* (*Axiopsis*) *pitatucensis* De Man, 1925b, by present designation, and monotypy. The gender of the new generic name, *Colemanaxius*, is masculine.

Species included. — *Colemanaxius pitatucensis* (De Man, 1925b).

Etymology. — The new genus is named *Colemanaxius* in honour of Dr. Oliver Coleman, Curator of the Zoologisches Museum zu Berlin, who kindly gave me a chance to study the precious type specimen for this revision, with *Axius*, the generic name of the type genus of the Axiidae added.

Colemanaxius pitatucensis (De Man, 1925)
(fig. 17)

Axiopsis (*Axiopsis*) *pitatucensis* De Man, 1925b: 133, fig. 5-5f; De Man, 1925d: 6 (list), 69 (key).

Spongiaxius pitatucensis — Sakai & De Saint Laurent, 1989: 44.

Not: *Manaxius pitatucensis* — Kensley, 2003: 368, figs. 3, 4 [invalid: not *Axiopsis* (*Axiopsis*) *pitatucensis* De Man, 1925b].

Material examined. — ZMB 14439, holoype, female (TL/CL, 14.0/4.9 mm), Pitatuki, Buka Island, German Papua New Guinea, 23.x.1909, leg. H. Schoede.

Diagnosis of holotype. — Species of small size (fig. 17A). Rostrum (fig. 17B; De Man, 1925b, fig. 5) trispinose, bearing no teeth but distinct supraorbital spine proximally on lateral margins, which extend posteriorly onto gastric region as lateral carinae with buttressed tooth, and reaching to near cervical groove; gastric region bearing median carina with three tubercles including hepatic one, and medially interrupted submedian carinae also with two tubercles. Anterolateral margin of carapace with a small spine. A2 scaphocerite short and horn-shaped. Cervical groove distinct. In larger cheliped (fig. 17C); ischium armed with two low, thick proximal teeth, a strong distal one on the ventral

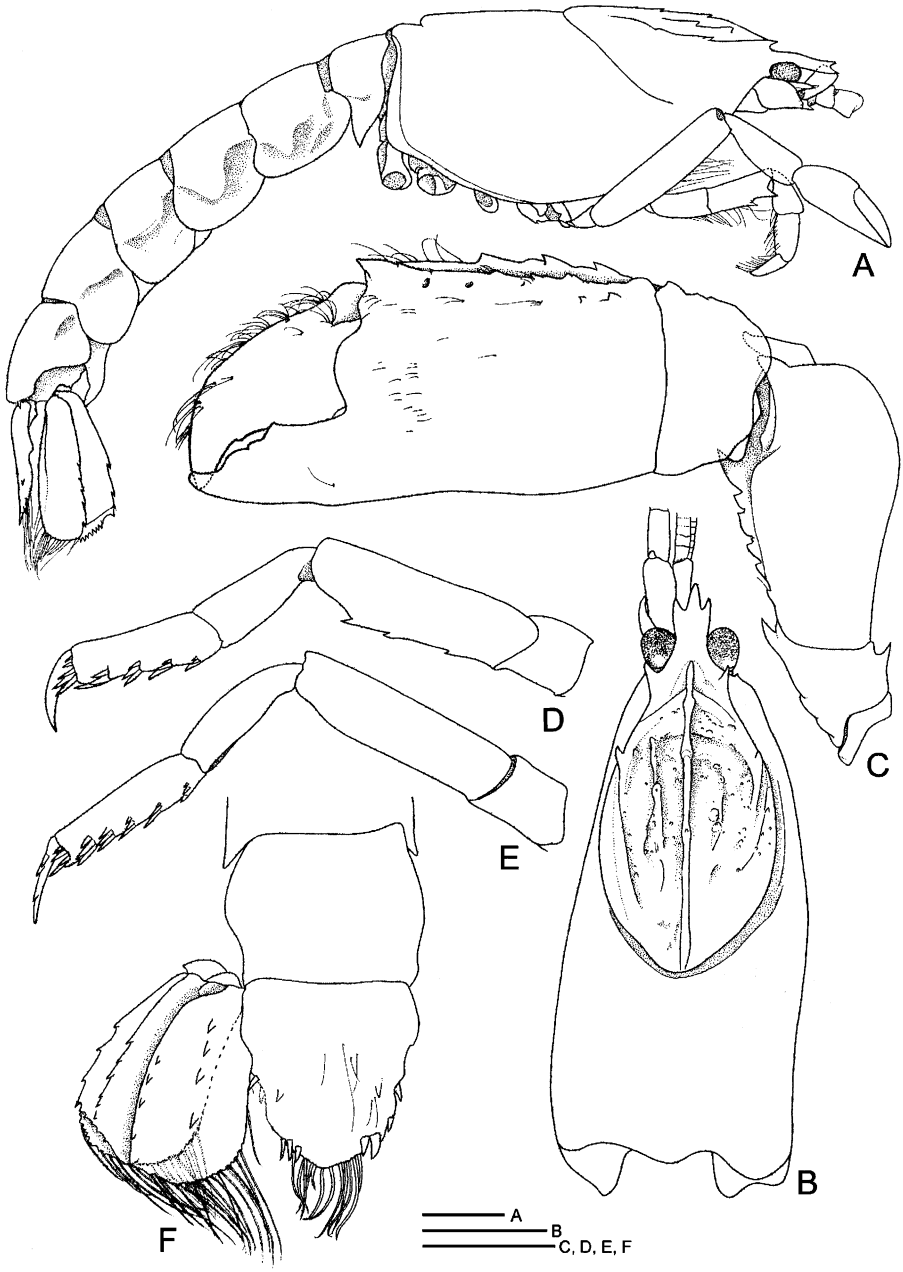

Fig. 17. *Colemanaxius pitatucensis* (De Man, 1925). A, whole body, lateral view; B, carapace, dorsal view; C, cheliped on left side, lateral view; D, P3, lateral view; E, P4, lateral view; F, abdominal somite 6, telson, and uropod on left side, dorsal view. A-F, ZMB 14439, holotype, female (TL/CL, 14.0/4.9 mm), Pitatuki, Buka Island, German Papua New Guinea. Scales 1 mm.

margin, and a sharp subdistal tooth on the dorsal margin; merus unarmed on dorsal margin, but armed with 5 thick teeth including distal triangular tooth on ventral margin, and protrusion at ventrodistal angle; carpus short, bearing obtuse subdistal tooth on dorsal margin; palm 1.5 times as long as wide, bearing three buttressed teeth mesiodorsally, and some small, irregularly arranged teeth and a distinct distal tooth dorsolaterally; distal margin largely convex in ventral half; fixed finger bearing triangular median tooth, followed distally by two low continuous teeth on cutting edge. P2 chelate; fingers longer than palm. Ps3-4 propodi (fig. 17D, E) with a row of transverse setae. Abdominal pleuron 1 acutely triangular ventrally, abdominal pleura 2-6 (fig. 17A) convex or rounded ventrally. Female Plp1 unknown; Plps2-5 biramous, endopods with appendix interna. Telson (fig. 17F) convergent toward rounded posterior margin without median spine. Uropodal endopod bearing spines on lateral margin, including distinct spine at posterolateral corner, and median row of 4 spines on dorsal surface; uropodal exopod bearing 4 spines on lateral margin, sublateral carina with spines, and serrated oblique suture with distal flap dorsally. Female genital pores confirmed on P3 coxa.

Remarks. — De Man (1925b) stated that the Plp1 is absent in the female type specimen, but the present re-examination of the female type specimen (ZMB 14439, holoype) suggests that the female Plp1 is simply missing, because it is usually present in females and consists of a proximal segment and a multiarticulate flagellum. The female Plp2 endopod is provided with an appendix interna as De Man described (1925b: 137, fig. 5d), but Plps3-5 are very much shrunk in the present condition, which makes it difficult to examine them precisely.

Type locality. — Pitatuki, Buka Island, Papua New Guinea.

Distribution. — Papua New Guinea — Buka Island (De Man, 1925b; Sakai & De Saint Laurent, 1989).

Genus **Dorphinaxius** Sakai & De Saint Laurent, 1989

Dorphinaxius Sakai & De Saint Laurent, 1989: 33; Poore, 1994: 97 (key); Davie, 2002: 452; Poore, 2004: 175; Poore & Collins, 2009: 253.

Diagnosis. — Rostrum distinct and triangular, with supraorbital spines at base; lateral margins unarmed, posteriorly extending shortly onto gastric region as lateral carinae; gastric region steeply elevated from base of rostrum, bearing median carina with tooth halfway along, and submedian carinae with a blunt tooth at anterior end. Anterolateral margin of carapace unarmed. Cervical

groove present at full length. Eyestalks small; cornea pigmented. A2 scaphocerite comma-shaped and directed anteriorly. P1 unequal; palms of both chelipeds much longer than dactyli. Pleurobranchs present on Ps2-4. Abdominal pleura smooth on surface, and truncate or rounded on ventral margins. Male Plp1 absent; male Plp2 biramous and slender, endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 biramous and slender, endopods with appendix interna. Telson longer than wide, bearing no median spine on rounded posterior margin. Uropodal exopod with transverse suture.

Remarks. — This genus *Dorphinaxius* Sakai & De Saint Laurent, 1989 is similar to the genus *Ralumcaris* gen. nov. in that the male Plp1 is absent, and the gastric region is steeply elevated from the base of the rostrum. However, they differ from each other, because in *Dorphinaxius* the gastric region is provided with median, submedian, and lateral carinae, and the male Plp2 endopod bears appendices interna and masculina, whereas in *Ralumcaris* the gastric region bears only a median carina, and the male Plp2 endopod bears an appendix masculina, but no appendix interna.

Type species. — *Axiopsis* (*Paraxiopsis*) *appendiculis* Poore & Griffin, 1979, by original designation and monotypy. Gender of the new generic name, *Dorphinaxius*, masculine.

Species included. — *Dorphinaxius kermadecensis* (Chilton, 1911).

Dorphinaxius kermadecensis (Chilton, 1911)
(fig. 18)

Iconaxiopsis kermadecensis Chilton, 1911: 550, figs. 1, 2; Balss, 1925: 211.
Axius (*Eiconaxius*) *kermadecensis* — De Man, 1925d: 4 (list), 15 (key).
Eiconaxius kermadecensis — Sakai & De Saint Laurent, 1989: 23.
Axiopsis (*Paraxiopsis*) *appendiculis* Poore & Griffin, 1979: 224, fig. 1; Poore & Collins, 2009: 254, figs. 21-23. [Type locality. — Shellharbour, New South Wales, Australia.]
Dorphinaxius appendiculis — Sakai & De Saint Laurent, 1989: 34; Sakai, 1994: 200 (key).
Dorphinaxius kermadecensis — Davie, 2002: 452; Poore, 2004: 175, figs. 45e, f, 46c.

Material examined. — AM P 9359, holotype, ovig. female (TL/CL, 39.0/13.7 mm), Shellharbour, New South Wales, tide marks; AM P 9063, 1 ovig. female (TL/CL, 36.0/11.9 mm); AM P 6365, 1 male (TL/CL, 26.0/9.6 mm); AM P 18557, 1 male (TL/CL, 51.0/18.5 mm), Long Reef, Collaroy, N.S.W., 30.xii.1971, leg. D. Hoese, det. G. Poore; AM P 24674, 1 male (TL/CL, 25.0/8.2 mm), Mince Waters near Graftor, N.S.W., intertidal rock platform, i.1967, leg. G. Biddle; AM P 8693, 1 female (TL/CL, 36.0/12.9 mm), Bottle & Glass Rocks, Port Jackson, Australia.

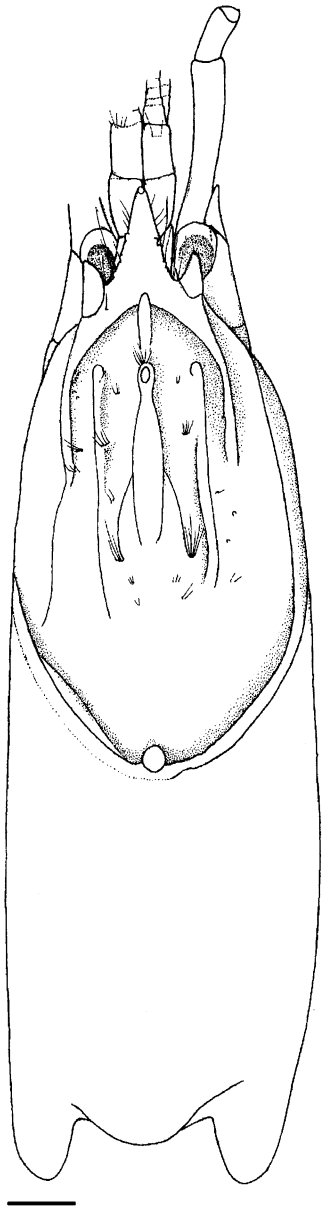

Fig. 18. *Dorphinaxius kermadecensis* (Chilton, 1911). Carapace, dorsal view. AM P 9359, holotype, ovig. female (TL/CL, 39.0/13.7 mm), Shellharbour, New South Wales, tide marks. Scale 1 mm.

Diagnosis. — Rostrum (fig. 18) distinct and triangular in dorsal view, bearing distinct supraorbital tooth proximally. Male Plp1 absent; male Plp2

biramous, endopod and exopod slender, endopod with appendices interna and masculina; Plps3-5 biramous, endopods and exopods slender, endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum; Plps2-5 biramous and slender, endopods with appendix interna.

Remarks. — *Axiopsis* (*Paraxiopsis*) *appendiculis* Poore & Griffin, 1979 was synonymized with *Iconaxiopsis kermadecensis* Chilton, 1911 by Davie (2002: 452) and Poore (2004: 175). However, the former species had been designated as the type species of the genus *Dorphinaxius* Sakai & De Saint Laurent, 1989, so that as a result the valid name for the present species now is *Dorphinaxius kermadecensis* (Chilton, 1911).

Type locality. — Meyer Is. and Kermadec Islands, littoral.

Distribution. — Meyer Is. and Kermadec Islands (Chilton, 1911); Australia — Grafton, Collaroy, Port Jackson, Bass Point, and Shellharbour, N.S.W. (Poore & Griffin, 1979); intertidal to 5 m; Emily Bay, Norfolk Is. (Poore & Collins, 2009).

Genus **Eutrichocheles** Wood-Mason, 1876

Eutrichocheles Wood-Mason, 1876b: 264; Chopra, 1933: 277; Balss, 1957: 1580; Sakai & De Saint Laurent, 1989: 51; Sakai, 1992b: 215; Poore, 1994: 97 (key); Sakai, 1994: 185, 200 (key); Ngoc-Ho, 1998: 364; Ngoc-Ho et al., 2005: 199, figs. 1-3.

Diagnosis — Rostrum triangular with pointed apex, bearing denticles on lateral margins extending posteriorly onto gastric region as lateral carinae; gastric region convex, bearing smooth median carina with hepatic tubercle, submedian rows of denticles, and lateral carinae in anterior half with supraorbital tooth followed posteriorly by another tooth; anterolateral margin of carapace usually with spine. Cervical groove distinct. Postcervical carina occasionally present posteriorly. Posterior margin of carapace with a pair of posterolateral lobes. Eyestalks subglobose; cornea pigmented. A1 segment 1 slightly inflated, segments 2-3 short. A2 scaphocerite short, and bi- or trifurcate. Mxp3 pediform, exopod slender; ischium with strong, dentate crest on inner surface; merus dentate on mesial margin. P1 chelate and asymmetrical. P2 chelate. Ps3-4 simple, and propodi with transverse rows of spines laterally. P5 simple or subchelate, propodus with setae on distoventral margin. Epipod present. Pleurobranchs absent. Abdominal somites 1-5 with or without longitudinal carina between tergum and pleuron, pleuron 1 narrow and protruded ventrally, pleuron 2 broad and truncate ventrally, pleura 3-6 triangular or rounded ventrally, pleura 2-5 usually without anteroventral spine. Male Plp1 uniramous and unsegmented, as stubby protrusion or slightly curved truncate protrusion; male

Plp2 biramous, endopod bearing appendix masculina with distal setae, but no appendix interna; male Plps3-5 biramous, endopods without appendix interna. Female Plp1 consisting of a proximal segment and a multiarticulate flagellum; female Plps2-5 biramous, and endopods without appendix interna. Telson subsquare, bearing proximal lobe with spine on lateral margin, and median spine on posterior margin; dorsal surface with paired, divergent carinae. Uropodal endopod bearing lateral spines and median carina with spines on dorsal surface. Uropodal exopod with transverse suture with spinules. Gonochoristic, but some species are hermaphroditic.

Remarks. — *Eutrichocheles* is closely similar to *Paraxiopsis*, as evident from those features of the two genera that the male Plp2 is biramous, and the endopod bears an appendix masculina with distal setae but no appendix interna; male Plps3-5 are biramous, and the endopods lack an appendix interna; female Plp1 consists of a proximal segment and a multiarticulate flagellum; female Plps2-5 are biramous, and the endopods bear no appendix interna. However, *Eutrichocheles* is different from *Paraxiopsis*, because in the type species of *Eutrichocheles*, *E. modestus* (Herbst, 1796), the male Plp1 is uniramous and unsegmented, as a stubby protrusion (fig. 20E), or as a slightly curved truncate protrusion (fig. 20D; Ngoc-Ho et al., 2005: 206), and the gastric region bears submedian rows of teeth. In contrast, in the type species of *Paraxiopsis*, *P. brocki* De Man, 1888, the male Plp1 is a small, thorn-like protrusion (WAM 34-75 from Garden Island, Western Australia, Poore & Griffin, 1979, fig. 3i), or a slender bisegmented one (fig. 25C, AM P 6824 from Rail Pier, Port Darwin, Northern Territory, Australia), though it is absent in a young specimen (SMF 20362, from Bora Bora, French Polynesia; Sakai, 1992b: 216), as Kensley (1996c) mentioned in the definition of the genus *Paraxiopsis*, and the gastric region bears smooth submedian carinae.

It is here considered that the differences in the features of the postcervical carina, P1 chela, and the median notch of the telson, which are found in the species included in *Eutrichocheles*, result from the difference in size of the specimens; in *E. modestus*, the postcervical carina is distinct posteriorly in larger specimens, but indistinct in a smaller mature specimen (NHM 1879.32, 1 male, CL, 31.3 mm, from Pinang, Malaysia).

Type species. — *Cancer modestus* Herbst, 1796, designated by Wood-Mason, 1876b, and by monotypy. The gender of the generic name, *Eutrichocheles*, is masculine.

Species included. — *Eutrichocheles austrinus* Sakai, 1994; *E. defensus* (Rathbun, 1901); *E. foveolatus* (Kensley, 1996c); *E. granulimanus* (Kensley,

1996c); *E. modestus* (Herbst, 1796) [=*E. crosnieri* Ngoc-Ho, 1998]; *E. spinipleurus* (Kensley, 1996c); *E. tuamotu* Ngoc-Ho, 1998.

KEY TO THE SPECIES OF THE GENUS *EUTRICHOCHELES*

1 – Pleuron 2 triangular ventrally 2
– Pleuron 2 truncate or rounded ventrally 3

2 – P1-2 fingers longer than palm . . . . . *E. modestus*
– P1-2 fingers shorter than palm . . . . . *E. spinipleurus*

3 – P1 smaller cheliped with fingers longer than palm; P1 chela densely setose and tuberculate . . . . . *E. granulimanus*
– P1 smaller cheliped with fingers shorter than palm; P1 chela poorly setose 4

4 – Carapace obviously pitted . . . . . *E. foveolatus*
– Carapace smooth or setose 5

5 – Carapace, pereiopods, and abdomen covered with setae . . . . . *E. austrinus*
– Carapace smooth 6

6 – Pleura 3-5 triangular with obtuse tip ventrally . . . . . *E. tuamotu*
– Pleura 3-5 rounded ventrally . . . . . *E. defensus*

Eutrichocheles austrinus (Sakai, 1994)

Eutrichocheles austrinus Sakai, 1994: 185, 200 (key), figs. 6, 7.
Paraxiopsis austrinus — Kensley, 2003, table 2; Animal Diversity Web, Univ. Michigan; Poore & Collins, 2009: 266, fig. 29.

Remarks. — In *Eutrichocheles austrinus* Sakai, 1994, the submedian carinae of the gastric region are denticulate as in *E. modestus*.

Type locality. — Darwin, Australia.

Distribution. — Australia — Darwin (Sakai, 1994).

Eutrichocheles defensus (Rathbun, 1901)

Axius defensus Rathbun, 1901: 95, text-fig. 17.
?*Axiopsis defensus* — Borradaile, 1903: 539.
Axiopsis (*Paraxiopsis*) *defensus* — De Man, 1925d: 7 (list), 71 (key); Schmitt, 1935a: 191, fig. 51; Coelho & Ramos-Porto, 1985: 76, fig. 5.
Eutrichocheles defensus — Sakai & De Saint Laurent, 1989: 3, 52, 101.
Paraxiopsis defensus — Kensley, 1996c: 715, figs. 3, 4; Melo, 1999: 320, figs. 215-216.

Material examined. — USNM 23780, holotype, female (TL/CL, 30.0/10.8 mm), off Boca Prieta, Puerto Rico, 8.1/2 fms, leg. R/V "Fish Hawk", Sta. 6075, US EC, det. M. Rathbun.

Remarks. — *Paraxiopsis defensus* is to be included in *Eutrichocheles*, because the gastric region bears no smooth submedian carinae, but submedian rows of teeth.

Type locality. — Off Boca Prieta, Puerto Rico, 15.5 m (= 8.5 fms), coral and sand.

Distribution. — Puerto Rico — off Boca Prieta (Rathbun, 1901; Kensley, 1996c); Dominican Republic — Barahona Harbour (Kensley, 1996c); 15 m.

Eutrichocheles foveolatus (Kensley, 1996)

Paraxiopsis foveolata Kensley, 1996c: 718, fig. 5.

Type locality. — Florida shelf, Gulf of Mexico, 25°45′42″N 83°11′04″W, 53.7 m.

Distribution. — Gulf of Mexico — Florida shelf (Kensley, 1996c); 53.7 m, soft sand and mud bottom.

Eutrichocheles granulimanus (Kensley, 1996)

Paraxiopsis granulimana Kensley, 1996c: 722, fig. 8.

Remarks. — In the present species, the submedian carina of the gastric region is denticulate; abdominal somites 2-6 are smooth, and the pleura are triangular ventrally.

Type locality. — S.W. Florida shelf, Gulf of Mexico, 53.7 m.

Distribution. — Gulf of Mexico — S.W. Florida shelf (Kensley, 1996c); off Trinidad (Kensley, 1996c); 53-95 m.

Eutrichocheles modestus (Herbst, 1796)
(figs. 19, 20, 21A-G)

Homarus scaber Weber, 1795: 94 [nomen nudum].

Cancer modestus Herbst, 1796: 173, pl. 43 fig. 2; Latreille, 1816: 35; Stebbing, 1893: 206; Balss, 1933: 87.

Astacus scaber Fabricius, 1798: 407; Bosc, 1801-1802: 62; Latreille, 1802-1803: 241; Latreille, 1806: 52; Desmarest, 1830: 41; H. Milne Edwards, 1837a: 335; H. Milne Edwards, 1837b: 383; Broderip, 1838: 274; Zimmsen, 1964: 652. [Type locality: Indian Ocean.]

Astacus Scaber — Lamarck, 1818: 217.

Axius biserratus Von Martens, 1869: 612; Nobili, 1903: 12; De Saint Laurent, 1979 (in De Saint Laurent & Le Loeuff, 1979): 32. [Type locality: Indian Ocean.]

Astacus modestus — Wood-Mason, 1876a: 231; Wood-Mason,1876b: 264; Bouvier, 1917: 14; De Saint Laurent, 1979: 32.

Eutrichocheles modestus — Wood-Mason, 1876a: 231; Wood-Mason, 1876b: 264; Miers, 1880: 380; Stebbing, 1893: 206; De Man, 1916: 96; Bouvier, 1917: 14; Balss, 1933: 87; Chopra, 1933: 277, text-fig. 1, pl. 6; Balasubrahmanyan & Jacob, 1961: 830, fig. 1; Kensley, 1961c: 711; De Saint Laurent & Le Loeuff, 1979: 32; Holthuis, 1986: 249; Sakai & De Saint Laurent, 1989: 51, 102; Ngoc-Ho, 1998: 374, fig. 6C-F; Komai, 2000b: 345; Xuân & Ngoc-Ho, 2006: 1153-1166, figs. 1-4.

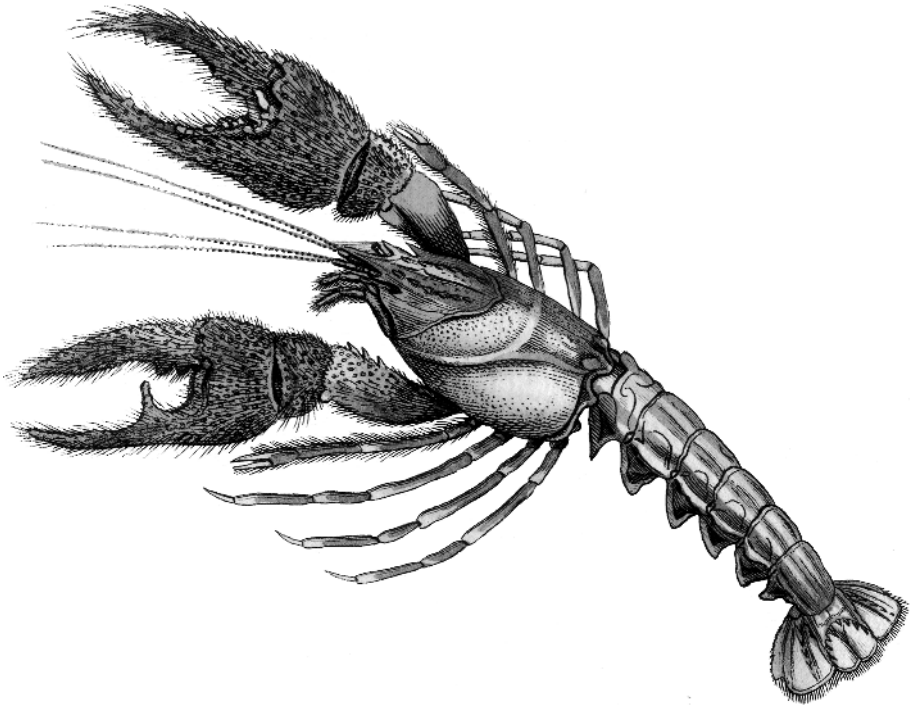

Fig. 19. *Cancer modestus* Herbst, 1796 (= *Eutrichocheles modestus* (Herbst, 1796)), copy of original figure of Herbst (1796, pl. 43 fig. 2).

?*Axiopsis biserratus* — Borradaile, 1903: 538.

Axiopsis (*Paraxiopsis*) *biserrata* — De Man, 1925b: 138, fig. 6; De Man, 1925d: 7 (list), 71 (key).

Eutrichocheles crosnieri Ngoc-Ho, 1998: 371, figs. 4-6; Komai, 2000b: 345; Ngoc-Ho et al., 2005: 206. [Type locality: Ha-tien, Vietnam, 30 m.]

Eutrichocheles Holthuis, 1946: 71.

Paraxiopsis crosnieri — Kensley, 2003, table 2.

Material examined. — RMNH D 38354, 1 female, Trat Province Koa Chang, Gulf of Thailand, Thailand, 1980, don. S. Chaitiamvong; ZMB 3226, 1 male (TL/CL, 64.0/21.4 mm, lacking P1 on left side) [*Axius biserrata* Von Martens, 1869, lectotype (fig. 21A)]; ZMB x3226, 1 male (TL/CL, 55.0/20.3 mm, lacking both P1) [*Axius biserrata* Von Martens, 1869, paralectotype], Malacca, leg. S. Baumgarten; NHM 1879.32 (fig. 20A, B), 1 male (CL 31.3 mm, damaged), Pinang, Malaysia, Indopacific side, from Indian Museum, det. De Saint Laurent, vi.1977; MNHN Th 1267, 1 male (TL/CL, 74.0/29.5 mm), Singapore fishmarket, i.1914, leg. Falshwn; MNHN Th 1499, 1 female (TL/CL, 82.0/33.0 mm, scaphocerite with 1 spine) Cangio District, about 10 km north of Vung Tan (Cap Sta. Jacques), 10 m, bottom sand and mud, iv.2000, leg. N. Van Xuan; MNHN Th 1500, 3 males (TL/CL, 76.0/32.0-78.0/32.0 mm, scaphocerite with 1-3 spines), Vietnam, Cangio District, about 21 km north of Vung Tan (Cap

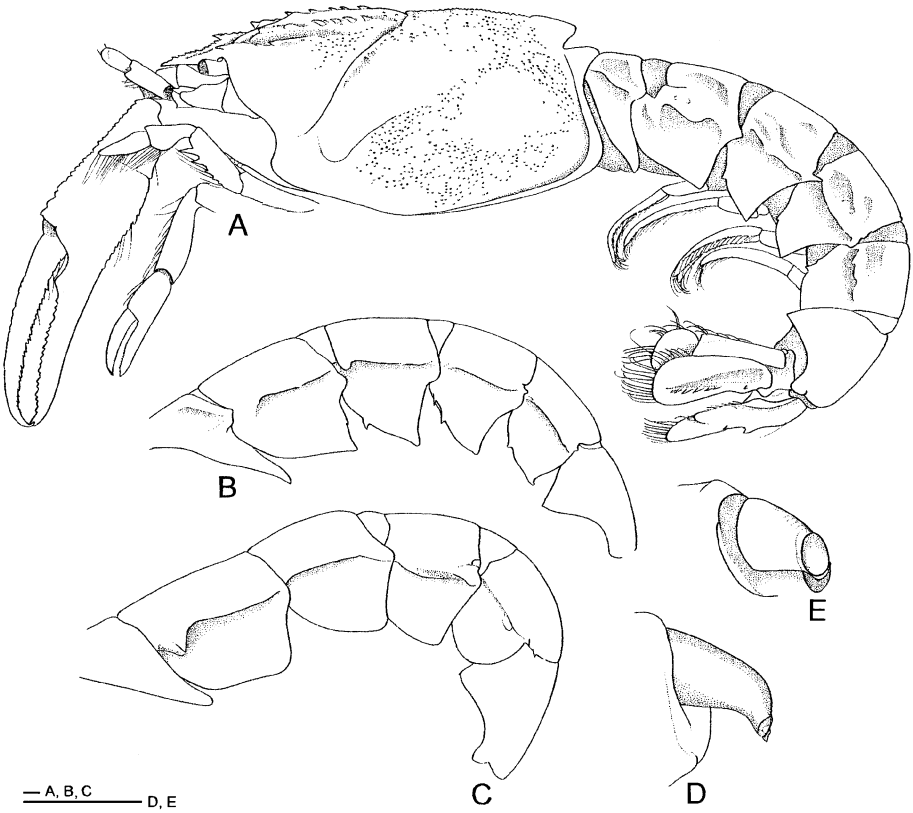

Fig. 20. *Eutrichocheles modestus* (Herbst, 1796). A, whole body, lateral view; B, C, abdomen, lateral view; D, E, male Plp1. A, ZMB3226, 1 male (TL/CL, 64.0/21.4 mm), Malacca [= *Eutrichocheles biserrata* (Von Martens, 1869), lectotype]; B, MNHN Th 1267, male (TL/CL, 74.0/29.5 mm), Singapore fishmarket; C, MNHN Th 1314, female (TL/CL, 83.5/33 mm [= *Eutrichocheles crosnieri* Ngoc-Ho, 1998, holotype]; D, E, NHM 1879.32, 1 male (CL, 31.3 mm, damaged), Pinang, Malaysia, Indo-Pacific side. Scales A, 0.8 mm; B, C, 1 mm; D, E, 0.5 mm.

Sta. Jacques), 6-8 m, iv-viii.2000, leg. N. Van Xuan; MNHN Th 1314, 1 female (TL/CL, 83.5/33 mm) [= *Eutrichocheles crosnieri* Ngoc-Ho, 1998, holotype], Ha-tien, Vietnam, 30 m.

Diagnosis. — Rostrum (figs. 19, 21A-B) acutely triangular and denticulate on lateral margins, with supraorbital spine at rostral base, extending posteriorly onto anterior half of gastric region as lateral carinae with tooth. Gastric region bearing smooth median carina with hepatic tubercle, and submedian carinae with 6 spines. Postcervical carina present in posterior fourth in larger specimen. A2 scaphocerite (fig. 21A) short and bi- or trifurcate distally. P1 chelate and unequal (figs. 19, 20A); in smaller (fig. 21C) and larger chelipeds of both sexes, cutting edge of fixed finger denticulate, proximally bearing

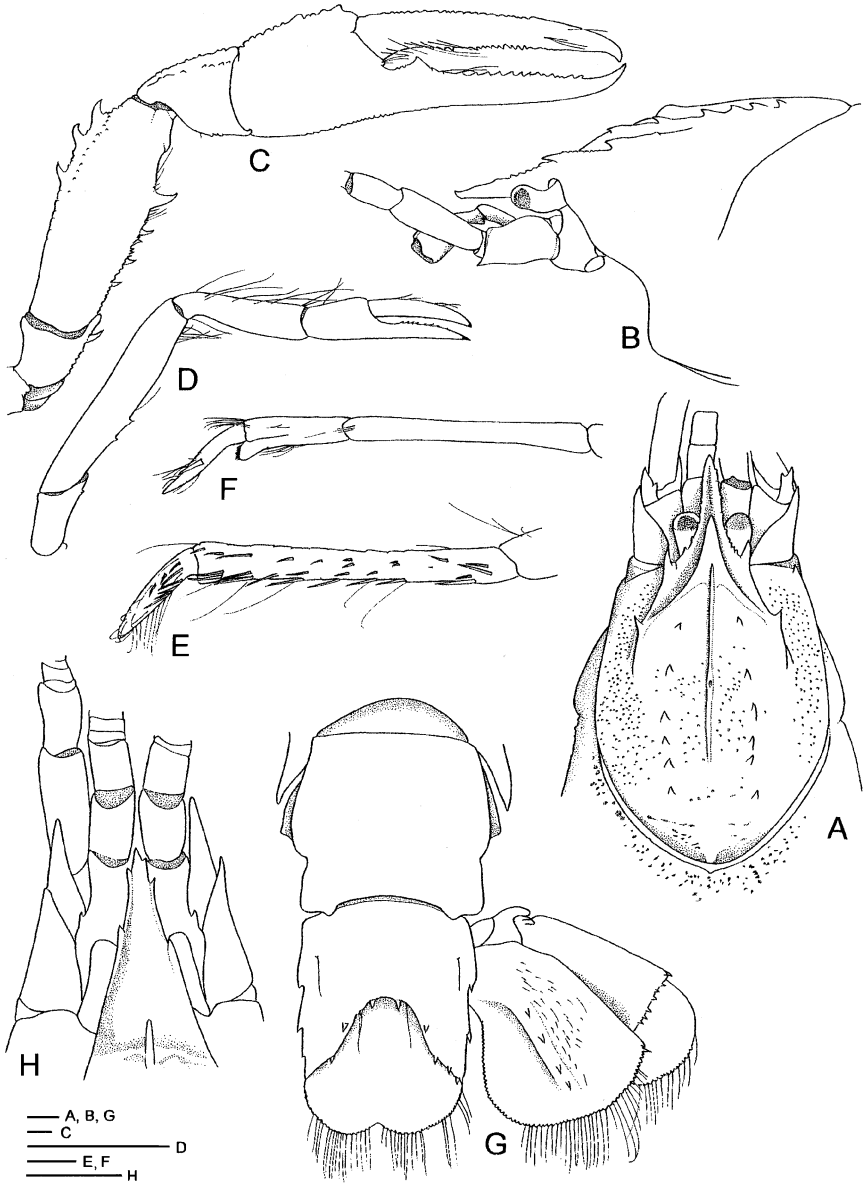

Fig. 21. *Eutrichocheles modestus* (Herbst, 1796) and *Levantocaris hornungae* Galil & Clark, 1993. A, H, gastric region, dorsal view; B, same, lateral view; C, smaller cheliped, on right side, lateral view; D, P2, lateral view; E, distal parts of P3, lateral view; F, distal parts of P4, lateral view; G, tail-fan, dorsal view. A-G, *Eutrichocheles modestus*, ZMB3226, male (TL/CL, 64.0/21.4 mm), Malacca [= *Eutrichocheles biserrata* (Von Martens, 1869), lectotype]; H, *Levantocaris hornungae*, NHM 1192: 608, holotype, hermaphroditic male (TL/CL, 28.0/10.9 mm), north Haifa, Israel, 33°00′N 34°35′E, 1400 m. Scales 1 mm.

distinct conical tooth; P2 (fig. 21D) chelate, fingers longer than palm. P3 (fig. 21E) simple. P4 simple; propodus with spinules laterally and ventrally. P5 (fig. 21F) subchelate, propodus unarmed laterally, bearing protrusion with distal spinules distoventrally. Abdominal somites 1-5 (figs. 19, 20A, B) with longitudinal carina between tergum and pleuron. Male Plp1 uniramous and unsegmented, as a stubby protrusion or a slightly curved truncate protrusion (fig. 20D, E); male Ppl 2 biramous, endopod bearing appendix masculina with distal setae, but no appendix interna; Plps3-5 biramous, endopods lacking appendix interna. Telson (fig. 21G) longer than wide, bearing proximal lobe with spine followed by 2-4 spines on lateral margin, median notch with or without spine on posterior margin, and paired divergent carinae with spines on dorsal surface. Uropodal endopod broad and armed with teeth or unarmed on lateral margin, and bearing median carina with 4-5 teeth dorsally. Uropodal exopod broad and armed with teeth or unarmed on lateral margin, and bearing smooth median carina and transverse suture with spinules on dorsal surface.

Remarks. — The type specimen of *Eutrichocheles modestus* (Herbst, 1796) is missing (Balss, 1933: 87), but the figure (fig. 19; Herbst, 1796, pl. 43 fig. 2) was made clear enough to distinguish the species from the other species included in *Eutrichocheles*, though the figure shows no proximal conical tooth on the cutting edge of the fixed finter of the larger cheliped on the right side. Herbst defined the specimen as *Cancer modestus*, but it was later described as *Astacus scaber* (Flusskrebs) by Fabricius (1798).

Wood-Mason (1876b) designated this species as *Eutrichocheles modestus*, though he thought that it might be a species of Thaumastochelidae, *Thaumastocheles zaleucus* (Thompson, 1873), or a species of the Laomediidae, *Jaxea nocturna* Nardo, 1847 (= *Calliaxis adriatica* Heller, 1863). Chopra (1933) reported, by following Balss' (1933) suggestion, on the type specimen of *Eutrichocheles modestus* that it should be a species of the Axiidae, though the specimen she defined as a female by mentioning that "The pleopods of the first pair in the single female example that I have seen are very much reduced, and are represented by short, uniramous, stumpy structures (Chopra, 1933: 280)", has turned out to be a male, because the feature mentioned above by her is a decisive feature of the males of *Eutrichocheles modestus*.

De Man (1925b: 138) described two types of *Axiopsis* (*Paraxiopsis*) *biserrata* (= *Eutrichocheles biserrata*), the lectotype (fig. 20A) and a paralectotype, and mentioned that those two types are probably males. It is confirmed through the present examination that those types of *E. biserrata* are males, because the genital pores are located on the P5 coxae; Plp1 bears a

movable thorn-shaped ramus; and the Plp2 endopod bears an appendix masculina, but no appendix interna, as shown in De Man's (1925b) description of Plp2, that "der Endopod der 2. Pleoden keine mit Cincinnuli versehene Stylamblys, sondern eine Appendix masculina und die folgenden Pleopoden keine Stylamblys" [= Plp2 without appendix interna, but with appendix masculina, and Plps3-5 without appendix interna]. The lectotype and paralectotype have the following characteristics in common with each other: the scaphocerite is bifurcate, the carapace bears a longitudinal postcervical carina; pleuron 2 is unarmed on the anteroventral margin, but pleura 3, 4, and 5 bear an anteroventral spinule. However, they differ from each other in that in the lectotype the anterolateral margin of the carapace bears a distinct antennal spine and below it an indistinct spinule as in *E. crosnieri* Ngoc-Ho, 1998, while in the paralectotype the anterolateral margin of the carapace bears an antennal spine, but below it a second, obscure protrusion. Those characteristics are observed also in *E. modestus* in the Paris collections under MNHN Th 1499 and Th 1500.

Ngoc-Ho (1998: 376) compared a large-sized male specimen of *E. modestus* and the female holotype of *E. crosnieri* Ngoc-Ho, 1998 from Ha-tien, Vietnam, and later Ngoc-Ho et al. (2005: 206) compared again two female specimens of *E. modestus* and the female holotype of *E. crosnieri*, and summed up the differences between the females of the two species, *E. modestus* and *E. crosnieri*, in the same way they had done between the male of *E. modestus* and the female of *E. crosnieri* in 1998, describing as follows. (1) The anterolateral border of the carapace often bears a spinule and a tubercle in *E. modestus* (with two spinules in *E. crosnieri*); (2) the postcervical region of the carapace has a short median dorsal carina in the posterior quarter in *E. modestus* (absent in *E. crosnieri*); (3) the abdominal pleura 3-5 carry an anterior spine in *E. modestus* (unarmed in *E. crosnieri*); (4) the antennal acicle (= scaphocerite) is bifid in *E. modestus* (trifid in *E. crosnieri*); (5) the 4th thoracic sternite is armed with a lateral spine in *E. modestus* (unarmed in *E. crosnieri*). They (Ngoc-Ho et al., 2005) reached the same conclusion as Ngoc-Ho in 1998, mentioning that "the above distinguishing characters permit an unambiguous separation of females of *E. modestus* from *E. crosnieri* and confirm the validity of the latter species", without making any reference to the differences in the features between the males and females of the two species.

However, those differences are to be considered allowable as variations in the species and are not to be regarded as species differences between *E. modestus* and *E. crosnieri*, because of the small number of specimens she compared: only one female holotype of *E. crosnieri* (MNHN-Th 1314, TL/CL

83.5/33 mm), and a male (MNHN Th 1267, TL/CL 74.0/29.5 mm) and two females (ZRC 1999.0088, TL/CL 84.0/33.0 mm; RMNH D 38354 TL/CL 70.5/30.0 mm) of *E. modestus*. Accordingly, it is too hasty a conclusion that those two species are different from each other and that *E. crosnieri* would thus be valid.

Besides, it is also found through the present comparison of the female holotype of *E. crosnieri* (MNHN-Th 1314) with the male specimen of *E. modestus* (MNHN Th 1267), that the postcervical carina of the carapace is present in both *E. crosnieri* and *E. modestus*; the armature of the ventral margins of the abdominal pleura is variable, and it has also turned out by examining the specimens (MNHN Th 1499, 1 female, and MNHN Th 1500, 3 males) that in the female (MNHN Th 1499) pleura 3 and 4 bear a spine on the anteroventral margin, though in the female (MNHN Th 1314, *E. crosnieri*, holotype) pleura 2 and 6 are indeed unarmed (fig. 20C). In two of the three males (MNHN Th 1500) pleura 4 and 5 bear a spine on the anteroventral margin, but pleura 2, 3, and 6 are unarmed, and in the other male (MNHN Th 1500) pleura 3, 4, and 5 bear a spine on the anteroventral margin, though pleura 2 and 6 are unarmed. Those differences in the armature of the pleural ventral margin are, however, not to be regarded as specific characteristics, but as intraspecific variation of the species.

The present observation shows that the A2 scaphocerite is simple, bi-, or trifurcate in *E. modestus*, though Ngoc-Ho reported that it is bifurcate in *E. modestus* (trifurcate in *E. crosnieri*) (Ngoc-Ho, 2005).

Those variations found in the males of *E. modestus* are also observed in the males of *E. biserrata* (figs. 20A, 21A-G). Furthermore, her comparison of *E. crosnieri* with *E. modestus* is of little value, because she discussed those two species regardless of the sexual differences of the specimens, namely the specimen of *E. crosnieri* she used for comparison with the male specimen of *E. modestus* is a female, and such a comparison is not essential for the separation of one species from the other, considering that spinulation often varies by size and by sex. So, it is safely concluded without further discussion that *E. crosnieri* is synonymous with *E. modestus*.

Type locality. — Indian Ocean.

Distribution. — India — Porto Novo; Malacca (Von Martens, 1869; De Man, 1925b); Malaysia — Pinang (Ngoc-Ho, 1998, as *E. crosnieri*); Singapore (Nobili, 1903; Ngoc-Ho, 1998, as *E. crosnieri*); Vietnam — Ha-tien (Ngoc-Ho, 1998 as *E. crosnieri*).

Eutrichocheles spinipleurus (Kensley, 1996)

Paraxiopsis spinipleura Kensley, 1996c: 726, figs. 10-12.

Remarks. — In *Eutrichocheles spinipleurus* (Kensley, 1996c), the submedian carinae of the gastric region are denticulate; abdominal somites 2-5 are provided with a longitudinal carina between tergum and pleuron; and pleura 2-6 are triangular ventrally as in *E. modestus*.

Type locality. — Sta. Thomas, U.S. Virgin Islands.

Distribution. — Florida — Looe Key reef (Kensley, 1996); Belize — Carrie Bow Cay (Kensley, 1996c); U.S. Virgin Islands — Sta. Thomas (Kensley, 1996c).

Eutrichocheles tuamotu Ngoc-Ho, 1998

Eutrichocheles tuamotu Ngoc-Ho, 1998: 368, figs. 2, 3.
Paraxiopsis tuamotu — Kensley, 2003, table 2.

Material examined. — MNHN, 1 male (TL/CL, 19.0/7.8 mm), ?Bali, Indonesia, leg. A. Anker.

Remarks. — In *Eutrichocheles tuamotu* Ngoc-Ho, 1998, the submedian gastric carinae are denticulate as in *E. modestus*; Ps1-2 fingers are shorter than the palm; the abdominal somites are smooth; and pleuron 2 is truncate distally as in *Paraxiopsis brocki* De Man, 1888b; however, pleura 3-5 are triangular ventrally as in *E. modestus*.

Type locality. — Mururoa, Tuamotu Archipelago, 21°53.12′S 139°2.62′W, 140 m.

Distribution. — Only known from the type locality, and only by the material mentioned here.

Genus **Guyanacaris** gen. nov.

Diagnosis. — Carapace tuberculate. Rostrum narrowly protruded, bearing 3-4 spinules on the lateral margins. Gastric region bearing lateral, submedian, and median carinae each with spinules; postcervical carina present. Eyestalks subglobose and large; cornea pigmented. A2 scaphocerite elongate. P1 subequal in size and dissimilar in shape. Ps3-4 propodi with a ventrolateral row of spinules. Abdominal pleuron 2 broadly truncate ventrally and abdominal pleura 3-5 rounded ventrally; terga and pleura separated by weak longitudinal carinae with tubercles. Male Plp1 uniramous and bisegmented, distal segment shorter than proximal; male Plp2 biramous and foliaceous, endopod with appendices interna and masculina, appendix interna slightly longer than appendix

masculina; male Plps3-5 biramous, endopods with appendix interna. Telson longer than wide, bearing proximal lobe on lateral margin, and median spine on convex posterior margin. Uropodal endopod broad, bearing median carina with teeth on dorsal surface. Uropodal exopod broadened, bearing transverse suture with denticles.

Remarks. — The two species, *Axiopsis* (*Axiopsis*) *caespitosa* Squires, 1979 from San Juan del Sur, Colombia, Pacific Ocean, and *Calocaris* (*Calastacus*) *hirsutimana* Boesch & Smalley, 1972 from off British Guiana, which were included in the genus *Acanthaxius* by Sakai & De Saint Laurent (1989), are reclassified under the new genus *Guyanacaris* gen. nov., because the two species are distinctly different from the type species of *Acanthaxius*, *A. pilocheirus* (Sakai, 1987a). In the latter, the A2 scaphocerite is directed outward; and male Plp1 is absent; whereas in the former two species the A2 scaphocerite is strongly elongate and directed forward, and male Plp1 is uniramous and bisegmented.

Type species. — *Calocaris* (*Calastacus*) *hirsutimana* Boesch & Smalley, 1972, by present designation. The gender of the new name, *Guyanacaris*, is feminine.

Species included. — *Guyanacaris caespitosa* (Squires, 1979); *G. hirsutimana* (Boesch & Smalley, 1972).

Etymology. — The generic name *Guyanacaris* is derived from the type locality, British Guyana.

Guyanacaris caespitosa (Squires, 1979)

Axiopsis (*Axiopsis*) *caespitosa* Squires, 1979: 1584, figs. 1-3, tabs. 1-2.
Acanthaxius caespitosa — Sakai & De Saint Laurent, 1989: 73; Lemaitre & León, 1992: 44; Hendrickx, 1995: 390 (list), 393, 394, figs.; Hendrickx et al., 2005: 171.

Material examined. — USNM 172265, holotype female (TL/CL, 90.0/29.0 mm), San Juan del Sur, Colombia, Pacific Ocean, 90 m, 16.ii.1971, leg. Choco, det. H.J. Squires.

Diagnosis. — Rostrum narrowly protruded forward, bearing 4 spines laterally. Eyestalks stout and subglobose, and longer than rostrum; eyes wider than stalk, cornea pigmented. A2 scaphocerite present as a long, spine-like process. Gastric region with 5 longitudinal carinae each with a few or several spines directed forward; postcervical carina distinct. Abdominal pleuron 2 truncate ventrally, and abdominal pleura 3-5 rounded ventrally, pleura 1-5 with thin border and a double row of denticles along ventral margin. Female Plp1 uniramous; female Plps2-5 endopods with appendix interna. [Adapted from Squires, 1979: 1584, figs. 1-3.]

Remarks. — This species was described only from the female holotype, so male Plps1-2 are unknown. However, it is safely included in the present new genus *Guyanacaris*, because the rostrum is narrowly protruded, the eyestalks are thick, overreaching the rostrum, the carapace bears a postcervical carina, and the abdominal pleura, and the tail-fan are similar to those of the type species of the genus *Guyanacaris*, *G. hirsutimana*.

Type locality. — Off Rio San Juan del Sur, Pacific coast of Colombia.

Distribution. — Colombia — off Rio San Juan del Sur (Squires, 1979).

Guyanacaris hirsutimana (Boesch & Smalley, 1972)
(fig. 22A-B)

Calocaris (*Calastacus*) *hirsutimana* Boesch & Smalley, 1972: 45, figs. 1-9.
Acanthaxius hirsutimanus — Sakai & De Saint Laurent, 1989: 73; Blanco-Rambla, 1995: 62, figs. 11, 12; Heard et al., 2007: 18, fig. 10.
Axiopsis hirsutimana — Vargas & Cortés, 1999a: 882.

Material examined. — Carribean Sea: USNM 137428, holotype, male (TL/CL, 75.0/27.0 mm), off British Guiana, Surinam, 6°50′N 54°47′W, leg. U.S. Fish and Wildlife Service, 28 fathoms (51.2 m), leg. R/V "Coquette", Sta. 422. — Pacific side: RMNH D 31563, 1 male (TL/CL, 116.0/40.8 mm), Caleta la Cruz, Peru, 180 m, v.1952, leg. M. del Solar; SMF 31827, 1 female (TL/CL, 135.0/48.0 mm), Golfo Dulce, SW Rio Coto, Costa Rica, Pacific side, 8°28′N 83°10.3′W, 12.3-23 m, xii.1993-ii.1994, R/V "Victor Hensen".

Diagnosis. — Carapace (fig. 22A, B) granulate, rostrum slender and acutely triangular, lateral margins with 3-4 spinules; gastric region bearing distinct median carina with 4 anterior spinules, submedian rows of 3-4 irregularly sized spinules, and lateral carinae with 5 anteriorly directed spinules; postcervical carina present. Eyestalks stout and subglobose, exceeding rostrum; cornea pigmented. A2 scaphocerite elongate, extending to distal fourth of A2 segment 3. P1 dissimilar in shape; carpi and chelae densely covered with thick setae. Abdominal pleura 1-3 denticulate on ventral margin; pleura 2-3 bearing longitudinal carina with tubercles between tergum and pleuron. Male Plp1 is small, uniramous, and bisegmented, distal segment leaf-like and shorter than proximal one. Male Plp2 biramous and foliaceous, endopod with appendices interna and masculina, appendix interna slightly longer than appendix masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and leaf-like; female Plps2-5 biramous, endopods with appendix interna. Telson subsquare, bearing median spine on convex posterior margin. Uropodal exopod with transverse suture.

Type locality. — Off Guyana, 6°50′N 54°47′W, 50 m.

Distribution. — Atlantic side: Florida; Guyana (Abele & Kim, 1986; Boesch & Smalley, 1972); Costa Rica (Vargas & Corté, 1999a); Mississippi

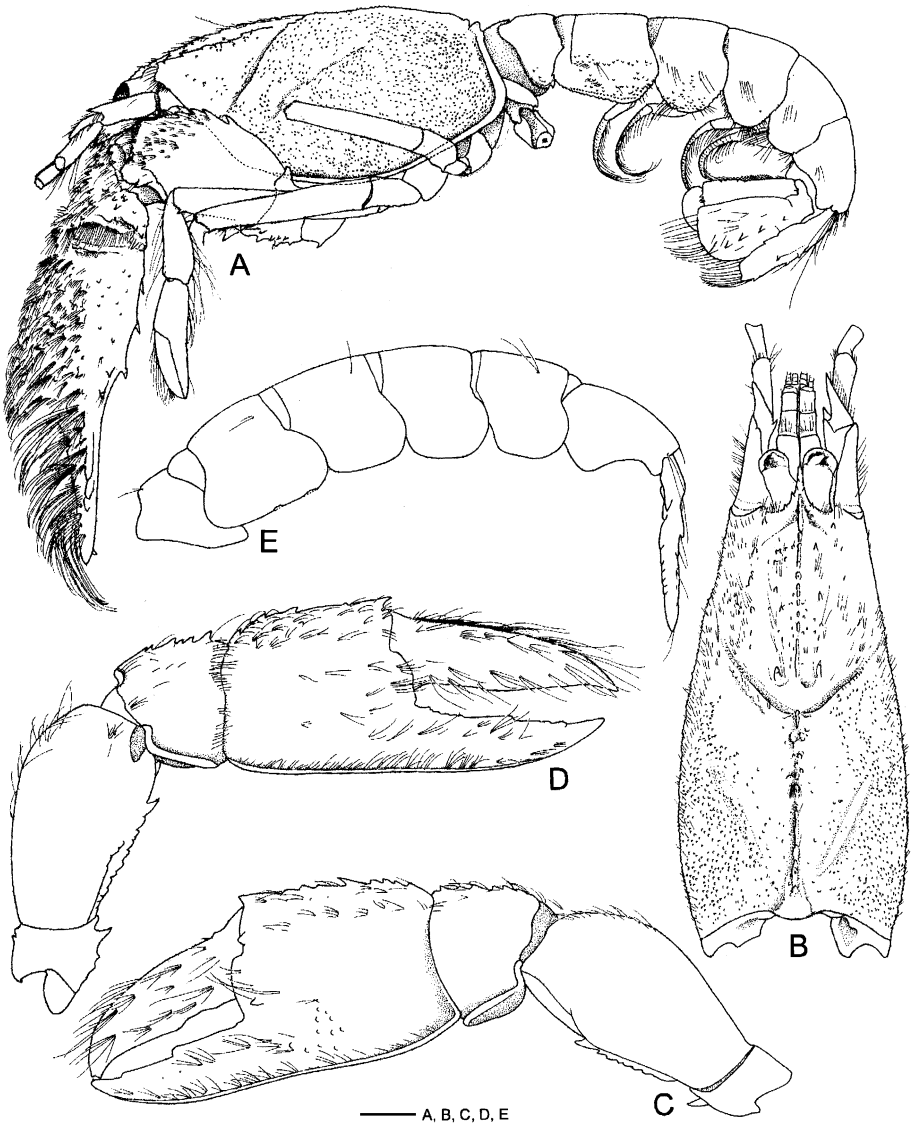

Fig. 22. *Guyanacaris hirsutimana* (Boesch & Smalley, 1972) and *Manaxius euophthalmus* (De Man, 1905). A, whole body with left P1-4, lateral view; B, carapace, dorsal view; C, larger cheliped, lateral side; D, smaller cheliped, lateral view; E, abdomen, lateral view. A, B, *Guyanacaris hirsutimana*, USNM 137428, holotype, male (TL/CL, 75.0/27.0 mm), off British Guiana, 6°50′N 54°47′W, 28 fathoms (51.2 m); C, D, E, *Manaxius euophthalmus*, ZMA Crust. De. 240080, holotype, male (TL/CL, 220./8.6 mm), north of the island of Batjan, 0°11′S 127°25′E, "Siboga" Sta. 139, 4.viii.1899-1900, mud, stones, and coral. Scale A, 5 mm; B, 4 mm; C, D, E, 1 mm.

(Boesch & Smalley, 1972); 11-50 m. Pacific side: Caleta la Cruz, Peru, 180 m; Herradura, Costa Rica, Pacific side.

Genus **Heterocalaxius** gen. nov.

Diagnosis. — Rostrum stoutly triangular with obtuse and upturned apex, bearing two similar lateral spines and supraorbital one at base; lateral margins extending posteriorly onto gastric region as lateral carinae with obtuse median spine; gastric region bearing median carina in anterior half as weak crest with worn tubercle near posterior end, and submedian carinae originating from anteriormost of two slightly offset submedian teeth, becoming ill-defined posteriorly; postcervical carina absent. Anterolateral margin of carapace unarmed. Cervical groove remarkable with broadened V-shape posteromedially. Eyestalks subglobose; cornea pigmented. A2 scaphocerite short and protruded forward. P1 similar in shape; carpus and palm tuberculate on dorsal margin, beset with tufts of setae on lateral surface; fingers of both chelipeds shorter than palms. P2 fingers slightly longer than palm. Abdominal pleuron 1 narrow and protruded ventrally; pleuron 2 broadened ventrally, bearing small, acute tooth at posteroventral angle; pleura 3-5 truncate ventrally, bearing small acute tooth on anteroventral margin and another one on posteroventral margin; pleuron 6 triangular ventrally, bearing small acute tooth on anteroventral tip and broad triangular flange at posteroventral angle. Male Plp1 absent; male Plp2 biramous, bearing thick setae; endopod with appendix interna, but without appendix masculina; male Plps3-5 biramous, bearing thick setae, endopods with appendix interna. Tail-fan with thick plumose setae; telson distinctly longer than basal width, bearing at proximal fourth a fixed spine followed posteriorly by serration on lateral margin, and tapering towards rounded posterior margin. Uropodal endopod broad, bearing posterolateral spine; uropodal exopod with transverse suture with few denticles.

Remarks. — *Calaxius carneyi* was described by Felder & Kensley (2004) as one of the species belonging to the genus *Calaxius*. However, it has turned out through the present examination of the holotype that their species is not to be included in *Calaxius*, because *C. carneyi* is different in morphological features from the type species of *Calaxius*, *C. acutirostris* Sakai & De Saint Laurent, 1989. In *C. carneyi* the male Plp2 endopod bears an appendix interna, but no appendix masculina; the carapace lacks a postcervical carina; the scaphocerite is short; in the larger cheliped the carpus and palm are weakly tuberculate on the dorsal margin, in the smaller cheliped the carpus and palm are more distinctly tuberculate than in the larger cheliped; the fingers of both

chelipeds are shorter than the palms; and the telson is triangular, tapering posteriorly. In *C. acutirostris*, on the other hand, the male Plp2 endopod bears appendices interna and masculina; the carapace bears a postcervical carina; the scaphocerite is strongly protruded forward; in the larger and smaller chelipeds the palms are armed with distinct interspaced teeth on the dorsal margins, and the fingers are longer than the palms; and the telson is rectangular. For those reasons, *C. carneyi* is not to be included in *Calaxius*, and is reclassified here under the new genus *Heterocalaxius*, which is established for the species *C. carneyi*, as *Heterocalaxius carneyi*.

Type species. — *Calaxius carneyi* Felder & Kensley, 2004, by present designation and monotypy. The gender of the new name, *Heterocalaxius*, is masculine.

Species included. — *Heterocalaxius carneyi* (Felder & Kensley, 2004).

Etymology. — The new genus is named *Heterocalaxius*, derived from its heterogenic characteristics, which differentiate the new genus from *Calaxius*, by adding a Greek prefix "hetero", meaning "different", to the generic name *Calaxius*.

Heterocalaxius carneyi (Felder & Kensley, 2004)

Calaxius carneyi Felder & Kensley, 2004: 69, figs. 1, 2; Clark et. al., 2007: 72.

Material examined. — USNM 1009165, holotype, male (TL/CL, 30.0/11.0 mm), 27°46.904′N 91°30.286′W, chemosynthetic communities of the Louisiana continental slope, Gulf of Mexico, 544 m.

Diagnosis. — Male Plp1 absent; Plps2-5 endopods with appendix interna.

Type locality. — 27°46.904′N 91°30.286′W, chemosynthetic communities of the Louisiana continental slope, Gulf of Mexico, 544 m.

Distribution. — Only known from the type locality.

Genus **Leonardsaxius** gen. nov.

Diagnosis. — Rostrum triangular with upturned apex; lateral margins armed with teeth, extending posteriorly onto gastric region as lateral carinae. Gastric region convex, bearing median carina with 1-3 teeth originating from base of rostrum, and smooth submedian and lateral carinae. Cervical groove distinct at full length; postcervical carina absent. Anterolateral margin of carapace unarmed. Eyestalks subglobose, not reaching middle of rostrum. A2 scaphocerite elongate. P1 chelate and unequal; palm of cheliped unarmed on dorsal margin. Ps3-4 propodi elongate without transverse rows of spines on

ventrolateral margin. Abdominal pleura rounded on ventral margin. Male Plp1 uniramous and bisegmented, distal segment triangular; male Plp2 biramous, endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and bisegmented, proximal segment simple and distal one multiarticulate; female Plps2-5 endopods with appendix interna. Telson longer than wide, bearing median tooth on posterior margin. Uropodal endopod shorter than telson, bearing strong distal spine on lateral margin, and median carina with spines on dorsal surface. Uropodal exopod with transverse suture.

Remarks. — The type species *Axiopsis werribee* was described as one of the species included in *Axiopsis* by Poore & Griffin (1979). However, it is not included in *Axiopsis*, because in *Axiopsis werribee* the male Plp1 is uniramous and bisegmented, and the gastric region bears a median carina with 1-3 teeth originating from the base of the rostrum and smooth submedian and lateral carinae. In the type species of *Axiopsis*, in contrast, *Axiopsis serratifrons* A. Milne-Edwards, 1873, the male Plp1 is absent and the gastric region forms a horseshoe-shaped prominence, bearing 5 longitudinal rows of denticles. So *Axiopsis werribee* is reclassified here under the new genus *Leonardsaxius*, which is established for *Axiopsis werribee*, as *L. werribee* (Poore & Griffin, 1979).

Type species. — *Axiopsis* (*Axiopsis*) *werribee* Poore & Griffin, 1979, by present designation. The gender of new name, *Leonardsaxius*, is masculine.

Species included. — *Leonardsaxius amurensis* (Kobjakova, 1937); *L. spinulicauda* (Rathbun, 1902); *L. werribee* (Poore & Griffin, 1979); and *L.* sp. aff. *werribee* Poore & Collins, 2009.

Etymology. — The new genus is named *Leonardsaxius*, derived from the type locality of the type species, Sta. Leonards, Port Phillip Bay, Victoria, by adding Leonards as a prefix to the generic name *Axius*.

Leonardsaxius amurensis (Kobjakova, 1937)

Axius spinulicauda amurensis Kobjakova, 1937: 142, pl. 2 fig. 9; Kensley, 1996a: 68; Komai, 2000a: 229.

Axiopsis spinulicauda amurensis — Vinogradov, 1950: 223, pl. 24 fig. 102.

Diagnosis. — Carapace and rostrum shorter than or equal in length to 4 abdominal somites; rostrum straight, not curved; gastric submedian carinae considerably longer than lateral ones, and not straight but curved anteriorly, merging to median carina; A1 peduncle longer than rostrum; long setae on margin of rostrum and on gastric area of carapace; abdominal somite 6 and telson markedly setose. [Adapted from translation by V. Spiridonov.]

Remarks. — Kobjakova (1937) included her (sub)species in *Axius*, as *Axius spinulicauda amurensis*. The type specimen of her species is inaccessible, which makes its exact observation impossible. However, it is characterized by Kobjakova's (1937) figure and description, translated by V. Spiridonov as follows: "the rostrum is straight and slightly elongate, spinulate, and the submedian carinae of the gastric region are considerably longer than the lateral ones, and are not straight but curved anteriorly and merging to the median one". Those morphological features are different from those of the type species of *Axius*, *Axius stirhynchus* Leach, 1815, in which the rostrum is straight but stoutly triangular with a median carina and denticles on the lateral margins, the gastric region bears short submedian carinae, and a median carina is continued to the rostral median carina. Therefore, Kobjakova's (1937) species does not belong in *Axius*, but is here assigned to a new genus, *Leonardsaxius*, as *L. amurensis* (Kobjakova, 1937).

On the other hand, in *Leonardsaxius spinulicauda* (Rathbun, 1902), which was once included in *Axius* and later in *Calocarides*, the rostrum is curved downward, the submedian carinae are short and curved anteriorly, and not merging with the median one (Kensley, 1996a, fig. 7c; cf. also Rathbun, 1904, fig. 90a). It is thus evident that *L. spinulicauda amurensis* and *L. spinulicauda* are characteristically and geographically different, so that those two forms are considered as valid species, i.e., as *L. amurensis* (Kobjakova, 1937) and *L. spinulicauda* (Rathbun, 1902).

Type locality. — Amur Bay, Sea of Japan, 31 m.

Distribution. — Amurskiy Bay, part of Peter the Great Bay, Sea of Japan, 31 m.

Leonardsaxius spinulicauda (Rathbun, 1902)

Axius spinulicauda Rathbun, 1902: 886, 10; Rathbun, 1904: 149, fig. 90a-b.
Axius (*Paraxius*) *spinulicauda* — Borradaile, 1903: 538.
Axiopsis spinulicauda — Schmitt, 1921: 111, fig. 74; Hart, 1982: 44, fig. 8, 1 colour fig.
Axiopsis (*Axiopsis*) *spinulicauda* — De Man, 1925d: 6 (list), 69 (key).
Acanthaxius spinulicaudus — Sakai & De Saint Laurent, 1989: 66.
Calocarides spinulicauda — Kensley, 1996a: 54 (list), 66, fig. 7.

Material examined. — USNM 25239, holotype, female (TL/CL, 57.0/19.0 mm), Bodega Head, California, "Albatross" Sta. 3172, 113 m.

Diagnosis of holotype. — Female Plp1 uniramous and bisegmented, distal segment slender and longer than proximal one; female Plp2 biramous, endopod on left side missing, endopod on right side lacking appendix interna; detached Plps3-5 endopods with appendix interna.

Remarks. — The species *Axius spinulicauda* Rathbun, 1902 was included in the genus *Calocarides* by Kensley (1996a: 66). However, it is not to be included in *Calocarides*, in which the gastric median carina bears a few denticles anteriorly; the submedian and lateral carinae are serrate; and the P1 carpi and chelae are characteristically tuberculate on the lateral surfaces. It is probably better included in the genus *Leonardsaxius*, because it is very similar to the type species of *Leonardsaxius*, *L. werribee* (Poore & Griffin, 1979) in that the rostrum is elongate and triangular with an upturned apex; the lateral margins are armed with teeth, extending onto the gastric region as lateral carinae; the gastric region is convex, bearing a median carina with 3 teeth anterior to the hepatic one, originating from the base of rostrum, and smooth submedian and lateral carinae; and the P1 carpi and chelae are not tuberculate on the lateral surfaces. Although it is impossible to compare this species with those of *Calocarides* in regard of the male Plps1-2, because this species was described only on the female type specimen, it is safely concluded that *Axius spinulicauda* Rathbun, 1902 can be reclassified under the new genus *Leonardsaxius* as *L. spinulicauda* (Rathbun, 1902).

Type locality. — Off Bodega Head, California, "Albatross" Sta. 3172, 113 m.

Distribution. — California — off Bodega Head (Rathbun, 1902; Kensley, 1996a); 113 m.

Leonardsaxius werribee (Poore & Griffin, 1979)

Axiopsis (*Axiopsis*) *werribee* Poore & Griffin, 1979: 232, figs. 5, 6; Poore & Collins, 2009: 244, fig. 14b.

Calocarides werribee — Sakai & De Saint Laurent, 1989: 84; Sakai, 1994: 201 (key).

Axiopsis werribee — Kensley, 1996e: 469 (list); Poore, 2004: 174, figs. 45c, d, 46b.

Material examined. — AM P 25276, paratype, 1 female (TL/CL, 23.0/7.5 mm), Port Phillip Bay, det. G. Poore; AM P 25285, paratype, 1 female (TL/CL, 22.0/8.2 mm), Fisheries & Wildlife Dept., Sp. No. 050, Sample 969/3; AM P 25277, paratype, 2 juvs. (TL/CL, 9.0/3.0; 10.0/3.5 mm), Fisheries & Wildlife Dept., Sp. No. 340, Sample 917/2; AM P 25286, paratype, 1 female (TL/CL, 13.0/4.8 mm), Fisheries & Wildlife Dept., Sp. No. 7409, Sample 983/3; AM P 25278, paratype, 1 juv. (TL/CL, 8.0/3.2 mm), Fisheries & Wildlife Dept., Sp. No. 303, Sample 917/4; AM P 72885, 1 juv. (TL/CL, 6.0/2.8 mm), Malabar Deep Ocean Outfall Study, Sydney, benthos samples, site Sept. 95, no. 22, 1995-1998: USNM 1082580, paratype, 1 male (TL/CL, 35.0/11.0 mm); USNM 1082581, paratype, 1 female (TL/CL, 29.0/9.5 mm), Port Phillip Bay, 38°16.3′S 144°51.5′E, 24 m, 8.xii.1971, leg. Port Phillip Bay Environmental Study Benthic Survey, 1969-1973, Sta. 977, det. G. Poore.

Diagnosis. — Small-sized species. P1 subequal and dissimilar in shape, in larger cheliped fingers shorter than palm, but in smaller cheliped fingers longer

than palm. Male Plp1 uniramous and bisegmented, distal segment slenderly leaf-shaped with distal setae, slightly convex on mesial margin, and slightly longer than proximal segment; male Plp2 biramous, endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and bisegmented, distal segment multiarticulate; female Plps2-5 endopods with appendix interna.

Remarks. — The present species, *Leonardsaxius werribee* was described on the basis of the female holotype as a species included in *Axiopsis*, as follows: "female Plp1 is uniramous and bisegmented, the distal segment is smaller and medially lobed; Plp1 is absent in male". However, it is found through the examination of the type specimens (NMV J. 280, holotype, and USNM 1082580, paratype), that the figure drawn as female Plp1 (Poore & Griffin, 1979, fig. 6h) is considered to be that of a male Plp1, which was subsequently admitted by G.C.B. Poore (in litt.), who also admitted that he had by mistake regarded his holotype as a female (Poore & Griffin, 1979: 235), but that it is a male, and they had made a misdescription. Thus, the characteristics of the female Plp1 shown in their figure (Poore & Griffin, 1979, fig. 6h) have turned out to be those of a male Plp1.

It is here confirmed by examining the male specimen (USNM 1082580) that male Plps1-2 are characterized as follows; male Plp1 is uniramous and bisegmented, and the distal segment bears two rami mesially, as shown by Poore (cf. Poore & Griffin, 1979, fig. 6h), but as features of a female Plp1; the male Plp2 endopod bears appendices interna and masculina.

Type locality. — 15°E of Sta. Leonards, Port Phillip Bay, Victoria, Australia, 24 m.

Distribution. — Australia — Port Phillip Bay, Victoria (Poore & Griffin, 1979); Tasmania — Isthmus Bay (Poore & Griffin, 1979; Poore & Collins, 2009); 2-25 m.

Leonardsaxius sp. aff. **werribee** (Poore & Collins, 2009)

Axius sp. aff. *werribee*, Poore & Collins, 2009: 244.

Remarks. — Poore & Collins (2009) described *Axius* sp. aff. *werribee* based on a juvenile male from east of Nowra, N.S.W., Australia. However, it would be better to treat their species as an undefined species belonging to the genus *Leonardsaxius* in the present review, because it is indicated as "aff. *werribee*".

Distribution. — East of Nowra, N.S.W., Australia.

Genus **Levantocaris** Galil & Clark, 1993

Levantocaris Galil & Clark, 1993: 48; Poore, 1994: 97 (key).

Diagnosis. — Rostrum narrowly protruded, lateral margins with two spines, extending posteriorly onto gastric region as unarmed lateral carinae; gastric region slightly convex, bearing median carina developed anteriorly and posteriorly except on interrupted median part with median tubercle, but no submedian carinae; postcervical carina absent; posterior margin of carapace sinuous, medially convex. Eyestalks flattened, without cornea. A2 scaphocerite prominent. P1 chelate and subequal; ischium and merus with a row of interspaced spines ventrally; carpus triangular; palm with triangular tooth on distal margin but without dorsodistal tooth; in right cheliped fingers slightly shorter than palm, whereas in left cheliped fingers slightly longer than palm; in both chelipeds cutting edge of fixed finger roughly denticulate, proximally serrated, and armed medially with several teeth including first strong one followed distally by teeth gradually reducing in size; cutting edge of dactylus widely concave at proximal third, and distal to it finely denticulate. P2 chelate; Ps3-5 simple; Ps3-4 propodi elongate, lacking rows of spines ventrally. Male Plp1 uniramous and bisegmented, proximal segment slender, and distal segment spatulate and mesially protruded triangularly with minute setae; male Plp2 biramous and foliaceous, endopod bearing mesiomedially appendices masculina and interna; male Plps3-5 biramous, endopods with appendix interna. Telson longer than wide, bearing median spine on rounded posterior margin. Pleurobranchs present on Ps2-4. Hermaphroditic, genital pores on Ps3 and 5 coxae.

Remarks. — The genus *Levantocaris* Galil & Clark, 1993 is closely similar to *Calocaris* in the family Calocarididae, in that the gastric region bears no submedian carinae; the eyestalks are flattened; the male Plp1 bears a spatulate distal segment with a mesial patch of hooklets; and pleurobranchs are present. However, they differ from each other, because in *L. hornungae*, type species of *Levantocaris* in the family Axiidae, the A2 scaphocerite is distinct; Plp2 is biramous, and the endopod bears mesiomedially slender appendices interna and masculina with distal setae. Whereas in *Calocaris macandreae* Bell, 1846, type species of the genus *Calocaris* in the family Calocarididae, the A2 scaphocerite is a small and reduced spine; Plp2 is biramous, and the endopod bears distally an elongate, stout appendix masculina with marginal setae and a slender and shorter appendix interna with a distal patch of hooklets.

Type species. — *Levantocaris hornungae* Galil & Clark, 1993, by original designation and monotypy. The gender of the generic name, *Levantocaris*, is feminine.

Species included. — *Levantocaris hornungae* Galil & Clark, 1993.

Levantocaris hornungae Galil & Clark, 1993
(fig. 21)

Levantocaris hornungae Galil & Clark, 1993: 49, figs. 1-4; d'Udekem d'Acoz, 1999: 154; Costello et al., 2001: 289; Türkay, 2001: 289; Ngoc-Ho, 2003: 455, fig. 4.

Material examined. — *Levantocaris hornungae* Galil & Clark, 1993 NHM 1192: 608, holotype, hermaphroditic male (TL/CL, 28.0/10.9 mm), north of Haifa, Israel, 33°00′N 34°35′E, 1400 m, xii.1991, leg. B.S. Galil.

Diagnosis. — Rostrum (fig. 21H) narrowly triangular, lateral margins with two spines, extending posteriorly onto anterior third of gastric region. A2 scaphocerite strong, reaching middle of A2 penultimate segment.

Remarks. — *Levantocaris* bears pleurobranchs on Ps2-4 and genital pores on the Ps3 and 5 coxae, and is hermaphroditic as *Calocaris*, in which the Plp2 endopod bears a distinct appendix masculina distally provided proximally with an appendix interna. However, *Levantocaris* is not included in the Calocarididae but in the family Axiidae, because the Plp2 endopod bears mesiomedially slender appendices interna and masculina.

Type locality. — Fifty km N.W. of Haifa, Israel, 33°00′N 34°35′E, 1400 m.

Distribution. — Only known from the type locality.

Genus **Litoraxius** Komai & Tachikawa, 2007

Litoraxius Komai & Tachikawa, 2007: 114.

Diagnosis. — Carapace not tuberculate, bearing median, submedian, and lateral carinae in gastric region; postcervical median carina present. Eyestalks stout, reaching nearly to distal end of rostrum. P1 asymmetrical, chelae bearing several prominent tufts of plumose setae. Male Plp1 consisting of two partially fused segments, distal segment spatulate with proximomesial clump of adhesive hooks; Plp2 biramous, endopod with appendices interna and masculina; Plps3-5 with appendix interna.

Type species. — *Litoraxius boshu* Komai & Tachikawa, 2007, by original designation and monotypy. The gender of the generic name, *Litoraxius*, is masculine.

Species included. — Only the type species is known so far.

Litoraxius boshu Komai & Tachikawa, 2007

Litoraxius boshu Komai & Tachikawa, 2007: 115, figs. 1-6.

Material examined. — CBM-ZC 9226, paratype, male (TL/CL, 43.0/15.7 mm), Ubara, Katuura, Boso Peninsula, Chiba Pref., Japan, SCUBA diving, vi.1994, leg. M. Aizawa.

Diagnosis. — As mentioned in the diagnosis of the genus.

Type locality. — Pacific side of Boso Peninsula, Ubara, Katsuura, Chiba Prefecture, at 10 m depth.

Distribution. — Japan — Pacific side of Boso Peninsula, Katsuura; Ubara Inlet, Katsuura; Kominato; Tateyama at the tip of Boso Peninsula, Chiba Pref.; Misaki at the tip of Miura Peninsula, Kanagawa Pref.

Genus **Manaxius** Kensley, 2003 **(sensu nov.)**

Manaxius Kensley, 2003: 367 (sensu nov.)

Diagnosis. — Rostrum acutely triangular, lateral margins with 2-4 teeth and supraorbital tooth. Gastric region bearing lateral carinae with 1-5 buttressed teeth, median and submedian carinae with denticles; postcervical carina absent. Anterolateral margin of carapace unarmed. Cervical groove distinct almost at full length. Eyestalks subglobose; cornea pigmented. A2 scaphocerite horn-shaped. P1 unequal; in both chelipeds dorsal margin of palm armed with interspaced teeth; P2 chelate; fingers shorter than palm. Ps2-4 with pleurobranchs. Abdominal somites smooth laterally. Abdominal pleuron 1 narrow and triangular ventrally; pleuron 2 broad and triangular ventrally, pleura 3-5 triangular ventrally. Male Plp1 absent; male Plp2 biramous, endopod with appendices interna and masculina at proximal third; male Plps3-5 endopods with appendix interna. Telson longer than wide; posterior margin rounded, without median tooth. Uropodal exopod with transverse suture.

Remarks. — Kensley (2003: 367, figs. 3, 4) described *Manaxius pitatucensis* as the type species of the genus *Manaxius* Kensley, 2003. However, it was found through the present examination of his blue-stained male specimen (USNM 243379) that *Manaxius pitatucensis* Kensley, 2003 is different from *Axiopsis* (*Axiopsis*) *pitatucensis* De Man, 1925b. This is the classical case of a misidentified type-species, and art. 70.3 of the ICZN allows the first revising author to decide upon the further usage of the name. I consider it preferable to fix the name in the sense of Kensley (2003) by leaving of what he thought to be *pitatucensis* De Man as the type species of *Manaxius*; the different genus attributed to *pitatucensis* proper already received the name *Colemanaxius* in this revision (see p. 103). Besides the decision taken here, *pitatucensis* Kensley [not De Man] needs a new name, *M. aganaensis*, as characterized below.

Manaxius is similar to *Calocarides* Wollebæk, 1908, in that the rostrum is protruded forward and triangular, bearing two lateral and supraorbital spines; the gastric region is slightly convex, bearing 5 longitudinal carinae; the A2 scaphocerite is distinct and horn-shaped; male Plp1 absent; male Plp2 biramous, and the endopod bears appendices interna and masculina at its

proximal third; the appendix interna is slender and longer than the appendix masculina with apical setae; male Plps3-5 endopods bear an appendix interna. However, *Manaxius* and *Calocarides* differ from each other, because in *Manaxius* the P1 carpus and chela are granulate on the lateral surface, bearing some sharp, interspaced spines on the dorsal margin; the abdominal pleura are triangular ventrally; and the telson is rounded on the posterior margin without a median spine. In *Calocarides*, the P1 carpus and chela are smooth on the lateral surface, bearing granules or spinules on the dorsal margin; the abdominal pleura are rounded ventrally; and the telson is convex on the posterior margin, with a median spine.

Type species. — *Manaxius aganaensis* sp. nov. by present designation. The gender of the generic name, *Manaxius*, is masculine.

Species included. — *Manaxius aganaensis* sp. nov.; *M. angulatus* (Coelho, 1973); *M. euophthalmus* (De Man, 1905); *M. galapagensis* Kensley & Hickman, 2001; *M. inaequalis* (Rathbun, 1901); *M. jenneri* (Williams, 1974b); *M. kensleyi* (Clark, Galil & Poore, 2007); *M. mimasensis* (Sakai, 1967); *M. ohsumiensis* sp. nov.; *M. pailoloensis* (Rathbun, 1906); *M. sibogae* (De Man, 1925d); *M. thailandensis* sp. nov.

KEY TO THE SPECIES OF THE GENUS *MANAXIUS*

1 – Rostrum trispinose distally ..... *M. galapagensis*
– Rostrum simply pointed distally 2

2 – Eyestalks reaching or overreaching tip of rostrum 3
– Eyestalks reaching middle of rostrum 5

3 – Eyestalks distinct and dumbbell-shaped ..... *M. inaequalis*
– Eyestalks elongate 4

4 – Gastric submedian carina with 4 slender teeth ..... *M. jenneri*
– Gastric submedian carina with buttressed denticles ..... *M. angulatus*

5 – Gastric submedian carina terminating anteriorly with denticle ..... *M. thailandensis* sp. nov.
– Gastric submedian carina with denticles 6

6 – Gastric lateral carina consisting of anterior buttressed tooth and following teeth ..... *M. mimasensis*
– Gastric lateral carina consisting of 1-2 buttressed teeth 7

7 – Abdominal pleuron 2 rounded ventrally ..... 8.
– Abdominal pleuron 2 angulated ventrally 9

8 – Ischium of larger cheliped armed with minute denticle on ventral margin ..... *M. euophthalmus*
– Ischium of larger cheliped armed with 3 sharp spines on ventral margin ... *M. sibogae*

9 – A2 segment 2 armed with ventral spine ..... *M. aganaensis* sp. nov.
– A2 segment 2 unarmed ventrally 10

10 – Dorsal surface of telson with one pair of spines ..... *M. kensleyi*
– Dorsal surface of telson with two pairs of spines 11

11 – Telson with rounded posterior margin ..... *M. pailoloensis*
– Telson subquadrate ..... *M. ohsumiensis* sp. nov.

Manaxius aganaensis sp. nov.

Manaxius pitatucensis — Kensley, 2003: 368, figs. 3, 4 [misidentification; partim also *Manaxius paulayi* Kensley, 2003].

Diagnosis. — Rostrum simply pointed distally. Eyestalks reaching middle of rostrum. Gastric submedian carina with denticles. A2 segment 2 armed with ventral spine. Gastric lateral carina consisting of 1-2 buttressed teeth. Abdominal pleuron 2 angulated ventrally.

Remarks. — Kensley (2003: 268, figs. 5, 6) described *Manaxius pitatucensis* (De Man, 1925b) with figures. However, his *M. pitatucensis* has turned out to be invalid (as shown in the remarks of the genus *Manaxius* sensu Sakai).

Type locality. — Agana, Guam Island.

Etymology. — The new species is named *M. aganaensis*, derived from the type locality, Agana, Guam Island, with a Latin suffix "-ensis" added, referring to a geographic locality.

Manaxius angulatus (Coelho, 1973)

Calastacus angulatus Coelho, 1973: 344; Coelho & Ramos-Porto, 1985: 82, figs. 7, 8; Rodrigues et al., 1998: 382; Melo, 1999: 328, figs. 221-212.
Acanthaxius angulatus — Coelho et al., 2007: 4.

Diagnosis. — Rostrum simply pointed distally. Eyestalks elongate, overreaching tip of rostrum. Gastric submedian carina with buttressed denticles. Abdominal pleuron 2 triangular ventrally. [Adapted from Coelho & Ramos-Porto, 1985, figs. 7, 8.]

Remarks. — This species was classified under the genus *Acanthaxius* by Coelho et al. (2007). However, it does not belong in *Acanthaxius*, because in *Acanthaxius* the fingers of the chelipeds are longer than the palm, and pleura 2-5 are truncate or rounded ventrally, whereas in the present species, the fingers of the chelipeds are shorter than the palm, and pleura 2-5 are triangular ventrally (Coelho & Ramos-Porto, 1985, fig. 8b), so that it is reclassified here under the genus *Manaxius*.

Type locality. — Cabo Caciporé, Amapá, Brazil, 108-118 m.

Distribution. — Only known from the type locality.

Manaxius euophthalmus (De Man, 1905)
(fig. 22C-E)

Calastacus euophthalmus De Man, 1905: 598; Balss, 1925: 209.
Calocaris (*Calastacus*) *euophthalma* — De Man, 1925d: 8 (list), 118 (key), 122, pl. 10 fig. 22-22g.
Calaxius euophthalmus — Sakai & De Saint Laurent, 1989: 86; Kensley & Hickman, 2001: 487.

Material examined. — ZMA Crust. De. 240080, lectotype, male (TL/CL, 22.0/8.6 mm), north of the island of Batjan, 0°11′S 127°25′E, "Siboga" Sta. 139, 4.viii, 1899-1900, mud, stones and coral [det. as *C. euophthalmus*]; MNHN Th 1421, 1 female (TL/CL, 19.0/6.3 mm), French Polynesia, Marquesas Islands, Nuju Hiva, MUSORSTOM 9, R/V "Alis", Sta. 1298, 305 m, 9.ix.1997, leg. P. Bouchet, B. Dayrat, B. Richer de Forges [det. as *M. sibogae*]; USNM 243379, 1 male (CL, 6.0 mm; abdomen + telson, 15.9 mm), Okinawa, Japan, 70.1 m, 11.vi.1981, leg. R. Bolland; USNM 243378, 1 male (TL/CL, 10.0/3.2 mm), 1 female (TL/CL,10.0/3.2 mm), Agana Bay, Guam, 30 ft, 23.x.1984, leg. J.H. Dominguez, det. B. Kensley; USNM 243380, 1 female (TL/CL, 6.3/2.1 mm, rostrum broken), on reef front 300 ms north of boat basin channel, Agana Bay, Guam, 42 ft [ca. 12.6 m], 26.iv.1984, leg. R.K. Kropp, det. B. Kensley; USNM 243381, 1 male (TL/CL, 10.5/3.2 mm), Piti Channel, Cabras Island, Guam, 40 ft [ca. 12 m], 31.v.1984, leg. H. Dominguez & R.K. Kropp, det. B. Kensley [det. as *Manaxius pitatucensis* Kensley, 2003].

Diagnosis. — Rostrum narrowly triangular, lateral margins with spines and distinct supraorbital spine. Gastric region with 5 carinae. P1 (fig. 22C, D) subequal; in larger cheliped merus unarmed on dorsal margin but denticulate on ventral margin; carpus with irregularly arranged spines on dorsal margin; palm with irregularly arranged teeth on dorsal margin, and 1-2 distinct subdistal spines on lateral surface. Abdominal somites (fig. 22E) smooth laterally; pleuron 1 rounded ventrally; pleura 2-5 truncate ventrally, without marginal spines; pleuron 6 rounded ventrally in anterior half. Male Plp1 absent; Plp2 biramous and slender, endopod with appendices interna and masculina, appendix masculina extremely longer than appendix interna, bearing setae; Plps3-5 endopods with appendix interna. Telson longer than wide, bearing proximal lobe with spine followed distally by denticles on lateral margin; posterior margin rounded without median tooth. Uropodal endopod oval, bearing spines on lateral margin, movable spine distolaterally, and median carina with spines on dorsal surface. Uropodal exopod oval, bearing 5 denticles on lateral margin including posterolateral one, and distal flap with distinct, movable spine laterally, as well as some denticles sublaterally on dorsal surface.

Remarks. — *Axius pailoloensis* Rathbun, 1906, *Calocaris* (*Calastacus*) *sibogae* De Man, 1925, and *Manaxius aganaensis* sp. nov. are closely similar to *M. euophthalmus* (De Man, 1905), because of the denticles on the five gastric

carinae, the spines on the dorsal margin of the P1 palm, the denticulation of the cutting edges of the P1 chela, and the form of the A2 scaphocerite. However, those three species are different, as shown in the key, in the features of the ventral margin of A2 segment 2, the denticulation on the ventral margin of the ischium of the larger cheliped, and the form of the telson.

Type locality. — North of Batjan Island, Indonesia, 0°11′S 127°25′E, "Siboga" Sta. 139, 397 m.

Distribution. — Indonesia — north of Batjan Island (De Man, 1905, 1925), 397 m; between the islands Wowoni and Buton [= Butung] (De Man, 1925d). Hawaiian Islands — Pailolo Channel (Rathbun, 1906; Sakai & De Saint Laurent, 1989); 74-252 m.

Manaxius galapagensis (Kensley & Hickman, 2001)

Calaxius galapagensis Kensley & Hickman, 2001: 484, fig. 1, table 1.

Material examined. — USNM 308977, holotype, ovig. female (41.0/14.0 mm), west end of North Plaza, Santa Cruz Island, Galapagos Islands, 6 m, 28.viii.1997, leg. C.P. Hickman, Jr.

Type locality. — West end of North Plaza, off Isla Santa Cruz, Galapagos Islands, 6 m.

Distribution. — Only known from the type locality.

Manaxius inaequalis (Rathbun, 1901)

Axius inaequalis Rathbun, 1901: 96, fig. 18a-b.
?*Axiopsis inaequalis* — Borradaile, 1903: 539.
Axiopsis (*Axiopsis*) *inaequalis* — De Man, 1925d: 6 (list), 69 (key); Schmitt, 1935a: 190, fig. 50.
Calaxius inaequalis — Sakai & De Saint Laurent, 1989: 85; Kensley & Hickman, 2001: 487.

Type locality. — Mayagüez Harbor, Puerto Rico, 289-309 m.

Distribution. — Puerto Rico — Mayagüez Harbor (Rathbun, 1901); 289-309 m.

Manaxius jenneri (Williams, 1974)

Calocaris (*Calastacus*) *jenneri* Williams, 1974b: 451, figs. 1-10.
Calaxius jenneri — Sakai & De Saint Laurent, 1989: 86; Kensley & Hickman, 2001: 487; Clark et al., 2007: 72; Heard et al., 2007: 19, fig. 12.

Material examined. — USNM 150472, holotype, male (TL/CL, 38.0/15.0 mm), east of Cape Lookout, North Carolina, 34°18′N 74°01.2′W – 34°17.1′N 76°01.3′W, 100-85 m, 3.x.1969, leg. R/V "Eastwing", Sta. 12885, dredge, C.E. Jenner & class; USNM 150473, paratype, 1 male (TL/CL, 26.0/9.5 mm), SSW of Cape Lookout, North Carolina, 33°43.3′N

76°42′W – 34°44′N 76°41′W, 91-98 m, 4.xi.1968, leg. R/V "Eastwing", Sta. 10789, dredge, J. & W. Vernberg.

Diagnosis. — Male Plp1 absent; male Plp2 biramous and slender; endopod with appendices interna and masculina; male Plps3-5 biramous and slender, endopods with appendix interna.

Type locality. — S.W. of Cape Lookout, North Carolina, 33°43.1′N 76°40.7′W – 33°43.4′N 76°40.3′W, 100 m.

Distribution. — North Carolina — Cape Lookout (Williams, 1974b); 85-110 m.

Manaxius kensleyi Clark, Galil & Poore, 2007

Calaxius kensleyi Clark et al., 2007: 63-73, figs. 1-6.

Remarks. — The present species *M. kensleyi* was described by Clark et al. (2007) as the first member of *Calaxius* from the western Atlantic Ocean. Most of the species in *Calaxius* are reclassified under *Manaxius* sensu Sakai, except *C. acutifrons* Sakai & De Saint Laurent, 1989, in which the abdominal pleura are acutely angulate ventrally. *M. kensleyi* is very similar to the Indo-West Pacific species, *M. euophthalmus* (De Man, 1905), but differs from it, because in *M. kensleyi* the Mxp3 ischium is armed with 4 spines on the mesial margin, and abdominal pleuron 2 is triangular ventrally, whereas in *M. euophthalmus* the Mxp3 ischium is armed with two spines on the mesial margin, and abdominal pleuron 2 is truncate ventrally (fig. 22E).

Type locality. — Off Gabon, 0°5′S 9°3′E, 49.2-49.3 m.

Distribution. — Off Gabon, 0°4-5′S 9°3′E; 49.2 m.

Manaxius mimasensis (Sakai, 1967)

Calocaris (*Calastacus*) *mimasenis* Sakai, 1967: 41, pl. 3 fig. 1.
Calocaris mimasensis — Sakai, 1987a: 303 (list).
Calaxius mimasensis — Sakai & De Saint Laurent, 1989: 86; Kensley & Hickman, 2001: 487; Komai et al., 2002: 30, figs. 4-6, tables 1, 4.

Diagnosis. — Male Plp1 absent; Plp2 biramous, endopod with appendices interna and masculina at proximal third (cf. Komai et al., 2002: 37, fig. 6K).

Type locality. — Tosa Bay, Japan.

Distribution. — Japan — Tosa Bay (Sakai, 1967), littoral; off S. Izuhara, Tsushima Island, 33°56.21′N 129°25.36′E, 1333 m.

Manaxius ohsumiensis sp. nov.
(figs. 23, 24)

Material examined. — SMF 31814, holotype, female (TL/CL, 21.0/8.2 mm), Ohsumi shoto, between Yakushima and Tanegashima, Kagoshima Pref., Japan, 80-82 m, KT93-09, Sta. YT 12(1), 17.vi.1993, by 1 m biol. dredge, leg. S. Ohta.

Description of female holotype. — Rostrum (fig. 23A, B) acutely triangular, bearing two teeth on each lateral margin, which extend short posteriorly as gastric lateral carinae with paired teeth anteriorly and another tooth posterior to lateral carina on left side. Carapace studded with tubercles and setae. Gastric region convex, bearing distinct median carina with some short or elongate tubercles extending to cervical groove, and submedian rows of irregularly arranged denticles submedially between median and lateral carinae. Cervical groove distinct at full length. Cardiac prominence present. Eyestalks subglobose, reaching distal third of rostrum. A1 peduncle overreaching rostrum at distal end of penultimate segment; proximal segment unarmed and longer than penultimate and distal segments combined; penultimate segment unarmed and slightly longer than distal one. A2 scaphocerite distinct and horn-shaped, and about twice as long as dorsodistal tooth of segment 2; penultimate segment about twice as long as distal one, overreaching rostrum at its middle.

Mxp3 (fig. 23C) exopod absent. Coxa with sharp tooth on ventral margin; basis with sharp ventral tooth; ischium 2.5 times as long as wide, bearing tooth on mesial margin, and ischial crest with more than 16 teeth; merus about as long as ischium, bearing two sharp teeth on mesial margin; carpus about two-thirds as long as merus and subequal to propodus; dactylus slightly shorter than propodus.

P1 (fig. 24A, B) subequal. In right larger cheliped coxa carinate proximally on mesial margin, bearing two teeth; basis unarmed; ischium with three ventral teeth. Merus about 1.8 times as long as wide; dorsal margin largely convex in distal part, bearing two subterminal teeth, and ventral margin almost straight, bearing series of 5 distinct teeth; carpus wider than long, bearing two subdistal teeth on dorsal margin and median tooth on ventral margin. Chela twice as long as wide; palm 1.2 times as long as wide, bearing three interspaced teeth on dorsal margin, one subdistal tooth on dorsolateral and dorsomesial margins, and another three small teeth at mesiodistal part of dorsal margin, ventral surface unarmed. Fixed finger with two w-shaped teeth proximally and convex subdistally on cutting edge. Dactylus shorter than palm, and concave proximally. In smaller left cheliped, ischium bearing 4 teeth on ventral margin and distinct subdistal spine on dorsal margin; merus broad, bearing 5 teeth

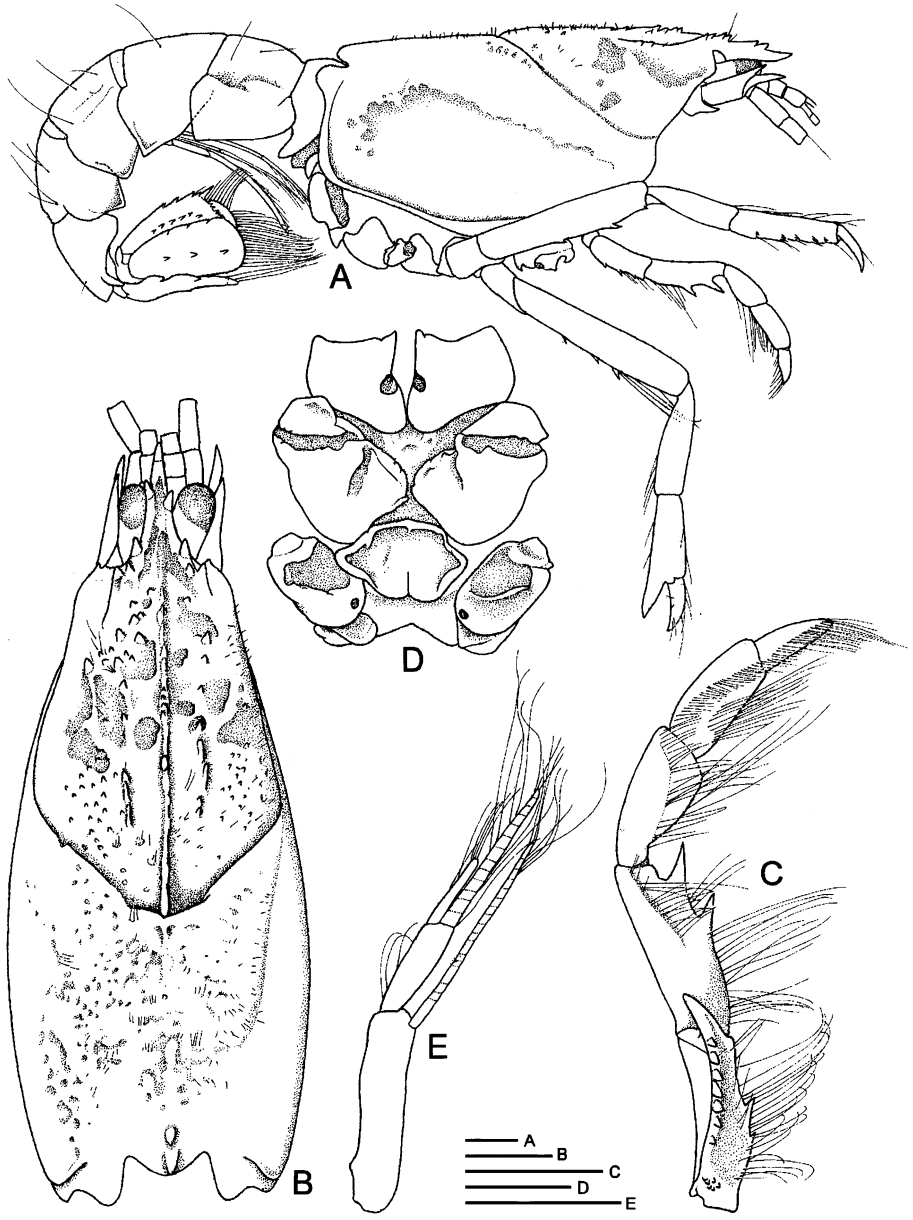

Fig. 23. *Manaxius ohsumiensis* sp. nov. A, whole body, lateral view; B, carapace, dorsal view; C, Mxp3, mesial face; D, P3-5 coxae and thoracic sternite between coxae 4; E, female Plp2. A-E, SMF 31814, holotype, female (TL/CL, 21.0/8.2 mm), Ohsumi shoto, between Yakushima and Tanegashima, Kagoshima Pref., Japan, 80-82 m. Scales 1 mm.

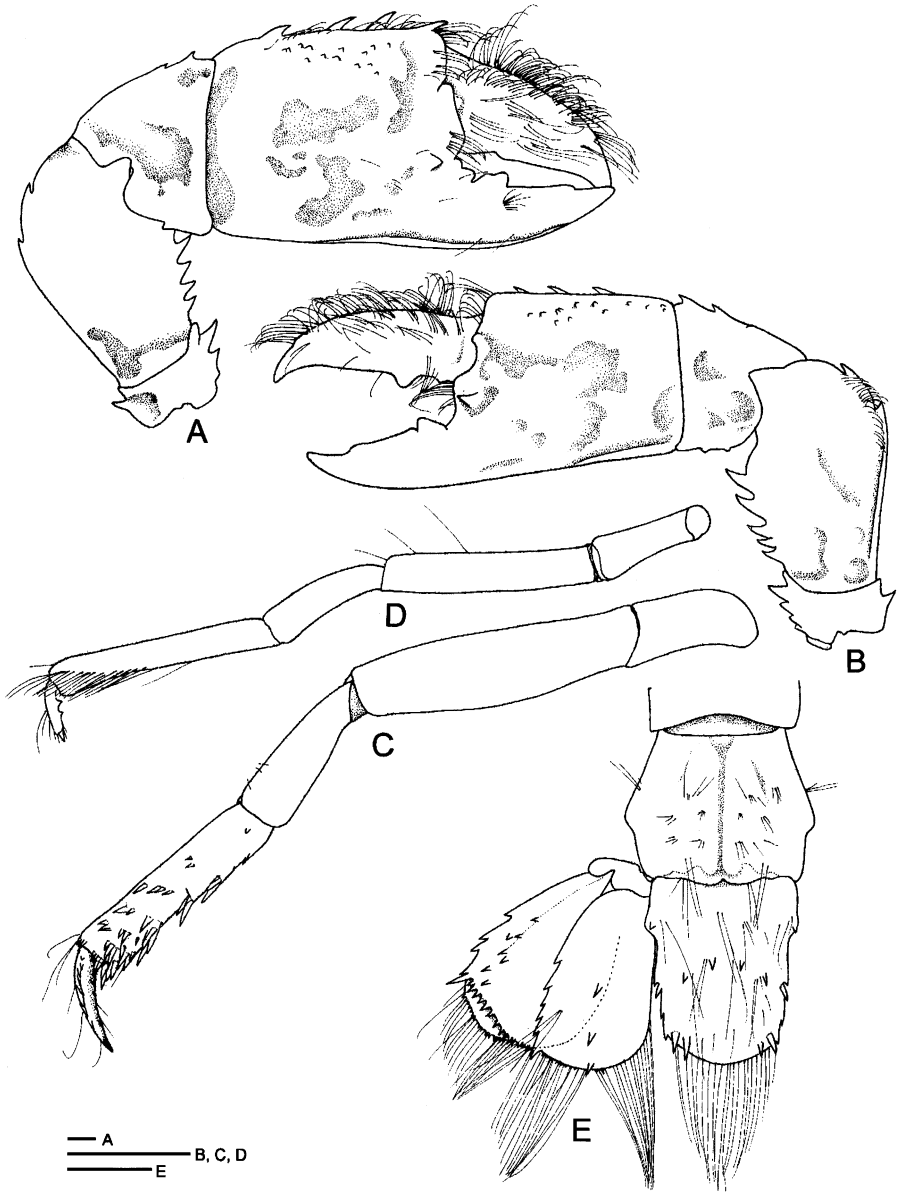

Fig. 24. *Manaxius ohsumiensis* sp. nov. A, large cheliped on right side; B, small cheliped on left side; C, P3; D, P5; E, telson and uropod on left side. A-E, SMF 31814, holotype, female (TL/CL, 21.0/8.2 mm), Ohsumi shoto, between Yakushima and Tanegashima, Kagoshima Pref., Japan, 80-82 m. Scales 1 mm.

on ventral margin and subterminal spine on dorsal margin; carpus slightly wider than long, bearing two spines on dorsal margin and two tubercles on ventral margin; chela narrower than that of larger cheliped, and more than twice as long as wide; palm slightly longer than wide, bearing three interspaced teeth on dorsal margin; fixed finger with triangular subproximal tooth, and concave distally. P2 merus elongate, bearing three teeth on ventral margin; fingers about half length of palm. P3 (fig. 24C) merus with 4 teeth on ventral margin; propodus twice as long as carpus, bearing 5 transverse rows of transparent articulate spinules on ventrolateral surface; dactylus with 7 transparent spinules on dorsal margin. P4 similar in shape to, but shorter than, P3; merus unarmed on ventral margin; propodus about 1.5 times as long as carpus, bearing transverse rows of transparent articulate spinules laterally; dactylus sharp and armed with transparent articulate spinules ventrolaterally. P5 simple; coxa (fig. 24D), basis, and ischium unarmed; propodus 1.8 times as long as carpus, and ventral margin protruded distally to form subchela with dactylus.

Abdominal somites 1-6 (fig. 23A) with longitudinal carina between tergum and pleuron. Abdominal pleuron 1 narrow, protruded ventrally into obtuse angle, and curved posteriorly. Pleura 2-6 angulated ventrally. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 (fig. 23E) biramous, with slender foliaceous endopod and exopod; endopods without appendix interna.

Telson (fig. 24E) longer than wide, slightly converging posteriorly, and slightly longer than somite 6; lateral margins bearing proximal lobe with spine followed distally by three interspaced teeth including one at posterolateral corner; posterior margin rounded without median spine; dorsal surface longitudinally furrowed medially, bearing pair of sharp teeth at each posterolateral angle and paired oblique rows of three spines on posterior half. Uropodal endopod bearing 6-7 spines on lateral margin, including one at posterolateral angle, and a row of three spines medially on dorsal surface. Uropodal exopod denticulate on distal half of lateral margin, on dorsal surface bearing a submarginal row of teeth and distal flap with distinct, movable posterolateral spine.

Remarks. — The present new species is counted as the 11th species of the genus *Manaxius*, because, as in the other species of *Manaxius*, the P1 chelae are setose, the dorsal margin of the palm bears teeth, the abdominal pleura are triangular ventrally, and the telson bears no median tooth on the posterior margin. The present species is characteristic in bearing paired spines on each side of the rostral base.

Type locality. — Ohsumi shoto, between Yakushima and Tanegashima, Kagoshima Pref., Japan, 80-82 m.

Distribrution. — Only known from the type locality.

Etymology. — The present new species is named after the type locality, the Ohsumi Islands between Tanegashima und Yakushima in Kagoshima Prefecture, where the specimen was collected by dredge [S. Ohta & H. Watabe, in litt.]

Manaxius pailoloensis (Rathbun, 1906)

Axius pailoloensis Rathbun, 1906: 893, fig. 49.
Axiopsis pailoloensis — Balss, 1925: 209.
Axiopsis (*Axiopsis*) *pailoloensis* — De Man, 1925d: 6 (list), 69 (key), 89, pl. 7 fig. 15-15b.
Calaxius pailoloensis — Sakai & De Saint Laurent, 1989: 85, fig. 22; Poore, 1994: 114, fig. 3a; Kensley & Hickman, 2001: 487.

Material examined. — USNM 30533, lectotype, male (TL/CL, 31.0/11.0 mm), Pailolo Channel, Hawaii Islands, 9.iv.1902, leg. R/V "Albatross" Sta. 3859, 138-140 m, det. Rathbun.

Diagnosis. — Rostrum simply pointed distally. Eyestalks reaching middle of rostrum. A2 segment 2 unarmed ventrally. Gastric submedian carina with denticles. Gastric lateral carina consisting of 1-2 buttressed teeth. Abdominal pleuron 2 angulated ventrally. Telson rectangular with rounded posterior margin.

Type locality. — Pailolo Channel, Hawaiian Islands, 248-252 m.

Distribution. — Only known from the type locality.

Manaxius sibogae (De Man, 1925)

Calocaris (*Calastacus*) *Sibogae* De Man, 1925d: 8 (list), 118, pl. 9 fig. 21-21e.
Calaxius sibogae — Sakai & De Saint Laurent, 1989: 86; Kensley & Hickman, 2001: 487; Ngoc-Ho, 2005: 57, fig. 5.

Diagnosis. — Rostrum simply pointed distally. Eyestalks reaching middle of rostrum. Gastric submedian carina with denticles. Gastric lateral carina consisting of 1-2 buttressed teeth. Ischium of larger cheliped armed with 3 sharp spines on ventral margin. Abdominal pleuron 2 rounded ventrally.

Type locality. — North of Batjan Island, Indonesia, 0°11′S 127°25′E, "Siboga" Sta. 139, 397 m.

Distribution. — Only known from the type locality.

Manaxius thailandensis sp. nov.

Eutrichocheles sp., Sakai, 1992a: 169, fig. 10.

Material examined. — ZMUC, holotype, male (TL/CL, 9.5/3.8 mm), paratype, 1 female (TL/CL, 8.0/2.2 mm), Gulf of Thailand, 7°00′N 103°18′E, 55 m, mud, a little sand, and shell, GE Sta. 381-I, 8.vi.1951 (Sakai, 1992a).

Diagnosis. — Rostrum simply pointed distally, and armed with lateral denticles. Eyestalks subglobose, reaching middle of rostrum. Anterolateral margin of carapace with two denticles. Gastric median carina with anterior spine and hepatic tubercle. Gastric submedian carina with anterior buttressed denticle. Abdominal pleuron 2 angulated ventrally. Telson longer than broad, bearing proximal lobe with spine followed posteriorly by 3-4 spines on lateral margin. [Adapted from Sakai, 1992.]

Remarks. — The present species was treated in 1992 (Sakai, 1992a) as *Eutrichocheles* sp. However, the present revision suggests that it is to be considered a species included in *Manaxius* and not in *Eutrichocheles*, because in the present species the A2 scaphocerite is short and simple, and the telson is unarmed on the posterior margin as in *Manaxius*, while in *Eutrichocheles* the A2 scaphocerite is short and usually bifurcate, and the telson is armed with a median spine on the posterior margin.

Type locality. — Gulf of Thailand (Sakai, 1992a), 55 m.

Distribution. — Only known from the type locality.

Genus **Marianaxius** Kensley, 1996

Marianaxius Kensley, 1996e: 483.

Diagnosis. — Carapace slightly convex. Rostrum armed with teeth on lateral margins; gastric region anteriorly bearing short, entire median and lateral carinae, but no submedian carinae. Anterolateral margin of carapace without supraorbital spine; postcervical carina and spines absent. Eyestalks subglobose, cornea well pigmented, facets hexagonal. A2 scaphocerite fairly well developed as a spike, less than half length of A2 segment 4. Mxp3 ischial crest with about 20 denticles; merus with 3 teeth on ventral margin, distalmost largest. P1 asymmetrical, not sexually dimorphic; P2 chelate, fingers longer than palm; Ps3-5 simple. Male Plp1 uniramous and unsegmented; male Plp2 biramous, endopod with strong appendix masculina in middle, but without appendix interna; male Plps3-5 biramous, endopods without appendix interna. Telson longer than wide, tapering toward posterior margin without median spine, and bearing a row of 4 articulate spines at each posterolateral angle;

dorsal surface with non-articulate submedian spines. Uropodal endopod broad, with three lateral spines including one at posterolateral angle, and a row of 4 spines medially on dorsal surface. Uropodal exopod broad, bearing three lateral spines including one at posterolateral angle, and distal flap with strong, movable spine at posterolateral angle. [Adapted from Kensley, 1996e.]

Remarks. — Kensley (1996e) mentioned that "*Marianaxius* superficially appears most similar to *Paraxiopsis* (Kensley, 1995 — [not 1995, but 1996c]), especially in the lack of appendices internae on the pleopods. They differ, however, in that *Marianaxius* does not have a bifid, shortened antennal scale, possesses pleopod 1 in the male (absent in *Paraxiopsis*), lacks a submedian carapace carina and spines" (Kensley, 1996c: 484).

However, it must be pointed out that he made a mistake in comparing *Marianaxius* with *Paraxiopsis*, because the male Plp1 is present in *Paraxiopsis*, though he mentioned in his remarks, as shown above, that male Plp1 is absent in *Paraxiopsis*.

Type species. — *Marianaxius kroppi* Kensley, 1996, by original designation. Gender of generic name, *Marianaxius*, masculine.

Species included. — *Marianaxius kroppi* Kensley, 1996.

Marianaxius kroppi Kensley, 1996

Marianaxius kroppi Kensley, 1996e: 484, figs. 9, 10, table 4; Kensley, 2003: 368.

Material examined. — USNM 243530, holotype, male (TL/CL, 17.0/6.2 mm), Piti Bay, Guam, 15 m, 11.vi.1986, leg. L. Kropp; USNM 43531, allotype, female (TL/CL, 14.0/5.5 mm), Piti Bay, Guam, 15 m, 18.v.1986, leg. L. Kropp.

Type locality. — Piti Bay, Guam, outer reef, flat rubble, to 1.5 m.

Distribution. — Guam — Piti Bay (Kensley, 1996e); to 1.5 m.

Genus **Michelaxiopsis** Poore & Collins, 2009

Michelaxiopsis Poore & Collins, 2009: 000.

Diagnosis. — Rostrum triangular, bearing median carina; lateral margins armed with teeth, extending posteriorly onto gastric region. Gastric region forming convex platform, bearing tuberculate lateral, submedian, and median carinae, and additionally a short row of tubercles between median and submedian carinae. Anterolateral margin of carapace unarmed. Cervical groove present at full length. Eyestalks subglobose; cornea pigmented. A2 scaphocerite prominent. P1 subequal in length and shape. Ps3-4 propodi narrow. Abdominal pleura 3-5 truncate ventrally, bearing soft marginal setae. Male

Plp1 absent; male Plp2 endopod with appendix interna, but without appendix masculina; male Plps3-5 biramous and broad, bearing soft marginal setae; endopods with appendix interna. Telson longer than wide, lateral margins armed with a few spinules or unarmed, slightly convergent toward posterior margin with median tooth. Uropodal exopod with distal flap.

Remarks. — *Axiopsis* (*Axiopsis*) *australiensis* De Man, 1905b was included in the genus *Axius* by Sakai & De Saint Laurent (1989), but it does not belong in *Axius*, in which the male Plp1 is present and the male Plp2 endopod bears appendices interna and masculina, because in *A.* (*Axiopsis*) *australiensis* the male Plp1 is absent and the male Plp2 endopod bears an appendix interna but no appendix masculina. The species seems to belong rather to *Axiorygma* Kensley & Simmons, 1988 by the features of Plps1-2. However, *A.* (*Axiopsis*) *australiensis* is also different from the type species of *Axiorygma*, *A. nethertoni* Kensley & Simmons, 1988. In the former, the gastric region is provided with tuberculate lateral, median, and submedian carinae, and additionally a row of tubercles between the median and submedian carinae; the eyestalks are subglobose and shorter than the rostrum; the male P1 chelae bear no cluster of slender feathered setae; and the telson is longer than wide, with the lateral margins armed with a few spinules or unarmed, slightly convergent toward the posterior margin with a median tooth. Whereas in the latter species, the gastric region is provided with five smooth carinae; the eyestalks are elongate, reaching the level of the rostral apex; the male P1 chelae proximally bear a dorsal cluster of slender feathered setae; and the telson is subsquare, bearing distinct spines on the lateral margins. For those reasons mentioned above, *A.* (*Axiopsis*) *australiensis* De Man, 1925b is reclassified under the genus *Michelaxiopsis* Poore & Collins, 2009.

Type species. — *Axiopsis* (*Axiopsis*) *australiensis* De Man, 1925b, by original designation. The gender of the generic name, *Michelaxiopsis*, is feminine.

Species included. — *Michelaxiopsis australiensis* (De Man, 1925b).

Michelaxiopsis australiensis (De Man, 1925)
(figs. 25, 26A, B)

Axiopsis (*Axiopsis*) *australiensis* De Man, 1925b: 127, fig. 4-4j; De Man, 1925d: 5 (list), 69 (key); Poore & Griffin, 1979: 226, fig. 2.

Axius australiensis — Sakai & De Saint Laurent, 1989: 29; Sakai, 1992a: 165, fig. 7; Sakai, 1994: 200 (key).

Axiopsis australiensis — Kensley, 1996e: 469 (list); Poore, 2004: 174, figs. 45a, b, 46a, 176.

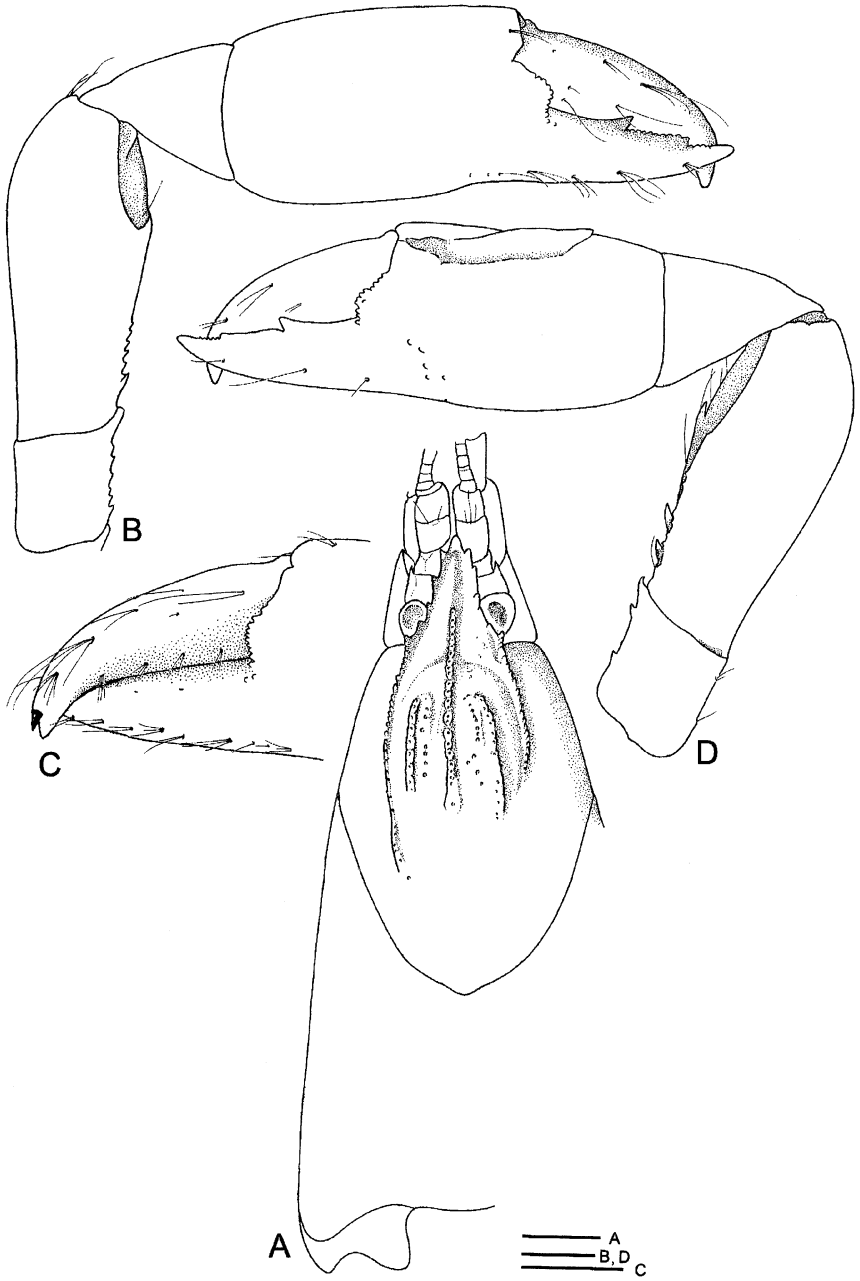

Fig. 25. *Michelaxiopsis australiensis* (De Man, 1925b). A, carapace, dorsal view; B, cheliped on right side, lateral view; C, distal part of cheliped on right side, mesial view; D, cheliped on left side, lateral view. A-D, ZMB 14260, holotype, female (TL/CL, 22.0/9.1 mm), Port Jackson, Australia. Scales 1 mm.

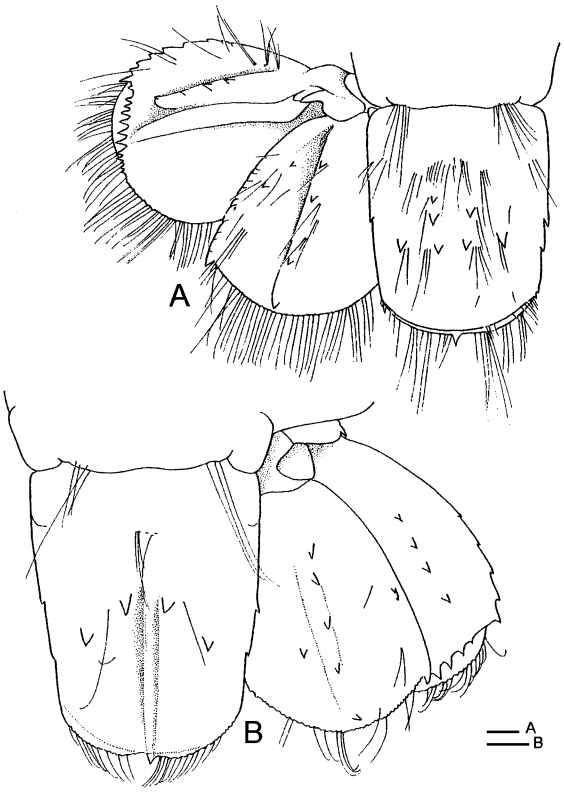

Fig. 26. *Michelaxiopsis australiensis* (De Man, 1925b). A, telson and uropodal endopod and exopod on left side; B, telson and uropod with endopod and exopod on right side. A, *Michelaxiopsis australiensis*, ZMB 14260, holotype, female (TL/CL, 22.0/9.1 mm), Port Jackson, Australia; B, *Michelaxiopsis australiensis*, AM P 29545, 1 male (TL/CL, 62.0/20.8 mm), Long Reef, Collaroy, N.S.W., Australia, 33°45′S 151°19′E, intertidal. Scales 1 mm.

Michelaxiopsis nauo Poore & Collins, 2009: 263, figs. 27, 28. [Type locality. — Roxby I., Sir Joseph Banks Group, South Australia].

Material examined. — ZMB 14260, holotype, female (TL/CL, 22.0/9.1 mm), Port Jackson, Australia, leg. Oschat; RMNH D10605, 1 male (TL/CL, 43.0/13.6 mm), Long Reef, Collaroy, N. of Sydney, New South Wales, Australia, 22.iv.1955, leg. L.B. Holthuis; AM P 29545, 1 male (TL/CL, 62.0/20.8 mm), 1 ovig. female (TL/CL, 66.0/21.6 mm), Long Reef, Collaroy, N.S.W., Australia, 33°45′S 151°19′E, intertidal, under boulders, intertidally, 16.x.1978, leg. I. Bennet; AM P23493, 1 male (TL/CL, 38.0/12.6 mm), Long Reef, Collaroy, coast N. of Sydney, 33°44′S 151°19′E, under stones, low tide, 25.i.1956, leg. E. Pope; AM P24700, 1 male (TL/CL, 44.0/14.5 mm), Angourie, Clarence River mouth, N.S.W., 29°29′S 153°22′E, 1.ix.1961, leg. A.A. Cameron; AM P 72882, 1 male (TL/CL, 46.0/14.8 mm), N. side of Long Reef, Collaroy, N.S.W., intertidal, 28.viii.1976, leg. I. Ioch & J. Farguhar; AM P 11360, 1 male (TL/CL, 37.0/12.0 mm), Angourie, near Yamba, N.S.W., leg. Allan & Cameron; AM P 8693, 1 male (TL/CL, 52.0/16.8 mm), 1 ovig. female (TL/CL, 59.0/17.5 mm), Long Reef, Collaroy, near Sydney, N.S.W., intertidal, 27.i.1964, leg. J.C. Yaldwyn; AM P 64235, 1 female (TL/CL,

25.0/8.7 mm), northwest side of Bare Island, Botany Bay, N.S.W., 33°59.6′S 151°13.8′E, 13.8 m, 18.v.1998, leg. S. Ahyong; AM P 7472, 1 male (TL/CL, 35.0/11.2 mm), 1 ovig. female (TL/CL, 47.0/14.4 mm); 1 female (TL/CL, 40.0/13.4 mm), Long Reef, Port Jackson; AM P 36104, 1 ovig female (TL/CL, 50.0/17.0 mm), Muccumbulga Point, Two Gold Bay, N.S.W., intertidal rocks, 11.xii.1984, leg. S. Eab; AM P 72883, 1 female (TL/CL, 29.0/9.4 mm), Angourie, Clarence River, N.S.W., 4.x.1940, leg. A.A. Cameron.

Diagnosis. — Rostrum (fig. 25A) stoutly triangular, blunt at apex, and slightly longer than basal width, bearing 5-6 blunt teeth on each lateral margin. Gastric region with longitudinal, tuberculate submedian carinae curving together anteriorly about midway along tuberculate median carina to form deep inverted U-shape; median carina continuing to base of rostrum; posterior part of gastric region smooth; anterolateral margin of carapace smooth. A1 peduncle reaching middle of A2 penultimate segment, scaphocerite present as a strong spine. A2 segment 2 with distolateral spine; scaphocerite present as a single long spine, reaching about midpoint of segment 4; segment 3 smooth. Eyestalks half length of rostrum. Mxp3 ischium with strong teeth on ischial crest, merus with 3-4 large mesial spines distally. P1 (fig. 25B, D) subequal and not sexually dimorphic. P1 ischium dentate on ventral margin; merus also dentate on ventral margin, including strong spines, and smooth dorsally; carpus and chela smooth; distal margin of palm convex, with denticles in ventral half; cutting edge of fixed finger with strong tooth medially and another one near distal end; dactylus as long as fixed finger, bearing strongly curved tip (fig. 25C). P2 chelate; fingers shorter than palm. Ps3-5 propodi with rows of spines ventrolaterally; dactyli with longitudinal row of spines laterally. Male Plp1 absent; male Plp2 endopod with appendix interna, but without appendix masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum, this flagellum about twice as long as proximal segment; female Plps2-5 endopods with appendix interna. Telson (fig. 26A, B) longer than wide, armed with a few denticles or unarmed on lateral margins, which are slightly convergent toward rounded posterior margin with a median spine, bearing two pairs of spines on dorsal surface. Uropodal endopod bearing small lateral spine at distal end, sometimes additionally 1-2 lateral spines, and dorsal longitudinal ridge with 3-5 spines; uropodal exopod bearing spines on distal half of lateral margin, movable spine distolaterally, and sublateral row of spinules and transverse suture with spinules dorsally. [Adapted from Poore & Griffin, 1979.]

Remarks. — Poore & Collins (2009: 263) established a new species, *Michelaxiopsis nauo*, and distinguished their species from *M. australiensis*, because in *M. nauo* the telson always bears three spines on the lateral margin,

while in *M. australiensis* it bears no spine on the lateral margin. However, the difference in the number of teeth on the lateral margins of the telson is observed in the series of the specimens of *M. australiensis* examined in the present study and, moreover, De Man (1925: 129, fig. 4c) described from the holotype of his species, *M. australiensis* as follows: "...der vorderste Zahn des Seitenrandes [of the telson], whelcher bei *Ax. consobrina* ungefähr am vorderen Drittel gelegen ist, liegt bei der neuen Art [=*M. australiensis*] mehr nach hinten, nahezu in der Mitte des Telsons, den medianen Endstachel nicht mitgerechnet. Der vordere Teil der Seitenränder zwischen der Basis und dem vorderen Zahn erscheint schwach gebogen, beinahe recht, bei *Ax. consobrina* ein bißchen konkav; bei *Ax. consobrina* tragen die Seitenränder zwei Zahne zwischen dem vordersten und der hinteren Seitenecken, bei *Ax. australiensis* nur einen, gerade in der Mitte zwischen dieser Ecke und dem fordersten Zahne..." [=...the most anterior spine is located rather posteriorly on the middle of the lateral margin of the telson in *M. australiensis*, and there is another spine between the anterior spine and the posterolateral angle...] (fig. 26A).

As mentioned above, the difference in the number of spines on the lateral margin of the telson is not so decisive a character as to distinguish those two species from each other, and it is true of the difference in number of the spines on the gastric median carina in *M. australiensis*, which suggests that those two species, *M. nauo* and *M. australiensis* are not to be distinguished from each other, and therefore *M. nauo* is synonymized with *M. australiensis*.

Type locality. — Port Jackson, Australia.

Distribution. — Australia — Port Jackson, N.S.W. (De Man, 1925b); Clarence River, Collaroy; North Head, Shellharbour, N.S.W., Broken Bay, about 50 km north of Sydney on the coast of N.S.W. (Sakai, 1992a), and Shoreham, Victoria (Poore & Griffin, 1979); intertidal zone; Roxby Is., Sir Joseph Banks Group, Reevesby Is., Marum Is., South Australia; 3-6 m (Poore, 2009).

Genus **Newzealandaxius** gen. nov.

Diagnosis. — Rostrum prominent and furrowed on surface; lateral margins armed with erect spines, extending posteriorly onto gastric region. Gastric region convex, bearing 5 carinae; median carina originating from middle keel of rostrum and running to anterior two-thirds of gastric region, bearing in middle an elongate-triangular patch of granules gradually narrowing anteriorly

and becoming a single row of spines; submedian carinae with strip of granules becoming spines just behind base of rostrum; lateral carinae with spines, posterior smaller ones and anterior larger ones including anteriormost stout, thorn-like one at some distance from base of rostrum. Anterolateral margins of carapace unarmed. Cervical groove distinct. Eyestalks subglobose; cornea pigmented. A2 scaphocerite prominent and horn-shaped. P1 unequal in size and dissimilar in shape. P2 chelate, fingers longer than palm. Ps3-4 propodi elongate, bearing transverse rows of spines ventrolaterally. Abdominal pleura 1-5 convex between terga and pleura, and acutely triangular ventrally; abdominal pleura 3-5 in male with spinule on anteroventral margin, while abdominal pleura 3-5 in females unarmed ventrally. Male Plp1 absent; male Plp2 biramous, endopod and exopod slender, endopod with appendices interna and masculina; male Plps3-5 biramous, endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 endopods with appendix interna. Telson longer than wide, bearing proximal lobe with spine on lateral margin; posterior margin with median spine. Uropodal exopod without distal flap.

Remarks. — It has turned out through the examination of the male type specimen of *Axius* (*Axius*) *novae-zealandiae* Borradaile, 1916 (NHM 1917.1. 29.106-110, TL 50 mm), which was included in *Spongiaxius* by Sakai & De Saint-Laurent (1989), that *Spongiaxius novaezealandiae* does not belong in the genus *Spongiaxius*, because it has distinct morphological characteristics different from those of the type species of the genus *Spongiaxius*, *S. brucei* (Sakai & De Saint-Laurent, 1989). In *Spongiaxius novaezealandiae*, the male Plp1 is absent, and the median gastric carina originates from the middle keel of the rostrum up to the anterior two-thirds of the gastric region, bearing in its middle an elongate-triangular patch of granules gradually narrowing anteriorly and becoming a single row of spines, and the uropodal exopod bears no transverse suture. In *Spongiaxius brucei*, however, the male Plp1 is present, bearing a spatulate distal segment, the gastric median carina is serrated, and the uropodal exopod bears a transverse suture. Therefore, *Spongiaxius novaezealandiae* is here reclassified under the new genus *Newzealandaxius* as *N. novaezealandiae*. The male type specimen of *N. novaezealandiae* examined, seems to be an immature one.

Type species. — *Axius* (*Axius*) *novae-zealandiae* Borradaile, 1916, by present designation and monotypy. The gender of the new generic name, *Newzealandaxius*, is masculine.

Species included. — *Newzealandaxius novaezealandiae* (Borradaile, 1916).

Etymology. — The new genus is named *Newzealandaxius* after the type locality, New Zealand, where the type specimen was collected, with the existing generic name *Axius* added.

Newzealandaxius novaezealandiae (Borradaile, 1916)

Axius (*Axius*) *novae-zealandiae* Borradaile, 1916: 91, fig. 5a-b; De Man, 1925d: 3 (list), 12 (key).
Axius (*Axius*) *novaezealandiae* — Balss, 1933: 87.
Spongiaxius novaezealandiae — Sakai & De Saint Laurent, 1989: 42, fig. 11.

Material examined. — NHM 1917.1.29.106-110, types, 1 male (TL/CL, 50.0/19.6 mm), 2 females (TL/CL, 27.0/9.7-37.0/14.0 mm), 1 damaged female, New Zealand, "Terra Nova" Expedition.

Type locality. — Seven miles [± 13 km] east of North Cape, New Zealand, 126 m.

Distribution. — New Zealand — North Cape (Borradaile, 1916; Sakai & De Saint Laurent, 1989); 70-720 m.

Genus **Oxyrhynchaxius** Parisi, 1917

Oxyrhynchaxius Parisi, 1917: 17; De Man, 1925d: 2 (key); Sakai, 1987a: 303 (list); Sakai & De Saint Laurent, 1989: 65; Poore, 1994: 98 (key); Poore & Collins, 2009: 203.

Diagnosis. — Rostrum styliform, lateral margins denticulate and not extending onto gastric region. Carapace covered with scale-like granules. Gastric region not convex, and situated at same level as rostrum, bearing 5 almost parallel carinae. Anterolateral margins of carapace armed with a denticle each. Cervical groove present at full length. Eyestalks elongate, overreaching rostrum; cornea pigmented. A2 scaphocerite prominent. P1 subequal; chelae obliquely positioned; lateral surface granulate, with setae. Pleurobranchs absent. Abdominal pleura unarmed ventrally. Male Plp1 uniramous and unsegmented; male Plp2 biramous, endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum. Telson longer than wide, lateral margins with proximal lobe with spine, and posterior margin convex with median spine. Uropodal exopod with transverse suture. [Adapted from Sakai & De Saint Laurent, 1989.]

Type species. — *Oxyrhynchaxius japonicus* Parisi, 1917, by original designation and monotypy. The gender of the generic name, *Oxyrhynchaxius*, is masculine.

Species included. — *Oxyrhynchaxius japonicus* Parisi, 1917; *O. manningi* Lin, Kensley & Chan, 2000; *O. tricarinatus* Lin, 2006.

KEY TO THE SPECIES OF THE GENUS *OXYRHYNCHAXIUS*

1 – Postcervical carina absent; abdominal somites 2-5 with distinct dorsal carina . . . . . *O. manningi*
– Postcervical carina present 2

2 – Abdominal somites 3-5 with 3 distinct longitudinal dorsal carinae . . . . . *O. tricarinatus*
– Abdominal somites lacking distinct longitudinal dorsal carina . . . . . *O. japonicus*

Oxyrhynchaxius japonicus Parisi, 1917

Oxyrhynchaxius japonicus Parisi, 1917: 18, figs. 5, 6; De Man, 1925d: 7 (list); Froglia & Grippa, 1986: 260, fig. 4; Sakai, 1987a: 303 (list); Sakai & De Saint Laurent, 1989: 65; Komai, 2000b: 345; Lin et al., 2000: 199, figs. 1, 2, 3a-c.

Material examined. — MNHN Th 428, 1 female (TL/CL, 69.0/25.5 mm), Hong Kong.

Diagnosis. — Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 endopods with appendix interna.

Type locality. — Enoshima, Sagami Bay, Japan.

Distribution. — Japan — Sagami Bay (Parisi, 1917); Hong Kong (Sakai & De Saint Laurent, 1989).

Oxyrhynchaxius manningi Lin, Kensley & Chan, 2000

Oxyrhynchaxius manningi Lin et al., 2000: 199-206, figs. 3c, d, f, 4; Davie, 2002: 203; Poore & Collins, 2009: 266.

Remarks. — Only the female type specimens are known.

Type locality. — North West Shelf between Port Hedland and Dampier, Western Australia, 134 m.

Distribution. — Only known from the type locality.

Oxyrhynchaxius tricarinatus Lin, 2006

Oxyrhynchaxius tricarinatus Lin, 2006: 238, figs. 3, 4, table 2.

Material examined. — MNHN Th 1467, holotype, male (TL/CL, 53.0/19.0 mm, dissected), New Caledonia, 4, 20°16.68′S 163°50.26′E, BATHUS (French expedition), 500-600 m, 3.viii.1994.

Diagnosis. — Male Plp1 missing; male Plp2 endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna.

Remarks. — Male Plp1 of the male holotype (MNHN TH 1467) is missing, but it is described as rudimentary, as shown in the figure (Lin, 2000: 238, fig. 4G).

Type locality. — New Caledonia, [Sta.] 4, 20°16.68′S 163°50.26′E, 500-600 m.

Distribution. — Only known from the type locality.

Genus **Parascytoleptus** Sakai & De Saint Laurent, 1989

Parascytoleptus Sakai & De Saint Laurent, 1989: 39; Sakai, 1992b: 212.

Diagnosis. — Rostrum triangular and short, barely reaching distal end of eyes, tuberculiform tooth on either side. Lateral margins extending posteriorly onto gastric region as lateral carinae. Gastric region steeply elevated from rostrum, bearing median carina reaching cervical groove, but no submedian carinae. Anterolateral margin of carapace unarmed. Cervical groove discernible only in dorsal part. Eyestalks short and subglobose; cornea pigmented. A1 peduncles reaching proximal third of A2 penultimate segment. A2 scaphocerite reduced. P1 chelate and distinctly unequal; palm bearing no dorsodistal spine. P2 chelate, fingers shorter than palm. Ps3-4 propodi with transverse rows of spines. Pleurobranchs present on Plps2-4. Abdominal somites smooth; terga 2-5 with 1-2 tufts of long setae, and pleura truncate ventrally. Male Plp1 present as small unsegmented protrusion; male Plp2 biramous, endopod bearing appendix interna, but no appendix masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous, slender, and composed of proximal segment and multiarticulate flagellum; female Plps2-5 slender and biramous, endopods with appendix interna. Telson triangular and convergent towards rounded posterior margin, without median spine, bearing proximal lobe with spine followed distally by another two spines on lateral margin. Uropodal endopod elongate and oval, bearing distolateral spine, and median carina with spine on posterior margin. Uropodal exopod with two lateral spines, but without distal flap dorsally. [Adapted from Sakai & de Saint Laurent, 1989.]

Remarks. — The genus *Parascytoleptus* is characterized by the male pleopods; male Plp1 is present as a small, unsegmented protrusion, male Plp2 is biramous, and the endopod bears an appendix interna but no appendix masculina; male Plps3-5 endopods bear an appendix interna. This genus is similar to the genus *Scytoleptus* in that the gastric region is elevated.

Type species. — *Paraxius tridens* Rathbun, 1906, by monotypy. The gender of the generic name, *Parascytoleptus*, is masculine.

Species included. — *Parascytoleptus tridens* (Rathbun, 1906).

Parascytoleptus tridens (Rathbun, 1906)
(fig. 27A-B)

Paraxius tridens Rathbun, 1906: 895, fig. 53; Sendler, 1923: 44.
Axius (*Paraxius*) *tridens* — De Man, 1925d: 5 (list), 18 (key).

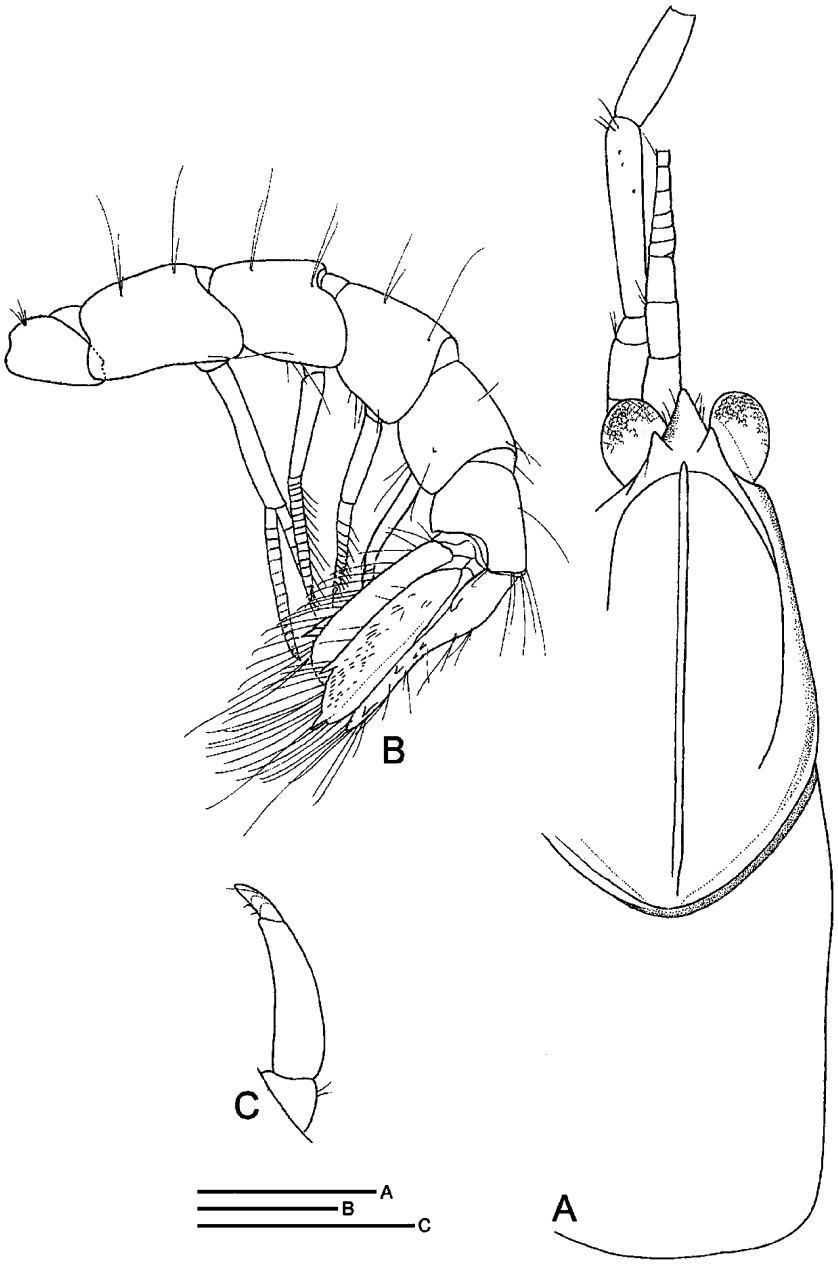

Fig. 27. *Parascytoleptus tridens* (Rathbun, 1906) and *Paraxiopsis brocki* (De Man, 1888b). A, carapace, dorsal view; B, abdomen, pleopods 2-5, and tail-fan, lateral view; C, male Plp1 on left side. A-B, *Parascytoleptus tridens*, SMF 20361, male (TL/CL, 9.0/3.8 mm), Bora Bora, French Polynesia, riff-edge by Baitape, 0.5-1 m; C, *Paraxiopsis brocki*, AM P 6824, male (TL/CL, 45.0/13.5 mm), rail pier, Port Darwin, Northern Territory, Australia. Scales 1 mm.

Parascytoleptus tridens — Sakai & De Saint Laurent, 1989: 40, fig. 10; Sakai, 1992b: 212, fig. 2; Kensley, 2003: 370.

Material examined. — SMF 4936, 1 female (TL/CL, 24.0/6.9 mm, lacking small cheliped), Makatea, Paumotu-Island, 10-20.vii.1909, Hanseatische Süde-Expedition, leg. E. Wolf (Lit. Sendler, 1923: 44, as *Paraxius tridens*); SMF 20358, 2 males (TL/CL, 8.0/3.1-12.0/4.3 mm), ca. 2.6 km W. of airport, Moorea, French Polynesia, Bareer-reef at Maharepa, 0.5 m, dead coral, iii.1988, leg. H.G. Müller; SMF 20359, 1 male (TL/CL, 10.0/4.2 mm), 1 female (TL/CL, 12.0/4.8 mm), ca. 2.6 km W. of airport, Moorea, French Polynesia, Bareer-reef at Maharepa, 0.5 m, dead coral, iii.1988, leg. H.G. Müller; SMF 20360, 1 ovig. female (TL/CL, 22.0/6.9 mm), 1 juv., Moorea, French Polynesia, riff-edge by Afareaitu, 1-2 m, dead coral, 26.iii.1988, leg. H.G. Müller; SMF 20361, 2 males (TL/CL, 13.0/5.3; 9.0/3.8 mm), Bora Bora, French Polynesia, riff-edge by Baitape, 0.5-1 m, dead coral, 27.ii.-06.iii.1988, leg. H.G. Müller.

Diagnosis. — Rostrum small, short, triangular, and concave on dorsal surface, lateral margins each with distinct proximal tooth, extending posteriorly onto gastric region (fig. 27A). Gastric region steeply elevated from rostrum; median carina entire, originating from proximal part of rostrum and running to cervical groove; submedian carinae absent. Anterolateral margins of carapace unarmed. Cervical groove discernible only in dorsal part. Eyestalks short and subglobose; cornea pigmented. A1 peduncles reaching proximal third of A2 penultimate segment. A2 scaphocerite reduced. P1 chelate and unequal. In male larger cheliped ischium unarmed; merus unarmed on dorsal margin, and unarmed or armed with some obscure denticles on ventral margin; carpus broad and two-thirds as wide as long; palm broad and more than twice as long as carpus, bearing obtuse dorsodistal spine, and obtuse subdorsal tooth on distal margin. Fixed finger short, cutting edge slightly convex in proximal half, bearing 2-3 obtuse denticles. Dactylus thick and curved downward, and unarmed on cutting edge. In smaller cheliped carpus as long as wide, and palm twice as long as carpus. Dactylus and fixed finger slender, about 2/3 length of palm, cutting edges of dactylus and fixed finger with spinules. P2 chelate and unarmed. Ps3-4 propodi with transverse rows of spines. Pleurobranch present on Ps2-4.

Abdominal pleuron 1 triangular ventrally, pleura 2-5 truncate ventrally with some marginal setae (fig. 27B). Male Plp1 present as small, unsegmented protrusion (SMF 20359, male; SMF 20361, larger male), Plp2 slender and biramous, endopod bearing appendix interna but no appendix masculina; Plps3-5 biramous, endopods with appendix interna. Female Plp1 uniramous, composed of proximal segment and multiarticulate flagellum; female Plps2-5 slender and biramous, endopods with appendix interna.

Type locality. — French Frigate Shoal, Hawaiian Islands, 36-59 m.

Distribution. — Madagascar (Sakai & De Saint Laurent, 1989); Hawaiian Islands — French Frigate Shoal and off Modu Manu (Rathbun, 1906); Society Islands — Moorea and Bora Bora (Sakai, 1992b); Tuamotu Archipelago — Makatea; 36-59 m.

Genus **Paratrichocheles** gen. nov.

Diagnosis. — Rostrum acutely triangular with pointed apex, located at level lower than that of anterior carapace, lateral margins each armed with 1-2 teeth proximally, and spinule or none at proximal third, extending posteriorly onto anterior half of gastric region as lateral carinae; gastric region convex, bearing short smooth median carina. Hepatic tubercle present. Anterolateral margin of carapace unarmed. Cervical groove distinct. Postcervical carina absent. Posterior margin of carapace with lateral lobes. Eyestalks subglobose; cornea pigmented. A1 peduncle with slightly inflated basal segment; segments 2-3 short. A2 scaphocerite short and bifurcate. Mxp3 pediform, ischium with strongly dentate crest on inner surface; merus dentate on mesial margin; exopod slender. P1 chelate and symmetrical. P2 chelate, fingers shorter than palm; Ps3-5 unknown. Abdominal somites 1-5 smooth, pleura rounded, bearing no tuft of setae ventrally. Male Plp1 absent; male Plp2 biramous, endopod bearing appendix interna, but no appendix masculina; male Plps3-5 biramous, endopods lacking appendix interna. Female Plp1 uniramous and bisegmented; Plps2-5 biramous, endopods without appendix interna. Telson longer than wide, bearing proximal lobe with spine followed posteriorly by 1-2 teeth on lateral margin, and two posteriorly-divergent carinae with single and double spines originating from two paired spines centrally on dorsal surface; posterior margin without median spine. Uropodal endopod broad, bearing sharp spine at posterolateral angle and median carina with spines dorsally. Uropodal exopod bearing movable spine at distolateral angle, and denticulate transverse suture dorsally. [Adapted from Sakai, 1994.]

Remarks. — *Eutrichocheles pumilus* Sakai, 1994 was treated as one of the species included in the genus *Eutrichocheles* in an earlier identification, but this species has turned out to be clearly different from the type species of *Eutrichocheles*, *E. modestus* (Herbst, 1796), as follows. In *Eutrichocheles pumilus* Sakai, 1994 from Port Essington, Cobourg Peninsula, NT, the gastric region bears no submedian rows of denticles; male Plp1 is absent; and the male Plp2 endopod bears an appendix interna, but no appendix masculina. In the type species of *Eutrichocheles*, by contrast, the gastric region bears submedian rows of denticles; the male Plp1 is present as a simple protrusion; and the male

Plp2 endopod bears an appendix masculina, but no appendix interna. For those reasons, *E. pumilus* is to be excluded from *Eutrichocheles*, and reclassified under the new genus *Paratrichocheles* gen. nov., based on *E. pumilus* as the type species.

Type species. — *Eutrichocheles pumilus* Sakai, 1994, by present designation and monotypy. The gender of the name, *Paratrichocheles*, is masculine.

Species included. — *Paratrichocheles pumilus* (Sakai, 1994).

Etymology. — The new genus is named *Paratrichocheles* by replacing the Greek prefix "eu" meaning "good or true" with the Greek prefix "para" meaning "near".

Paratrichocheles pumilus (Sakai, 1994)

Eutrichocheles pumilus Sakai, 1994: 188, 200 (key), figs. 8, 9.
Paraxiopsis pumilus — Kensley, 2003, table 2; Animal Diversity Web, Univ. Michigan; Poore & Collins, 2009: 266, figs. 30, 31, 44.
Paraxiopsis dianae Poore, 2008: 165, fig 2. [Type locality. — Dampier Archipelago, Western Australia, 6.0-14.0 m.]

Remarks. — The diagnosis is given under the genus *Paratrichocheles*.

Type locality. — Port Essington, Cobourg Peninsula, Australia, 11°21.5′S 132°13′E.

Distribution. — Australia — Port Essington and North West Shelf (Sakai, 1994); off Barrow Is.; Port George IV, Bonaparte Archipelago, Western Australia; Port Essington, west side of Barrow Bay; Northern Territory; Arafura Sea (Poore & Collins, 2009).

Genus **Paraxiopsis** De Man, 1905

Axiopsis (*Paraxiopsis*) [s. str.] De Man, 1905: 597; Poore & Griffin, 1979: 221 (key); Sakai & De Saint Laurent, 1989: 3, 51; Poore, 2008: 164.
Axiopsis (*Paraxiopsis*) — De Man, 1925d: 2 (key), 71, 101; Gurney, 1942: 240; Balss, 1957: 1579; Sakai, 1987a: 303 (list).
Paraxiopsis — Kensley, 1996c: 709; Kensley, 2003: 372; Poore, 2004: 175. [Type species: *Axius Brocki* De Man, 1888b.]

Diagnosis. — Rostrum acutely triangular and furrowed on dorsal surface; lateral margins with denticles followed by surpaorbital spine, extending posteriorly onto gastric region as lateral carinae. Gastric region convex; median carina smooth with hepatic tubercle; submedian carinae smooth and lateral carinae with 1-2 anterior teeth; anterolateral margin of carapace usually armed with a spine. Cervical groove distinct at full length. Postcervical carina absent.

Posterior margin of carapace with a pair of lateral lobes. Eyestalks subglobose; cornea pigmented. A1 peduncle with slightly inflated proximal segment; segments 2-3 short. A2 scaphocerite short and simple, and bi- or trifurcate. Mxp3 pediform, exopod slender; ischium with denticulate crest on inner surface; merus with teeth on mesial margin. P1 chelate and asymmetrical, fingers with wide gape. P2 chelate. Ps3-4 simple, propodi with transverse rows of spines ventrolaterally. P5 simple or subchelate, propodus with setae on distoventral margin. Epipod present. Pleurobranchs absent.

Abdominal somites 1-5 smooth laterally, pleura 2-5 broadly rounded or triangular ventrally. Male Plp1 uniramous, unsegmented or bisegmented; male Plp2 biramous, endopod bearing appendix masculina with distal setae, but no appendix interna; male Plps3-5 biramous, endopods without appendix interna. Telson longer than wide, lateral margins bearing proximal lobe with spine; dorsal surface with divergent carinae with spines in posterior two-thirds, posterior margin with median spine. Uropodal endopod broad, bearing spine posterolaterally and median carina with spinules on dorsal surface. Uropodal exopod bearing distinct, movable spine at distolateral angle, and denticulate transverse suture dorsally.

Type species. — *Axiopsis* (*Paraxiopsis*) *brocki* (De Man, 1888b), by original designation. The gender of the generic name, *Paraxiopsis*, is feminine.

Species included. — *Paraxiopsis brocki* (De Man, 1888b); *P. gracilimana* Kensley, 1996c; *P. hispida* Kensley, 1996c; *P. johnstoni* Edmondson, 1925; *P. majuro* Kensley, 2003; *P. paulayi* (Kensley, 2003); *P. pindatyba* (Rodrigues & Kensley, 1991); *P. plumosimanus* (Kensley, 2003); *P. vicina* Coelho & Ramos-Porto, 1985; *P.* sp., Robles et al., 2009.

KEY TO THE SPECIES OF THE GENUS *PARAXIOPSIS*

1 – P2 fingers longer than palm ..... *P. johnstoni*
– P2 fingers shorter than palm 2

2 – Pleura 2-5 triangular ventrally, and pleura 3-5 armed with anterolateral spinule 3
– Pleura 2-5 rounded ventrally and unarmed 4

3 – Carapace smooth ..... *P. paulayi*
– Carapace finely pitted ..... *P. majuro*

4 – Uropodal endopod smooth or 2-3 spinules on lateral margin 5
– Uropodal endopod serrate on lateral margin 6

5 – P1 palm with denticulate ventral plate ..... *P. vicina*
– P1 palm without denticulate ventral plate ..... *P. brocki*

6 – Carapace scattered with short setae; P1 chela with granules 7
– Carapace smooth 8

7 – Gastric submedian carinae entire ..... *P. plumosimanus*
– Gastric submedian carinae with 2-3 small tubercles ..... *P. hispidus*

8 – P1 propodus with numerous low tubercles, and finely serrate on ventral margin .....
..... *P. gracilimana*
– P1 propodus roughly tuberculate and distinctly serrate on ventral margin .....
..... *P. pindatyba*

Paraxiopsis brocki (De Man, 1888)
(fig. 27C)

Axius Brocki De Man, 1888b: 475, pl. 20 fig. 3.
?*Axiopsis Brocki* — Borradaile, 1903: 539.
Axiopsis (*Paraxiopsis*) *Brocki* — De Man, 1905: 597; De Man, 1925d: 7 (list), 71 (key) 101, pl. 8 fig. 19-19f.
Axiopsis (*Paraxiopsis*) *brocki* — Poore & Griffin, 1979: 228, fig 3; Tirmizi, 1983: 88, fig. 3; Sakai, 1987a: 304 (list); Morgan, 1990: 6, 63.
Eutrichocheles brocki — Sakai & De Saint Laurent, 1989: 3, 8, 52, fig. 4B; Sakai, 1992b: 215; Sakai, 1994: 185, 200 (key); Ngoc-Ho, 1998: 365, fig. 1.
Eutrichocheles aff. *brocki* — Sakai, 1992a: 168.
Paraxiopsis brocki — Kensley, 1996c: 712, figs. 1, 2; Kensley, 2003, table 2; Poore, 2004: 176; Poore & Collins, 2009: 266.

Material examined. — ZMB 20454, 5 males (TL/CL, 11.0/3.3-21.0/6.3 mm); 1 ovig. female (TL/CL, 20.0/6.7 mm); 1 female (TL/CL, 16.0/5.1 mm), Piatuki, Buka Island, German New Guinea, biotope, 23.x.1909, leg. Schoede, det. De Man; SMF 16569, 1 male (TL/CL, 17.0/5.3 mm), Amboina, Moluccas, 1891, leg. Strubell; SMF 20362, 1 ovig. female (TL/CL, 20.0/6.6 mm), 2 males (TL/CL, 14.0/4.0; 12.0/3.9 mm), Bora Bora, French Polynesia, 0.5-1 m, in dead stone coral, 27.ii.-06.iii.1988, leg. H.G. Müller; SMF 20363, 1 juvenile (TL/CL, 6.0/2.3 mm), Bora Bora, French Polynesia, 1-1.5 m, in dead stone coral, 07.iii.1988, leg. H.G. Müller; RMNH D1167, 1 male (TL/CL, 36.0/8.5 mm), 0°7.2′N 130°′25.5′E, Singapore Expedition vii.1929; NHM 189311.3.74-75, 2 males (TL/CL, 23.0/8.4-21.0/7.0 mm), 1 female (TL/CL, 33.0/10.6 mm), Macclesfield Bank, South China Sea, 25-40 fms [ca. 40-72 m], H.M.S. "Egeria", leg. Bassett-Smith; AM P20357, 1 female (TL/CL, 94.0/31.6 mm), Waigait Reef, Darwin, Northern Territory, Australia; AM P 6824, 1 male (TL/CL, 45.0/13.5 mm), Rail Pier, Port Darwin, Northern Territory, Australia.

Diagnosis. — Carapace smooth. Rostrum acutely triangular and concave on dorsal surface, lateral margins with 4-6 spines followed by supraorbital spine, extending posteriorly onto gastric region as lateral carinae with 1-2 spines. Gastric region convex, with 5 distinct carinae; median carina originating from base of rostrum, extending to posterior third, bearing thick hepatic tubercle; submedian carinae with tooth at anterior end. Anterolateral margins of carapace with distinct spine just above A2 basis. A1 peduncle barely reaching distal margin of A2 penultimate segment; A2 segment 2 with dorsodistal spine; scaphocerite bifurcate; segment 3 with distoventral spine. Eyestalks subglobose, less than half length of rostrum. Mxp3 ischium with toothed crest on

mesial margin, merus with 2-3 large distinct spines and several smaller proximal spines on mesial margin, propodus with distoventral spine.

Pl subequal, not sexually dimorphic. P1 ischium with 3-4 spines on ventral margin; merus with spine on dorsal margin and 3-4 sharp spines on ventral margin; carpus short, bearing 2-3 tubercles on ventral margin; palm about 1.5 times as long as dactylus, bearing subdistal spine on dorsal margin; cutting edge of fixed finger denticulate, bearing triangular convexity at proximal third; dactylus as long as fixed finger; cutting edge concave at proximal third, denticulate in distal two-thirds, and curved downward distally. P2 chelate; ischium and merus with distinct teeth on ventral margin; palm slightly longer than dactylus. Ps3-5 propodi with numerous small, articulate spines ventrolaterally.

Abdominal somite 1 narrow and protruded ventrally, with rounded tip, somite 2 smooth with broadened pleuron, somites 3-4 smooth with rounded pleura ventrally, somite 5 smooth with slightly truncate pleuron, and somite 6 smooth and concave on posterior half of ventral margin. Male Plp1 present as slender, unsegmented or bisegmented protrusion (fig. 27C); male Plp2 bearing appendix masculina with distal setae, but no appendix interna; Plps3-5 biramous, endopods lacking appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum about three times as long as proximal segment; Plps2-5 biramous, endopods lacking appendix interna.

Telson longer than wide and parallel-sided, bearing proximal lobe with spine followed posteriorly by 1-3 spines on lateral margin, strong, movable spine posterolaterally, and posteriorly-divergent carinae each with 3-4 spines in posterior two-thirds of dorsal surface; posterior margin rounded with median spine. Uropodal endopod smooth laterally, bearing spine at posterolateral angle, and median longitudinal carina with 5-8 spines extending to posterior margin on dorsal surface. Uropodal exopod bearing 2-5 distal spines on lateral margin, distinct, movable spine at distolateral angle, and denticulate transverse suture dorsally. Hermaphroditic, genital pores present on Ps3 and 5 coxae.

Remarks. — *Paraxiopsis brocki* is characterized as shown above, but it is found by examining and comparing the specimens with one another that this species has some variation in the characteristics of its abdominal pleura and male Plp1: (1) abdominal pleura 3 and 4 bear a denticle at the anteroventral angle, and abdominal pleuron 5 also bears a denticle at the posteroventral angle (NHM 1893.11.3.74-75, 2 males and 1 female from Macclesfield Bank, South China Sea; USNM 95562, 1 female from Bikini Atoll; from Kensley,

1996c, fig. 1), while the abdominal pleura lack such denticles (SMF 20362, 1 ovig. female, 2 males from Bora Bora, French Polynesia; MNHN Th. 1313, 1 female; from Ngoc-Ho, 1998, fig. 1); (2) male Plp1 is present as a short conical projection (ZMB 20454, 1 male, TL/CL, 21.0/6.3 mm, from Buka Island, former German New Guinea; RMNH 1167, 1 male, TL/CL, 36.0/8.5 mm, from Singapore), but it is absent in 3 males from Buka Island; or it is a slender simple protrusion tapering distally (SMF 16569, 1 male, TL/CL, 17.0/5.3 mm, from Amboina); or it is a slender, bisegmented protrusion (AM P 6824, 1 male, TL/CL, 45.0/13.5 mm, Rail Pier, Port Darwin, Northern Territory, Australia) (fig. 27C); or it is absent (SMF 20362, 1 male, TL/CL, 14.0/4.0 mm; 1 male, 12.0/3.9 mm, from Bora Bora, French Polynesia). The result of the present examination and comparison of the specimens shows, that whether the pleura are armed with denticles or unarmed, is not to be considered a valid character to distinguish one species from the other, but instead considered as intraspecific variation, and male Plp1 is absent in the smaller specimens, whereas in the larger ones, it is present and varies in shape from a simple conical protrusion to a slender bisegmented protrusion.

Type locality. — Ambon, Indonesia.

Distribution. — Kenya — off Mombasa (Sakai, 1992a); Indonesia — Ambon and Edam Island, Jakarta (De Man, 1888b), Madura Bay, Borneo Bank, anchorage off Beo, and north of Waigeo Island (De Man, 1925d); Papua New Guinea — Buka Island; Timor Sea — Ashmore Reef (Sakai, 1994); Australia — Darwin, Broome, Point Peron, Geladton, Mullaloo Beach, Rottnest Island, Cockburn Sound near Fremantle, Garden Island, Safety Bay, and Augusta (Poore & Griffin, 1979), Darwin (Kensley, 1996c); Marshall Islands — Bikini Atoll (Kensley, 1996c); Society Islands — Bora Bora (Sakai, 1992b); Tuamotu Archipelago — Fangataufa (Ngoc-Ho, 1998); reef to 91 m; Japan — Okinawa (Sakai & De Saint Laurent, 1989).

Paraxiopsis gracilimana Kensley, 1996

Paraxiopsis gracilimana Kensley, 1996c: 719, figs. 6, 7; Heard et al., 2007: 19, fig. 14.

Material examined. — RMNH D 41747, 1 female (TL/CL, 16.0/5.5 mm), Pillsbury Sta. P-1208 West Atlantic, Jamaica, 17°45.5′N 76°59.1′W, 15 m, 10′ ottertrawl, 5.vii.1970, USNM Acc. No. 381702.

Type locality. — Bonaire Harbor, Netherlands Antilles.

Distribution. — Off South Carolina (Kensley, 1996c); Florida — Looe Key reef and off Panama City (Kensley, 1996c); Gulf of Mexico (Kensley, 1996c); Netherlands Antilles — Bonaire Harbor (Kensley, 1996c); Tobago – Charlottesville (Kensley, 1996c); Belize — Carrie Bow Cay (Kensley, 1996c).

Paraxiopsis hispida Kensley, 1996

Paraxiopsis hispida Kensley, 1996c: 724, fig. 9.

Remarks. — Hermaphroditic species (Kensley, 1996c).

Type locality. — Off Yucatan Peninsula, 15°59.2′N 86°02′W, 35-37 m.

Distribution. — Off Yucatan Peninsula (Kensley, 1996c); Belize — Carrie Bow Cay (Kensley, 1996c); 24-37 m.

Paraxiopsis johnstoni Edmondson, 1925

Axiopsis (*Paraxiopsis*) *johnstoni* Edmondson, 1925: 20, fig. 4, pl. 1A.
Eutrichocheles johnstoni — Sakai & De Saint Laurent, 1989: 54.
Paraxiopsis johnstoni — Kensley, 2003, table 2.

Type locality. — John Stone Island, Hawaiian Islands.

Distribution. — Hawaiian Islands — John Stone Island (Edmondson, 1925).

Paraxiopsis majuro Kensley, 2003

Paraxiopsis majuro Kensley, 2003: 380, figs. 9, 10, pl. 7, table 2.

Type locality. — Majuro Island, Marshall Islands, patch reef in north-north-east lagoon, under rock, 10 m.

Distribution. — Only known from the type locality.

Paraxiopsis paulayi Kensley, 2003

Paraxiopsis paulayi Kensley, 2003: 372, figs. 5, 6, pl. 3, table 2.

Material examined. — USNM 296395, holotype, hermaphrodite (TL/CL, 36.0/10.5 mm), on reef flat, Luminao Reef, Guam, 10 m, 21.v.1999, leg. L. Kirkendale, det. B. Kensley.

Diagnosis of holotype specimen (USNM 296395). — Rostrum sharply triangular, with proximal spine on lateral margin. Gastric region with 5 carinae; smooth median carina with hepatic tubercle starting at rostral base, smooth submedian carinae with anterior spine, and lateral carinae with two spines including supraorbital one. A2 scaphocerite short and simple. P1 merus bearing two teeth on dorsal margin, and 4 interspaced, sharp teeth on ventral margin, carpus and palm tuberculate on lateral surface, palm tuberculate on dorsal and ventral margins, bearing distodorsal tooth and another tooth on distal margin. Cutting edge of fixed finger denticulate, and cutting edge of dactylus concave proximally and denticulate toward distal end. Genital pores present on Ps3 and 5 coxae. Plp1 present as a short, simple protrusion tapering

distally. Plp2 biramous, endopod on left side without appendix interna. Plps3-5 biramous, endopods without appendix interna. Hermaphroditic.

Remarks. — The present re-examination of the holotype specimen shows that Plp2 on the right side is missing, and Plp2 on the left side is biramous, and the endopod bears neither an appedix interna nor an appendix masculina. Considering that in *Paraxiopsis* the male Plp2 endopod bears an appendix masculina but no appendix interna, it may safely be said that the holotype specimen of *P. paulayi* was damaged and lost Plp2 on the right side and the appendix masculina of the Plp2 endopod on the left side.

Type locality. — Luminao Reef flat, Guam, 10 m.

Distribution. — Guam, Luminao Reef flat, 10 m; Double Reef, 3-4 m; south-east of Orote Peninsula, under rock.

Paraxiopsis pindatyba (Rodrigues & Kensley, 1991)

Eutrichocheles pindatyba Rodrigues & Kensley, 1991: 556, figs. 1-16, table 1; Rodrigues et al., 1998: 379; Melo, 1999: 322, figs. 217-218.

Remarks. — In *P. pindatyba* (Rodrigues & Kensley, 1991), the submedian carinae of the gastric region are smooth, the Ps1-2 fingers are shorter than the palm, and abdominal somites 1-6 are smooth laterally as in *Paraxiopsis brocki* (De Man, 1888), though pleura 2-3 are truncate ventrally, and pleura 4-5 are triangular ventrally as in the species of *Eutrichocheles*.

Type locality. — Santa Cruz, Espirito Santo, Brazil, 19°57′S 40°08′W, intertidal, under stones.

Distribution. — Only known from the type locality.

Paraxiopsis plumosimanus Kensley, 2003

Paraxiopsis plumosimanus Kensley, 2003: 376, figs. 7, 8, table 2.

Remarks. — Kensley mentioned in the remarks (Kensley, 2003: 377) that "The present specimen has both male and female genital orifices, but pleopod 1 is present, while pleopod 2 lacks an appendix masculina. The specimen is thus regarded as a female". However, the presence or absence of an appendix interna and an appendix masculina are generic features and have nothing to do with the definition of the sex of specimens. So, the present species is a hermaphroditic species.

Type locality. — Apra Harbour, Sasa Bay, Guam, sand bottom, 3-5 m.

Distribution. — Only known from the type locality.

Paraxiopsis vicina Coelho & Ramos-Porto, 1985
(fig. 28)

Axiopsis (*Paraxiopsis*) *vicina* Coelho & Ramos-Porto, 1985: 79, fig. 6; Melo, 1999: 324, figs. 219-220.

Material examined. — Holotype, male TL/CL, 23.0/7.9 mm, 2°13′S 40°43′W, Brazil.

Diagnosis. — Rostrum sharply triangular with 5 spines on each of the lateral margins, which extend posteriorly onto anterior half of gastric region as lateral

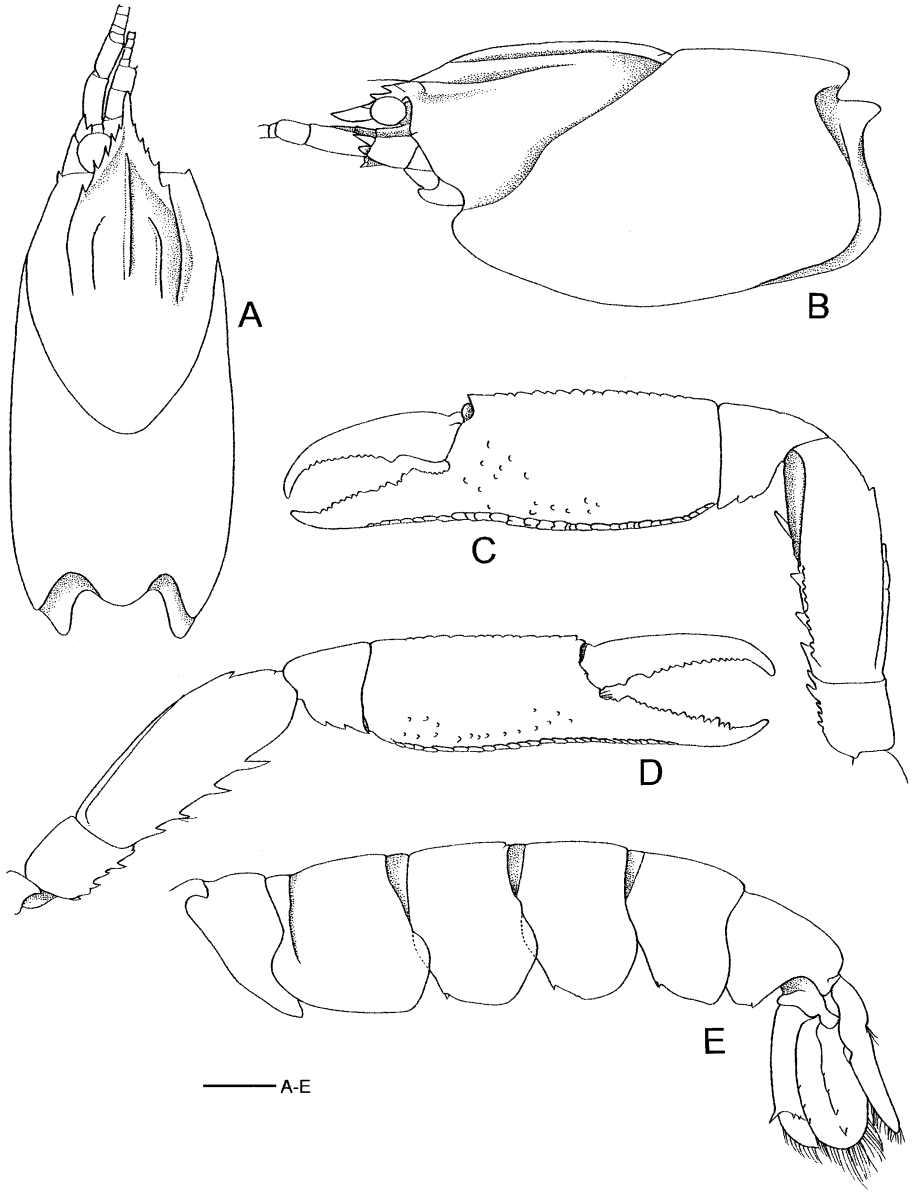

Fig. 28. *Paraxiopsis vicina* Coelho & Ramos-Porto, 1985. A, carapace, dorsal view; B, carapace, lateral view; C, cheliped on left side, lateral view; D, cheliped on right side, lateral view; E, abdomen and tail-fan, lateral view. Scale 1 mm.

carinae. Gastric region with smooth median carina starting at rostral base and extending to anterior half of gastric region, and smooth submedian carinae extending also to anterior half of gastric region (fig. 28A). A2 scaphocerite short and bilobed distally (fig. 28B). P1 subequal (fig. 28C, D); merus bearing subdistal tooth on dorsal margin, and 4 interspaced, sharp teeth on ventral margin, carpus denticulate on ventral margin, palm tuberculate on dorsal margin, bearing some tubercles on lateral surface and tuberculate plate on ventral margin. P1 fixed finger denticulate on whole cutting edge, concave proximally, bearing triangular convexity at proximal fourth followed distally by irregular denticulation towards distal end; dactylus convex and smooth proximally on cutting edge, bearing triangular convexity at proximal third followed distally by denticulation towards distal end. Abdominal somites smooth on lateral surface, pleura 3-5 bearing spine at anteroventral angle, and pleuron 6 with spine at posteroventral angle (fig. 28E). Genital pores present on P3. Male Plp1 present as a small, unsegmented protrusion; male Plp2 biramous, endopod proximally bearing appendix masculina without distal setae, but no appendix interna; Plps3-5 biramous, endopods lacking appendix interna. Uropodal exopod with distal flap (fig. 28E).

Remarks. — The present species, *P. vicina* from Brazil is closely similar to *P. brocki* from the Indo-West Pacific region, but differs in that in *P. vicina* the male P1 palm is distinctly tuberculate on the dorsal margin, bearing a tuberculate plate on the ventral margin, whereas in *P. brocki* it is slightly tuberculate on the dorsal margin (Kensley, 1996c), bearing no tuberculate plate on the ventral margin.

Type locality. — Brazil, 2°13′S 40°43′W.

Distribution. — Only known from the type locality.

Paraxiopsis sp. Robles et al., 2009

Paraxiopsis sp., Robles et al., 2009: 316.

Genus **Paraxius** Bate, 1888

Paraxius Bate, 1888: 37; Stebbing, 1893: 188; Sakai & De Saint Laurent, 1989: 34; Poore, 1994: 98 (key).

Paraxius s. str. — Borradaile, 1903: 538; De Man, 1925d: 1 (key), 18 (key); Balss, 1957: 1579.

Diagnosis. — Rostrum short, triangular, and concave dorsally, lateral margins armed with teeth, posteriorly extending shortly onto gastric region. Anterolateral margins of carapace unarmed. Gastric region convex, bearing median carina with hepatic tubercle in anterior two-thirds, and short, obscure

lateral carinae, but no submedian carinae. Cervical groove distinct only on dorsal surface. Eyes fixed on conical peduncles, cornea faded. A2 scaphocerite short and directed outward. P1 unequal; palm of larger cheliped with dorsodistal spine. No pleurobranchs. Abdominal pleura smooth on lateral surface, and rounded ventrally. Male Plp1 uniramous, bisegmented, and rod-shaped, distal segment shorter than proximal one; male Plp2 biramous, endopod bearing appendix interna with patch of hooklets distally, but no appendix masculina. Plps3-5 endopods with appendix interna. Telson longer than wide, serrate on lateral margins, and slightly convergent toward rounded posterior margin without median spine; dorsal surface with two pairs of spines medially. Uropodal endopod with two spines laterally. Uropodal exopod with transverse suture. Deep-water habitat. [Adapted from Borradaile, 1903 and Sakai & De Saint Laurent, 1989.]

Type species. — *Paraxius altus* Bate, 1888, by original designation and monotypy. The gender of the generic name, *Paraxius*, is masculine.

Species included. — *Paraxius altus* Bate, 1888.

Paraxius altus Bate, 1888
(fig. 29)

Paraxius altus Bate, 1888: 37, pl. 5 fig. 1d-z; Balss, 1925: 210; Sakai & De Saint Laurent, 1989: 35, fig. 8.

Axius (*Paraxius*) *altus* — Borradaile, 1903: 538; De Man, 1925d: 5 (list), 18 (key).

Material examined. — NHM 88.22, holotype, male (CL 8.1; Abd with telson, 19.0 mm, damaged, P1 left missing), north of Papua, 23°3′S 144°4′E, 1070 fathoms (1956.8 m), leg. “Challenger”; MNHN Th 996, 1 male (TL/CL, 17.0/5.5 mm), Philippines.

Diagnosis. — Rostrum (fig. 29A) short, triangular, and concave dorsally, lateral margins armed with 4 distinct teeth, posteriorly extending shortly onto gastric region as obscure lateral carinae. Gastric region distinctly convex, bearing short, smooth median carina in middle of dorsal surface, but no submedian carinae. Cervical groove distinct only in dorsal part. Eyes fixed on conical peduncles, cornea faded. A1 reaching distal margin of A2 penultimate segment, proximal segment with dorsal denticle in middle; scaphocerite minute and directed outward. P1 unequal; in cheliped on right side (fig. 29B) ischium with subdistal spine on ventral margin; merus with subdistal spine on dorsal margin, and denticulate with sharp subdistal spine on ventral margin; carpus short and unarmed; palm longer than fingers, dorsal margin carinate with distal tooth; dactylus with proximal and median teeth on cutting edge; and fixed finger with a series of tubercles in proximal third of cutting edge, which gradulally

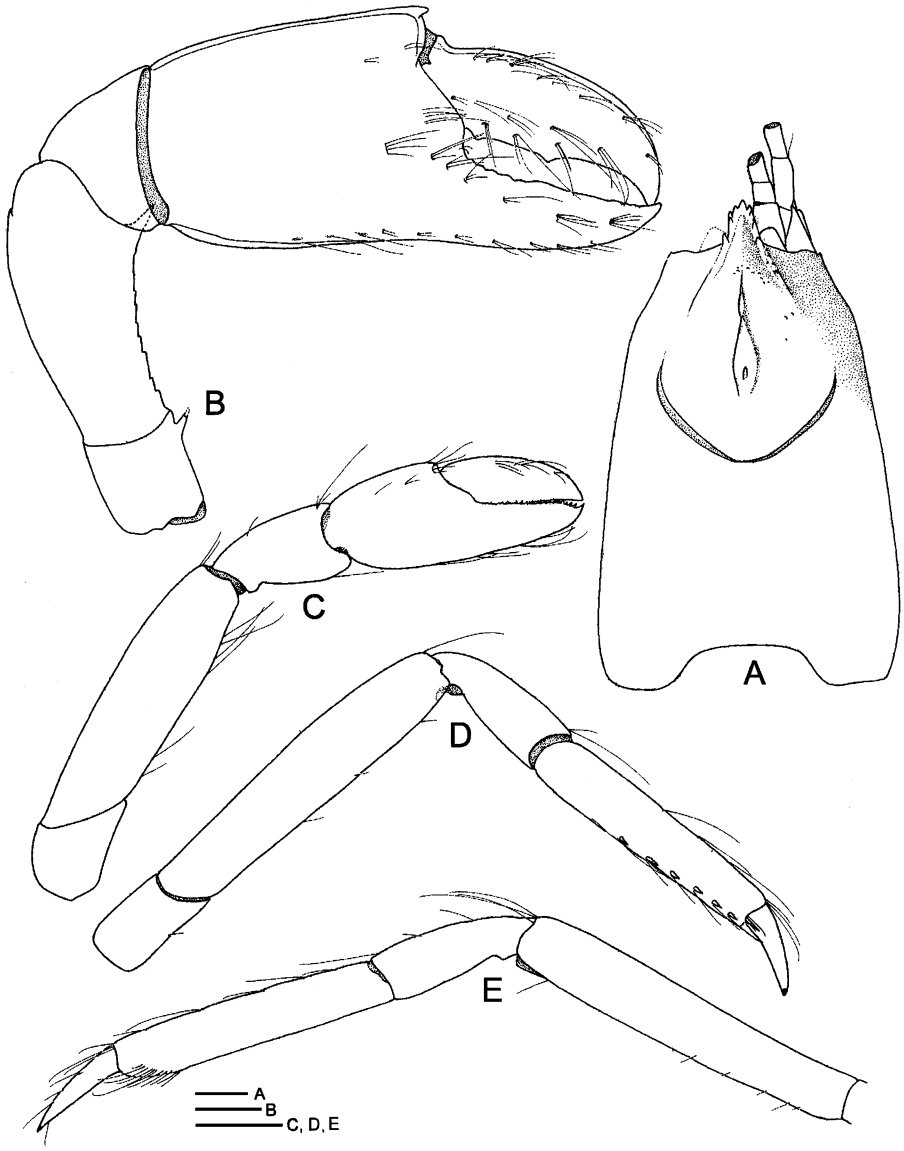

Fig. 29. *Paraxius altus* Bate, 1888. A, carapace, dorsal view; B, cheliped on right side; C, P2, lateral view; D, P3, lateral view; E, P4, lateral view. A-E, NHM 88.22, holotype, male (CL, 8.1; abd. with telson, 19.0 mm; damaged), Papua. Scales 1 mm.

become smaller in size towards distal part. Cheliped on left side missing. P2 (fig. 29C) fingers of chela about as long as palm. P3 propodus (fig. 29D) elongate, bearing a row of spinules on ventrolateral surface and strong ventrodistal spine. P4 propodus (fig. 29E) unarmed on lateral surface, but bearing oblique

row of setae near distal end and distoventral spine. P5 simple. Male Plp1 uniramous and bisegmented: distal segment simple, rod-shaped, and shorter than proximal one; male Plp2 biramous, endopod bearing appendix interna with patch of hooklets distally, but no appendix masculina; male Plps3-5 endopods with appendix interna. Telson longer than wide and denticulate on lateral margins, slightly tapering towards rounded posterior margin without median spine. Uropodal exopod with irregularly denticulate suture and movable spine at posterolateral angle. [Adapted from Sakai & De Saint Laurent, 1989, fig. 8.]

Remarks. — Bate (1888: 40) described *Paraxius altus* on the basis of a female, but the "holotype" examined (NHM 88.22) is a male, which is dissected into some parts. The gastric region is obscurely provided with median and lateral carinae. Male Plp1 on the left side and Plp2 on the right side are missing, and the exopod of Plp2 on the left side is also missing.

Type locality. — North of Papua New Guinea, 1958 m, blue mud.

Distribution. — Philippines — Sibuyan Sea (Sakai & De Saint Laurent, 1989); north of Papua New Guinea (Bate, 1888; Sakai & De Saint Laurent, 1989); 1926-1958 m.

Genus **Pilbaraxius** Poore & Collins, 2009

Pilbaraxius Poore & Collins, 2009: 267.

Diagnosis. — Rostrum acutely triangular, with a pair of lateral spines, longer than eyestalk, not depressed below level of carapace, and continuous with definite lateral carinae; supraocular spines prominent. Eyestalk cylindrical and articulating; cornea weakly pigmented. A2 scaphocerite long. Carapace smooth or tuberculate; gastric lateral carinae each with a spine; gastric submedian carinae present, each bearing spine; gastric median carina present as unarmed, weak ridge; cervical groove visible laterally over third distance to anterolateral margin; postcervical carina absent. Mxp3 exopod not clearly bent at base of flagellum. P1 slightly asymmetrical; propodus flattened; carpus-propodus unarmed and sparsely setose on dorsal margin. Ps3-5 propodi with transverse rows of robust setae; dactyli tapering, and bearing longitudinal row of robust setae. Pleurobranchs present above Ps2-4; podobranchs and arthrobranchs well developed; epipods present on Mxp2 to P4. Abdominal somites with pleura 1-2 acute, pleura 3-5 acute, bearing anteroventral tooth. Male Plp1 absent; male Plp2 endopod with appendix interna, but without appendix masculina; Plps3-5 endopods with appendix interna. Telson rounded on posterior margin, bearing fixed spines on lateral margin and robust setae at posterolat-

eral angle. Uropodal endopod without lateral and distolateral spines. Uropodal exopod with transverse suture. [Adapted from Poore & Collins, 2009.]

Type species. — *Pilbaraxius kariyarra* Poore & Collins, 2009, by original designation and monotypy. Gender of generic name, *Pilbaraxius*, masculine.

Species included. — Only known by the type species.

Pilbaraxius kariyarra Poore & Collins, 2009

Pilbaraxius kariyarra Poore & Collins, 2009: 269, figs. 32, 33, 45.
Calaxiopsis sp., Robles et al., 2009: 314.

Diagnosis. — Rostrum 0.4 times length of front-to-cervical groove, acute, elongate, with long lateral spine anterior to supraocular spine, continuous with definite gastric lateral carinae. Supraocular spines prominent. Eyestalk 0.3 length of rostrum; cornea weakly pigmented. A1 peduncle reaching to end of A2 segment 4. A2 segment 1 with two small spines on distal margin; segment 2 with straight distal spine, approximately half length of segment 2; scaphocerite simple and straight, reaching distally almost to end of segment 4; segment 3 with spine on ventral margin; segment 4 about as long as segment 2 (excluding distal spine); segment 5 about half as long as segment 4. Carapace covered with small tubercles; gastric lateral carinae each with a spine; gastric submedian carinae each with a spine; gastric median carina present as ridge extending anteriorly onto rostrum, bearing tubercle located midway between rostrum and cervical groove. Postcervical carina absent. Mxp3 basis with spine; crista dentata with 15 teeth; merus with two spines (one large and one small) on ventral margin; carpus unarmed.

P1 differentiated, and propodus of larger cheliped longer and more swollen than that of smaller cheliped. In larger (right) cheliped, coxa with spine on ventral margin; basis unarmed on ventral margin; ischium with spine on ventral margin; merus with hooked spine on convex dorsal margin, and spine and obsolete tubercle laterally on ventral margin, lateral face with broad tubercle distally and mesial face smooth; carpus tuberculate on dorsal margin, and unarmed on ventral margin, lateral face tuberculate and mesial face smooth; propodus with distal spine on dorsal margin, and low lateral carina on ventral margin, lateral face tuberculate and mesial face smooth; fixed finger 1.2 times length of dorsal palm, and cutting edge with 4 large, irregular, rounded teeth; dactylus smooth on dorsal margin, lateral and mesial faces smooth, and cutting edge with narrow proximal notch. In smaller cheliped, coxa, ischium, merus, and carpus as in larger cheliped; propodus similar except mesial face with spine near gape; fixed finger about as long as dorsal palm,

cutting edge with two large triangular teeth and smaller intermediate denticles; dactylus excavated proximaly on cutting edge. P2 unarmed; carpus slightly shorter than chela; propodus as long as dactylus. P3 unarmed; propodus 2.2 times as long as dactylus, bearing 6 marginal robust setae (some duplicated). P4 unarmed; propodus 2.2 times as long as dactylus, bearing 7 marginal robust setae (some duplicated). P5 propodus subchelate and 3.9 times as long as dactylus; fixed finger short, bearing 5 distinct robust setae; dactylus slightly flattened. Pleurobranchs present above Ps2-4; arthrobranchs on Mxp2 (rudimentary) to P4; epipods with well developed podobranchs (with up to 10 gill filaments) on Mxp2 to P3. Abdominal pleuron 1, 2.6 times as deep as middorsal length, bearing small ventral spine; pleuron 2 asymmetrical, lateral length 1.3 times dorsal length, concave ventrally, bearing two distinct ventral spines; pleura 3 and 4 tapering to ventral spine, bearing another spine located anteroventrally; pleuron 5 tapering to ventral spine, bearing another two spines located anteroventrally; pleuron 6 with ventral spine. Plp1 absent. Plp2 endopod without appendix masculina, but with slender appendix interna, and about quarter length of endopod. Telson 1.3 times as long as broad, bearing 4 spines on lateral margin, one robust seta at posterolateral angle, but no median spine on rounded posterior margin. Uropodal endopod 1.9 times as long as wide, bearing no lateral spines; dorsal surface with unarmed longitudinal ridge. Uropodal exopod 1.9 times as long as wide, bearing robust seta at posterolateral angle, but no lateral spines; dorsal surface with unarmed longitudinal ribs and unarmed transverse suture. [Adapted from Poore & Collins, 2009.]

Type locality. — Off Port Hedland, Western Australia, 401-405 m.

Distribution. — Only known from the type locality.

Genus **Pillsburyaxius** gen. nov.

Diagnosis. — Rostrum slender and rod-shaped; lateral margins armed with 2-3 spines, posteriorly extending shortly onto gastric region. Gastric region convex, bearing 5 carinae with teeth; median carina with two teeth anterior, and one posterior to hepatic tubercle, and running from rostral base to gastric region; submedian carinae with 4 teeth; lateral carinae with one buttressed tooth posterior to tooth at rostral base. Anterolateral margin of carapace usually unarmed. Cervical groove distinct. Postcervical carina poorly present. Eyestalks subglobose; cornea pigmented. A2 scaphocerite protruded forward, overreaching A2 penultimate segment. P1 asymmetrical; chelae slender in form, fingers distinctly longer than palm. Abdominal somites smooth on lateral surface, and convex to rounded ventrally; abdominal somites 4-5 bearing spinule

at anteroventral angle. Male Plps1-2 unknown. Female Plp1 uniramous and bisegmented, distal segment multiarticulate; female Plp2 biramous, endopod bisegmented, simple proximal segment and multiarticulate distal segment with appendix interna at base. Female Plps3-5 slender, endopods with appendix interna. Telson longer than wide, bearing proximal process with spine on lateral margin, and two movable spines at each posterolateral angle and median spine on posterior margin; posteriorly-divergent carinae with 2-3 spines medially on dorsal surface. Uropodal endopod bearing two lateral spines including distinct one at posterolateral angle, and median carina with 4 spines including distalmost one on posterior margin on dorsal surface. Uropodal exopod bearing two spines on lateral margin and movable spine at posterolateral angle, and transverse suture with spinules. [Adapted from Kensley, 1996b.]

Remarks. — It has turned out that *Acanthaxius kirkmilleri* Kensley, 1996b does not belong in *Acanthaxius*, because in *A. kirkmilleri* the rostrum is slender and rod-shaped, the carapace bears a poor postcervical carina, the A2 scaphocerite is protruded forward, overreaching the A2 penultimate segment, and abdominal somites 4-5 bear a spinule at the anteroventral angle. Whereas in the type species of *Acanthaxius*, *Axiopsis* (*Axiopsis*) *pilocheira* (Sakai, 1987) the rostrum is acutely triangular, the carapace bears no postcervical carina, the A2 scaphocerite is protruded either forward or laterally, not overreaching the A2 penultimate segment, and abdominal somites 4-5 are unarmed ventrally. Hence, *Acanthaxius kirkmilleri* Kensley, 1996b is reclassified here under the new genus *Pillsburyaxius* as *P. kirkmilleri* (Kensley, 1996b).

Type species. — *Acanthaxius kirkmilleri* Kensley, 1996b by present designation and monotypy. The gender of the generic name, *Pillsburyaxius*, is masculine.

Species included. — *Pillsburyaxius kirkmilleri* (Kensley, 1996b).

Etymology. — The new genus *Pillsburyaxius* is derived from the name of R/V “John Elliott Pillsbury”, by which the type specimen was collected from the Caribbean Sea.

Pillsburyaxius kirkmilleri (Kensley, 1996)

Acanthaxius kirkmilleri Kensley, 1996b: 71, figs. 1, 2.

Type locality. — Off Anguilla, Caribbean Sea, 18°26.4′N 63°12.6′W, 421-439 m.

Distribution. — Only known from the type locality.

Genus **Planaxius** Komai & Tachikawa, 2008

Planaxius Komai & Tachikawa, 2008: 22; Poore & Collins, 2009: 272.

Diagnosis. — Rostrum acutely triangular, with three teeth on each lateral margin, extending posteriorly to short lateral carina. Eyestalks rounded distally, reaching middle of rostrum; cornea distinct and located in distal half. Gastric region elevated dorsally, and lacking median and submedian carinae. P1 subequal. Abdominal somites 1-6 smooth laterally; abdominal somite 2 almost straight ventrally and protruded on ventral half of posterior margin. Male Plp1 uniramous, unsegmented, spatulate, and bilobed distally, bearing hooklets mesiomedially; male Plp2 with slender appendices interna and masculina; Plps3-5 with appendix interna. Telson with posterolateral spines; Plps3-5 with appendices internae. Uropodal exopod with distal flap. [Adapted from Komai & Tachikawa, 2008.]

Remarks. — The present genus, *Planaxius*, is similar to *Paraxius* Bate, 1888 in the shapes of the rostrum and the gastric region, but they differ in that in *Planaxius* the male Plp1 is unsegmented and spatulate, and the Plp2 endopod is provided with appendices interna and masculina, whereas in *Paraxius* the male Plp1 is two-segmented and rod-shaped, and the Plp2 endopod bears an appendix interna, but no appendix masculina. *Planaxius* is also similar to *Levantocaris* Galil & Clark, 1993 the form of the male Plps1-2, but differs from that genus, because in *Levantocaris* the gastric region, with a shorter median carina, is not as elevated as it is in *Planaxius*.

Type species. — *Planaxius brevifrons* Komai & Tachikawa, 2008, by original designation and monotypy. Gender of the generic name, *Planaxius*, masculine.

Species included. — Only the type species is known.

Planaxius brevifrons Komai & Tachikawa, 2008

Planaxius brevifrons Komai & Tachikawa, 2008: 24-29, figs. 2-6, tab. 1; Poore & Collins, 2009: 272, figs. 34, 46.

Material examined. — CBM-ZC 9226, paratype, male (TL/CL, 13.0/4.4 mm), off Kirime, Kii-Minabe, Wakayam Pref., Japan, gill-net, 80-100 m, leg T. Komai.

Diagnosis. — Rostrum acutely triangular, with three teeth on each lateral margin. Gastric region elevated with short lateral carinae, but without median and submedian carinae. Mxp3 with exopod. P1 subequal. Abdominal somites 1-6 smooth laterally. Male Plp1 uniramous, unsegmented, spatulate, and bilobed distally, bearing hooklets mesiomedially. Plp2 endopod with slender appendices interna and masculina; Plps3-5 with appendices internae. Telson

longer than wide, slightly convergent posteriorly, bearing distinct midspine followed by 3 or 4 spinules on lateral margin and spine at posterolateral angle, but no median tooth on slightly convex posterior margin. Uropodal exopod with distal flap. [Adapted from Komai & Tachikawa, 2008.]

Type locality. — Off Kirime, Minabe, Kii Peninsula, Wakayama Pref., 80-100 m.

Distribution. — Japan — Minabe, Kii Peninsula and Ogasawara Is., 47-100 m; off Jurien Bay, Western Australia.

Genus **Platyaxiopsis** gen. nov.

Diagnosis. — Rostrum triangular, lateral margins spinulate, extending onto gastric region. Gastric region slightly elevated from base of rostrum, bearing lateral carinae with some obscure tubercles, median carina with two spinules, running in anterior half, and two buttressed spinules between median and lateral carinae. Eyestalks subglobose, cornea pigmented. A2 scaphocerite prominent, peduncular segment 2 with strong dorsodistal spine. Anterolateral margin of carapace unarmed. Abdominal somite 1 deflected posteroventrally; somite 2 broad and unarmed ventrally; somites 3-5 subequal and unarmed ventrally, bearing no denticle at anteroventral angle. Male Plp1 absent; male Plp2 biramous, endopod and exopod elongate and leaf-like, endopod with appendices interna and masculina at proximal third; male Plps3-5 endopods with appendix interna. Telson longer than wide, bearing proximal lobe with spine on lateral margin, and median tooth on rounded posterior margin. Uropodal exopod without distal flap.

Remarks. — *Axius* (*Neaxius*?) *odontorhynchus* De Man, 1905 was included in *Spongiaxius* Sakai & De Saint Laurent, 1989, but it does not belong in *Spongiaxius*, because in *Axius* (*Neaxius*?) *odontorhynchus* the gastric region bears lateral carinae armed with some obscure tubercles, a median carina with two spinules running in the anterior half, and two buttressed spinules between median and lateral carinae; abdominal somite 2 is broad and unarmed ventrally; somites 3-5 are subequal and unarmed ventrally, bearing no denticle at anteroventral angle; male Plp1 is absent, and the uropodal exopod lacks a distal flap. In contrast, in the type species of *Spongiaxius*, *S. brucei* (Sakai, 1986), the gastric region is convex, bearing serrated median, submedian, and lateral carinae; the abdominal somites are almost smooth on lateral surface and acutely triangular ventrally; the male Plp1 is uniramous and bisegmented; distal segment spatulate, and the uropodal exopod bears a distal flap. For those reasons, *Axius* (*Neaxius*?) *odontorhynchus* is reclassified here under the new genus *Platyaxiopsis* gen. nov. as *P. odontorhyncha* (De Man, 1905).

Type species. — *Axius* (*Neaxius*?) *odontorhynchus* De Man, 1905, by present designation and monotypy. The gender of the new name, *Platyaxiopsis*, is feminine.

Species included. — *Platyaxiopsis odontorhyncha* (De Man, 1905).

Etymology. — The new genus is named *Platyaxiopsis*, derived from its similarity in appearance to the type species of *Platyaxius*, *P. brevirostris* Sakai, 1994.

Platyaxiopsis odontorhyncha (De Man, 1905)
(fig. 30)

Axius (*Neaxius*?) *odontorhynchus* De Man, 1905: 591.
Axius (*Axius*) *odontorhynchus* — De Man, 1925d: 3 (list), 12 (key), 18, pl. 1 fig. 1-1m.
Spongiaxius odontorhynchus — Sakai & De Saint Laurent, 1989: 42.

Material examined. — ZMA, lectotype, male (TL/CL, 9.0/3.0 mm), "Siboga" Sta. 260, north point of Nuhu Jaan Kei Island, 5°36.5′S 132°55.2′E, 90 m, 16 & 18.xii.1899.

Diagnosis. — Eyestalks stout, reaching tip of rostrum. Abdominal somite 1 deflected posteroventrally, somite 2 broad and twice as long as somite 1; somites 3-5 subequal and shorter than somite 2, bearing no denticle at anteroventral angle (fig. 30). Uropodal exopod without distal flap.

Remarks. — The present species is similar to *Platyaxius brevirostris* Sakai, 1994 in lacking a transverse suture on the uropodal exopod.

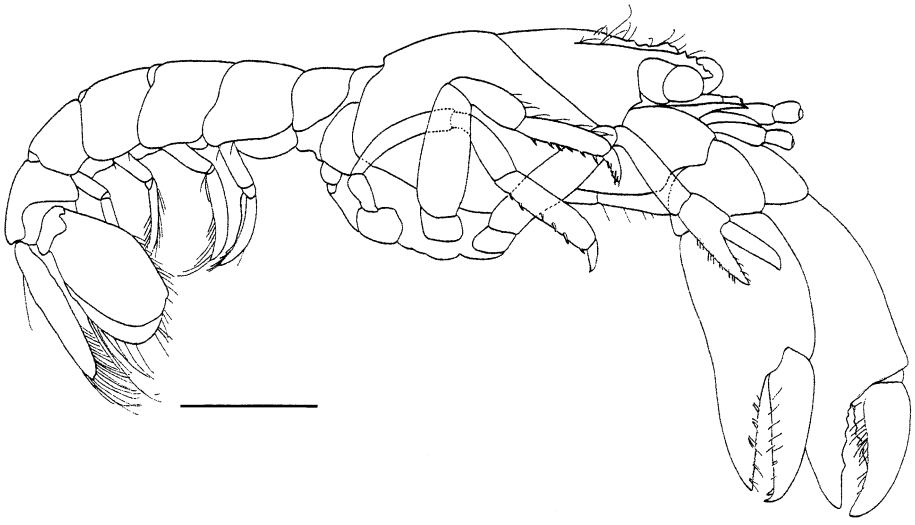

Fig. 30. *Platyaxiopsis odontorhynchus* (De Man, 1905). Lectotype, male (TL/CL, 9.0/3.0 mm), "Siboga" Sta. 260, north point of Nuhu Jaan Kei Island.

Type locality. — Kepulauan Kai, Indonesia, 5°36.5′S 132°55.2′E, “Siboga” Sta. 260, 90 m.

Distribution. — Indonesia — Kepulauan Kai (De Man, 1905), Kepulauan Kai and south coast of Timor (De Man, 1925d); 73-90 m.

Genus **Platyaxius** Sakai, 1994

Platyaxius Sakai, 1994: 180; Poore & Collins, 2009: 274.

Diagnosis. — Rostrum stoutly triangular, lateral margins spinulate, extending onto gastric region. Gastric region slightly elevated from base of rostrum, bearing 5 longitudinal carinae; lateral and submedian carinae smooth, and median carina present in anterior half, bearing denticles and distinct hepatic tubercle. Anterolateral margin of carapace unarmed. Cervical groove distinct. Eyestalk subglobose, cornea pigmented. A2 scaphocerite prominent, peduncular segment 2 with strong dorsodistal spine. P1 subequal. Ps3-4 propodi with transverse rows of spines ventrolaterally; dactyli with longitudinal rows of spines on lateral surface. Abdominal somite 1 deflected posteroventrally, somite 2 broadly rounded ventrally; somites 3-5 rounded ventrally, bearing denticle at anteroventral angle. Male Plp1 absent; male Plp2 biramous, endopod and exopod elongate and leaf-like, endopod with appendices interna and masculina at proximal third; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and bisegmented, proximal segment and multiarticulate flagellum; female Plps2-5 biramous, endopods with appendix interna. Telson longer than wide, lateral margins each with proximal lobe with spine; posterior margin rounded, without median tooth. Uropodal endopod bearing spinules on distal half of lateral margin, serrated protrusion at posterolateral angle, and a longitudinal row of 4 interspaced teeth medially on dorsal surface. Uropodal exopod without distal flap.

Type species. — *Platyaxius brevirostris* Sakai, 1994, by original designation. Gender of generic name, *Platyaxius*, masculine.

Species included. — *Platyaxius brevirostris* Sakai, 1994; *P. bardi* Poore & Collins, 2009.

Key to the Species of the Genus *Platyaxius*

1 – Gastric submedian carina smooth ..... *P. brevirostris*
– Gastric submedian carina denticulate ..... *P. bardi*

Platyaxius bardi Poore & Collins, 2009

Platyaxius bardi Poore & Collins, 2009: 274, figs. 35, 36, 47.

Diagnosis. — Rostrum 0.3 times length of front-to-cervical groove, narrowly triangular, with 4 weak lateral spines anterior to supraocular spine, and continuous with definite gastric lateral carinae. Supraocular spines similar in size to other rostral spines. Eyestalk 0.8 length of rostrum: cornea pigmented. A1 peduncle reaching to distal part of A2 segment 4. A2 segment 1 with two spinules on ventrodistal margin; segment 2 with well developed distal spine, reaching to proximal part of A2 segment 5; scaphocerite strongly curved downwards, reaching distally almost to end of segment 4; segment 3 with spine on ventral margin; segment 4 approximately as long as segment 2 (excluding distal spine); segment 5 about two-thirds length of segment 4. Carapace smooth; gastric lateral carina with two prominent spines in addition to supraocular spine; gastric submedian carina with 4 spines; gastric median carina with 6 spines. Mxp3 basis with spine; ischium with spine on ventral margin; crista dentata with numerous small, even teeth; merus with three spines on ventral margin; carpus unarmed.

P1 differentiated, and propodus of larger cheliped longer and more swollen than that of smaller cheliped. In larger (left) cheliped, coxa with spine on ventral margin; basis unarmed on ventral margin; ischium with 4 small spines and one larger on ventral margin; merus unarmed and strongly convex on dorsal margin, bearing 10 teeth on ventral margin, lateral and mesial faces smooth; carpus carinate on dorsal margin, and unarmed on ventral margin, lateral and mesial faces smooth; propodus with blunt tooth on carinate dorsal margin, and weak lateral carina along ventral margin, better defined on fixed finger, lateral face tuberculate over dorsal and ventral distal third, and mesial face tuberculate near base of fixed finger; fixed finger 0.6 length of dorsal palm, cutting edge straight; dactylus smooth on margins and faces, cutting edge with few blunt teeth. Smaller cheliped narrower than larger cheliped. In smaller cheliped, coxa, ischium, merus and carpus, as in larger cheliped; propodus with blunt distal tooth on carinate dorsal margin, and weak lateral carina along ventral margin, better defined on fixed finger, lateral face with few tubercles and mesial face with few tubercles near base of fixed finger; fixed finger as long as dorsal palm, cutting edge with regularly spaced sharp teeth; dactylus smooth on margins and faces, and cutting edge denticulate. P2 ischium unarmed on ventral margin; merus unarmed on ventral margin; carpus slightly longer than chela; propodus dorsal margin 0.4 length of dactylus. P3 merus with three weak spines on ventral margin; propodus 2.9 times as long

as dactylus, bearing 8 transverse rows each of 4-7 robust setae; dactylus with 13 robust setae on mesial face plus unguis. P4 propodus 4.1 times as long as dactylus, bearing 8 transverse rows each of 3-8 robust setae; dactylus with 12 robust setae on mesial face plus unguis. P5 propodus 3.5 times as long as dactylus, and weakly subchelate, bearing distally two transverse rows each of 2 or 3 robust setae; dactylus with 6 robust setae on distal margin, and three robust setae on mesial face.

Abdominal pleuron 1, 2.6 times as deep as middorsal length, and acute ventrally; pleuron 2 asymmetrical, lateral length 1.2 times dorsal length, and quadrate posteroventrally; pleura 3-5 angled posteroventrally, each bearing small anteroventral spine; pleuron 6 with small spine on ventral margin. Plp2 appendix masculina as long as appendix interna. Plps2-5 with appendix interna one-third length of endopod. Telson ovate, 1.1 times as long as wide, and slightly tapering posteriorly, bearing three spines on lateral margin, robust seta at posterolateral angle, and median spine on convex posterior margin; dorsal surface with two oblique rows of two spines. Uropodal endopod 1.7 times as long as wide, bearing 7 lateral spines; dorsal surface with longitudinal ridge with 4 spines (including marginal one). Uropodal exopod 1.6 times as long as wide, bearing 11 spines on lateral margin, and fixed spine and robust seta at posterolateral angle; dorsal surface with two longitudinal ribs (inner rib ending in marginal spine, outer rib with 7 spines) but without transverse suture. [Adapted from Poore & Collins, 2009.]

Type locality. — Near Mermaid Reef, Western Australia, 178-184 m.

Distribution. — Continental slope of North-West Shelf; 178-184 m.

Platyaxius brevirostris Sakai, 1994

Platyaxius brevirostris Sakai, 1994: 181, 200 (key), figs. 4-5; Poore & Collins, 2009: 277.

Diagnosis. — Abdominal somite 1 deflected posteroventrally, somite 2 broadly rounded ventrally; somites 3-5 rounded ventrally, bearing denticle at anteroventral angle. Male Plp1 absent; male Plp2 endopod with appendices interna and masculina (Sakai, 1994, fig. 4f); male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and bisegmented, proximal segment and multiarticulate flagellum; female Plps2-5 endopods with appendix interna.

Type locality. — North West Shelf, Western Australia, 18°33.4′S 118°35.4′E, 141 m.

Distribution. — Australia — North West Shelf (Sakai, 1994); 141 m.

Genus **Pseudoaxiopsis** gen. nov.

Diagnosis. — Rostrum triangular and pointed at apex; lateral margins spinulate, extending posteriorly onto gastric region as lateral carinae. Gastric region convex, bearing 5 longitudinal carinae; median carina tuberculate, running from middle of rostrum nearly to cervical groove, and bearing short double carina with tubercles in middle; submedian carinae tuberculate; and lateral carinae denticulate anteriorly but tuberculate posteriorly. Anterolateral margin of carapace armed with a small spine just above A2. Cervical groove distinct. Eyestalks subglobose; cornea pigmented. A2 scaphocerite strongly protruded forward. P1 subequal; fingers longer than palm. P2 fingers longer than palm. Abdominal terga 1-6 with carina in longitudinal stripes. Abdominal somite 1 narrow and pointed ventrally; somites 2-4 provided laterally with longitudinal carina between tergum and pleuron; somites 5-6 without longitudinal carina laterally; pleura 2-4 triangular and pleura 5-6 rounded ventrally; pleura 4-5 with spinule on anteroventral margin, and pleuron 6 with spinule ventrally. Male Plp1 absent; male Plp2 biramous, endopod with appendices interna and masculina at proximal third; appendix interna slightly longer than appendix masculina with distal setae; male Plps3-5 endopods with appendix interna. Telson longer than wide, bearing posteromedian tooth. Uropodal exopod with transverse suture.

Remarks. — Poore & Griffin (1979: 230, fig. 4) described *Axiopsis* (*Axiopsis*) *consobrina* on the basis of two specimens (male and female), but their male specimen is different from *Axiopsis consobrina* De Man, 1905 as follows. In De Man's (1905) *A. consobrina* the abdominal somites are smooth dorsally and laterally, and their pleura are truncate or triangularly protruded on the ventral margin; the P1 are unequal; the fingers are shorter than the palm; the P2 fingers are shorter than the palm; and the gastric median carina is denticulate throughout its length. In Poore & Griffin's (1979) *A. consobrina* the abdominal somites 2-4 are each provided with a longitudinal carina on the dorsal surface, pleura 2-4 are triangular ventrally, pleura 4-5 bear a spinule on the anteroventral margin, and pleuron 6 also bears a spinule ventrally; P1 are subequal; the fingers are longer than the palm; the P2 fingers are longer than the palm; and the gastric median carina, running from the middle of the rostrum to near the cervical groove, is tuberculate with a short double carina with tubercles in the middle. For those reasons, the specimen identified as *A.* (*A.*) *consobrina* by Poore & Griffin (1979) is considered to be a new species, and, therefore, reclassified here under the new genus *Pseudoaxiopsis* as the type species, *P. carpentariaensis* sp. nov.

Type species. — *Pseudaxiopsis carpentariaensis* gen. et sp. nov., by present designation and monotypy. The gender of the new generic name, *Pseudaxiopsis*, is feminine.

Species included. — *Pseudaxiopsis carpentariaensis* gen. et sp. nov.

Etymology. — The Greek prefix "pseud-", meaning "false", is added to the generic name *Axiopsis*, because the type species, *P. carpentariaensis* is closely similar to the species of the genus *Axiopsis*.

Pseudoaxiopsis carpentariaensis sp. nov.
(figs. 31, 32)

Axiopsis (*Axiopsis*) *consobrina* — Poore & Griffin, 1979: 230, fig. 4a-d [not fig. 4e = *Axiopsis consobrina* De Man, 1905].

Material examined. — AM P 16308, holotype, male (TL/CL, 52.0/18.2 mm), Gulf of Carpentaria, Queensland, Sta. 363, less than 14 fms [less than 25 m], 1963-64, leg. CSIRO Prawn Survey, det. G. Poore as *Axiopsis consobrina*.

Diagnosis of male holotype (fig. 31A). — Body scattered with short stiff setae and granules. Rostrum (fig. 31B) acutely triangular and deflexed downward distally and almost twice as long as wide at base, lateral margins each with about 7 spines, extending posteriorly onto gastric region as lateral carinae. Gastric region convex, bearing 5 longitudinal carinae; median carina tuberculate, originating from middle of rostrum to near cervical groove, and bearing short double carina with tubercles in middle; submedian carinae tuberculate, lateral carinae denticulate anteriorly but tuberculate posteriorly, and both lateral and submedian carinae also extending to near cervical groove. Anterolateral margin of carapace with a small spine just above rounded convexity at level of A2 peduncle, and below it two swellings; branchial region with anterior spine. A1 peduncle reaching proximal half of A2 penultimate segment. A2 peduncular segment 1 denticulate, with distinct distolateral tooth on dorsodistal margin; segment 2 elongate to form dorsodistal spine, bearing spine dorsoproximally; scaphocerite strong, reaching distal margin of penultimate segment, segment 3 terminated with ventrodistal spine. Eyestalks subglobose, reaching half length of rostrum. Mxp3 (fig. 31C) coxa with stout mesiodistal tooth; ischium with three mesial teeth; merus with 5 mesial spines increasing in length distally; propodus unarmed; and dactylus setose on distal half of ventral margin. P1 subequal. In left cheliped (fig. 32A), coxa with mesiodistal spine; merus with scale-like granules with setae on lateral surface, scale-like denticles on ventrolateral margin, 4 distinct ventral spines on ventromesial margin, and subdistal spine on dorsal margin; carpus smooth

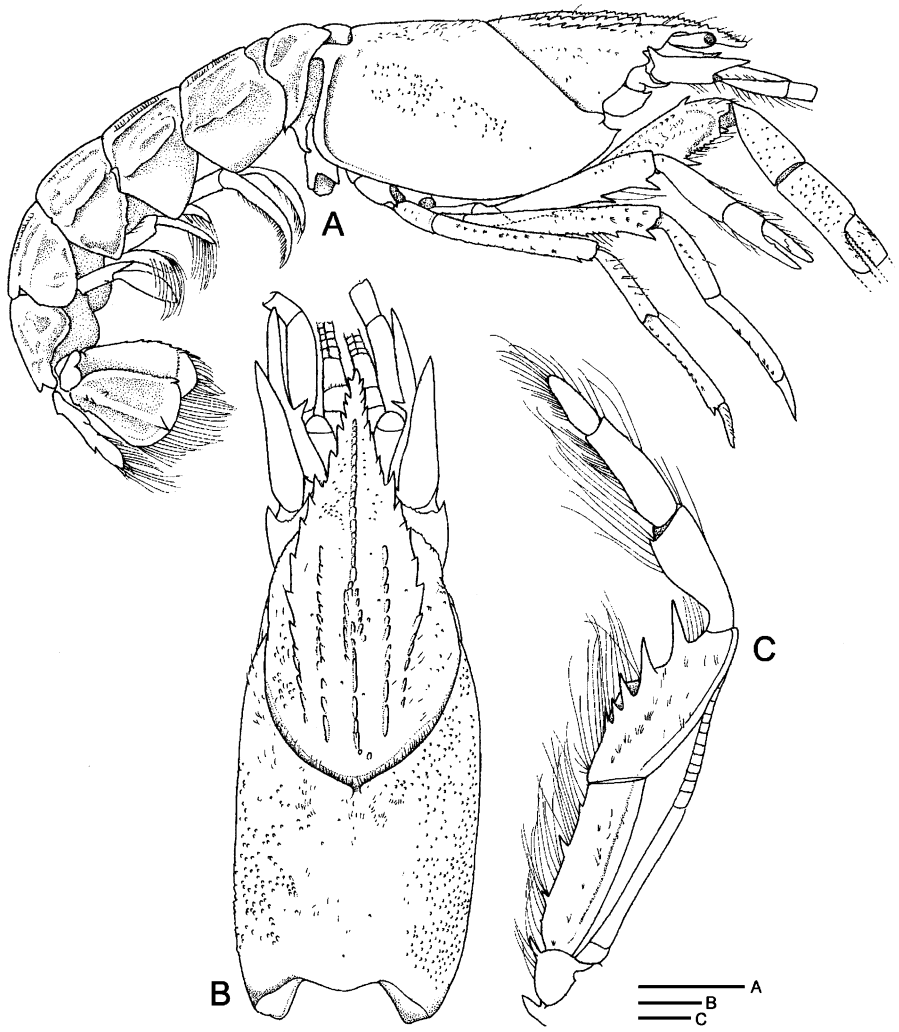

Fig. 31. *Pseudoaxiopsis carpentariaensis* sp. nov. A, whole body, lateral view; B, carapace, dorsal view; C, Mxp3. A-C, AM P 16308, holotype, male (TL/CL, 52.0/18.2 mm), Gulf of Carpentaria, Queensland. Scales A, 2 mm; B, C, 1 mm.

on ventral margin; palm with distodorsal spinule and unarmed ventrally, cutting edges of fingers dentate; dactylus as long as fixed finger; ratio of dorsal lengths of merus : carpus : propodus = 1.0 : 0.6 : 1.0. Right cheliped similar to left cheliped, but more slender: distal parts of fingers lost. P2 chelate; coxa with mesiodistal spine; ischium with distinct proximal and distal teeth, and three denticles on ventral margin; merus with 4 spines on ventral margin; fingers longer than palm. P3 merus with row of denticles and subdistal spines

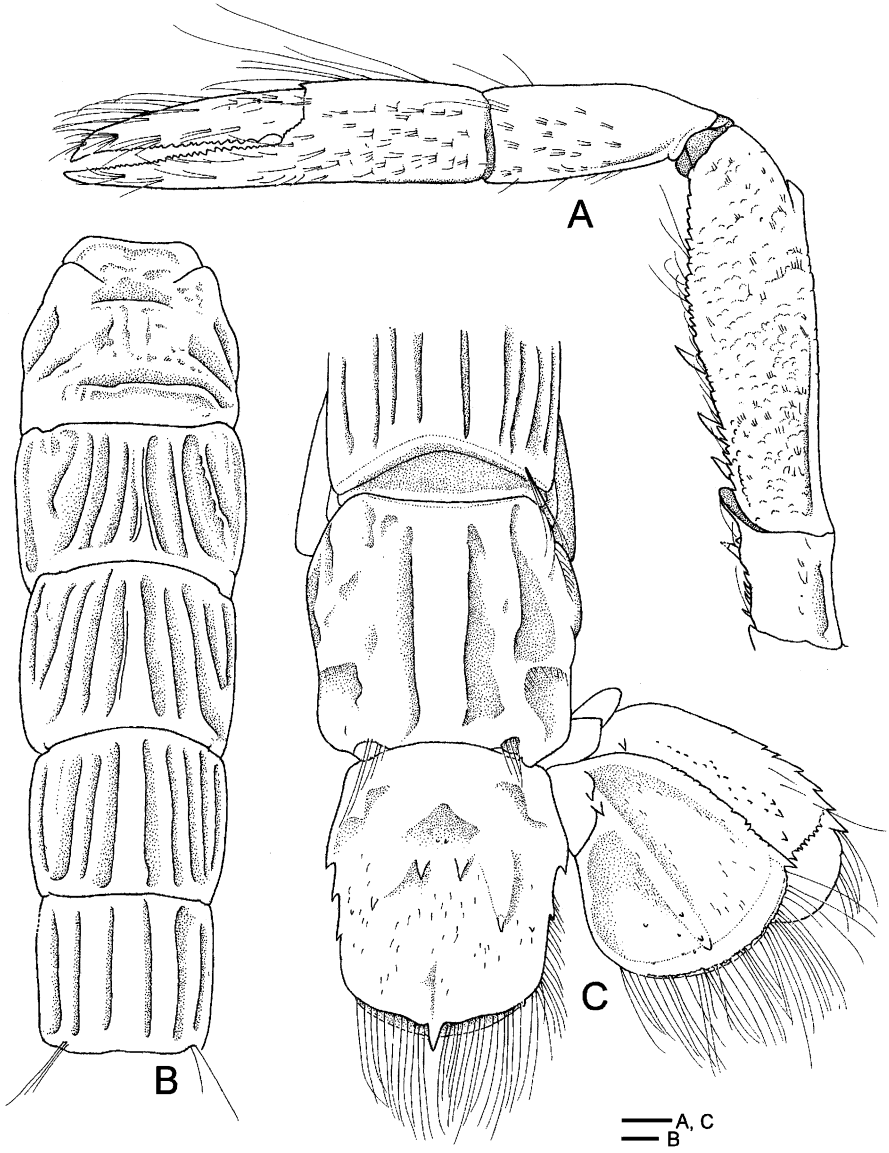

Fig. 32. *Pseudoaxiopsis carpentariaensis* sp. nov. A, P1 on left side; B, abdominal somites 1-5, dorsal view; C, abdominal somite 6, telson, and uropod on right side. A-C, AM P 16308, holotype, male (TL/CL, 52.0/18.2 mm), Gulf of Carpentaria, Queensland. Scales 1 mm.

on ventral margin; propodus elongate, with spinules on ventrolateral margin. P4 merus similar to P3 merus, but more slender. P5 missing. Abdominal somites 1-6 bearing characteristic tergum composed of carinae arranged in longitudinal stripes (fig. 32B, C). Male Plp1 absent; male Plp2 endopod with

appendices interna and masculina at proximal third, appendix interna slightly longer than appendix masculina, with distal setae; Plps3-5 endopods with appendix interna. Telson and uropods setose on posterior margin. Telson (fig. 32C) longer than wide; lateral margins almost parallel, each bearing proximal lobate process with spine, followed distally by 1-2 spines; posterior margin rounded with median spine; two pairs of spines medially on dorsal surface. Uropodal endopod denticulate, with spine at distolateral angle, bearing median carina with three distal spines dorsally. Uropodal exopod bearing 5 spines on lateral margin, and longitudinal ridge with spinules and transverse suture with spinules on dorsal surface.

Remarks. — Poore & Griffin (1979: 230, fig. 4) described one male (AMP 16308) and one female (AMP 24677), both from the Gulf of Carpentaria, Queensland, and regarded them as *Axiopsis consobrina* De Man, 1905, though the female specimen is inaccessible, because it was lost (G.C.B. Poore, in litt.). However, it is found in the present revision, by carefully examining the male specimen, that the gastric region is convex, bearing five longitudinal carinae; the median carina is tuberculate, originating from the middle of the rostrum to near the cervical groove, and bearing a short double carina with tubercles in the middle; the submedian carinae are tuberculate, and the lateral carinae are denticulate anteriorly but tuberculate posteriorly, both the lateral and submedian carinae are also extending to near the cervical groove (fig. 31B); the chelipeds on the left and right side are slender; the cheliped on the right side is cut off at the distal half of the chela (fig. 31A), and the larger cheliped propodus on the left side (fig. 32A) is slender with smooth dorsal and ventral margins, the surface is scattered with short vertical rows of setae, the cutting edges of the fingers are minutely and regularly dentate; the ratio of dorsal lengths of merus : carpus : propodus = 1 : 0.6 : 0.4; and male abdominal somite 1 is narrow and pointed ventrally; somites 2-4 are provided laterally with a longitudinal carina between tergum and pleuron; somites 5-6 are not provided laterally with a longitudinal carina; pleura 2-4 are triangular, and pleura 5-6 are rounded ventrally, pleura 4-5 bear a spinule on the anteroventral margin, and pleuron 6 is provided ventrally with a spinule (fig. 31A).

It is noted that there are some differences between Poore & Griffin's (1979) description and the present description. Nonetheless, the male specimen identified as *Axiopsis consobrina* by Poore & Griffin (1979) is clearly different from *Axiopsis consobrina* De Man, 1905, in which the gastric region bears lateral carinae with 8-9 denticles; submedian rows of 8-9 denticles, and a median row of 15 denticles including a hepatic tubercle, lacking a short double

carina in the middle. Also, "the lower angle of the pleura of the 1st somite is obtuse, presenting no small tooth; the regularly rounded, posterior margin of the pleura of the 2nd somite curves regularly into lower border, which is also the case in the pleura of the 3rd; those of the 4th an angle is still barely distinguishable, but only in the 5th an obtuse angle is observed" (De Man, 1925d: 81) and in the paralectotype of *A. consobrina* examined, abdominal somites 1-6 are smooth and bear no longitudinal carina between tergum and pleuron, and pleura 2-5 are convex or rounded ventrally (see fig. 7A). For those reasons mentioned, the male specimen must clearly be assigned to a new species and included into a new genus, *Pseudoaxiopsis*, as *P. carpentariaensis* sp. nov. Regarding the missing female specimen from the same locality, it is probable that the female specimen was not *Axiopsis consobrina* De Man either, because its larger cheliped (Poore & Griffin, 1979, fig. 4e) is quite different from that of *Axiopsis consobrina* De Man.

Type locality. — Gulf of Carpentaria, Queensland.

Distribution. — Only known from the type locality.

Etymology. — The new species is named *Pseudaxiopsis carpentariensis* sp. nov. after its type locality, Carpentaria, Queensland, where the holotype was collected.

Genus **Ralumcaris** gen. nov.

Diagnosis. — Rostrum short and triangular, unarmed on lateral margins, and proximally with a pair of distinct supraorbital spines. Gastric region distinctly elevated, bearing smooth median carina running to near cervical groove in male, though only in anterior half in female, but no submedian and lateral carinae. P1 chelate; merus with low triangular tooth on ventral margin. Abdominal somites smooth laterally. Male Plp1 absent; male Plp2 endopod without appendix interna, but with appendix masculina at proximal third; male Plps3-5 endopods without appendix interna. Uropodal exopod with distal flap.

Remarks. — *Axiopsis* (*Paraxiopsis*) *bisquamosa* De Man, 1905 was included in the genus *Eutrichocheles* by Sakai & De Saint Laurent (1989) as *E. bisquamosa* (De Man, 1905). However, it has turned out that *E. bisquamosa* is very different from the type species of *Eutrichocheles*, *E. modestus* (Herbst, 1796). *E. modestus* is a large-sized species, the scaphocerite is bifurcate, the gastric region bears median, submedian, and lateral carinae, and the postcervical carina is often present; and the male Plp1 is a simple stubby protrusion. Whereas *E. bisquamosa* is a small-sized species; the scaphocerite is small and

simple; the gastric region bears only a smooth median carina; the male Plp1 is absent. For those reasons, *E. bisquamosa* is excluded from *Eutricholeles* and reclassified here under the new genus *Ralumcaris* as *R. bisquamosa* (De Man, 1905).

Type species. — *Axiopsis* (*Paraxiopsis*) *bisquamosa* De Man, 1905, by present designation and monotypy. The gender of the new generic name, *Ralumcaris*, is feminine.

Species included. — *Ralumcaris bisquamosa* (De Man, 1905).

Etymology. — The new generic name *Ralumcaris* is derived from the type locality, "Ralum, New Pommerania", now a camp at Rabaul on New Britain (Bismarck Archipelago, Papua New Guinea); "New Pommeriana" comes from the German colonial name of the island that was called "Neu Pommern".

Ralumcaris bisquamosa (De Man, 1905)
(figs. 33, 34)

Axiopsis (*Paraxiopsis*) *bisquamosa* De Man, 1905: 597; De Man, 1925d: 7 (list), 72 (key), 109, pl. 8 fig. 20-20c, pl. 9 fig. 20d-m; Holthuis, 1953b: 51.
Eutrichocheles bisquamosa — Sakai & De Saint Laurent, 1989: 53, fig. 15; Kensley, 1994: 822.

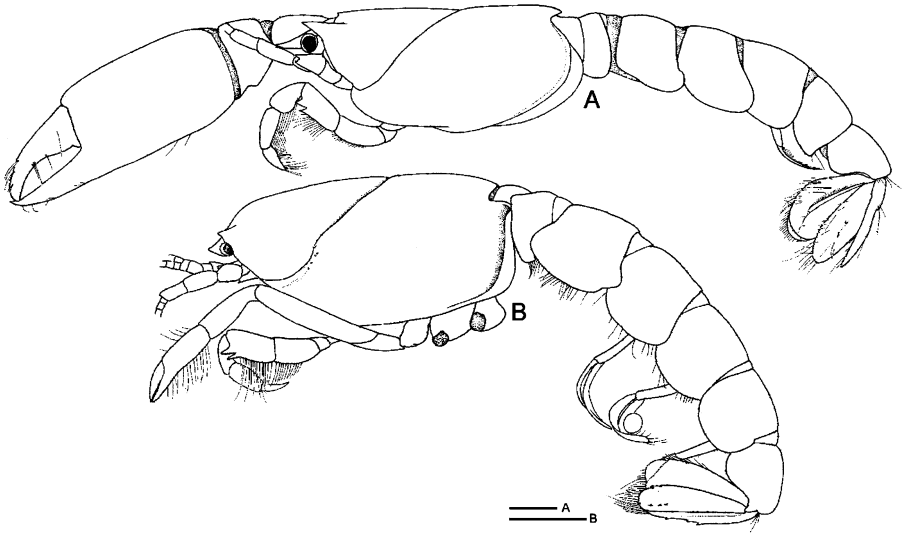

Fig. 33. *Ralumcaris bisquamosa* (De Man, 1905). A, B, whole body, lateral view. A, ZMA Crust. De. 102.674, lectotype, male (TL/CL, 10.5/3.5 mm), anchorage off Lirung, Salibabu-Island, "Siboga" Sta. 133, up to 36 m; B, ZMB 20455, 1 ovig. female (TL/CL, 20.0/6.1 mm), Ralum, New Pomerania. Scales 1 mm.

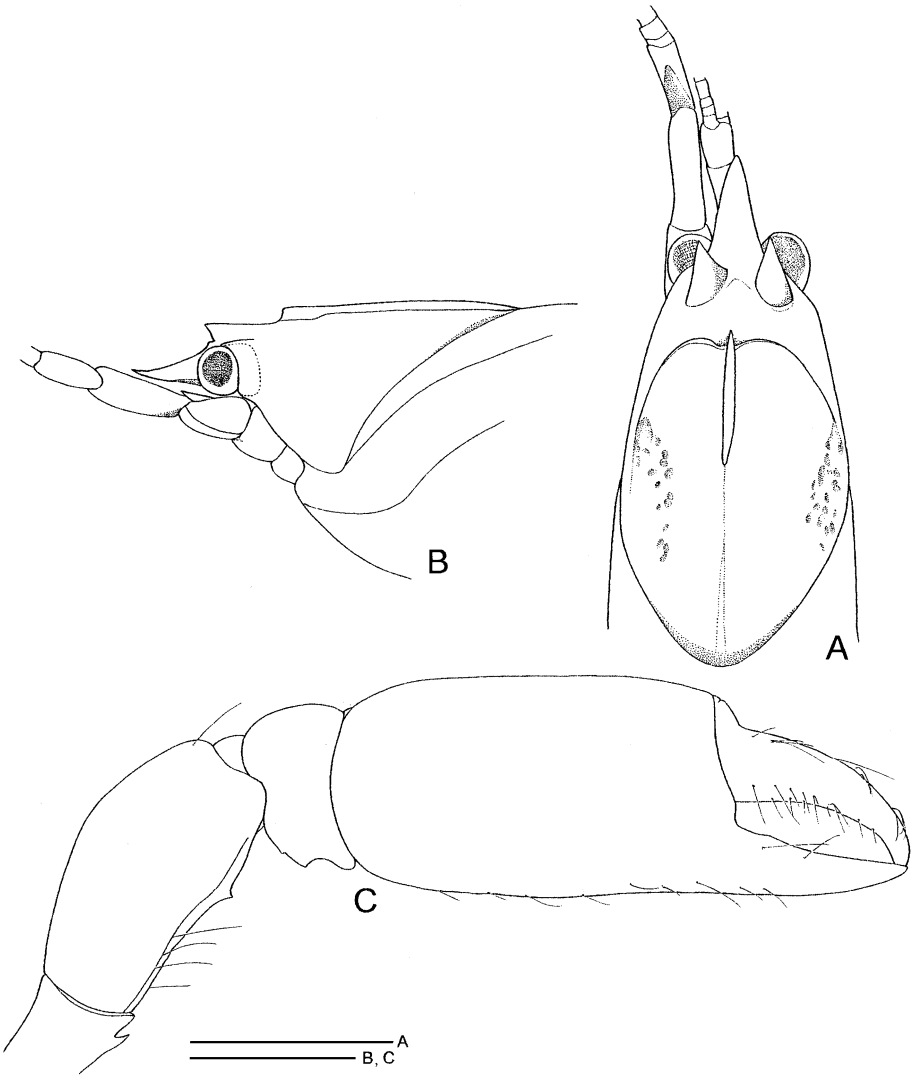

Fig. 34. *Ralumcaris bisquamosa* (De Man, 1905). A, gastric region of carapace, dorsal view; B, same, lateral view; C, larger cheliped, lateral view. A-C, ZMA Crust. De. 102.674, lectotype, male (TL/CL, 10.5/3.5 mm), anchorage off Lirung, Salibabu-Island, "Siboga" Sta. 133, up to 36 m. Scales 1 mm.

Paraxiopsis bisquamosa — Kensley, 1996c: 711, 712; Kensley, 2003: 372, table 2.

Material examined. — ZMA Crust. De. 102.674, lectotype, male (TL/CL, 10.5/3.5 mm) (fig. 33A), anchorage off Lirung, Salibabu-Island, "Siboga" Sta. 133, up to 36 m; ZMB 20455, 1 male (TL/CL, 11.0/4.2 mm), 2 ovig. females (TL/CL, 18.0/5.7; 20.0/6.1 mm) (fig. 33B),

Ralum, New Pommerania, 24.x.1896, leg. S. Dahl, det. De Man (De Man, 1925d: 190, shown as No. 18713 of the Berlin Museum).

Diagnosis. — Rostrum (figs. 33A, B, 34A, B) small and triangular, and slightly upturned, lateral margins unarmed, bearing proximally a pair of distinct supraorbital spines. Gastric region steeply elevated from base of rostrum, bearing median carina running to near cervical groove in male (ZMB 20455), though only in anterior half in female, and lateral carinae originating from behind supraorbital spines to near cervical groove, but no submedian carinae. Cervical groove distinct; no linea thalassinica. Posterior lobes present. A2 peduncular segment 2 not forming distodorsal spine; A2 scaphocerite small and simple. Mxp3 with denticulate ischial crest. P1 chelate, merus with low triangular tooth on ventral margin (fig. 34C). Ps3-4 propodi with series of ventral setae, bearing slender but distinct distoventral spines; P5 simple. Abdominal somites smooth laterally (fig. 33A, B). Male Plp1 absent; male Plp2 endopod with appendix masculina at proximal third, but without appendix interna; male Plps3-5 biramous, endopods without appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum, and female Plps2-5 biramous, endopods without appendix interna. Telson longer than wide, bearing proximal lobe with spine on lateral margins, and median spine on rounded posterior margin. Uropodal endopod bearing three spines including distal one on distal half of lateral margin, and longitudinal median carina with 4 spines on dorsal surface. Uropodal exopod bearing 4 spines on lateral margin and movable spine at distolateral angle, and transverse suture with spinules dorsally.

Type locality. — Anchorage off Lirung, Salibabu Island, “Siboga” Sta. 133, up to 36 m.

Distribution. — Indonesia — Salibabu Island (De Man, 1905, 1925; Sakai & De Saint Laurent, 1989); Mariana Islands — Saipan; Papua New Guinea – Ralum, Gazelle Peninsula (De Man, 1925d); up to 36 m.

Genus **Scytoleptus** Gerstaecker, 1856

Scytoleptus Gerstaecker, 1856: 155; Borradaile, 1903: 539; De Man, 1925d: 1 (key), 49; Barnard, 1950: 498 (key), 499; Poore & Griffin, 1979: 243; Sakai & De Saint Laurent, 1989: 36; Poore, 1994: 97 (key); Sakai, 1994: 180; Poore & Collins, 2009: 277.
Evaxius Kingsley, 1882: 126.

Diagnosis. — Rostrum small, short, and triangular, with pointed apex, bearing supraorbital spines at base. Anterolateral margin of carapace unarmed. Gastric region extremely elevated from base of rostrum, bearing median carina

and lateral carinae, but no submedian carinae. Eyestalks subglobose; cornea pigmented. A2 scaphocerite present as small plate. P1 unequal; palm much longer than fingers, and unarmed on dorsal margin. Ps3-4 propodi with transverse rows of spines ventrolaterally, and dactyli with lateral row of spines. Ps3-5 subchelate. Pleurobranchs on Ps2-4. Male Plp1 uniramous, and unsegmented or bisegmented; male Plp2 biramous, endopod with appendices interna and masculina; male Plps3-5 biramous, endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 endopods with appendix interna. Telson strongly convex dorsally and ovate, tapering towards rounded posterior margin with or without median spine. Uropods convex dorsally; exopod without distal flap.

Type species. — *Scytoleptus serripes* Gerstaecker, 1856, by original designation and monotypy. Gender of the generic name, *Scytoleptus*, masculine.

Species included. — *Scytoleptus barbatus* sp. nov. and *S. serripes* Gerstaecker, 1856.

KEY TO THE SPECIES OF THE GENUS *SCYTOLEPTUS*

1 – Gastric median carina running from base of rostrum onto vertically elevated anterior gastric region, bearing two spines on its vertical slope . . . . . *S. barbatus* sp. nov.
– Gastric median carina running from base of rostrum onto slantingly elevated anterior gastric region with three spines on its slanting slope . . . . . *S. serripes*

Scytoleptus barbatus sp. nov.
(figs. 35, 36)

Scytoleptus serripes — Strahl, 1862a: 1055 [type locality: Luzon]; Strahl, 1862b: 383; Estampador, 1937: 500; Poore & Griffin, 1979: 243, fig. 11; Sakai, 1994: 180, 200 (key), fig. 3; Poore & Collins, 2009: 277.

Material examined. — AM P 72878, holotype, male (TL/CL, 69.0/22.6 mm), between Cape Bossutt and Broome, W. Australia, dredged, 11.ix.1929; AM P 72879, allotype, female (TL/CL, 61.0/23.5 mm), between Cape Bossutt and Broome, Australia, dredged, 11.ix.1929; AM P 72875, paratypes, 2 females (TL/CL, 44.0/15.5; 68.0/23.0 mm), East Poiny, Port Darwin, Australia, 27.vi.1929; AM P 72876, paratype, 1 male (TL/CL, 40.0/14.3 mm), N.W. of South Shell Is., Port Darwin, dredged, 5 fms [ca. 9 m], 24.vii.1929; AM P 72877, paratype, 1 female (TL/CL, 74.0/23.2 mm), between Cape Bossutt and Broome, Australia, dredged, 10.ix.1929; AM P 72880, paratypes, 1 male (TL/CL, 68.0/20.9 mm), 2 females (TL/CL, 66.0/22.4; 78.0/25.8 mm), Dudley Rey, Darwin, Northern Territory, 13.x.1965, leg. B. Pope; AM P 72881, paratype, 1 male (TL/CL, 75.0/23.3 mm), Dudley Rey, Darwin, Northern Territory, 13.x.1965, leg. B. Pope; RMNH D 37756, 1 male (TL/CL, 38.0/13.3 mm), Australia, North Kimberley, east of Montaliver Island, Sta. 50, intertidal, 15.vii.1988, WAM 1023-88; NHM 1843.6, 1 female (TL/CL, 35.0/13.8 mm, smaller cheliped missing), S. Philippines, leg. Cuming.

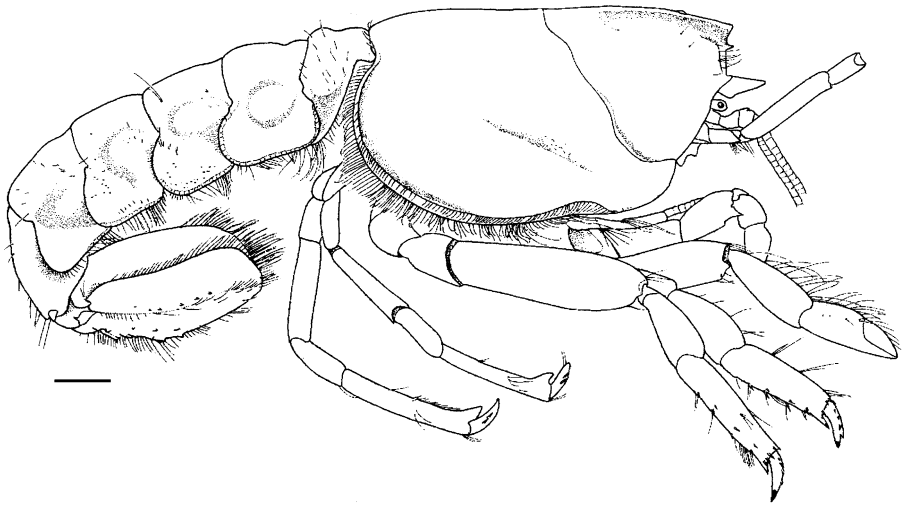

Fig. 35. *Scytoleptus barbatus* sp. nov. Whole body, lateral view. AM P 72878, holotype, male (TL/CL, 69.0/22.6 mm), between Cape Bossutt and Broome, Western Australia. Scale 1 mm.

Description of male holotype. — Rostrum (fig. 35) small, short, and triangular, with ventral convexity just above eyestalks, bearing a pair of supraorbital teeth at base. Carapace setose on lateral margins. Gastric region bearing median carina with hepatic tubercle, originating from base of rostrum onto vertically elevated anterior gastric region with two spines on vertical slope, and extending posteriorly to anterior two-thirds of gastric region; lateral carinae short and terminating anteriorly in rounded corner; but without submedian carinae. Cervical groove indistinct. Posteromedian carina obscure. A1 peduncle slightly overreaching rostrum. A2 peduncle segment 1 with 4 small ventrodistal spines and median spinule on ventral margin; segment 2 unarmed, scaphocerite present as small triangular plate; penultimate segment elongate, distal segment one-third of penultimate segment. Eyestalks small, cornea pigmented. Mxp3 ischial crest curved and dentate; merus with strong distal spine mesially. P1 (fig. 36A, B) unequal; larger cheliped unarmed on margins, merus smoothly carinate on ventral margin; palm two times as long as dactylus, and granulate in distal parts of lateral and mesial surfaces; fixed finger with obtuse median tooth on cutting edge; dactylus little longer than fixed finger, stout, curved downward distally, and unarmed on cutting edge. Smaller cheliped missing. P2 chelate. Ps3-4 propodi with transverse rows of spines ventrolaterally; dactyli with a row of spines laterally. Ps3-5 subchelate. Abdominal pleura 2-5 beset with thick setae on ventral margin. Male Plp1 uniramous and unsegmented, but slightly concave at distal third

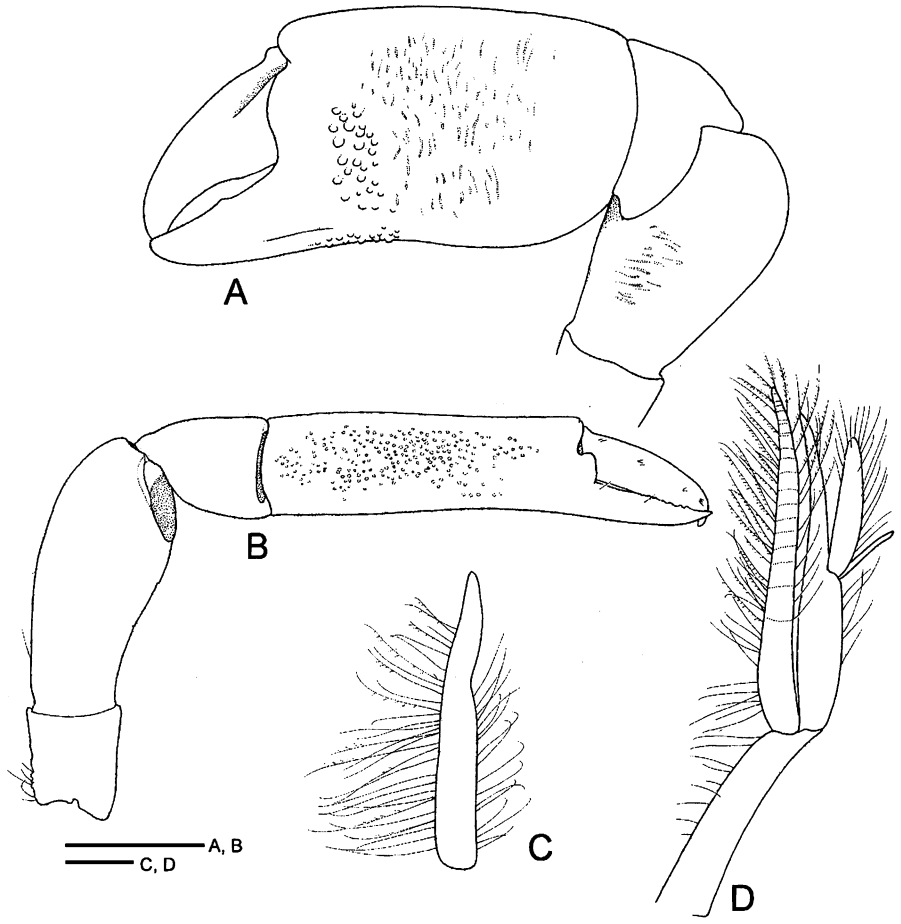

Fig. 36. *Scytoleptus barbatus* sp. nov. A, larger cheliped; B, smaller cheliped; C, male Plp1; D, male Plp2. A-D, AM P 72878, holotype, male (TL/CL, 69.0/22.6 mm), between Cape Bossutt and Broome, Western Australia. Scales 1 mm.

and setose marginally; male Plp2 biramous and slender, with thick marginal setae, endopod with appendices interna and masculina; Plps3-5 biramous, with thick marginal setae, endopods with appendix interna. Telson longer than wide, bearing proximal lobe with spine on lateral margins, small spine at posterolateral angle, and small median spine on rounded posterior margin; dorsal surface strongly convex, spinous, and setose. Uropodal endopod slightly shorter than telson, bearing spinous longitudinal carina medially on dorsal surface. Uropodal exopod convex dorsally, scattered with spinules on lateral half, and rounded at posterolateral angle.

In smaller cheliped of paratype (AM P 72881) merus smooth on ventral margin; palm more than twice as long as dactylus; fixed finger minutely denticulate.

Remarks. — The present new species, *Scytoleptus barbatus* from Australia is closely similar to the commonly known species *Scytoleptus serripes* Gerstaecker, 1856 from South Africa, but they are also clearly different from each other. In *Scytoleptus barbatus* sp. nov. the median gastric carina with a hepatic tubercle is running from the base of the rostrum onto the vertically elevated anterior gastric region, bearing two spines on its vertical slope, and extending to the posterior third of the gastric region; and the lateral carinae are short and terminating anteriorly with a rounded corner; in the larger cheliped the fixed finger is armed with an obtuse median tooth on the cutting edge; the abdominal pleura 2-5 are beset ventrally with thick setae. The male Plp1 (fig. 36C) is uniramous and unsegmented, slender and setose marginally, bearing a shallow concavity at its distal third; the proximal part is broader and longer than the distal section; the male Plp2 (fig. 36D) with slender protopod is biramous, the endopod and exopod are slender and setose marginally, and the endopod bears appendices interna and masculina mesiomedially; male Plps3-5 with slender protopod are biramous, the endopods and exopods are setose marginally, and the endopods bear an appendix interna; the telson bears a proximal lobe without a spine on the lateral margin. In *Scytoleptus serripes* by contrast, the gastric median carina is running from the base of the rostrum onto the slantingly elevated anterior gastric region, with three spines on its slanting slope, and extending to the cervical groove; the gastric lateral carinae are terminating anteriorly with a tooth, extending to the posterior third of the gastric region; in the larger cheliped the fixed finger is armed with a distinct median tooth on the cutting edge; the abdominal pleura 3-5 do not bear marginal setae ventrally. Male Plp1 (fig. 37C) is uniramous and leaf-like, and bisegmented, and the proximal segment is broader and longer than the distal one; and male Plp2 (fig. 37D) is biramous, the protopod is broadened and oval, and the endopod bears mesiomedially appendices interna and masculina; Plps3-5 protopods are broadened and oval, and the endopods bear an appendix interna; the telson is provided with a proximal lobe with a strong spine on the lateral margin.

The small specimen from the Philippines (NHM 1843.6, female, TL/CL, 35.0/13.8 mm) is identified as *S. barbatus* sp. nov. from Australia, because the gastric median carina is running from the base of the rostrum onto the

vertically elevated anterior gastric region, and the abdominal pleura are setose on the ventral margin, though the telson bears a proximal lobe with a reduced tooth on the lateral margins.

Most of the specimens recorded from the Indian Ocean belong to *Scytoleptus serripes*, because the gastric median carina is running from the base of the rostrum onto the slantingly elevated anterior gastric region, and the gastric lateral carinae are distinctly discernible, bearing a short, acute spine anteriorly (Bouvier, 1915b, fig. 8, from Mauritius Is.; Sakai & De Saint Laurent, 1989, fig. 9A, B, from Tuléar, Madagascar).

It has turned out by the present, careful examination of the material from Australia that the male Plp2 endopod bears slender appendices interna and masculina, though Sakai (1994: 180, fig. 3A, D) described that the male Plp2 endopod bears an appendix masculina, but no appendix interna. Such misdescription may have been caused by the thick setae covering the pleopods, which obstructed an exact observation.

Type locality. — Between Cape Bossutt and Broome, W. Australia.

Distribution. — Australia — Cape Wessel, Darwin, Cockatoo Island, Broome, Port Hedland, Dampier Archipelago, and Exmouth Gulf (Poore & Griffin, 1979); Darwin and Port Essington (Sakai, 1994), up to 36 m; Philippines — Luzon (Strahl, 1862b; Estampador, 1937).

Etymology. — The present new species is named *Scytoleptus barbatus*, by applying the Latin word "barbatus", meaning "bearded", because it is characterized by its marginal, thick setae on the carapace and the abdominal somites. The new species name is an adjective, agreeing in gender with the (masculine) generic name.

Scytoleptus serripes Gerstaecker, 1856
(fig. 37)

Scytoleptus serripes Gerstaecker, 1856: 158, pl. 6 figs. 1-4; Hilgendorf, 1878: 827; Borradaile, 1903: 540; Lenz, 1905: 379; Bouvier, 1914: 702; Bouvier, 1915b: 198, figs. 8, 9; De Man, 1925d: 5 (list), 49 (in part), pl. 4 fig. 9-9h; Barnard, 1950: 499; Fourmanoir, 1955: 30; Kensley, 1981b: 30; Sakai & De Saint Laurent, 1989: 37, fig. 9.

Evaxius tricarinatus Kingsley, 1882: 130, pl. 1 fig. 1 [type locality: Zanzibar]; Borradaile, 1903: 540.

Scytoleptus tricarinatus — De Man, 1925d: 5 (list).

Material examined. — RMNH D 1487, holotype, ovig. female, damaged (CL 14.8), Seba, Savu, "Siboga"-Exp., 25.iv.1899; ZMB 1135, 2 males (TL/CL, 45.0/16.7-47.0/17.9 mm), 1 ovig. female (TL/CL, 67.0/22.3 mm), 1 female (TL/CL, 59.0/21.4 mm), Mozambique, leg. Peters.

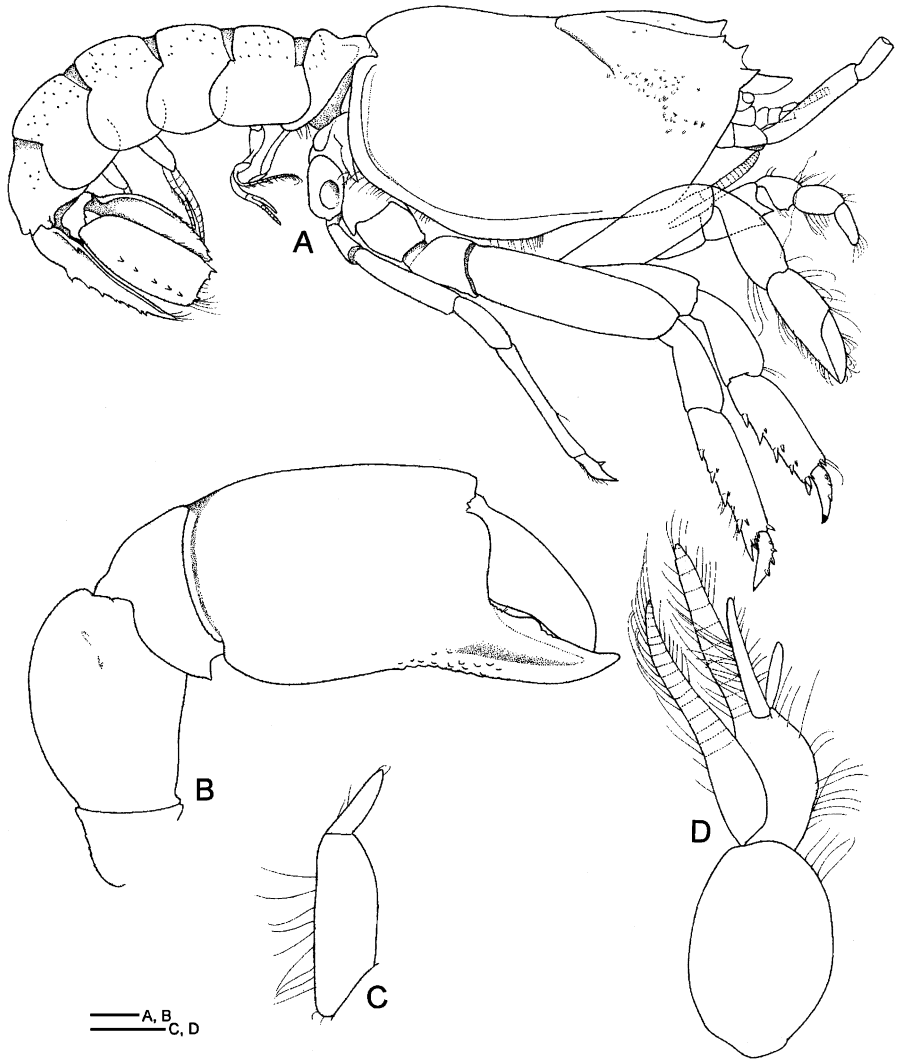

Fig. 37. *Scytoleptus serripes* Gerstaecker, 1856. A, whole body, lateral view; B, larger cheliped, lateral view; C, male Plp1; D, male Plp2. A-D, ZMB 1135, male (TL/CL, 47.0/17.9 mm), Moçambique. Scales 1 mm.

Diagnosis. — Rostrum (fig. 37A) thorn-shaped, lateral margins posteriorly extending shortly. Gastric region bearing median carina with hepatic tubercle running from base of rostrum onto slantingly elevated anterior gastric region with three spines on its slanting slope, and extending posteriorly to cervical groove; lateral carinae terminating anteriorly with tooth, extending to posterior third; submedian carinae absent. Cervical groove distinct. Postcervical ca-

rina obscurely developed in posterior part. Pair of postlateral lobes present. A1 segment 2 slightly overreaching rostrum. A2 segment 1 with ventral spine; segment 2 unarmed, scaphocerite present as a small triangular plate; penultimate segment elongate, 4 times as long as terminal one. Eyestalks about half length of rostrum. Mxp3 ischial crest curved and dentate on mesial surface; merus with strong mesiodistal spine. P1 unequal, not sexually dimorphic. Larger cheliped (fig. 37B) usually unarmed; merus smoothly carinate on ventral margin; palm two-thirds length of dactylus; fixed finger tuberculate on ventral margin, bearing obtuse median tooth on cutting edge; dactylus slightly longer than fixed finger, stout, curved downward distally, and unarmed on cutting edge. In smaller cheliped merus carinate on ventral margin; palm more than twice as long as dactylus; fixed finger denticulate on cutting edge. P2 chelate. Ps3-4 propodi with transverse rows of spines ventrolaterally; dactyli with rows of spines laterally. Ps3-5 subchelate. Abdominal pleura 1-6 without thick setae on ventral margin. Male Plp1 (fig. 37C) uniramous, leaf-like, and bisegmented, proximal segment broader and longer than distal one, distal segment slenderly protruded; male Plp2 (fig. 37D) with ovate protopod, biramous and slender, endopod with appendices interna and masculina; Plps3-5 biramous, endopods with appendix interna. Female Plp1 slender and uniramous, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 biramous, endopods with appendix interna. Telson longer than broad, tapering towards rounded posterior margin with small median spine; lateral margins bearing proximal lobe with strong spine; dorsal surface spinous and setose, and strongly convex. Uropodal endopod slightly shorter than telson, bearing longitudinal median carina with spinules. Uropodal exopod convex dorsally and rounded at distolateral angle, bearing spinous row sublaterally on dorsal surface.

Remarks. — The figure of *Evaxius tricarinatus* Kingsley, 1882 from Zanzibar clearly shows that his species is safely regarded as *Scytoleptus serripes*, because the gastric median carina is running from the base of the rostrum onto the slantingly elevated anterior gastric region, and the gastric lateral carinae are clearly developed, bearing a distinct anterior spine. Therefore, *E. tricarinatus* is here synonymized with *S. serripes*.

Poore & Collins (2009: 277) included *Scytoleptus serripes* in the Indo-West Pacific fauna as an Australian species. However, most probably the Australian specimens are to be referred to the new species here described, i.e., *S. barbatus*, because these cannot be identified with *S. serripes* in view of the present descriptions.

Type locality. — Port Natal, South Africa.

Distribution. — South Africa — Port Natal (Gerstaecker, 1856); Mozambique (Strahl, 1862a; Hilgendorf, 1878); Port Natal, South Africa (Fourmanoir, 1955); Mayotte (Sakai & De Saint Laurent, 1989); Kenya — Iwatin Island and Jadini (Sakai & De Saint Laurent, 1989); Zanzibar (Kingsley, 1882); Comoros (Sakai & De Saint Laurent, 1989); Madagascar — Sta. Marie (Bouvier, 1915b; Sakai & De Saint Laurent, 1989), Nosy Bé and Tuléar (Sakai & De Saint Laurent, 1989); Aldabra (Lenz, 1905); Mauritius (Bouvier, 1915b; Sakai & De Saint Laurent, 1989); Indonesia — Savu Islands and Salayar Island (De Man, 1925d).

Genus **Spongiaxius** Sakai & De Saint Laurent, 1989

Spongiaxius Sakai & De Saint Laurent, 1989: 41; Poore, 1994: 97 (key); Sakai & Ohta, 2005: 88; Poore, 2008: 168; Poore & Collins, 2009: 277.
Sakaiocaris Kensley, 1989: 964.

Diagnosis. — Rostrum prominent and furrowed on dorsal surface; lateral margins armed with erect spines, extending onto gastric region. Gastric region convex, bearing serrated median, submedian, and lateral carinae. Cervical groove distinct except for anterolateral part. Eyestalks subglobose; cornea pigmented. A2 scaphocerite prominent and horn-shaped. P1 subequal; chelae thick and semicircular. P2 chelae densely pubescent on lateral surface. Ps3-4 simple. P5 subchelate. Ps3-4 coxae with knobs ventrodistally. Both P3 and P5 coxae with genital pores. Pleurobranchs on Ps2-4. Abdominal somites 2-5 furrowed between tergum and pleuron. Abdominal pleura almost smooth on lateral surface and acutely pointed ventrally. Male Plp1 uniramous and bisegmented; distal segment spatulate; male Plp2 biramous and slender, endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 endopods with appendix interna. Telson twice as long as wide. Uropodal exopod bearing short transverse suture with spinules. Usually living in sponges. Hermaphroditic. [Adapted from Sakai & Ohta, 2005.]

Type species. — *Axiopsis brucei* (Sakai, 1986), by original designation and monotypy. The gender of the generic name, *Spongiaxius*, is masculine.

Species included. — *Spongiaxius brucei* (Sakai, 1986).

Spongiaxius brucei (Sakai, 1986)

Axiopsis brucei Sakai, 1986: 12, figs. 1-6.

Spongiaxius brucei — Sakai & De Saint Laurent, 1989: 44; Sakai, 1994: 200 (key); Sakai & Ohta, 2005: 89, fig. 11 (in colour); Poore, 2008: 168; Poore & Collins, 2009: 277; Robles et al., 2009: 316.

Material examined. — RMNH D 36516, paratype, 1 ovig. female (TL/CL, 68.0/22.6 mm), North West Shelf, Western Australia, 18°52.2′S 116°11.1′E, 30.i.1984, leg. A.J. Bruce; NHM 1986: 300, paratype, 1 female (TL/CL, 77.0/25.5 mm), same data as above; NTM Cr. 00605, 1 female (TL/C 71.0/24.9 mm), R/V "Soela" T/3, 17°55.5′S 118°19.5′E, 450-454 m, in hexactinellid sponge, 27.i.1984, leg. A.J. Bruce; NHM 1992.1087, paratype, 1 female (TL/CL, 48.0/15.8 mm), Philippines, 12°20′N 121°42′E, MUSORSTOM 3, Sta. CP 122, 1985, N.O. "Caviolis", 673-675 m.

Diagnosis. — Rostrum prominent and furrowed on dorsal surface; lateral margins armed with 9 erect spines, extending onto gastric region. Anterolateral margin of carapace unarmed. Gastric region convex, bearing serrated median, submedian, and lateral carinae. Cervical groove distinct except for anterolateral part. Posterior margin of carapace protruded as lateral lobes. Eyestalks subglobose; cornea pigmented. A2 scaphocerite prominent, horn-shaped, and of same length or slightly longer than dorsal spine of segment 2. Mxp3 ischium-merus subpediform; propodus rectangular; dactylus slender; exopod present. P1 subequal, palm broadened and tuberculate on lateral surface; chelae thick and semicircular. P2 chela densely pubescent on lateral surface. Ps3-4 simple, propodi bearing 15 transverse rows of spinules ventrolaterally, a row of spinules along distoventral margin, a strong spine at setose distoventral angle; dactyli scattered with 4-7 distinct, translucent spines on lateral surface, bearing translucent spinules on ventral margin, and distinct translucent spine at distal tip. P5 subchelate, propodus protruded ventrodistally and rounded on distal margin, with translucent spinules, bearing a row of thick setae distolaterally; dactylus truncate on distal margin, with slender translucent spines including strong one at distodorsal angle. Ps3-4 coxae with knobs ventrodistally. Both P3 and P5 coxae with genital pores. Pleurobranchs on Ps2-4. Abdominal somites 1-4 smoothly and shallowly furrowed on lateral side of tergum and convex on dorsal side of pleuron; abdominal somites 5-6 broadly convex on dorsal side of pleuron; pleura 1-6 sharply pointed ventrally; pleura 3-5 bearing small spine on anteroventral margin. Telson twice as long as wide, bearing proximal lobe with spine followed posteriorly by three spines on lateral margin, and two pairs of spines on anterior half of dorsal surface and a pair of spines at each posterolateral corner; posterior margin with median spine. Uropodal endopod as long as telson, bearing two spines including posterolateral one on lateral margin, and proximal spine medially on dorsal surface and median spine on posterior margin. Uropodal exopod with 5 spines

including distolateral one on lateral margin, bearing a row of 4 spines sublaterally and a short transverse suture with spinules on dorsal surface, and median spine on distal margin. Usually living in sponges. Hermaphroditic. [Adapted from Sakai & Ohta, 2005.]

Type locality. — North West Shelf, Western Australia, 18°43.7′S 117°02.2′E, R/V "Soela", Sta. NWS-43, trawl, 454 m.

Distribution. — Australia — North West Shelf, Western Australia, 296-456 m (Sakai, 1986; Sakai & De Saint Laurent, 1989); W. and WNW Lacépède Archipelago, 434-444 m (Poore, 2008); Philippines — Sulu Sea, 08°06.36′N 118°26.49′E – 08°07.04′N 118°26.06′E, 688-693 m (Sakai & Ohta, 2005).

FAMILY CALLIANIDEIDAE KOSSMANN, 1880

Callianideinae Kossmann, 1880: 80.

Callianideidae Kossmann, 1880: 80; Gurney, 1938: 343; De Saint Laurent, 1979: 1395; Poore & Griffin, 1979: 221; Sakai, 1987a: 303 (list); Kensley & Heard, 1991: 497; Sakai, 1992c: 9; Poore, 1994: 103; Poore, 1997: 348.

Callianideinae — De Man, 1928b: 20, 30; Melin, 1939: 4; Balss, 1957: 1582; De Saint Laurent, 1973: 515; Sakai, 1992c: 10.

Diagnosis. — Rostrum distinct or short between deep-set orbits. Carapace with setal rows, but without cardiac sulcus and cardiac prominence; linea thalassinica present but short posterior to eyestalk, or absent. Cervical groove present. Eyestalks flattened and contiguous. Maxilla 2 scaphognathite with posterior whip. P1 chelate, unequal, and dissimilar. P2 chelate. P3 propodus square. P4 propodus rectangular, coxa flattened. Abdominal somite 1 without anterolateral lobes. Male Plp1 uniramous and unsegmented, or bi- or trisegmented; male Plp2 biramous, endopod and exopod each with respiratory filaments; endopod bearing appendices interna and masculina; male Plps3-5 biramous, endopods and exopods each with respiratory filaments, endopods with appendix interna. Female Plp1 uniramous and bisegmented, distal segment slender; female Plps2-5 biramous, endopods and exopods each with respiratory filaments, endopods with appendix interna. Pleurobranchs absent. Uropodal exopod without suture and dorsal plate.

Remarks. — Kensley & Heard (1991) included 7 genera (*Callianidea* H. Milne Edwards, 1837a, *Michelea* Kensley & Heard, 1991, *Mictaxius* Kensley & Heard, 1991, *Thomassinia* De Saint Laurent, 1979, *Crosniera* Kensley & Heard, 1991, *Marcusiaxius* Rodrigues & De Carvalho, 1972, and *Meticonaxius* De Man, 1905) in the family Callianideidae Kossmann, 1880. Poore (1994) revised the Callianideidae and reclassified it into three families (Callianideidae and Thomassiniidae in the superfamily Callianassoidea Dana, and Micheleidae in the superfamily Axioidea Huxley, 1879). He included only one genus (*Callianidea* H. Milne Edwards, 1837a) in the Callianideidae, and three genera (*Crosniera* Kensley & Heard, 1991, *Mictaxius* Kensley & Heard, 1991, and *Thomassinia* De Saint Laurent, 1979) in the Thomassiniidae, and four genera (*Marcusiaxius* Rodrigues & De Carvalho, 1972, *Meticonaxius* De Man, 1905, *Michelea* Kensley & Heard, 1991, and *Tethisea* Poore, 1994) in the

Micheleidae. Though he included four genera (*Marcusiaxius*, *Meticonaxius*, *Tethisea*, and *Michelea*) in the Micheleidae, the first three genera are different from *Michelea*, the type genus of the family Micheleidae, because in those three genera the rostrum is distinct, whereas in *Michelea* it is located between the deep-set orbits and small, so that *Michelea* is safely included in the family Micheleidae as the type genus, but the other three genera (*Marcusiaxius*, *Meticonaxius*, and *Tethisea*) are not to be included in the family Micheleidae because of their distinct rostrums. Therefore, they are excluded from the Micheleidae, and reclassified under the family Meticonaxiidae Sakai, 1992c.

Type genus. — *Callianidea* H. Milne Edwards, 1837a, by designation of ICZN, 1989: 61; and as the nominate genus.

Genera included. — *Callianidea* H. Milne Edwards, 1837a; *Paracallianidea* Sakai, 1992c.

Genus **Callianidea** H. Milne Edwards, 1837

Isea Guérin-Méneville, 1832: 295 [suppressed by ICZN, 1989: 61].

Callianidea H. Milne Edwards, 1837a: 319; H. Milne Edwards, 1838: 388; Dana, 1852a: 14; Dana, 1852b: 509; Guérin-Méneville, 1857: 45; Boas, 1880: 108, 110; Kossmann, 1880: 80; Bate, 1888: 10; Stebbing, 1893: 184; Ortmann, 1899: 1143; Rathbun, 1901: 94; Borradaile, 1903: 548; Balss, 1914: 90; Gurney, 1938: 301, 342; Melin, 1939: 4; Balss, 1957: 1582; De Saint Laurent, 1973: 515; Le Loeuff & Intès, 1974: 23; Poore & Griffin, 1979: 281; Sakai & Holthuis, 1987: 93; Sakai, 1987a: 303 (list); ICZN, 1989: 61; Kensley & Heard, 1991: 498; Sakai, 1992c: 11; Poore, 1994: 103; Poore, 1997: 349.

Callianisea H. Milne Edwards, 1837a: 321. [Replacement name for *Isea* Guérin-Méneville.]

Callisea Dana, 1852a: 11; Dana, 1852b: 510. [Replacement name for *Isea* Guérin-Méneville.]

Callianassa (*Calliactites*) — Borradaile, 1903: 545; De Man, 1928b: 25, 91, 95. [Type species, *Callianassa secura* Lanchester, 1902.]

Calliactites — Stebbing, 1910: 369; Gurney, 1944: 83.

Diagnosis. — Cephalothorax laterally compressed. Rostrum short and broad. Linea thalassinica short. Mxp3 merus unarmed on ventral margin. Ps2-4 propodi with setal rows centrally or proximally. Male Plp1 uniramous and bisegmented; male Plp2 biramous, endopod and exopod with respiratory filaments, endopod with appendices interna and masculina; male Plps3-5 biramous, endopods and exopods with respiratory filaments, endopods bearing leaf-like appendix interna. Female Plp1 uniramous and bisegmented; distal segment elongate and twisted in distal half, with marginal setae (Sakai, 1992a, fig. 5G). Female Plps2-5 biramous, endopods and exopods with respiratory filaments, endopods bearing leaf-like appendix interna. [Adapted from Sakai, 1992c.]

Type species. — *Callianidea typa* H. Milne Edwards, 1837a, through designation by ICZN, 1989: 61. The gender of the genric name, *Callianidea*, is feminine.

Species included. — *Callianidea madagascariensis* sp. nov.; *C. ryukyu* sp. nov.; *C. typa* H. Milne Edwards, 1837a (= *Callianassa secura* Lanchester, 1902).

KEY TO THE SPECIES OF THE GENUS *CALLIANIDEA*

1 – Mxp3 merus with subterminal tooth on mesial margin; merus of larger cheliped 1.5 times as long as wide ..... *C. madagascariensis* sp. nov.
– Mxp3 merus unarmed on mesial margin; merus of larger cheliped 1.8 times as long as wide 2

2 – Male Plp1 with elongate distal segment bearing digitiform projection ..... *C. typa*
– Male Plp1 with distal segment shorter than proximal one, bearing no projection ..... *C. ryukyu* sp. nov.

Callianidea madagascariensis sp. nov.

Callianidea sp., Poore, 1997: 354, figs. 4D-I.

Remarks. — The present new species was described as *Callianidea* sp. from Madagascar by Poore (1997). His species is clearly different from *C. typa*; in his *Callianidea* sp. the Mxp3 merus bears a subdistal tooth on the mesial margin, and the merus of the larger cheliped is about 1.5 times as long as broad, while in *C. typa* the Mxp3 merus is unarmed on the mesial margin, and the merus of the larger cheliped is about 1.8 times as long as broad. Therefore, Poore's (1997) species is here defined as a new species under the name of *Callianidea madagascariensis*.

Type specimen. — MNHN Th. 139, female.

Type locality. — Madagascar — Maromandia, 14°10′S 48°06′E.

Distribution. — Only known from the type locality.

Etymology. — The species name is derived from the type locality, Madagascar. It is an adjective agreeing in gender with the (feminine) generic name.

Callianidea ryukyu sp. nov.
(figs. 38, 39)

Callianidea typa — Balss, 1914: 90; Miyake, 1956: 304, figs. 1-3; Sakai, 1992c: 12, figs. 3-5.

Material examined. — SMF 24918, holotype, male (TL/CL, 55.0/12.0 mm), Taketomi-jima between the islands Iriomote and Ishigaki, Ryukyu Islands, Japan, 1-8.v.1973, leg. Uchida & Uda; BLT 18238 (SMF 32730), paratypes, 2 males (TL/CL, 20.0/5.2; 24.0/4.3 mm), 2 females (TL/CL, 26.0/6.5; 39.0/8.8 mm), Mitara, Iriomote-Jima, Ryukyu Islands, 15.vi.2003, leg. H.O. Gusey; SMF 32731, paratype, 1 female (TL/CL, 40.0/7.0 mm), Maenohama, Aka-jima Island, Kerama Islands, Ryukyu Archipelago, Japan, 12.v.1991, leg. N. Iwasaki.

Diagnosis of male holotype (fig. 38). — Rostrum flat, triangular, with obtuse tip in dorsal view, and less than one-third as long as eyestalks (fig. 39A); carapace protruded backward medially on posterior margin, bearing submar-

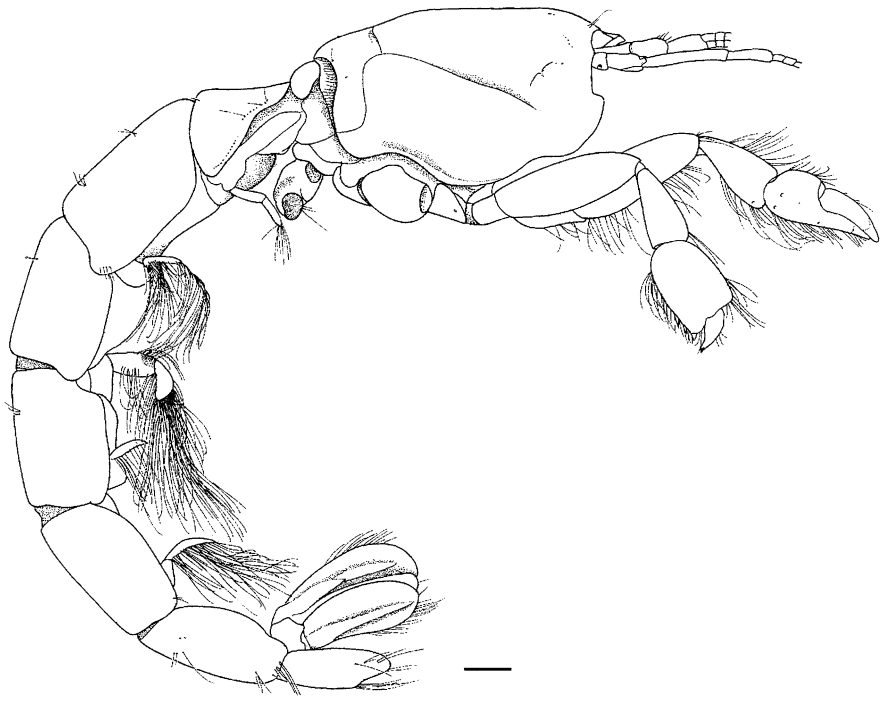

Fig. 38. *Callianidea ryukyu* sp. nov. Whole body, lateral view. SMF 24918, holotype, male (TL/CL, 55.0/12.0 mm), Taketomi-jima between Iriomote and Ishigaki Islands, Ryukyu Islands, Japan. Scale 1 mm.

ginal row of setae posterior to rostrum, vertical row of setae posterior to base of each antenna, and cervical groove dorsally. Eyestalks flattened and contiguous, with obtuse apex; cornea pigmented distolaterally. A1 segment 1 overreaching eyestalks; segment 2 shorter than segment 3. A2 peduncle overreaching A1 peduncle, reaching distal fourth of penultimate segment; terminal segment two-thirds as long as penultimate segment. Mxp3 ischium with denticulate ischial crest along mesial margin; merus without subterminal tooth mesially; ischium-merus with mesial row of long, dense setae; carpus-dactylus longer than ischium-merus; exopod with flagellum reaching middle of ischium. P1 unequal. In larger cheliped (fig. 39B) ischium denticulate on ventral margin; merus convex on ventral and dorsal margins, 1.8 times as long as wide; carpus with 4 teeth mesiodistally; palm with obsolete teeth on ventral margin; fixed finger two-thirds length of palm, and inconspicuously dentate on proximal half of cutting edge with obtuse median tooth, bearing a row of denticles mesially along cutting edge; dactylus bearing concavity with three distinct teeth on proximal half of cutting edge, followed by curved, denticulate

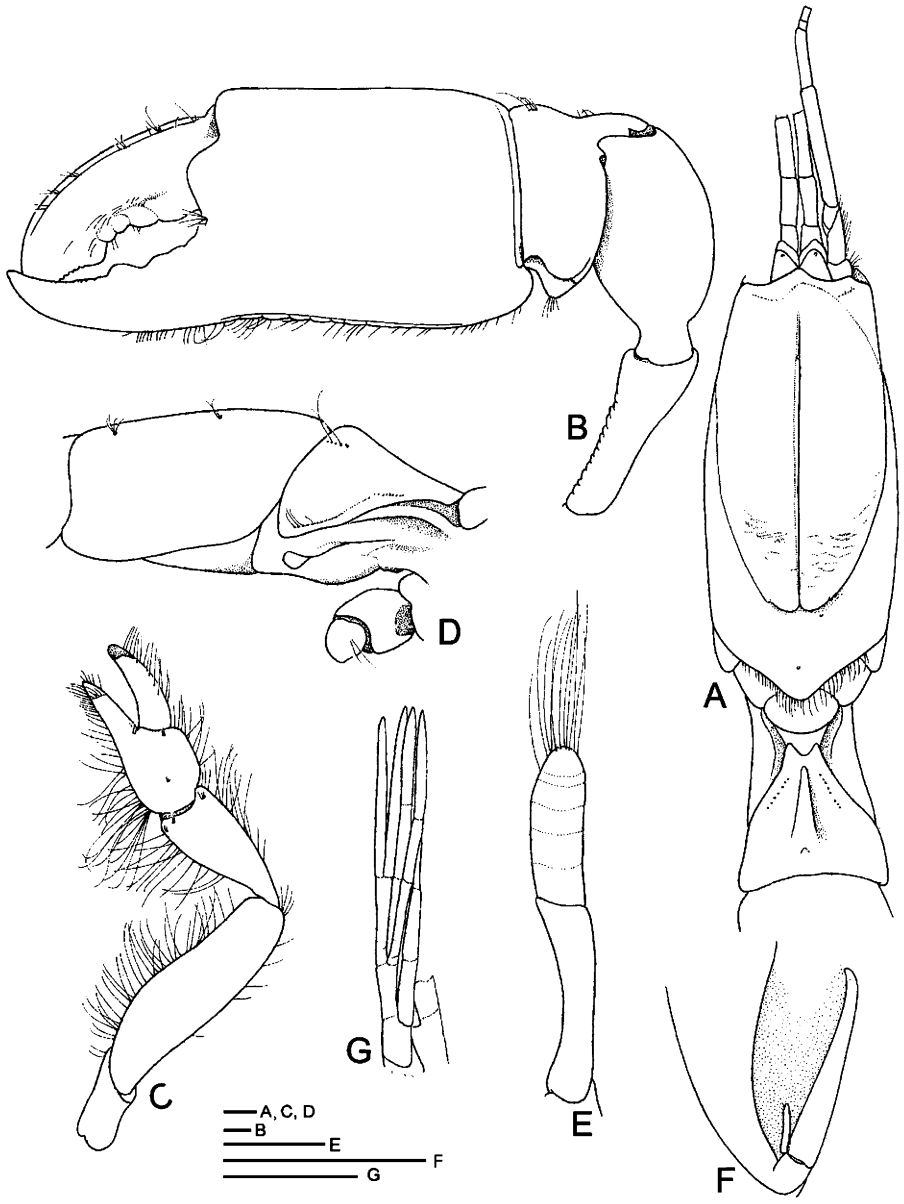

Fig. 39. *Callianidea ryukyu* sp. nov. A, carapace and abdominal somite 1, dorsal view; B, larger cheliped, lateral view; C, P2; D, abdominal somites 1-2, lateral view; E, male Plp1; F, Plp2; G, pleopodal gills. SMF 24918, holotype, male (TL/CL, 55.0/12.0 mm), Taketomi-jima, between Iriomote and Ishigaki Islands, Ryukyu Islands, Japan. Scales 1 mm.

distal half. Smaller cheliped with ischium and carpus unarmed and narrow, carpus much longer than that of larger cheliped; propodus elongate; fixed finger one-third length of palm, bearing two distal teeth; dactylus longer than fixed finger. P2 (fig. 39C) merus to propodus with marginal setae ventrally; carpus longer than half length of merus; chela as long as carpus; dactylus slightly longer than fixed finger. P3 (fig. 38) subchelate; propodus about 1.3 times as long as wide, bearing spiniform setae on ventrodistal corner. P4 coxa disc-like; propodus three times as long as wide, bearing spine at distal corner on ventral margin; P4 on left side missing. P5 subchelate; dactylus twice as long as fixed finger; P5 on right side missing.

Abdominal somite 1 (fig. 38) broadening posteriorly, bearing dorsal carina followed posteriorly by boss, and lateral row of setae on each side of dorsal carina; pleuron weakly rounded, bearing subventral row of setae. Abdominal somite 2 slightly longer than somite 1, pleuron without transverse setal row, not overlapping somite 1. Abdominal somite 6 with transverse row of about 6 setae on each side near posterior margin. Male Plp1 (fig. 39E) uniramous and bisegmented, proximal segment longer than distal one, and distal segment finger-like. Male Plp2 (fig. 39F) biramous, endopod with small appendix interna and elongate appendix masculina. Male Plps3-5 essentially similar to Plp2, endopods with leaf-like appendix interna, bearing elongate, tri-branched filaments (fig. 39G). Female Plp1 uniramous and bisegmented; distal segment leaf-like. Female Plps2-5 biramous, endopods with appendix interna. Telson longer than wide, parallel-sided in proximal half, and semicircular in distal half. Uropodal endopod oval and twice as long as wide; uropodal exopod twice as long as wide and convex laterally but straight on distal margin with short, spiniform setae.

Remarks. — The present new species *Callianidea ryukyu* is different from the Pan-Indopacific species *C. typa*, because in *C. ryukyu* the Plp1 is uniramous, the distal segment is shorter than the proximal segment and fingerlike (fig. 39E), whereas in *C. typa* the male Plp1 is uniramous and the distal segment is elongate, bearing a small digitiform projection distolaterally (fig. 40B).

Regarding the specimens collected in the area around Japan, Balss (1914: 90) described *C. typa* based on two female specimens from the Yaeyama Islands (= Iriomote-Ishigaki Islands) and Kagoshima. However, their localities suggest that those specimens are safely determined as the present new species, *C. ryukyu*.

Type locality. — Taketomi-jima between Iriomote and Ishigaki Islands, Ryukyu Archipelago, Japan.

Distribution. — Ryukyu Islands and Takara-jima, Tokara-retto (Miyake, 1956), Akajima (Akashima), Kerama Island group, Ryukyu Archipelago; and Kagoshima (Balss, 1914).

Etymology. — The new species is named *Callianidea ryukyu* after its type locality, the Ryukyu Archipelago, Japan. The name is to be considered a noun in apposition to the generic name.

Callianidea typa H. Milne Edwards, 1837
(fig. 40A-E)

Isea elongata Guérin-Méneville, 1832: 300, pl. 10A figs. 1-7. [Type locality: Mariana.] [Suppressed under the plenary powers of the ICZN (Sakai & Holthuis, 1987: 92).]

Callianidea typa H. Milne Edwards, 1837a: 320, pl. 25bis figs. 8-14; H. Milne Edwards, 1838: 389; Lockington, 1878: 302; Neumann, 1878: 34; Borradaile, 1898: 1000, 1001, 1015; Borradaile, 1900: 420; De Man, 1902: 751; Borradaile, 1903: 548; Borradaile, 1904: 752; Nobili, 1906b: 113; Pesta, 1913: 678; De Man, 1928b: 21 (list), 31, pl. 1 fig. 3-3f; Edmondson, 1944: 38, fig. 2; Holthuis, 1959: 129; Sakai, 1987a: 303 (list); ICZN, 1989: 61; Dworschak, 1992: 218, fig. 17a-d; Liu & Zhong, 1994: 562; Poupin, 1994: 7, fig. 3, colour pl. 1b; Poore, 1994: 113, fig. 2a; Poore, 1997: 349, figs. 1-3, 4A-B; Komai, 2000a: 236; Sakai & Sawada, 2006: 1357, figs. 11, 12; Komai, 2008: 29; Komai & Tachikawa, 2008: 29; Robles et al., 2009: 317.

Callianisea elongata — H. Milne Edwards, 1837a: 325.

Callianidea typus White, 1847: 71. [Type locality. — Philippine Islands.]

Callianidea elongata — Guérin-Méneville, 1857: 45; De Man, 1928b: 21, 30; Holthuis, 1953b: 51.

Callianidea mucronata Kossmann, 1880: 80; Borradaile, 1903: 548. [Type locality. — Red Sea.]

Callianassa secura Lanchester, 1902: 555, pl. 34 fig. 2. [Type locality. — Kota Bharu, Kelantan, Malaysia.]

Callianassa (*Calliactites*) *secura* — Borradaile, 1903: 545; De Man, 1928a: 5; De Man, 1928b: 26 (list), 93, 96 (key).

Callianidea planocula Melin, 1939: 5, figs. 1-4. [Type locality. — Port Lloyd, west side of Chichi-jima, Bonin Islands.]

Callianidea sp., Edmondson, 1944: 40, fig. 3.

Material examined. — SMF 23636, 1 female (TL/CL, 59.0/15.1 mm), Saudi-Arabia, Jana Island (27°22.240′N 049°54.000′E), eastern coast, under stone in shallow water, 25.iv.1993, leg. M. Apel; SMF 26511, 1 female bearing eggs, inside larvae with nauplius-eyes (TL/CL, 63.0/12.2 mm), Sokotra, Abd al-Kuri, NE coast, 12°11.750′N 052°20.170′E, 0.5 m intertidal, 6.iv.2000, leg. T. Wehe; SMF 7936, 1 male (TL/CL, 35.0/6.5 mm), Ternate, Indonesia, 1894, leg. Kükenthal; USNM 243606, 1 male (TL/CL, 62.0/22.0 mm), Piti Bay, Guam, 20.xii.1996, leg. L.A. Ward; USNM 1096793, 1 male (TL/CL, 36.0/8.0; 37.0/9.0 mm) and 1 female (TL/CL, 36.0/8.5 mm), Picard Island, Seychelles, Indian Ocean; ZMUC, 1 male (TL/CL, 29.0/6.4 mm), Sunda Strait, Kei Island, 5°57′N 105°32′E, sandy mud with pumice, Danish Expedition, 31.vii.1922.

Diagnosis. — Male Plp1 uniramous and bisegmented, proximal segment short and distal segment long, distal segment bearing small digitiform projection mesiodistally (fig. 40B, C); male Plp2 biramous, endopod with appendices interna and masculina (fig. 40D); male Plps3-5 biramous, endopods with leaf-

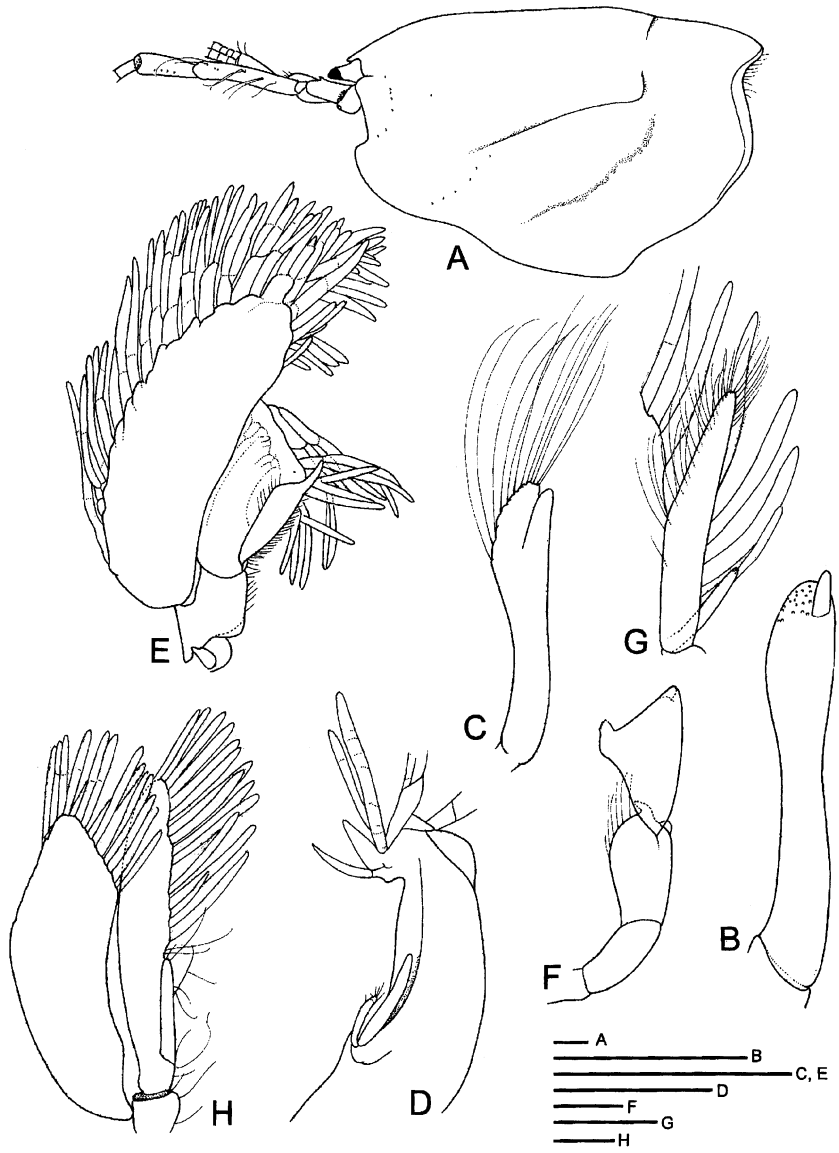

Fig. 40. *Callianidea typa* H. Milne Edwards, 1837 and *Paracallianidea laevicauda* Gill, 1859. A, carapace and A1-2 peduncles; B, C, F, male Plp1; D, G, male Plp2; E, male Plp3; H, male Plp3. A, *Callianidea typa* SMF 26511, 1 female bearing eggs, inside larvae with nauplius-eyes (TL/CL, 63.0/12.2 mm), Socotra, Abd al-Kuri, N.E. coast, 12°11.750′N 052°20.170′E, 0.5 m, intertidal; B, D, *Callianidea typa*, SMF 7936, male (TL/CL, 35.0/6.5 mm), Ternate, Indonesia; C, E, *Callianidea typa*, ZMUC, 1 male (TL/CL, 29.0/6.4 mm), Sunda Strait, Kei Island, Danish Expedition; F, G, H, *Paracallianidea laevicauda*, SMF 23607, 1 male (TL/CL, 53.0/12.1 mm), Colombia, Bahia Nenguangue, Magdalena, ca. 25 km N.E. of Santa Marta, littoral. Scales 1 mm.

like appendix interna (fig. 40E). Female Plp1 uniramous, bisegmented; distal segment leaf-like. Female Plps2-5 biramous, endopods with leaf-like appendix interna.

Remarks. — The female type specimen of *Callianidea planocula* is inaccessible, however, Melin's (1939) description and figures of *C. planocula* show that the abdominal pleuron 1 bears anterior and median setal rows subventrally (Melin, 1939: 6, fig. 2), as in *C. typa* (cf. Sakai, 1992c, fig. 3A). Though some difference is found between the two species, i.e., in *C. planocula* the distal segment of female Plp1 is slender (Melin, 1939, fig. 2), while in *C. typa* it is swollen proximally (Sakai, 1992c, fig. 5G), this difference probably relates to the stage of development, which makes it difficult to distinguish one species from the other, thus suggesting that the difference observed is not sufficiently distinct to distinguish two separate species. Therefore, *C. planocula* is safely considered synonymous with *C. typa*.

Type locality. — New Ireland, Bismarck Islands.

Distribution. — Red Sea — Massawa (Kossmann, 1880), Isles Muscha and Eritrea (Nobili, 1906b), Isles Muscha (Poore, 1997); Gulf of Aden — Djibouti and Obock (Nobili, 1906b; Poore, 1997); Tanzania — Tanga (Balss, 1914); Zanzibar (Poore, 1997); Comoro Island (Poore, 1997); Madagascar — Nosy Bé and Île Juan de Nova (Poore, 1997); Aldabra Islands (Poore, 1997); Maldives — Goidu, Goifurfejendu Atoll (Borradaile, 1904); Malay Peninsula — Kota Bharu, Kelantan (Lanchester, 1902; De Man, 1928a); Port Lloyd, west side of Chichi-jima (= Peel Island), Bonin Islands (Melin, 1939; Sakai, 1992c; Komai & Tachikawa, 2008); Taiwan; Philippines — Gulf of Davao (Poore, 1997); Indonesia — Ternate (De Man, 1902), Lombok, Paternoster Islands, Sawu, Adonara, Tanah Djampeah, and Atjatuning (De Man, 1928b), Sunda Strait, Karapang, E. Java, and Ternate (Sakai, 1992c); Papua New Guinea — New Ireland (H. Milne Edwards, 1837a; Poore, 1997), Sariba (Borradaile, 1900); Mariana Islands — (Guérin-Méneville, 1832; H. Milne Edwards, 1837a), Guam (Edmondson, 1944); Wake Island (Edmondson, 1944); Rotuma (Borradaile, 1898); Funafuti (Borradaile, 1898); Western Samoa — Savaii (Pesta, 1913; Dworschak, 1992); Tahiti (Edmondson, 1944); Tuamotu Archipelago — Taiaro (Poore, 1997); La Paz, Baja California, Mexico (Lockington, 1878).

Genus **Paracallianidea** Sakai, 1992

Paracallianidea Sakai, 1992c: 17; Poore, 1997: 354.

Diagnosis. — Linea thalassinica short, extending posteriorly from orbit. Mxp3 merus bearing subdistal spine on ventral margin. Ps2-3 propodi with

setal row proximally. Male Plp1 uniramous and bisegmented, distal segment broadly triangular, bearing patch of hooklets mesially; male Plp2 biramous, endopod with short appendix interna and elongate, rod-shaped appendix masculina, bearing unsegmented and 2- to 4-segmented respiratory filaments; male Plps3-5 biramous, endopods with appendix interna, bearing both unsegmented and 2- to 4-segmented respiratory filaments. Female Plp1 uniramous and bisegmented, distal segment leaf-like; female Plps2-5 biramous, endopods with appendix interna, bearing unsegmented and 2- to 4-segmented respiratory filaments. Uropodal exopod without transverse suture. [Adapted from Sakai, 1992c.]

Remarks. — Poore (1997: 354) did not accept the new genus *Paracallianidea* Sakai, 1992c, established for *Callianidea laevicauda*, mentioning that "Sakai (1992c) erected a separate genus *Paracallianidea*, for *C. laevicauda*. The general habitus of this species is very similar to that of the other species and the differences of the pleopods 1 and 2, the male appendix interna on pleopod 2, and the pleopodal filaments are not adequate to justify a second genus for a single species". However, he failed to pay attention to the features found on Plps1-2, which are important in separating one genus from the other. *Paracallianidea laevicauda*, though similar to *C. typa*, is very different at the generic level as follows. In *P. laevicauda* the male Plp1 is uniramous and bisegmented, and the distal segment is triangular, bearing a patch of hooklets mesially (fig. 40F); whereas in *C. typa* the male Plp1 is uniramous and bisegmented, and the elongate distal segment mesiodistally bears a small digitiform projection (fig. 40B, C). As a consequence, *Paracallianidea*, which is distinguishable from *Callianidea*, should definitely be admitted as a valid genus.

Type species. — *Callianidea laevicauda* Gill, 1859, by original designation and monotypy. The gender of the generic name, *Paracallianidea*, is feminine.

Species included. — Only the type species, *Paracallianidea laevicauda* (Gill, 1859).

Paracallianidea laevicauda Gill, 1859
(fig. 40F-H)

Callianidea laevicauda Gill, 1859: 167; Rathbun, 1901: 94; Borradaile, 1903: 548; Schmitt, 1924: 79; De Man, 1928b: 21, 30; Schmitt, 1935a: 193, fig. 54; Schmitt, 1936: 375; Rodriguez, G., 1980: 207; Rodrigues, 1983: 93; Kensley & Heard, 1991: 499, figs. 3, 4, tab. 1A; Dworschak, 1992: 218, fig. 16a-f; Lemaitre & León, 1992: 45; Lemaitre & Ramos, 1992: 352; Hendrickx, 1995: 390 (list); Poore, 1997: 354, fig. 4C; Vargas & Cortés, 1999b: 906; Hendrickx et al., 2005: 170.

Callianidea Steenstrupii Boas, 1880: 108.

Callianidea Steenstrupi — Borradaile, 1903: 548.

Callianidea laevicauda occidentalis Schmitt, 1939: 10, 26.
Paracallianidea laevicauda — Sakai, 1992c: 17.

Material examined. — SMF 23606, 2 females (TL/CL, 35.0/7.4; 55.0/11.2 mm), Colombia, Ensenada Taganga, Magdalena, ca. 5 km N.E. of Santa Marta, intertidal, ii.1977; SMF 23607, 1 male (TL/CL, 53.0/12.1 mm), Colombia, Bahia Nenguangue, Magdalena, ca. 25 km N.E. of Santa Marta, littoral, 26.iii.1975; SMF 23625, 1 female (TL/CL, 20.0/4.3 mm), Colombia, Bahia Nenguangue, Magdalena, ca. 25 km N.E. of Santa Marta, root of *Thalassia*, 28.v.1975, leg. M. Mercedes-Criales; SMF 9755 (ex Mus. Heidelberg), 1 male (TL/CL, 45.0/11.2 mm), 1 female (TL/CL, 48.0/10.8 mm), locality unknown.

Diagnosis. — Male Plp1 uniramous and bisegmented, distal segment triangular, bearing patch of hooklets on mesial margin (fig. 40F); male Plp2 biramous, endopod and exopod with simple and bisegmented respiratory filaments, endopod subproximally bearing elongate appendix masculina with setae, and small appendix interna with distal cluster of hooklets (fig. 40G); male Plps3-5 biramous, exopods with simple and bisegmented respiratory filaments, endopods with appendix interna (fig. 40H). Female Plp1 uniramous and bisegmented, distal segment leaf-like. Female Plps2-5 biramous, endopods with slender appendix interna.

Type locality. — Barbados.

Distribution. — Bahamas — San Salvador Is. (Kensley & Heard, 1991); Jamaica (Kensley & Heard, 1991); Puerto Rico — Ensenada Honda, Culebra (Rathbun, 1901; Kensley & Heard, 1991), near Guanica (Schmitt, 1935a); Playa Blanca, Parque Nacional Santa Rosa (Vargas & Cortés, 1999b); U.S. Virgin Islands — St. Johns (Kensley & Heard, 1991); British Virgin Islands — Norman Island (Poore, 1997); St. Maarten — Grande Bay (Kensley & Heard, 1991); Antigua — English Harbour (Kensley & Heard, 1991); Barbados — Needham's Point and Pelican Island (Schmitt, 1924; Kensley & Heard, 1991); Grenadines — Baradal, Tobago Cays (Kensley & Heard, 1991); Belize — Carrie Bow Cay (Kensley & Heard, 1991); Panama — Caledonia Bay (Kensley & Heard, 1991); Curaçao — Caracas Bay (Schmitt, 1924; Kensley & Heard, 1991); Bonaire, Kralendijk (Schmitt, 1936; Kensley & Heard, 1991); Bonaire (Dworschak, 1992); Venezuela (Dworschak, 1992); Mexico — Socorro Island (Schmitt, 1939); Colombia — Santa Marta (Sakai, 1992c); Gorgona Island and Ensenada de Utr'a (Lemaitre & Ramos, 1992); Galapagos Islands — Albemarle Island (Schmitt, 1939); Barrington Island (Poore, 1997); in shallow water under stones.

FAMILY CALOCARIDIDAE ORTMANN, 1891

Calocaridae Ortmann, 1891: 47, 50; Lagerberg, 1908: 47 (key), 50; Stephenson, 1910: 75, 77, 189; Runnstrøm, 1925: 14.

Calocarididae — Kensley, 1989: 960; Poore, 1994: 98; Kensley, 1996d: 158; Ngoc-Ho, 2003: 443; Kensley & Chan, 1998: 262; Felder, 2001: 440; Sakai & Ohta, 2005: 82.

Diagnosis. — Rostrum acutely or narrowly triangular, lateral margins extending posteriorly onto gastric region. Gastric region with median carina; submedian and lateral carinae present or absent; postcervical carina present or not; linea thalassinica absent; cervical groove distinct. Eyestalks reduced and cornea not pigmented. A1 segment 1 twice as long as segment 2; A2 scaphocerite distinct or indistinct. Maxilla 2 scaphognathite with posterior whip. Mxp3 with exopod. Abdominal pleuron 1 narrow; pleuron 2 broadened. Ps3-4 propodi more or less elongate; P4 coxa more or less cylindrical. Plp1 uniramous and bisegmented; distal segment diversified in shape, bearing cluster of hooklets; Plp2 biramous, endopod bearing distally enlarged un- or bisegmented appendix masculina with slender appendix interna with hooklets mesioproximally, or bearing no appendix masculina; exopod consisting of proximal segment and multiarticulate flagellum; Plps3-5 biramous, endopods with rod-like appendix interna. Uropodal endopod oval and uropodal exopod with transverse suture. Hermaphroditic.

Remarks. — The family Calocarididae includes 11 genera that are characterized as follows. The male Plp2 is biramous, the endopod bears distally an un- or bisegmented appendix masculina provided proximally with a small appendix interna with a cluster of hooklets, but exceptionally in *Calocarisopsis* gen. nov., it bears an appendix interna, lacking an appendix masculina. Kensley (1989: 965) mentioned that three synapomorphies separate the Calocarididae from the Axiidae (s. l.) "1. Invariable hermaphroditism. 2. Enlargement of the appendix masculina of pleopod 2, along with loss of the setose distal element of the endopod. 3. Eye reduction and loss of eye pigment". However, it was suggested by Xuân & Ngoc-Ho (2006: 1161) that *Eutrichocheles modestus* (Herbst, 1796) in the family Axiidae is hermaphroditic, so that hermaphroditism is not always so important a characteristic as to separate the Calocarididae from the Axiidae. The following genera, such as *Bouvieraxius*, *Calaxius* (*C. acutirostris* Sakai & De Saint Laurent, 1989), *Paraxiopsis*

(*P. brocki* (De Man, 1888b), *P. hispidus* Kensley, 1996c, *P. paulayi* (Kensley, 2003)), and *Levantocaris* are not included in the Calocarididae but in the Axiidae, though they are hermaphroditic. Instead, the male Plp2 is important in separating one family from the other, because the male Plp2 shows very distinct differences in morphology. In the Calocarididae the male Plp2 endopod bears distally an enlarged appendix masculina provided proximally with an appendix interna, whereas in the Axiidae the male Plp2 endopod bears medially or at its proximal third an appendix masculina provided proximally with an appendix interna.

Type genus. — *Calocaris* Bell, 1846.

Genera included. — *Ambiaxius* Sakai & De Saint Laurent, 1989; *Briancaris* Sakai & Ohta, 2005; *Calastacus* Faxon, 1893; *Calaxiopsis* Sakai & De Saint Laurent, 1989; *Calocaris* Bell, 1846; *Calocarisopsis* gen. nov.; *Eucalastacus* Sakai, 1992a; *Lophaxiopsis* gen. nov.; *Lophaxius* Kensley, 1989; *Nipponcalaxiopsis* gen. nov.; *Paracalocaris* Sakai, 1991.

KEY TO THE GENERA OF THE FAMILY CALOCARIDIDAE

1 – Plp2 endopod without appendix masculina ..... *Calocarisopsis* gen. nov.
– Ppl2 endopod with appendix masculina 2

2 – Plp2 appendix masculina boot-shaped 3
– Plp2 appendix masculina simple, un- or bisegmented 4

3 – Plp2 endopod bearing distally a boot-shaped appendix masculina, in such a shape, that between the "foot part" of the "boot" and the "leg" there is an angle of 90° ..... *Ambiaxius*
– Plp2 endopod bearing distally a boot-shaped appendix masculina, in such a shape, that between the "foot part" of the "boot" and the "leg" there is an angle of 30° ..... *Briancaris*

4 – Appendix masculina bisegmented 5
– Appendix masculina unsegmented 6

5 – Pleura 3-5 with sharp anteroventral spine, and triangular on posteroventral angle ..... *Calaxiopsis*
– Pleura 3-5 unarmed ventrally ..... *Calastacus*

6 – Carapace granulate or setose 7
– Carapace smooth; Plp1 distal segment elongate-triangular or pear-shaped 8

7 – Carapace granulate; Plp1 distal segment trispinose distally ..... *Paracalocaris*
– Carapace setose; Plp1 unknown ..... *Lophaxiopsis* gen. nov.

8 – Plp1 distal segment shaped as elongate triangle 9
– Plp1 distal segment pear-shaped 10

9 – Uropodal exopod without distal flap ..... *Eucalastacus*
– Uropodal exopod with distal flap ..... *Nipponcalaxiopsis* gen. nov.

10 – Eyes flattened, mesially contiguous, cornea unpigmented ..... *Calocaris*
– Eyes rounded, not mesially contiguous ..... *Lophaxius*

Genus **Ambiaxius** Sakai & De Saint Laurent, 1989

Ambiaxius Sakai & De Saint Laurent, 1989: 54; Poore, 1994: 99 (key); Sakai, 1994: 177; Sakai, 1995: 79; Kensley, 1996e: 486; Sakai & Ohta, 2005: 82; Poore & Collins, 2009: 237.
Callistocaris Kensley, 1989: 961 [partim = *Briancaris* Sakai & Ohta, 2005].
Not: *Ambiaxius* Kensley, 1996e: 486 [= *Briancaris* Sakai & Ohta, 2005].

Diagnosis. — Rostrum styliform and curved upward, lateral margins unarmed, extending posteriorly onto gastric region. Gastric region convex, bearing median and lateral carinae, but no submedian carinae. Anterolateral margins of carapace unarmed or armed with a pair of small teeth. Cervical groove distinct. Eyes and stalks not differentiated, flattened; cornea unpigmented. A2 scaphocerite prominent; penultimate segment long. Pl asymmetrical. Ps3 and 5 coxae with genital pores. All gills poorly developed or devoid of gill-branches. No pleurobranchs. Abdominal pleura smooth on lateral surface and truncate ventrally. Plp1 uniramous and bisegmented; proximal segment elongate and flattened, and distal segment divergent distally, bearing terminal plate with patch of hooklets; Plp2 biramous and slender; endopod bearing distally a boot-shaped appendix masculina with marginal setae, with an angle of 90° between the "foot" of the "boot" and the "leg", provided proximally with fused appendix interna with cluster of hooklets; exopod consisting of proximal segment and multiarticulate flagellum; Plps3-5 biramous and slender, endopods with appendix interna. Telson longer than broad, bearing obscurely marked carinae on dorsal surface, but no posteromedian spine. Uropodal exopod with non-dentate transverse suture. Hermaphroditic. [Adapted from Sakai & Ohta, 2005.]

Remarks. — The type species, *Ambiaxius alcocki*, which was described on the basis of an adult female as *Calocaris alcocki* by McArdle (1900), is different from the type species of *Calocaris*, *C. macandreae* Bell, 1846, because he described it as "Rostrum long, narrow, and curved upwards, deeply grooved on its upper surface" (McArdle, 1900: 476), whereas in *C. macandreae* the rostrum is stoutly triangular and not curved upwards, but horizontal or curved downward. Distinctive differences are also observed between their Plps1-2.

Type species. — *Calocaris Alcocki* McArdle, 1900, by original designation. The gender of the generic name, *Ambiaxius*, is masculine.

Species included. — *Ambiaxius alcocki* (McArdle, 1900); *A.* cf. *alcocki* (McArdle, 1901); *A. franklinae* Sakai, 1994; *A. surugaensis* Sakai & Ohta, 2005; *Ambiaxius* sp. Poore & Collins, 2009.

Ambiaxius alcocki (McArdle, 1900)

Calocaris Alcocki McArdle, 1900: 476; Balss, 1925: 209.
Calocaris alcocki — Alcock, 1901: 190; Alcock & McArdle, 1901, pl. 50 fig. 4; Stebbing, 1915: 59; Stebbing, 1917: 27, pl. 91.
Calocaris (*Calocaris*) *Alcocki* — Borradaile, 1903: 539; De Man, 1925d: 7 (list), 116 (key).
Calocaris (*Calocaris*) *alcocki* — Barnard, 1950: 502, fig. 93g-h; Kensley, 1981b: 30.
Ambiaxius alcocki — Sakai & De Saint Laurent, 1989: 54; Sakai, 1995: 80, figs. 1-5; Kensley, 1996e: 487 (list); Takeda, 1997: 250; Sakai & Ohta, 2005, fig. 8.

Type locality. — Off northeast Sri Lanka, 8°36.15′N 81°20.30′E, 992 m.

Distribution. — South Africa — Cape Natal (Stebbing, 1915; Sakai, 1995); S.W. Indian Ocean (Sakai, 1995); Sri Lanka (McArdle, 1900); Japan — Suruga Bay (Sakai, 1995; Takeda, 1997); New Caledonia (Sakai & De Saint Laurent, 1989); 792-1630 m.

Ambiaxius cf. **alcocki** (McArdle, 1901)

Calocaris cf. *alcocki* — McArdle, 1901.
Ambiaxius cf. *alcocki* — Kensley, 1996e: 487 (list).

Distribution. — Southwest Indian Ocean, 1000 m.

Ambiaxius franklinae Sakai, 1994

Ambiaxius franklinae Sakai, 1994: 177, 200 (key), figs. 1, 2; Poore & Collins, 2009: 238.

Type locality. — North West Shelf, Western Australia, 17°19.76′S 147°28.05′E, 1310-1357 m.

Distribution. — Western Australia — North West Shelf (Sakai, 1994); 1310-1357 m.

Ambiaxius surugaensis Sakai & Ohta, 2005

Ambiaxius alcocki — Sakai, 1995: 80, figs. 1-5; Takeda, 1997: 250.
Ambiaxius surugaensis Sakai & Ohta, 2005: 84, figs. 9, 10.

Type locality. — W. off Matsuzaki, Suruga Bay, 490-547 m.

Distribution. — Suruga Bay; 490-547 m.

Ambiaxius sp. Poore & Collins, 2009

Ambiaxius sp., Poore & Collins, 2009: 238.

Distribution. — Off Cape Leveque, Western Australia; 698-700 m.

Genus **Briancaris** Sakai & Ohta, 2005

Callistocaris Kensley, 1989: 961 (partim).
Ambiaxius — Kensley, 1996e: 486.
Briancaris Sakai & Ohta, 2005: 87.

Diagnosis. — Rostrum short and triangular, denticulate on lateral margins. Gastric region convex, bearing median carina and short lateral carinae, but no submedian carinae. Anterolateral margins of carapace unarmed or armed with a pair of small teeth. Cervical groove distinct. Eyes rounded in lateral view and contiguous to carapace; cornea unpigmented. A2 scaphocerite prominent; A2 penultimate segment long. P1 asymmetrical. Plp1 uniramous and bisegmented, proximal segment flattened, and distal segment divergent distally, bearing ovate terminal plate with patch of hooklets; male Plp2 biramous, endopod stem-like, bearing distally a boot-shaped appendix masculina with setae on distal margin and distal protrusion with apical setae, with an angle of 30° between the "foot" of the "boot" and the "leg", and provided proximally with appendix interna bearing a patch of hooklets; exopod consisting of proximal segment and multiarticulate flagellum. Telson longer than wide, and unarmed on lateral and posterior margins. Uropodal exopod with transverse suture. Dimorphic.

Remarks. — *Briancaris* is separated from *Ambiaxius*, because in *Briancaris* the rostrum is triangular and denticulate on the lateral margins; Plp2 is biramous, and the endopod bears distally a boot-shaped appendix masculina, with an angle of 30° between the "foot" of the "boot" and the "leg", that is provided proximally with an appendix interna with a patch of hooklets. In *Ambiaxius*, by contrast, the rostrum is styliform and almost unarmed laterally; Plp2 is biramous, and the endopod distally bears a boot-shaped appendix masculina, with an angle of 90° between the "foot" of the "boot" and the "leg", that is slightly concave on the distal margin, with marginal setae and an apical protrusion with setae, and is provided mesioproximally with a small appendix interna.

Type species. — *Ambiaxius japonicus* (Kensley, 1996e), by original designation. The gender of the generic name, *Briancaris*, is feminine.

Species included. — *Briancaris aberrans* (Bouvier, 1905); *B. japonica* (Kensley, 1996e); *B. foveolata* (Kensley, Lin & Yu, 2000).

Briancaris aberrans (Bouvier, 1905)

Calocaris aberrans Bouvier, 1905: 805; Bouvier, 1917: 120; Bouvier, 1925: 453, figs. 17-21, pl. 10 figs. 6, 7; Balss, 1925: 209.

Calocaris (*Calocaris*) *aberrans* — De Man, 1925d: 7 (list), 116 (key).
Ambiaxius aberrans — Sakai & De Saint Laurent, 1989: 55; Kensley, 1996e: 487 (list).

Type locality. — Santa Lucia, Antilles, 772 m.
Distribution. — Santa Lucia (Bouvier, 1905); 772 m.

Briancaris japonica (Kensley, 1996)

Ambiaxius japonicus Kensley, 1996e: 487, fig. 11, table 5.

Type locality. — Off Ose-saki, Japan, 34°58′40″N 138°43′35″E, "Albatross" Sta. 5056, 472 m.
Distribution. — Japan — Off Ose-saki (Kensley, 1996e); 472 m.

Briancaris foveolata (Kensley, Lin & Yu, 2000)

Ambiaxius foveolatus Kensley, Lin & Yu, 2000: 215, figs. 6, 7E.

Type locality. — Tai-Shi fishing port, I-Lan County, N.E. Taiwan, 400-500 m.
Distribution. — Only known from the type locality.

Genus **Calastacus** Faxon, 1893

Calastacus Faxon, 1893: 194; Faxon, 1895: 105; Borradaile, 1903: 539; Stebbing, 1910: 367; Schmitt, 1921: 112; Vinogradov, 1950: 223; Balss, 1957: 1580; De Saint Laurent, 1972: 353, 354; Kensley, 1989: 961; Sakai & De Saint Laurent, 1989: 59; Poore, 1994: 98 (key); Poore & Collins, 2009: 247.
Calastacus s. str. — Alcock, 1901: 191; Borradaile, 1903: 53; De Man, 1925d: 2 (key), 116; Barnard, 1950: 502.

Diagnosis. — Rostrum acutely elongate or triangular, lateral margins unarmed, shortly extending posteriorly onto gastric region as lateral carinae with supraorbital spine. Gastric region convex, bearing median carina, no submedian carinae, but submedian rows of 2-3 teeth may be present or not. Anterolateral margin of carapace unarmed. Cervical groove distinct only in dorsal region; no postcervical carina. Eyestalks obsolete and flattened on surface; cornea also obsolete. A2 scaphocerite slender and elongate. P1 chelate and subequal. Ps3-5 simple. Ps3 and 5 coxae with genital pores. No pleurobranchs. Abdominal pleura smooth on lateral surface and truncate ventrally, with or without teeth. Plp1 uniramous and bisegmented; proximal segment stem-shaped, and distal segment broad or elongate, and double-lobed by longitudinal median suture, mesial lobe proximally with a patch of hooklets. Plp2 biramous, endopod bearing slender, bisegmented appendix masculina fused

proximally with appendix interna bearing a patch of hooklets; exopod consisting of proximal segment and multiarticulate flagellum; Plps3-5 endopods with appendix interna. Telson longer than wide and rounded on posterior margin without median spine. Uropodal exopod with transverse suture. Hermaphroditic. [Adapted from Sakai & De Saint Laurent, 1989.]

Remarks. — The genus *Calastacus* Faxon, 1893 is closely similar to the genus *Calaxiopsis* Sakai & De Saint Laurtent, 1989 in that the Plp1 is uniramous and bisegmented, consisting of an elongate proximal segment and a broad distal segment, and Plp2 is biramous, and the endopod bears a slender bisegmented appendix masculina with setae on the mesial margin; the proximal segment is fused at its base with a small appendix interna with a cluster of hooklets. However, those two genera are also clearly different from each other: in *Calastacus* the rostrum is unarmed on the lateral margins, and the gastric region bears no submedian carinae, whereas in *Calaxiopsis* the rostrum is armed with lateral spines, and the gastric region bears submedian carinae.

Calastacus crosnieri is very characteristic and different from the other species in the genus *Calastacus*, in that the Plp1 distal segment is broad and sinuate on the mesial margin, bearing mesioproximally an appendage with hooklets; however, Plp2 is biramous, and the endopod bears a bisegmented appendix masculina with a small appendix interna proximally, as in *C. colpos*, *C. stilirostris*, *C. mexicanus*, and *C. laevis*, so that *C. crosnieri* is regarded as a member of the species included in *Calastacus*.

Type species. — *Calastacus stilirostris* Faxon, 1893, by original designation and monotypy. The gender of the generic name, *Calastacus*, is masculine.

Species included. — *Calastacus colpos* Kensley, 1996d; *C. crosnieri* Kensley & Chan, 1998; *C. inflatus* Komai et al., 2009; *C. laevis* (De Saint Laurent, 1972); *C. mclaughlinae* (Lin & Komai, 2006); *C. mexicanus* Kensley, 1996d; *C. myalup* Poore & Collins, 2009; *C. stilirostris* Faxon, 1893.

KEY TO THE SPECIES OF THE GENUS *CALASTACUS*

1 – Uropodal exopod with unarmed suture 2
– Uropodal exopod with armed suture 3

2 – Mxp3 merus with two distinct spines on ventral margin . . . . . *C. myalup*
– Mxp3 merus with only one distinct spine on ventral margin . . . . . *C. inflatus*

3 – Gastric region with submedian rows of 2-3 spines . . . . . *C. mclaughlinae*
– Gastric region without submedian rows or carinae 4

4 – P1 palm with spines on dorsal margin and lateral surface 5
– P1 palm with one subdistal spine on dorsal margin, but unarmed on lateral surface . . . 6

5 – Telson armed with posteromedian spine and posterolateral spines ..... *C. mexicanus*
– Telson unarmed ..... *C. stilirostris*

6 – Plp1 bisegmented, distal segment broad and double-lobed distally, mesial lob sinuate, bearing mesioproximally appendage with hooklets ..... *C. crosnieri*
– Plp1 bisegmented, distal segment elongate and double-lobed in plough-shape 7

7 – Eyes flattened; A2 scaphocerite longer than distodorsal spine of A2 segment 2; in Plp1 mesial lobe of distal segment triangular, distally with seta ..... *C. colpos*
– Eyes subspherical; A2 scaphocerite about same length of distodorsal spine of A2 segment 2; in Plp1 mesial lobe of distal segment rounded, distally without seta ..... *C. laevis*

Calastacus colpos Kensley, 1996

Calastacus colpos Kensley, 1996d: 159, figs. 1, 2.

Material examined. — USNM 243393, holotype, male (TL/CL, 30.0/10.0 mm), Gulf of Mexico, 27°17.5′N 95°08.5′W, 109 m, 21.xi.1968, leg. W.E. Pequegnat.

Diagnosis. — Carapace faintly rugose. Rostrum spiniform and unarmed, reaching anteriorly to level of A2 penultimate segment; supra-orbital spines directed anterodorsally. Median carina weakly defined, bearing tubercle at anterior third of gastric region; cervical groove distinct dorsally, becoming obsolete anteroventrally; suprabranchial groove faint. Eyes with flattened cornea, contiguous along midline, and unpigmented. A1 segment 1 subequal in length to segments 2 and 3 combined. A2 segment 2 with slender distolateral spine; scaphocerite slender, almost reaching distal part of penultimate segment. Maxilla 2 scaphognathite with elongate posterior whip. Mxp3 ischium smooth on lateral margin; ischial crest bearing about 20 denticles; merus with two spines mesiodistally. P1 subequal and similar in shape; ischium with subdistal spine on ventral margin; merus with about 6 spines on ventral margin, and subdistal spine on dorsal margin; carpus unarmed; palm slightly longer than fingers, bearing subdistal spine on dorsal margin; dactylus strongly curved downward; cutting edges of fingers finely serrated. P2 fingers shorter than palm.

Abdominal pleura 2-5 truncate and pleuron 6 rounded ventrally, bearing no longitudinal carinae between terga and pleura; pleuron 1 shortest and narrowed posteroventrally; pleuron 2 broadest. Plp1 uniramous and bisegmented, distal segment double-lobed, mesial lobe longer than lateral one and triangular, with distal seta and proximal patch of hooklets. Plp2 biramous, endopod with bisegmented appendix masculina distally, proximal segment bearing mesioproximally appendix interna with patch of hooklets, and distal segment shorter than proximal one and tapering; exopod consisting of proximal segment and multiarticulate flagellum.

Telson 1.6 times as long as its greatest width, and roughly rectangular in shape, bearing tiny, movable posterolateral spine on each side; posterior margin slightly convex. Uropodal endopod with one or two spines on lateral margin. Uropodal exopod bearing distinct, movable spine on lateral margin and transverse suture with 3-4 spinules on dorsal surface. [Adapted from Kensley, 1996d.]

Type locality. — North-western Gulf of Mexico, 27°17.5′N 95°08.5′W, 1098-1171 m.

Distribution. — Gulf of Mexico (Kensley, 1996d); 339-1171 m.

Calastacus crosnieri Kensley & Chan, 1998

Calastacus crosnieri Kensley & Chan, 1998: 262, figs. 1C, 5; Tsang et al., 2008: 218, 219; Chu et al., 2008.

Material examined. — USNM 253355, paratype, male (TL/CL, 30.0/12.0 mm), Ta-Chi, I-Lan County, N.E. Taiwan, 350 m, 10.vi.1993, leg. commercial trawler.

Diagnosis. — Carapace somewhat inflated and glabrous. Rostrum spiniform and dorsally grooved, bearing strong supraocular spines at base; median carina weakly indicated, rounded and stronger at base of rostrum. Cervical groove faintly discernible dorsally. Eyes rounded, unpigmented, not contiguous. A2 scaphocerite slender and acute, reaching middle of penultimate segment. P1 chelipeds subequal, ischium bearing 5 ventral spines; merus with 9-10 spines on ventral margin and single distal spine on dorsal margin; carpus unarmed; palm with a single distal tooth on carinate dorsal margin; fingers 0.7 times length of palm. Ps2-5 unarmed, P4 longest. Pleuron 1 triangular and subacute ventrally. Pleura 2-6 broadly rounded ventrally. Plp1 uniramous and bisegmented, distal segment broad, sinuate mesially, and double-lobed distally, bearing mesioproximally appendage with hooklets. Plp2 biramous, endopod bearing distally bisegmented appendix masculina with setae on mesial margin, provided mesioproximally with small, proximally fused appendix interna; exopod consisting of proximal segment and multiarticulate flagellum. Telson 1.7 times as long as wide, bearing proximal lobe on lateral margins and a single movable spinule on each posterolateral angle; posterior margin rounded. Uropodal endopod with distolateral spine. Uropodal exopod bearing transverse suture with 9 spinules and movable spine at distolateral angle. [Adapted from Kensley & Chan, 1998.]

Type locality. — Ta-Chi, I-Lan County, north-eastern coast of Taiwan, sandy mud bottom, 350 m.

Distribution. — Only known from the type locality.

Calastacus inflatus Komai, Lin & Chan, 2009

Calastacus inflatus Komai et al., 2009: 24-30.

Description. — Carapace stout; integument fragile and naked. Rostrum spiniform, unarmed, failing to reach distal margin of A1 second segment. Eyestalks slightly flattened dorsoventrally, hardly mobile, lacking pigment. A1 peduncle moderately stout; segment 1 subequal in length to distal two segments combined. A2 peduncle moderately stout, longer than A1 peduncle; second segment with weakly produced, rounded dorsolateral distal angle; third segment with small spine at ventromesial distal angle; fourth segment longest; scaphocerite slender and spiniform, reaching midlength of fourth segment; flagellum missing. Epistome produced in rounded lobe and naked.

Carapace somewhat compressed laterally and faintly rugose on branchiostegites, otherwise almost smooth; dorsal surface strongly convex, and gastric region much higher than base of rostrum; supraorbital spines small and directed anterodorsally; gastric median carina obsolete; cervical groove very shallow. Mxp3 moderately stout; ischium unarmed on ventral margin, crista dentata (not illustrated) with row of about 20 small acute teeth; merus with small subdistal spine on ventral margin; carpus with blunt dorsodistal projection; exopod overreaching distal margin of merus.

P1 slightly unequal (right larger than left), but similar in shape. In larger cheliped coxa with minute denticle on ventrodistal margin; ischium with some minute denticles mesially on ventral margin; merus slightly widened distally, dorsal and ventral margins each with moderately small subterminal spine, ventral margin also with two tiny denticles mesially; carpus about half length of palm; palm slightly widened distally, about twice as long as wide, with small subdistal spine dorsally and with sparse tufts of short setae on lateral surface; dorsal and ventral surfaces rounded, each bearing a row of long, stiff setae, and a row of minute denticles is also present on ventral surface; dactylus subequal in length to palm, terminating in slender, curved tip, lateral surface with weak longitudinal carina adjacent to dorsal margin, cutting edge with row of blunt or subacute teeth; fixed finger also terminating in slender, curved tip crossing tip of dactylus, and cutting edge with a row of small triangular teeth; scattered tufts of stiff setae on surfaces of both fingers.

Smaller (left) cheliped broken. P2 chelate and moderately slender, reaching anterolateral margin of carapace by tip of merus; ischium very short and unarmed; merus with few setae subdistally on dorsal margin and a row of long setae on ventral margin, bearing no spination; carpus slighty shorter than palm, bearing row of long setae on dorsal surface, and few setae on ventral

surface; palm about 2.7 times as long as wide, bearing a row of long setae on sharply carinate dorsal and ventral margins; dactylus about half length of palm, bearing a row of stiff setae on sharply carinate dorsal surface, and a row of minute corneous spinules on cutting edge; fixed finger also with a row of minute spinules on cutting edge.

P3 long, slightly overreaching anterolateral margin of carapace by tip of merus; merus and ischium unarmed; carpus about half length of propodus; dactylus 0.3 times as long as propodus, and slightly depressed dorsoventrally; propodus with tufts of stiff setae on dorsal and ventral margins, bearing slender terminal spine at ventrodistal margin. Ps4-5 damaged.

Plp1 uniramous and bisegmented; proximal segment stem-shaped, and distal segment broad or elongate, and double-lobed by longitudinal median suture, mesial lobe proximally with patch of hooklets. Plp2 biramous, endopod bearing slender bisegmented appendix masculina, fused proximally with appendix interna bearing patch of hooklets; exopod consisting of proximal segment and multiarticulate flagellum.

Abdomen dorsoventrally flattened. Pleuron 1 shortest and narrowed posteroventrally; pleura 2-6 rounded ventrally (pleuron 4 damaged on left side). Telson 1.8 times as long as wide and roughly rectangular, bearing faint proximal convexity but no spines on lateral margins and on gently convex posterior margin. Uropodal endopod broadened distally and tear-shaped, bearing no marginal spines; dorsal carinae faint. Uropodal exopod without marginal spines, bearing unarmed suture on dorsal surface; lateral margin slightly convex. [Adapted from Komai et al., 2009.]

Type locality. — Platas Island, South China Sea, 1400 m.

Distribution. — Only known from the type locality.

Calastacus laevis De Saint Laurent, 1972
(fig. 41C-D)

Calastacus laevis De Saint Laurent, 1972: 348, figs. 1-10; Sakai & De Saint Laurent, 1989: 60; Kensley, 1996d: 159 (list); Costello et al., 2001: 289.

Material examined. — MNHN TH 152, holotype, male (TL/CL, 45.0/15.0), Bay of Biscay, Spain, “Thalassa” Sta. W 377.

Diagnosis. — Plp1 (fig. 41C) bisegmented; proximal segment stem-like, distal segment double-lobed, mesial lobe rectangular, with patch of hooklets but without distal seta, and lateral lobe elongate. Male Plp2 (fig. 41D) biramous, endopod bearing bisegmented appendix masculina provided mesioproximally with small, proximally fused appendix interna with a patch of hooklets;

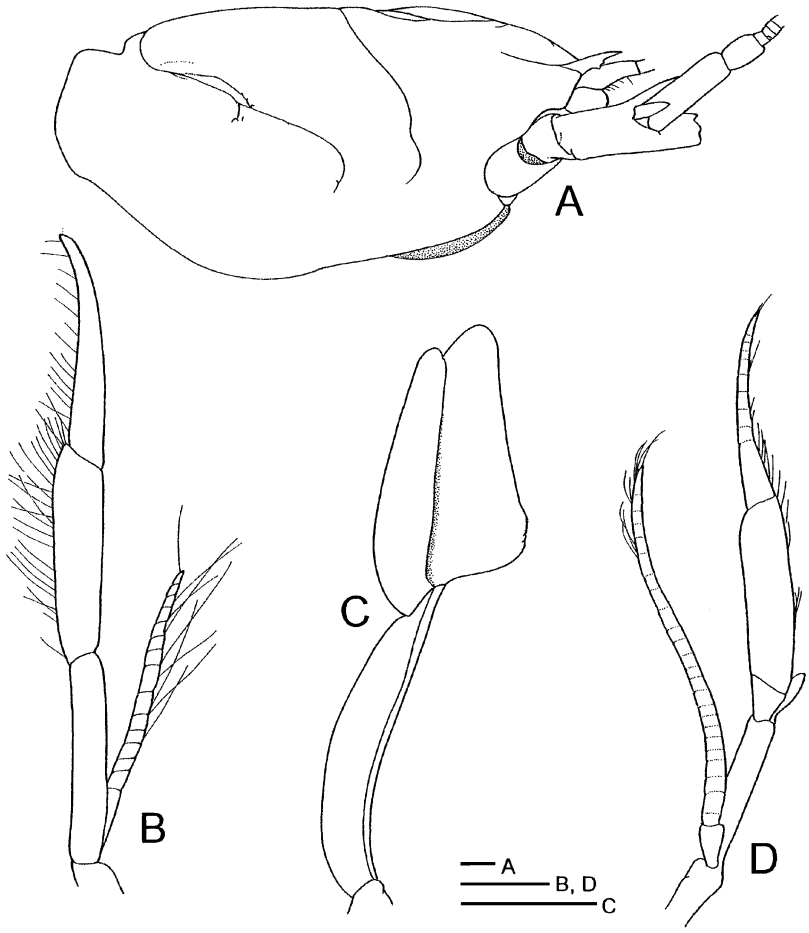

Fig. 41. *Calastacus stilirostris* Faxon, 1893 and *Calastacus laevis* De Saint Laurent, 1972. A, carapace, lateral view; B, D, male Plp2; C, male Plp1. A, B, *Calastacus stilirostris*, USNM 21064, syntype, male (TL/CL, 51.0/16.0 mm, distal part of rostrum missing), off Acapulco; C, D, *Calastacus laevis* MNHN Th 152, holotype, male (TL/CL, 45.0/15.0), Bay of Biscay, Spain. Scales 1 mm.

exopod consisting of proximal segment and multiarticulate flagellum. Plps3-5 endopods with appendix interna.

Remarks. — The male Plps1-2 are similar to those of *C. colpos* Kensley, 1996d, *C. mexicanus* Kensley, 1996d, and *C. mclaughlinae* (Lin & Komai, 2006).

Type locality. — Bay of Biscay, Spain, 43°43.5′N 04°27′W, 950-1000 m.

Distribution. — Only known from the type locality.

Calastacus mclaughlinae (Lin & Komai, 2006)

Calaxiopsis mclaughlinae Lin & Komai, 2006: 399, figs. 1-4.

Remarks. — Lin & Komai (2006) described the present species as *Calaxiopsis mclaughlinae*, while their species does not belong in the genus *Calaxiopsis*, but instead in the genus *Calastacus*, because they differ from each other as follows. In *Calaxiopsis* the rostrum is elongate and armed with lateral spines; pleura 3-5 bear a sharp spine anteroventrally; Plp1 uniramous and bisegmented, with the proximal segment short, and the distal segment slender and elongate, distally forming a spear-head shape; Plp2 is biramous, with the endopod rectangular, bearing a bisegmented appendix masculina, the proximal segment is elongate and provided basally with a small appendix interna, and the distal segment is short. In *Calastacus*, in contrast, the rostrum is spiniform and unarmed on the lateral margins; and pleura 3-5 bear no sharp spine anteroventrally; Plp1 is uniramous and bisegmented, with the proximal segment stem-shaped, and the distal segment broad or elongate, and double-lobed by a longitudinal median suture, the mesial lobe proximally bears a patch of hooklets; Plp2 is biramous, the endopod bears a slender bisegmented appendix masculina fused proximally with an appendix interna bearing a patch of hooklets. Therefore, *Calaxiopsis mclaughlinae* is reclassified under the genus *Calastacus*, as *C. mclaughlinae*, though its gastric region bears submedian rows of interspaced spines.

Type locality. — Vicinity of Taiwan 24°52.02′N 122°03.11′E; 572-605 m.

Distribution. — Off northern Taiwan, 24°51.17′N 122°04.97′E – 24°52.02′N 122°03.11′E; 572-800 m.

Calastacus mexicanus Kensley, 1996

Calastacus mexicanus Kensley, 1996d: 162, figs. 3, 4.

Material examined. — USNM 211496, holotype, male (TL/CL, 45.0/15.5 mm), Gulf of Mexico, 28°01.04′N 85°39.38′W, 629 m, 16.v.1985, det. Kensley.

Type locality. — Gulf of Mexico, 28°01.04′N 85°39.38′W, 629 m.

Distribution. — Gulf of Mexico (Kensley, 1996d); 624-640 m.

Calastacus myalup Poore & Collins, 2009

Calastacus myalup Poore & Collins, 2009: 248, figs. 17, 42.

Description. — Rostrum 0.5 times length of front-to-cervical groove, slender and acutely triangular, and unarmed anterior to supraocular spine on lateral

margin, not continuous with gastric lateral carina. Supraocular spines prominent. Eyestalk 0.4 length of rostrum; cornea unpigmented. A1 peduncle reaching two-thirds along A2 segment 4. A2 segment 1 with sharp spine and spinule on ventrodistal margin; segment 2 with slender distal spine, directed slightly inwards, reaching distally to middle of segment 4; scaphocerite slender and directed slightly upwards, reaching distally to middle of A2 segment 4; segment 3 with sharp distal spine on ventral margin; segment 4 little longer than segment 2 (excluding distal spine); segment 5 about half length of segment 4. Carapace smooth except for slight rugosity between supraocular spines; gastric median carina unarmed; gastric lateral and submedian carinae absent.

P1 coxa with spine; basis unarmed; remainder missing. P2 ischium unarmed; merus unarmed; carpus 0.7 length of chela. P3 merus unarmed; propodus three times as long as dactylus, bearing oblique rows of simple setae but no robust setae. P4 unarmed; propodus three times as long as dactylus, bearing oblique rows of simple setae distally but no robust setae. P5 unarmed; propodus with oblique rows of simple setae distally but without robust setae; fixed finger short and rounded; dactylus broken. Maxilliped 3 basis unarmed; ischium unarmed on ventral margin, bearing crista dentata with 20 teeth; merus with two long spines on distal half of ventral margin; carpus unarmed.

Abdominal pleuron 1 twice as deep as middorsal length, short, and rounded ventrally; pleuron 2 broad, lateral length 1.3 times dorsal length, and rounded anteroventrally; pleura 3-6 rounded ventrally. Plp1 bisegmented, distal segment 0.8 length of proximal segment and leaf-like, bearing hooklets on proximal broad triangular lobe; Plp 2 endopod with bisegmented appendix masculina bearing proximally thumb-like appendix interna; exopod half length of endopod. Telson 1.6 times as long as wide, widest proximally, approximately parallel-sided posterior to proximal process, and semicircular in posterior third, bearing no marginal spines; dorsal surface with unarmed obsolete oblique rib. Uropodal endopod two times as long as wide and unarmed marginally, bearing longitudinal ridge without spines on dorsal surface. Uropodal exopod twice as long as wide, bearing no spines on lateral margin but one fixed spine and one robust seta at distolateral angle; dorsal surface with two unarmed obsolete longitudinal ribs, and transverse suture with 11 robust setae of varying lengths. [Adapted from Poore & Collins, 2009.]

Type locality. — Off Bunbury, Western Australia, 397-423 m.

Distribution. — Only known from the type locality.

Calastacus stilirostris Faxon, 1893
(fig. 41A-B)

Calastacus stilirostris Faxon, 1893: 194; Faxon, 1895: 106, pl. 27 fig. 1-1f; Sakai & De Saint Laurent, 1989: 59; Hendrickx, 1995: 390 (list); Kensley, 1996d: 159 (list).
Calocaris (*Calastacus*) *stilirostris* — Borradaile, 1903: 539; De Man, 1925d: 8 (list), 117 (key).
Calastacus stylirostris — Balss, 1925: 209.

Material examined. — USNM 21064, syntype, 3 males (TL/CL, 51.0/16.0 mm, distal part of rostrum missing; TL/CL, 14.0/4.9-16.0/5.3 mm), off Acapulco, Mexico, 11.iv.1891, leg. U.S. Fish Commission Steamer "Albatross", Sta. 3418.

Remarks. — Faxon (1893: 107) examined 9 male specimens, three of which were examined in the present revision as follows. The carapace bears a median carina, as shown by Faxon (1895: 106), who described that "from the root of rostrum the median dorsal line of the carapace is convex; a light median carina runs along the back from the base of the rostrum, fading out before reaching the hind border of the carapace". The A2 scaphocerite is shorter than the distodorsal spine of segment 2 (fig. 41A). The male Plp2 (fig. 41B) is biramous, and the endopod distally bears a bisegmented appendix masculina, the proximal segment of which is mesioproximally provided with a tiny appendix interna.

Type locality. — Off Acapulco, 1098 m.

Distribution. — Acapulco (Faxon, 1893); Bay of Panama; 1098-1200 m.

Genus **Calaxiopsis** Sakai & De Saint Laurent, 1989

Calaxiopsis Sakai & De Saint Laurent, 1989: 60; Poore, 1994: 99 (key).

Diagnosis. — Rostrum elongate and acutely triangular, lateral margins with 4 distinct spines, extending posteriorly onto anterior part of gastric region. Anterolateral margins of carapace unarmed. Gastric region convex with 5 carinae. Cervical groove only on dorsal region; no postcervical carina. Eyes subspherical and contiguous to carapace; cornea unpigmented. P1 subequal. Both Ps3 and 5 coxae with genital pore. Pleura 2-5 triangular or subsquare, bearing small anteroventral spine or not, and sharp distinct posteroventral spine or not. Pleurobranchs absent. Plp1 uniramous and bisegmented; proximal segment short and distal segment slender and elongate to form distally spearhead shape. Plp2 biramous; endopod rectangular, bearing bisegmented appendix masculina, proximal segment elongate and provided basally with small appendix interna, and distal segment short; exopod consisting of proximal segment and multiarticulate flagellum. Plps3-5 endopods with appendix interna. Telson longer than broad, and rounded on posterior margin without me-

dian spine. Uropodal exopod with transverse suture. Hermaphroditic. [Adapted from Sakai & de Saint Laurent, 1989.]

Remarks. — The genus *Calaxiopsis* was established on the basis of the type species *C. serrata* Sakai & De Saint Laurent, 1989, and is different from the genus *Calastacus* not only in the shapes of male Plps1-2, but also as follows. In *Calaxiopsis* the gastric region bears submedian carinae, and pleura 2-5 are triangular or subsquare, bearing a small anteroventral spine in some species (not in all), and a sharp, distinct posteroventral spine in some species (not in all). In *Calastacus*, in contrast, the gastric region bears no submedian carinae, and pleura 3-6 are rounded ventrally and pleura 2-6 bear no spine ventrally.

Type species. — *Calaxiopsis serrata* Sakai & De Saint Laurent, 1989, by original designation. The gender of the generic name, *Calaxiopsis*, is feminine.

Species included. — *Calaxiopsis serrata* Sakai & De Saint Laurent, 1989; *Calaxiopsis* sp. Robles et al., 2009.

Calaxiopsis serrata Sakai & De Saint Laurent, 1989
(figs. 42, 43A-E)

Calaxiopsis serrata Sakai & De Saint Laurent, 1989: 61, fig. 16 [partim; mis-described; the second D is for E, female MP 1173].

Material examined. — MNHN Th 1172, holotype, male (TL/CL, 21.0/9.0 mm), Guinea, Guinea Trawling Survey, Sta. 11, 11.viii.1966; MNHN Th 1173, paratype, female, (TL/CL, 18.0/7.8 mm), Guinea, Trawling Survey, 240-250 m, 19.viii.1966; MNHN Th 1174, paratype, juv. male (TL/CL, 10.0/3.5 mm), Guinea, Trawling Survey, Radial B, Sta. 7, 200 m, 25.xi.1966; MNHN Th 1175, paratype, male (TL/CL, 19.0/8.0 mm), Guinea, Guinea Trawling Survey, Radial D, Sta. 8, dredged, 100 m, 24.ii.1966; MNHN Th 1176, paratype, male (TL/CL, 23.0/8.5 mm), Guinea, Guinea Trawling Survey, Sta. 11, 25.viii.1966.

Diagnosis. — Rostrum elongate, acutely triangular, furrowed on dorsal surface, overreaching distal margin of penultimate segment of A1 peduncle, lateral margins with three teeth posteriorly extending shortly onto gastric region as smooth lateral carinae with supraorbital spines. Carapace smooth. Anterolateral margin of carapace unarmed. Gastric region convex, bearing median and submedian carinae; median carina running short from base of rostrum; submedian carinae incurved, with two spines anteriorly. Cervical groove only on dorsal part. Eyes subspherical and contiguous to carapace; cornea unpigmented. A1 peduncle reaching distal third of A2 penultimate segment. A2 segment 1 with strong ventral tooth; segment 2 elongated to form dorsodistal tooth reaching distal third of penultimate segment; scaphocerite (fig. 42D) directed outward, and about as long as dorsodistal tooth of segment 2; segment 3 with short ventrodistal tooth; penultimate segment about three times as

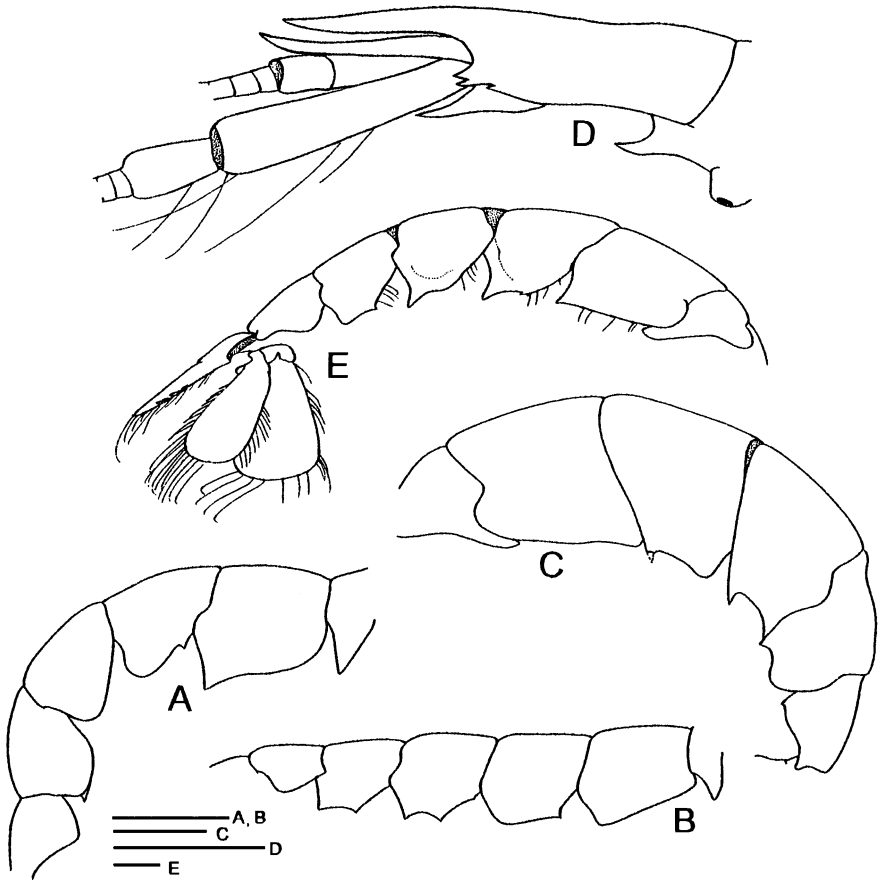

Fig. 42. *Calaxiopsis serrata* Sakai & De Saint Laurent, 1989. A, C, male abdominal somites 1-6; B, female abdominal somites 1-6; D, A2 peduncle, lateral view; E, male abdominal somites 1-6 and tail-fan. A, MNHN Th 1174, paratype, juv. male (TL/CL, 10.0/3.5 mm), Guinea; B, MNHN Th 1173, paratype, female (TL/CL, 18.0/7.8 mm), Guinea; C, MNHN Th 1175, paratype, male (TL/CL, 19.0/8.0 mm), Guinea; D, E, MNHN Th 1176, male (TL/CL, 23.0/8.5 mm), Guinea. Scales 1 mm.

long as distal segment; antennal flagellum about twice as long as antennular flagella. Mxp3 pediform; coxa and basis each with ventrodistal tooth; ischium more than twice as long as wide, bearing two teeth on mesial margin, and ischial crest with 11 interspaced marginal denticles, terminated with triangular tooth. Merus about as long as ischium, armed with two sharp teeth distally on mesial margin. Carpus broadened distally, about three-fourths length of merus and about as long as propodus. Dactylus about three-fourths length of propodus, and brimmed with dense bristles on ventral margin.

P1 subequal; in larger cheliped on left side, coxa and basis unarmed; ischium with subterminal tooth on ventral margin; merus armed with two sharp teeth on ventral margin and subterminal tooth on dorsal margin; carpus with ventrolateral tooth, and subterminal tooth on dorsal margin; chela 2.5 times as long as wide; fingers setose and longer than palm; palm slightly longer than wide, lateral surface smooth, furnished with sharp subterminal tooth; dorsal margin carinate with distal tooth; cutting edge of fixed finger armed with two sharp teeth. Dactylus clearly longer than palm, cutting edge armed proximally with obtuse triangular tooth, followed distally by large concavity. In smaller cheliped on right side, ischium with two teeth on ventral margin; merus less than twice as long as wide, armed with three teeth on ventral margin and subterminal one on dorsal margin; carpus about half length of merus, armed with subterminal tooth on dorsal margin; chela about 2.5 times as long as wide; palm with subterminal tooth on carinate dorsal margin, lateral surface bearing subterminal tooth; fingers longer than palm; fixed finger with two teeth on cutting edge; dactylus 1.6 times as long as palm, and slightly sigmoid on cutting edge. Both Ps3 and 5 coxae with genital pore. Pleurobranchs absent.

Abdominal somites smooth laterally. Somite 1 triangular. In young male specimen (MNHN Th 1174, paratype, juv. male, TL/CL, 10.0/3.5 mm) pleuron 2 broad, bearing strong posteroventral spine (fig. 42A); pleuron 3 rounded posteroventrally, bearing small anteroventral spine; pleuron 4 unarmed; pleuron 5 with small posteroventral spine. In adult male specimen (MNHN Th 1176) pleuron 2 almost straight ventrally, bearing strong posteroventral spine (fig. 42E); pleuron 3 with reduced anteroventral and distinct posteroventral spines; pleuron 5 with small anteroventral spine; and pleuron 6 rounded and unarmed ventrally. In female specimen (MNHN Th 1173) pleuron 2 broad and triangular ventrally; pleuron 3 with small anteroventral spine; pleura 3-4 with antero- and posteroventral spines; and abdominal somite 6 triangular and unarmed ventrally (fig. 42B). In male specimen (MNHN Th 1172, holotype) abdominal pleuron 2 with triangular posteroventral tooth; pleura 3-5 bearing sharp anteroventral teeth and triangular posteroventral teeth. In male specimen (MNHN Th 1175) pleuron 2 declining ventrally towards posteroventral angle and unarmed; pleuron 3 rounded posteroventrally, bearing a single small anteroventral spine; pleura 3-4 with antero- and posteroventral teeth; pleuron 5 with a single anteroventral spine; and pleuron 6 triangular with a small ventral spine (fig. 42C).

In male specimens (MNHN Th 1174, 1173) Plp1 uniramous and bisegmented; proximal segment short and distal segment slender and elongate distally to form spear-head shape (fig. 43A, B). In male specimens (MNHN Th

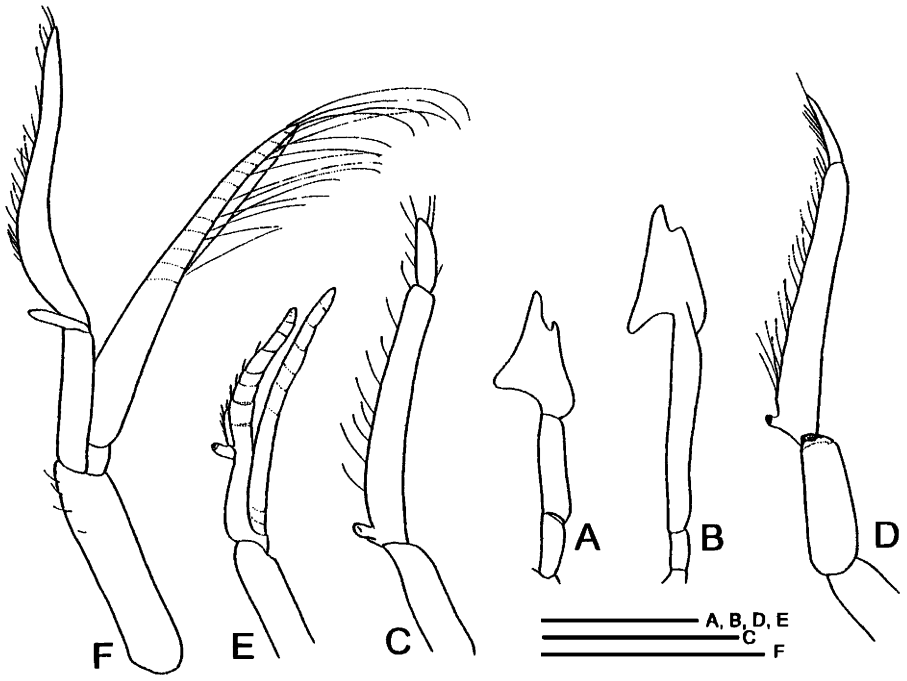

Fig. 43. *Calaxiopsis serrata* Sakai & De Saint Laurent, 1989 and *Nipponcalaxiopsis manningi* (Komai, 2000). A, B, male Plp1; C, D, E, F, male Plp2. A, E, *Calaxiopsis serrata* MNHN Th 1175, paratype, male (TL/CL, 19.0/8.0 mm), Guinea; B, D, *Calaxiopsis serrata*, MNHN Th 1176, male (TL/CL, 23.0/8.5 mm), Guinea; C, *Calaxiopsis serrata*, MNHN Th 1172, holotype, male (TL/CL, 21.0/9 mm), Guinea; F, *Nipponcalaxiopsis manningi* (Komai, 2000), CBM-ZC 4934, holotype (TL/CL, 19.2/7.1), off Takeoka, Uchibo coast of Boso peninsula. Scales 1 mm.

1172, 1176) Plp2 biramous and slender, endopod bearing distally bisegmented appendix masculina, proximal segment provided mesioproximally with small, proximally fused appendix interna, and short distal segment with marginal setae (fig. 43C, D); in the male specimen (MNHN Th 1175), an aberrant specimen, Plp2 is biramous, endopod with multiarticulate distal half, bearing mesiomedially appendices interna and masculina (fig. 43E). Plps3-5 biramous, endopods with appendix interna. Telson longer than wide, slightly convergent posteriorly; lateral margins with proximal lobe with distinct spine followed posteriorly by two teeth; dorsal surface with a pair of teeth; posterior margin rounded and unarmed. Uropodal endopod with distinct spine at distolateral angle, bearing smooth median carina. Uropodal exopod unarmed on lateral margin, bearing movable spine at distolateral angle and distinct transverse suture with 2-3 spinules.

Remarks. — The male holotype (MNHN 1172 from Guinea, Guinea Trawling Survey, Sta. 11) is slightly different from the male paratype (MNHN 1176 from Guinea, Guinea Trawling Survey, Sta. 11) in the shape of the distal segment of the bisegmented appendix masculina, because in the male holotype (MNHN 1172) that distal segment is short with an obtuse tip (fig. 43C), whereas in the male paratype (MNHN 1176) the distal segment of the bisegmented appendix masculina is slender and pointed distally (fig. 43D). Another male paratype (MNHN 1175 from Guinea, Guinea Trawling Survey, Radial D, Sta. 8, dredged, 100 m) is different from those two males (MNHN 1172, 1176), because in the male specimen (MNHN 1175) the Plp2 endopod is slender and multiarticulate in its distal half, bearing mesiomedially appendices interna and masculina (fig. 43E). It seems that the male specimen (MNHN 1175) is aberrant in the form of the male Plp2 from the other type specimens.

Type locality. — Guinea, Guinea Trawling Survey, Sta. 11, 240-250 m.

Distribution. — Only known from the type locality.

Calaxiopsis sp. Robles et al., 2009

Calaxiopsis sp., Robles et al., 2009: 316.

Genus **Calocaris** Bell, 1846

Calocaris Bell, 1846: 231; Dana, 1852a: 13; Dana, 1852b: 509; Ortmann, 1891: 50, pl. 1 fig. 5d-I; Stebbing, 1893: 190; Alcock, 1901: 187; Borradaile, 1903: 539; Lagerberg, 1908: 50; Selbie, 1914: 88 (key), 92; Pesta, 1918: 191; De Man, 1925d: 2 (key), 114; Rathbun, 1929: 25; Bouvier, 1940: 95; Barnard, 1950: 498 (key), 502; Balss, 1957: 1580; Zariquiey Alvarez, 1968: 225; De Saint Laurent, 1972: 353; Sakai, 1987a: 303 (list); Kensley, 1989: 962; Sakai & De Saint Laurent, 1989: 55; Squires, 1990: 338; Poore, 1994: 98 (key); Felder, 2001: 440; Ngoc-Ho, 2003: 459.

Callocaris — Zariquiey Alvarez, 1946: 95 (key), 104.

Calocaris s. str. — Borradaile, 1903: 539; De Man, 1925d: 2 (key), 115; Balss, 1957: 1580.

Diagnosis. — Rostrum triangular and grooved on dorsal surface, lateral margins with 0-8 teeth, extending posteriorly onto anterior half of gastric region as lateral carinae. Anterolateral margins armed or unarmed. Gastric region convex; median carina smooth, submedian carinae absent. Cervical groove present at full length. Postcervical carina present. Eyestalks and cornea not differentiated, cornea unpigmented, anteriorly flattened and contiguous along midline. A2 scaphocerite reduced. P1 subequal in length and similar in shape; palm of larger cheliped with dorsodistal spine; fingers longer than palm. P2 fingers longer than palm. Ps3-4 propodi without spinous rows. Ps3-5 dactyli simple. Ps3 and 5 coxae with genital pore. Pleurobranchs on Ps2-4.

Abdominal pleura convex or rounded ventrally, and distinguished from terga by obscure longitudinal carina. Plp1 uniramous and bisegmented; proximal segment elongate and distal segment pear-shaped, bearing apically a small lobe with a patch of hooklets. Plp2 biramous, exopod elongate and endopod bearing distally elongate appendix masculina and small, slender appendix interna. Plps3-5 biramous with slender endopod and exopod, endopod with appendix interna. Telson longer than wide, bearing proximal lobe with spine followed posteriorly by denticles on lateral margin; posterior margin with or without median spine. Uropodal exopod bearing movable spine at posterolateral angle, and transverse suture dorsally. Hermaphroditic.

Type species. — *Calocaris macandreae* Bell, 1846, by original designation and monotypy. The gender of the generic name, *Calocaris*, is feminine.

Species included. — *Calocaris caribbaea* Kensley, 1996d; *C. granulosa* Grebenjuk, 1975; *C. isochela* Zarenkov, 1989; *C. macandreae* Bell, 1846 (syn. *Calocaris barnardi* Stebbing, 1914); *C.* sp. Kensley, 1996d.

KEY TO THE SPECIES OF THE GENUS *CALOCARIS*

1 – Plp1 with subtriangular distal segment ..... *C. isochela*
– Plp1 with pear-shaped distal segment with distal patch of hooklets 2

2 – Carapace covered with tubercles with setae; abdominal somite 6 with pair of longitudinal setal rows ..... *C. granulosa*
– Carapace smooth 3

3 – Lateral margins of rostrum and lateral gastric carinae continuous, each with 2-3 spines; dorsal surface of telson bearing medially paired divergent carinae with 4-5 spines ..... *C. macandreae*
– Lateral margins of rostrum and lateral gastric carinae continuous, each with 4-8 spines; dorsal surface of telson bearing medially paired divergent carinae with 1-2 spines ..... *C. caribbaea*

Calocaris caribbaea Kensley, 1996
(fig. 44)

Calocaris caribbaeus Kensley, 1996d: 164, figs. 5, 6; Robles et al., 2009: 316.

Material examined. — RMNH 41755 (= USNM 243421), 1 female (TL/CL, 31.2/11.2 mm), western Atlantic, N. of Tobago, 11°37.8′N 60°37.4′W – 11°38.8′N 60°37.5′W, 659-1126 m, 10′ ottertrawl, 2.vii.19769, Pillsbury Sta. P-846; RMNH D 41746 (USNM Acc. No. 381702), 2 males (TL/CL, 36.0/12.2 mm; CL 12.1 mm, Abd4-telson missing), off coast of Surinam, 07°56.5′N 54°39′W – 08°08′N 54°36′W, 1042-1070 m, 41′ ottertrawl, 11.vii.1968.

Diagnosis. — Rostrum (fig. 44A, B) triangular and pointed distally, lateral margins extending posteriorly onto gastric region as lateral carinae, and

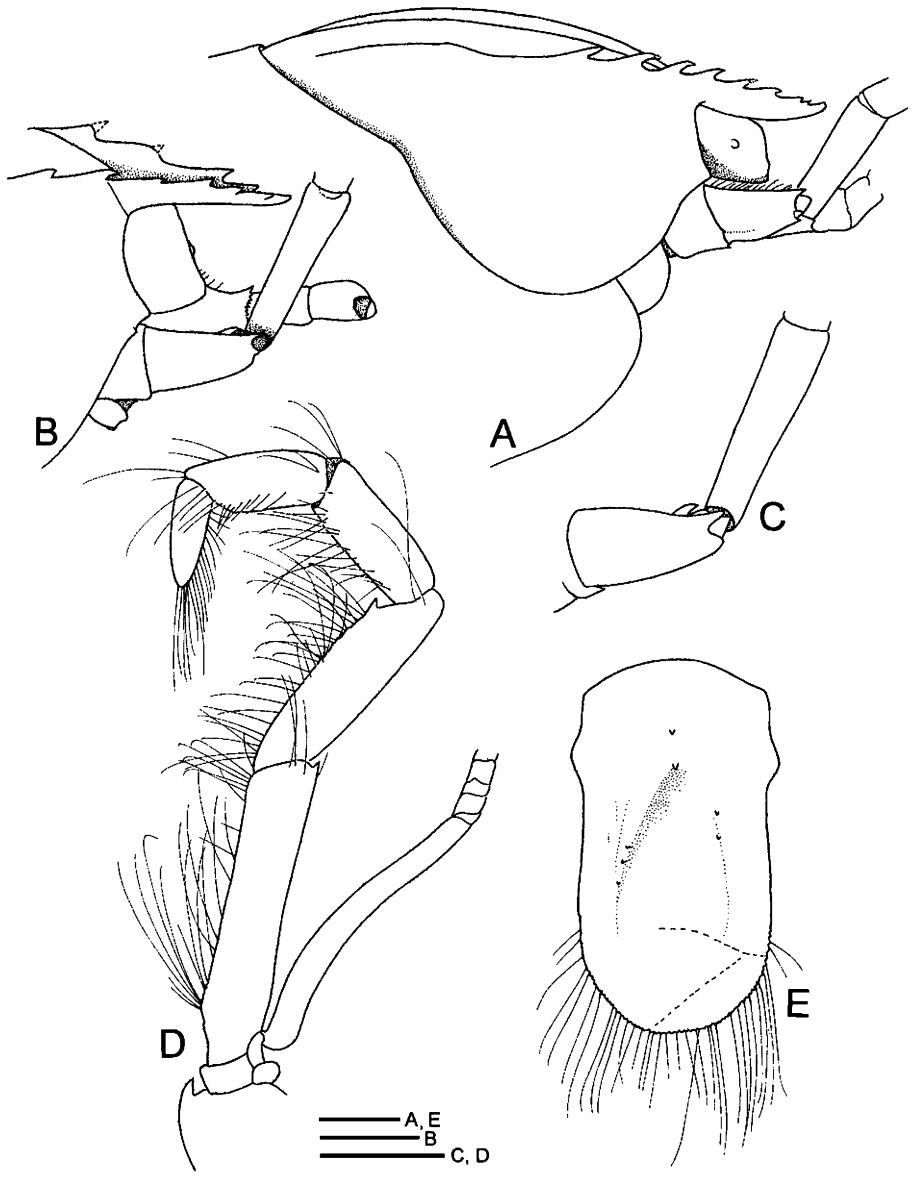

Fig. 44. *Calocaris caribbaea* Kensley, 1996. A, B, anterior part of carapace; C, A2 peduncle, lateral view; D, Mxp3; E, telson. A-E, RMNH D 41746, male (TL/CL, 36.0/12.2 mm), off coast of Surinam, 07°56.5′N 54°39′W – 08°08′N 54°36′W, 1042-1070 m. Scales 1 mm.

bearing series of 4-8 (5-6) spines. Carapace smooth. A1 segment 1 subequal in length to segments 2 and 3 together, bearing small tooth on lateral margin. Eyes flattened and contiguous along midline, cornea unpigmented. A2 segment 3

with short distolateral tooth; scaphocerite (fig. 44C) reduced to tiny scale; segment 4 three times as long as segment 5. Maxilla 2 scaphognathite with posterior whip. Mxp3 (fig. 44D) ischium unarmed on mesial margin, ischial crest bearing 9 denticles; merus with a single small distomesial tooth. P1 ischium with small distal spine on ventral margin; merus bearing 4 ventral spines increasing in size distally, and a single subdistal spine on dorsal margin; carpus unarmed; palm two-thirds length of fingers, bearing strong distal spine on dorsal margin, and strong carina on lateral surface reaching fixed finger; fixed finger bearing on cutting edge distinct proximal tubercle followed distally by 5 small tubercles and finely denticulate straight distal end; dactylus bearing on cutting edge distinct proximal tubercle followed distally by well-interspaced low tubercle about in middle and finely denticulate straight distal end. Plp1 uniramous and bisegmented, proximal segment fusiform; distal segment broadened distally to form pear-shape with rounded distal lobe bearing subapical patch of hooklets. Plp2 biramous, endopod bearing distally appendix masculina with dense setae in proximal two-thirds, and appendix interna. Plps3-5 endopods with appendix interna at proximal third. Abdominal pleura rounded ventrally, bearing no spine. Telson (fig. 44E) longer than wide, bearing 0-6 spinules on lateral margin; posterior margin rounded; dorsal surface medially concave between divergent carinae, each with 0-4 spinules. Uropodal endopod without spines on lateral margin. Uropodal exopod bearing a single spine at posterolateral angle, and transverse suture. [Adapted from Kensley, 1996d.]

Remarks. — Plps1-2 are the same as those of *Calocaris macandreae* Bell, 1846, which were figured by me (Sakai, 1991, fig. 5C, D).

Type locality. — Lesser Antilles, off Antigua, 17°06′N 62°17′W, 589 m.

Distribution. — Gulf of Mexico (Kensley, 1996d); Lesser Antilles — off Antigua (Kensley, 1996d); off Surinam (Kensley, 1996d); off Trinidad (Kensley, 1996d); 589-1272 m.

Calocaris granulosa Grebenjuk, 1975

Calocaris (*Calocaris*) *granulosus* Grebenjuk, 1975: 299, figs. 1, 2.
Calocaris granulosus — Sakai & De Saint Laurent, 1989: 59; Kensley, 1996d: 163 (list).
Paracalocaris granulosa — Sakai, 1991: 31.
Not: *Calocaris* (*Calocaris*) *granulosus* — Sakai, 1987a: 300, 303 (list) [= *Paracalocaris sagamiensis* Sakai, 1991].

Diagnosis. — Carapace scattered with many clumps of setae. Rostrum acutely triangular, lateral margins extending posteriorly onto gastric region as lateral carinae, bearing three spines. A2 scaphocerite shorter than dorsal spine

of A2 segment 2. Abdominal somite 6 bearing dorsomedially paired, divergent rows of 6 clumps of setae. Plp1 uniramous and bisegmented, proximal segment fusiform, distal segment pear-shaped. Plp2 biramous, endopod bearing distally elongate appendix masculina and small appendix interna. Telson longer than wide, bearing proximal lobe with spine, followed posteriorly by spines on lateral margin, and divergent carinae with 6 spines medially on dorsal surface; posterior margin slightly concave. [After Grebenjuk, 1975.]

Remarks. — Grebenjuk shows in his figure that the maxilla 2 scaphognathite bears no posterior whip (Grebenjuk, 1975, fig. 3), however, that was presumably lost in the course of dissection, because all the other species in *Calocaris* bear a posterior whip as a characteristic of the family Calocarididae.

Type locality. — Bay of Alaska.

Distribution. — Alaska (Grebenjuk, 1975); 756-1000 m.

Calocaris isochela Zarenkov, 1989

Calocaris isochela Zarenkov, 1989: 25, fig. 2; Kensley, 1996d: 163 (list).

Diagnosis. — Rostrum triangular, lateral margins extending posteriorly onto gastric region as lateral carinae, bearing 6 spines. Gastric submedian carinae absent, median carina unarmed, originating from base of rostrum and running to cervical groove. Anterolateral margin of carapace armed with a spine. A2 scaphocerite reduced. P1 chelate and unequal, merus with subdistal tooth on dorsal margin; carpus unarmed; palm with subdistal tooth on dorsal margin; fingers distinctly longer than palm. P2 fingers longer than palm. Plp1 uniramous and bisegmented, distal segment subtriangular. Plp2 biramous, endopod unsegmented, bearing mesiomedially distinct appendix interna and elongate appendix masculina. Telson longer than wide, bearing unarmed proximal lobe followed distally by denticles on lateral margin, and divergent carinae with spinules medially on dorsal surface, posterior margin slightly concave. Uropodal endopod with median carina. Uropodal exopod bearing a spine at posterolateral angle, and a transverse suture. [After Zarenkov, 1989, fig. 2.]

Remarks. — The type specimen is inaccessible, however, it is possible to identify the species by examining in detail the figures given by Zarenkov (1989, fig. 2). Zarenkov's species, *Calocaris isochela* is then characterized as follows: The A2 scaphocerite is reduced, Plp1 is uniramous and bisegmented, the distal segment is subtriangular; Plp2 is biramous, and the endopod bears mesiomedially a distinct appendix interna and an elongate appendix masculina.

Type locality. — New Zealand.
Distribution. — New Zealand — Plateau; 570 m.

Calocaris macandreae Bell, 1846
(figs. 45-47)

Calocaris Macandreae Bell, 1846: 233, figs.; White, 1850: 33; Smith, 1879: 55; Sars, 1883: 6; Sars, 1884: 180, pls. 2, 6, 7; Carus, 1885: 490; Stebbing, 1893: 190; Adensamer, 1898: 621; Lo Bianco, 1903: 187; Norman & Scott, 1906: 12; Hansen, 1908: 41; Lo Bianco, 1909: 603; Stephensen, 1910a: 277; Selbie, 1914: 92, pl. 14 figs. 5-7; Bouvier, 1917: 119, pl. 11 figs. 5, 6; Balss, 1925: 209; De Man, 1925b: 140, fig. 7; Zariquiey Cenarro, 1935: 7.

Calocaris Macandrei — White, 1857: 99, pl. 8 fig. 4.

Calocaris macandreae — Kirk, 1879: 401; Sars, 1884: 166, pl. 2; Lovett, 1885: 16; Ortmann, 1891: 50, pl. 1 fig. 5; Meinert, 1893: 220; Anderson, 1896: 97; Adensamer, 1898: 621; Appelhöf, 1906: 132; Lagerberg, 1908: 51, pl. 1 fig. 17; Wollebæk, 1909b: 251, figs. 1-6, pls. 15-17; Björck, 1913: 1, figs. 1-6, pl. 1; Selbie, 1914: 92, pl. 14 figs. 5-7; Williamson, 1915: 447, figs. 211-214; Pesta, 1918: 191, fig. 59; Caroli, 1921a: 241; Caroli, 1921b: 264, fig. 2; Runnstrøm, 1925: 14, pl. 1 figs. 1-2, 7, 10-15, pl. 2; Balss, 1926: 26; Grieg, 1927: 34; Williamson, 1927: 447, figs. 211-214; Rathbun, 1929, fig. 33 (after Bouvier, 1917, pl. 11 fig. 5); Miranda y Rivera, 1933: 21; Gustafson, 1934: 16; Poulsen, 1940: 208, 214, 236 (key), fig. 3; Gurney, 1942: 242, fig. 97; Zariquiey Alvarez, 1946: 104, fig. 132; Holthuis, 1950: 108, fig. 38; Zariquiey Alvarez, 1952: 19; Christiansen, 1955: 5; Soot-Ryen, 1955: 1; Holthuis, 1958: 8, fig. 5; Gordon, 1959: 191; Bourdillon-Casanova, 1960: 101, figs. 36, 37; Holthuis, 1962: 246; Buchanan, 1963: 729, figs. 1-15, tabl. 1; O'Riordan, 1963: 72; ICZN, 1964: 340; Forest, 1965: 347; Picard, 1965: 104; Squires, 1965: 10, figs. 2Cm, 3Cm, 5Cm; Allen, 1967: 17, 57, 89 (fig.); Zariquiey Alvarez, 1968: 225, fig. 88b; Stevčić, 1969: 128; Christiansen, 1972: 40, fig. 46; Kattoulas & Koukouras, 1974: 344; Froglia, 1976: 76; Holthuis & Heerebout, 1976: 62, fig. 82; Thiriot, 1976: 349; Beaubrun, 1979: 70, figs. 45, 46; Moncharmont, 1979: 70; Manning & Froglia, 1982: 323; Abel et al., 1983: 482, pl. 177; García Raso, 1983: 318; Macpherson, 1983: 44, fig. 25A; Riedl, 1983: 482, pl. 177, 2 figs; Nash et al., 1984: 425, figs. 1-3, pls. 1-3; Atkinson, 1986: 356, figs. 1K, 2A; Moore, 1986: 31; Thessalou-Legaki, 1986: 182; Atkinson & Taylor, 1988: 212, fig. 1h; Sakai & De Saint Laurent, 1989: 56; Moyse & Smaldon, 1990: 117, figs. 10, 12; Števčić, 1990: 214; Sakai, 1991: 31, fig. 5C-D; Dworschak, 1992: 215; Falciai & Minervini, 1992: 143, 1 fig.; Koukouras et al., 1992: 223; Noël, 1992: 79; Kocatas & Katagan, 1993: 35; Pipitone & Tumbiolo, 1993: 361; Anderson et al., 1994: 515, figs. 1-5; Cartes et al., 1994: 136, tables 2, 3; Diez et al., 1994: 47; Galil & Goren, 1994: 47; Froglia, 1995: 7; Hayward et al., 1995: 432, fig. 8.51 (partim); Falciai & Minervini, 1996: 143, 1 fig.; Barnich, 1996: 131, fig. 65; García Raso, 1996: 738; Kensley, 1996d: 163 (list); Astall et al., 1997: 675, pl. 1a, tabls. 1-5; Brattegard & Christiansen, 1997: 220; Hughes & Atkinson, 1997: 640; Johns et al., 1997: 127, figs. 1-4, tabl. 2; Pinn et al., 1998a; 243, fig. 1A; Pinn et al., 1998b: 211, figs. 1B, 2B; Števčić, 1998: 652; Pinn et al., 1999a: 103, figs. 2B-D, 2H, 4A, 4B, 5F; Pinn et al., 1999b: 1461, figs. 1E, 2, 3, tabls. 1-6; Taylor et al., 1999: 163, figs. 1, 2, tabls. 1-4; d'Udekem d'Acoz, 1999: 153; Christiansen, 2000: 230, fig. 1, tabl. 1; Taylor et al., 2000: 265, figs. 1-3, tabls. 1-6; Widdicombe et al., 2000: 371, figs. 1-8, tabls. 1-3; Costello et al., 2001: 289; González-Gordillo et al., 2001: 279; Türkay, 2001: 289; Ngoc-Ho, N., 2003: 458, figs. 6, 7; Atkinson & Taylor, 2004: 45, fig. 1, tabls. 1-2; Ingle & Christiansen, 2004: 84, fig. 64.

Calocaris Macandrae — Adensamer, 1898: 621.

Calocaris (*Calocaris*) *Macandreae* — Borradaile, 1903: 539; De Man, 1925d: 7 (list), 116 (key).

Calocaris barnardi Stebbing, 1914: 9, pl. 46; Kensley, 1981b: 30; Macpherson, 1983: 42, fig. 25B-D; Sakai & De Saint Laurent, 1989: 58; Bianchi et al., 1993: 34; Kensley, 1996d: 163 (list). [Type locality. — Cape Castle, South Africa, 163 m.]

Calocaris (*Calocaris*) *Barnardi* — De Man, 1925d: 7 (list), 116 (key).

Calocaris Macandrae — Bull, 1933: 48, figs. 1-18.

Calocaris Mc Andreae — Bouvier, 1940: 96, pl. 4 figs. 1, 2 (cf. Bouvier, 1917).

Callocaris macandreae — Zariquiey Alvarez, 1946: 104, fig. 132.

Calocaris (*Calocaris*) *barnardi* — Barnard, 1950: 502 (key), 503, fig. 93i-k.

Not: *Calocaris macandreae* — Alcock, 1901: 189 (= *Calocaris* sp. Kensley, 1996d: 163); Alcock & Anderson, 1894: 163; Whiteaves, 1901: 257 (= *Calocarisopsis templemani* Squires, 1965).

Not: *Calocaris macandreae* — Rathbun, 1929: 25 (Gulf of St. Lawrence, Iceland).

Material examined. — RMNH D 38575, 4 samples, Turkey, Sea of Marmara, 52 m, beam-trawl, 23.xi.1990, leg. et don. B. Öztürk; ZMB 4878, 1 female (TL/CL, 41.0/14.4 mm), Korsfjord, Finnmark, Norway; ZMB 19882, 2 hermaphrodites (TL/CL, 50.5/17.3; 47.0/16.6 mm), Biological Station Hardla at Bergen, 5.viii.1923, leg. Andt; SMF 20650, 4 hermaphrodites. (TL/CL, 24.0/7.8-45.0/15.6 mm), North Sea, E. of Witch-Ground, 58°00.00′N 0°55.90′E – 57°59.12′N 0°55.59′E, 142.5 m, 22.vii.1989, R/V "Senckenberg"; SMF 29467, 1 hermaphrodite (TL/CL, 43.0/15.8 mm), North Sea, Fladengrund Val 103-46 Ku (58°12.7′N 0°12′W – 58°12.7′N 0°12′W), 133-133 m, 05.x.1990, R/V "Valdivia"; SMF 25683, 1 hermaphrodite (TL/CL, 43.0/14.6 mm), North Sea, central North Sea, (55°20.540′N 0°04.690′W – 55°20.570′N 0°030.370′W, 101 m, 04.ii.1987, R/V "Valdivia"; SMF 20649, 1 hermaphrodite (TL/CL, ca. 39.0/11.0 mm, carapace damaged), Fladengrund, North Sea, 58°21.00′N 0°31.01′W, 130.6 m, 22.vii.1989, R/V "Senckenberg"; SMF 20645, 1 ovig. hermaphrodite (TL/CL, 48.0/17.4 mm), Fladengrund, North Sea, 58°47.37′N 0°08.19′W – 58°46.56′N 0°06.77′E, 137.3-146.6 m, 20.vii.1989, R/V "Senckenberg"; SMF 20647, 1 hermaphrodite (TL/CL, 43.0/16.7 mm), S.W. Fladengrund-Rinne, North Sea, 58°48.62′N 0°43.82′W, 130.6 m, 21.vii.1989, R/V "Senckenberg"; SMF 29466, 1 hermaphrodite (TL/CL, 40.0/14.8 mm), Morocco between Tanger and Rabat M 60-12ST (34°56′N 07°4′W – 34°56′N 07°7′W, 784-829 m, closing trawl, 23.i.1882, R/V "Meteor"; MNHN Th 1046 (TL, ca. 28.0, CR damaged), 26°22′S 13°59′E, R/V "Benguela II", 380 m; ZMB 4878, 1 hermaphrodite (TL/CL, 42.0/14.0 mm), Korsfjord entrance, Norway, biotope, 135-217 Faden (246.9-396.8 m), leg. Pommerania; ZMB 8170, 1 hermaphrodite (TL/CL, 32.0/12.0 mm), Häkonsund, Norway; ZMB 1015 (TL/CL, 30.0/11.0 mm), 1 hermaphrodite, Christian Fjord, Norway; ZMB 19882, 2 hermaphrodites (TL/CL, 50.0/17.0; 51.0/18.0 mm), Biological Station Hardla near Bergen, 5.viii.1923, leg. Biological Station Hardla; ZMB 18611, 1 hermaphrodite (TL/CL, 22.0/0.8 mm), Skagerrak, Bohüslan, Sweden, 2.vii.1878, leg. A.W. Malm; SMF Ex-28339, 4 hermaphrodites (TL/CL, 47.0/16.9, 46.0/15.9, 45.0/14.8, 42.0/14.2 mm), Fiskebäckskil, Göteborg and Bohüslan, Sweden, 120 km N. of Göteborg, Kristineberg Marine Station, ix.1976, leg. U. Pettke; SMF 20651, 4 hermaphrodites (TL/CL, 42.0/15.7; 42.0/12.5; 41.2/15.2; 35.0/12.0 mm), Fladengrund, North Sea, NWN 18 Ku (58°21.00′N 0°30.88′W, 58°20.20′N 0°29.27′W), 22.vii.1989, leg. R/V "Senckenberg", 4 m; SMF 28341, 1 hermaphrodite (TL/CL, 45.0/14.5 mm), Fladengrund, Vall 03-46 Ku (58°12.7′N 0°12.0′W), 133 m, 05.x.1990, leg. R/V "Valdivia".

Material identified as *Calocaris barnardi*. — SAMC A 10697, 3 syntypes, (TL/CL, 28.03/11.2; ca. 32.0/11.1; 34.0/11.6 mm), alcohol specimens after having been dried, hermaphrodites, 29°S 16°45′E, 84 m, Fishery Survey; ZMB 26195, 1 ovig. female, hermaphrodite

(TL/CL, 50.0/15.6 mm), S. Atlantic, 26°38′S 13°54′E, 410-375 m, 23.v.1968, leg. E. Haeckel, det. H.-E. Gruner; ZMB 26194, 1 hermaphrodite (TL/CL, 30.0/9.4 mm), S. Atlantic, 20°16′S 12°16′E, 30.iv.1968, leg. E. Haeckel, det. H.-E. Gruner.

Diagnosis. — Rostrum triangular with pointed apex, straight, horizontal or slightly curved downward anteriorly (figs. 45A, 46A, 47A), lateral margins extending posteriorly onto gastric region as lateral carinae, bearing 2-6 spines. Carapace (fig. 45B, C) convex dorsally and carinate dorsomedially in gastric and cardiac regions; gastric region convex, bearing smooth median carina. Anterolateral margin of carapace with antennal spine. Posterolateral lobes present. Eyes and eyestalks not differentiated and hardly mobile, cornea flattened anteriorly, unpigmented, and contiguous to carapace. A1 peduncle reaching distal two-thirds of A2 penultimate segment. A2 scaphocerite (figs. 46A, 47A, B) reduced, with pointed tip. P1 (figs. 46B, 47C) subequal; ischium with two ventral spines; merus with 4-6, or 7 (ZMB 19882) interspaced spines on ventral margin; carpus triangular; palm bearing triangular subdistal tooth on dorsal margin and 1-2 teeth distally on ventrolateral carina; fingers much compressed, approximately of same length, and 1.5-3 times as long as palm; in larger cheliped cutting edge of dactylus bearing broad median concavity, followed distally by triangular tooth and denticulate distal third; cutting edge of fixed finger bearing proximally conical tooth, followed distally by denticulation; in smaller cheliped dactylus smooth on cutting edge; and fixed finger denticulate on cutting edge. P2 chelate. Ps3-5 simple. Ps3-4 propodus elongate, bearing no spinous rows. Plp1 uniramous and bisegmented, distal segment pear-shaped, bearing apical lobe with patch of hooklets (Sakai, 1991, fig. 5C); Plp2 biramous, and exopod and endopod elongate, endopod distally bearing appendices masculina and interna (Sakai, 1991, fig. 5D). Telson (figs. 46C, D, 47D) 1.5 times as long as wide, bearing proximal lobe with spine followed distally by spinules on lateral margin, and also bearing median concavity between divergent carinae with 3-7 spinules on dorsal surface (table IV); posterior margin with median spine (SMF 25683, female). Hermaphroditic, genital pore on Ps3 and 5 coxae.

Remarks. — In the specimens of *Calocaris macandreae* the rostral lateral margins extend posteriorly onto the gastric region as lateral carinae, bearing 2-6 spines; in the larger cheliped the cutting edge of the dactylus bears a broad median concavity, followed distally by a triangular tooth and a denticulate distal third, the cutting edge of the fixed finger proximally bears a conical tooth, followed distally by denticulation; in the smaller cheliped the cutting edge of the dactylus is denticulate; and the dorsal surface of the telson is concave medially between the divergent carinae, each with 1-6 sharp spinules.

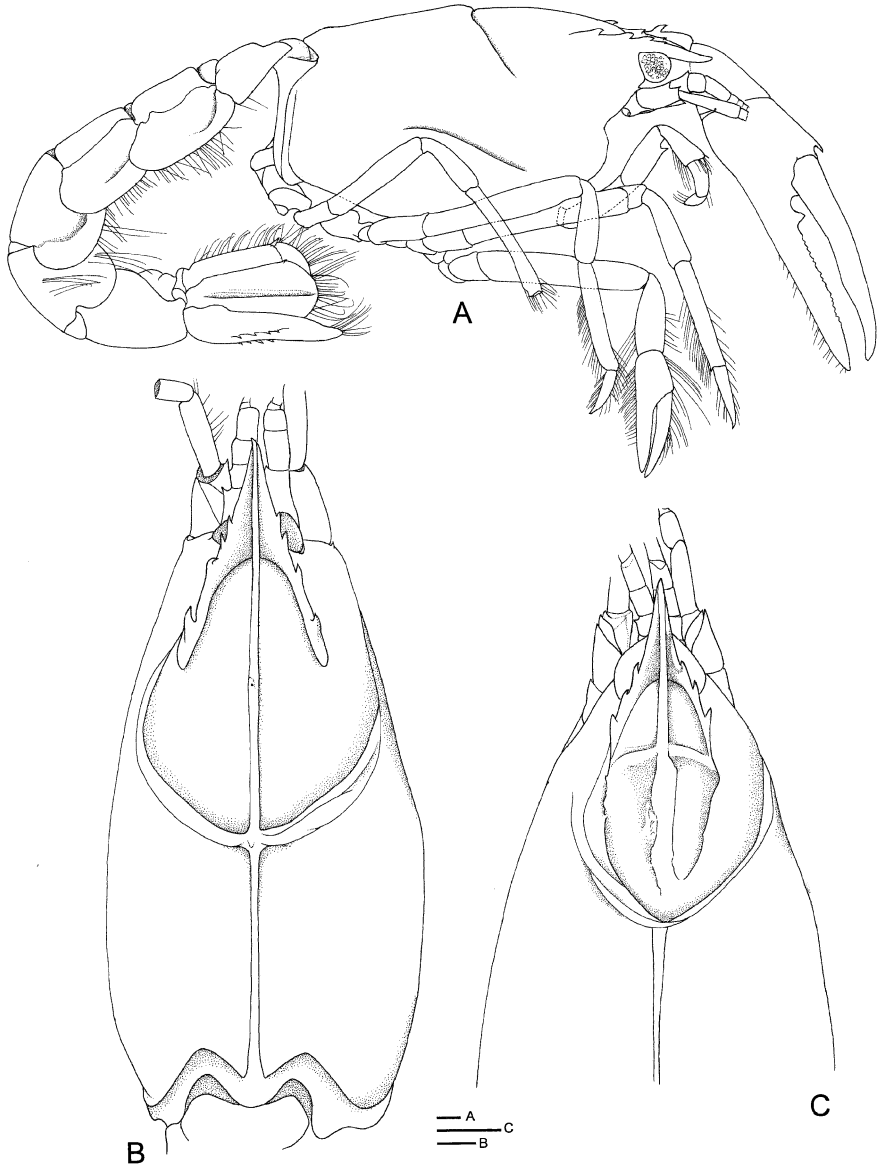

Fig. 45. *Calocaris macandreae* Bell, 1846 (synonym: *Calocaris barnardi* Stebbing, 1914). A, whole body with A1-2 peduncles, lateral view; B, C, anterior part of carapace and A1-2 peduncles, dorsal view. A, B, SAMC A 10697, syntype, from the South Atlantic Ocean (29°S 16°45′E, 84 m); C, ZMB 26195, 1 ovig. female, hermaphrodite (TL/CL, 50.0/15.6 mm), South Atlantic, 26°38′S 13°54′E, 410-375 m. Scales 1 mm.

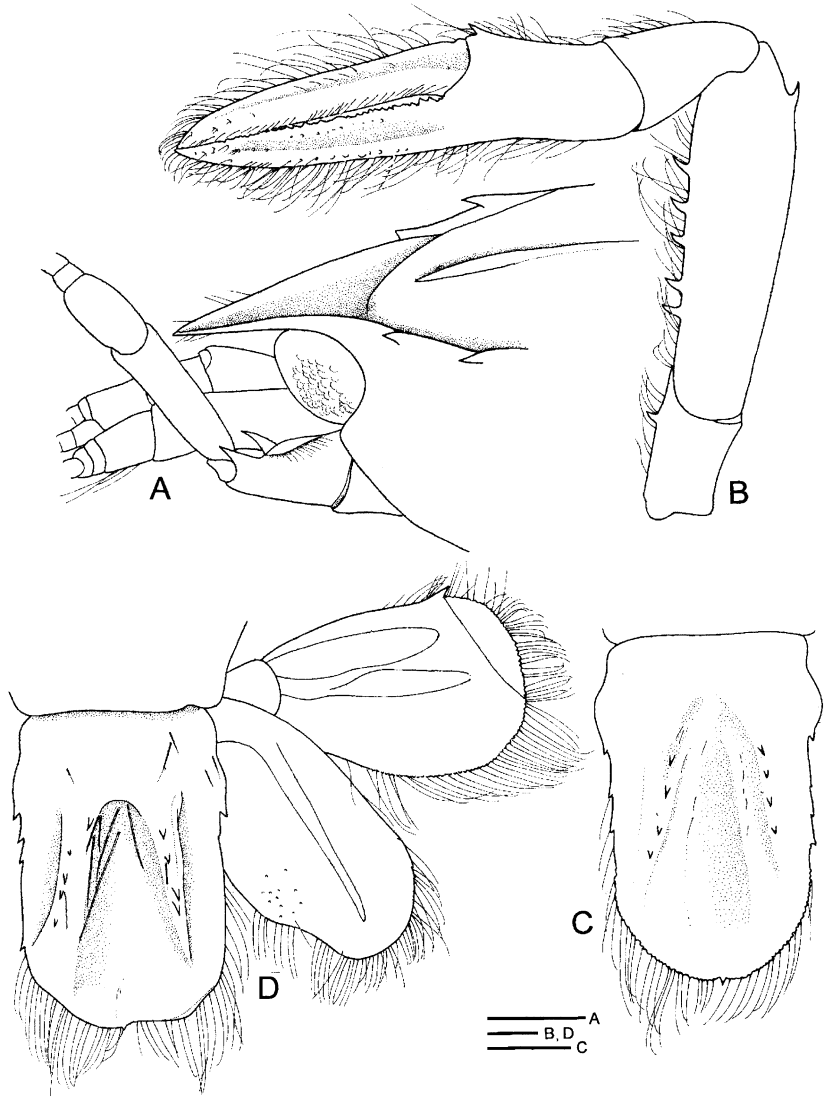

Fig. 46. *Calocaris macandreae* Bell, 1846 (synonym: *Calocaris barnardi* Stebbing, 1914). A, anterior part of carapace and A1-2 peduncles; B, smaller cheliped, lateral view; C, telson; D, telson and uropod on right side. A, B, D, ZMB 26195, 1 ovig. female, hermaphrodite (TL/CL, 50.0/15.6 mm), South Atlantic, 26°38′S 13°54′E, 410-375 m; C, ZMB 26194, 1 ovig. female, hermaphrodite (TL/CL, 50.0/15.6 mm), South Atlantic, 26°38′S 13°54′E, 410-375 m. Scales 1 mm.

In the present revision, 5 specimens of *Calocaris barnardi* including three syntypes from the South Atlantic Ocean have been compared with many

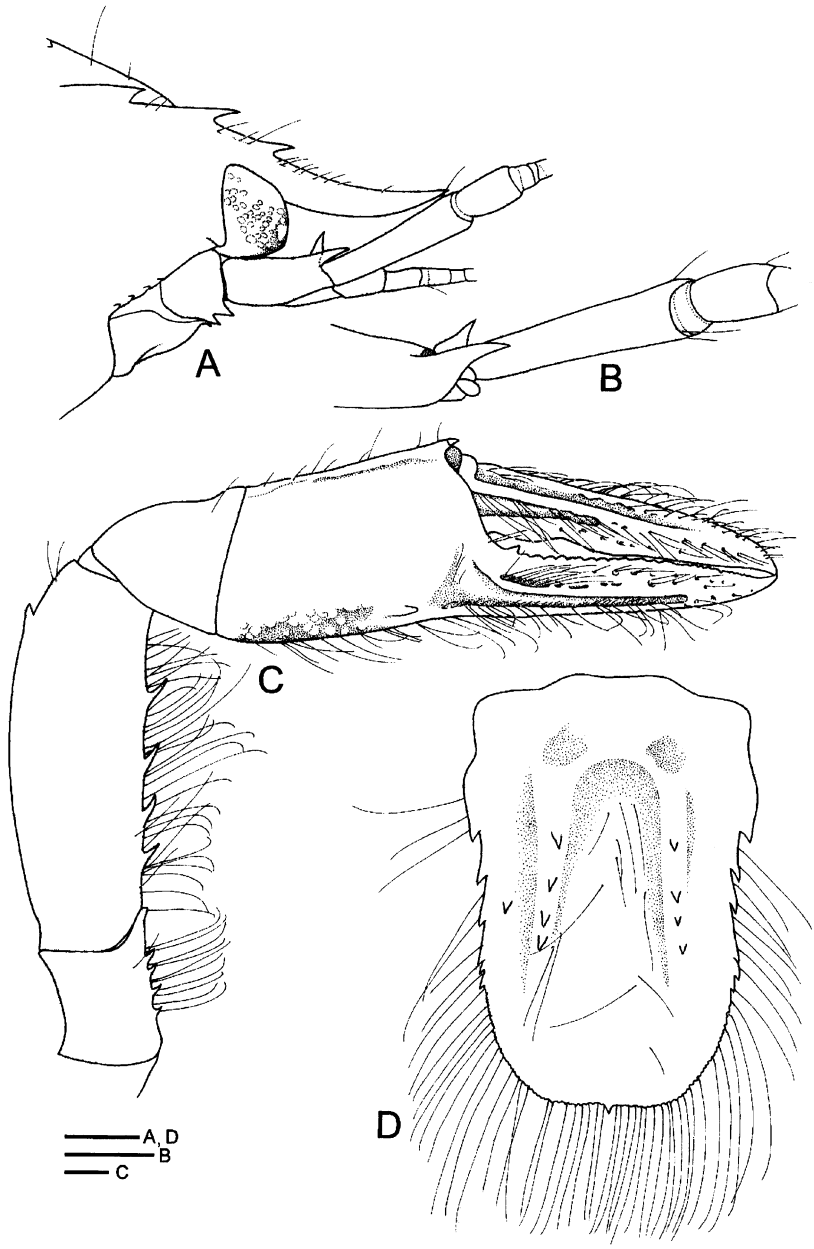

Fig. 47. *Calocaris macandreae* Bell, 1846. A, anterior part of carapace; B, A2 peduncle, C, cheliped on right side; D, telson. A, B, SMF 29466, 1 hermaphroditic spm. (TL/CL, 40.0/14.8 mm), Morocco, between Tanger and Rabat; C, ZMB 26195, 1 ovig. female, hermaphrodite (TL/CL, 50.0/15.6 mm), South Atlantic, 26°38′S 13°54′E, 410-375 m; D, SMF, 25683, 1 hermaphroditic spm. (TL/CL, 43.0/14.6 mm), North Sea, central North Sea, (55°20.540′N 0°04.690′W – 55°20.570′N 0°030.370′W, 101 m, R/V "Valdivia". Scales 1 mm.

TABLE IV

Spines on rostral lateral margins, gastric lateral carinae, and divergent median carinae on dorsal surface of telson, as defined for *Calocaris macandreae* Bell

Cat. No.	TL/CL (mm)	Localities	Spines on rostral lateral margins and gastric lateral carinae (left + right sides)	Spines on median carinae of telson (left + right sides)
		Specimens det. as *Calocaris macandreae*		
SMF Ex-28339	47.0/16.9	120 km N. Göteborg	4 + 4	6 + 5
SMF Ex-28339	46.0/15.9	120 km N. Göteborg	4 + 5	4 + 5
SMF Ex-28339	45.0/14.8	120 km N. Göteborg	5 + 5	5 + 4
SMF Ex-28339	42.0/14.2	120 km N. Göteborg	4 + 4	6 + 6
SMF 20651	42.0/15.7	North Sea, 58°21.00′N 0°30.88′W – 58°20.20′N 0°29.27′W	4 + 4	1 + 2
SMF 20651	42.0/12.5	North Sea, 58°21.00′N 0°30.88′W – 58°20.20′N 0°29.27′W	3 + 3	5 + 5
SMF 20651	41.2/15.2	North Sea, 58°21.00′N 0°30.88′W – 58°20.20′N 0°29.27′W	4 + 3	4 + 4
SMF 20651	35.0/12.0	North Sea, 58°21.00′N 0°30.88′W – 58°20.20′N 0°29.27′W	4 + 3	4 + 4
SMF 28341	45.0/14.5	58°12.7′N 0°12.0′W	4 + 4	2 + 3
ZMB 19882	50.0/17.0	Bergen	4 + 6	5 + 4
ZMB 19882	51.0/18.0	Bergen	5 + 5	4 + 4
ZMB 8170	32.0/12.0	Häkonsund, Norway	4 + 5	3 + 3
ZMB 18611	22.0/0.8	Skagerrak, Bohüslan, Sweden	4 + 3	3 + 3
ZMB 4878	42.0/14.0	Korsfjord, Norway	5 + 5	5 + 4
ZMB 1015	30.0/11.0	Christiansfjord, Denmark	6 + 5	4 + 5

specimens of *C. macandreae* from the North and South Atlantic Oceans and the Mediaterranea Sea.

In the three syntypes of *Calocaris barnardi* (SAMC A 10697, 3 syntypes (TL/CL, 28.03/11.2; ca. 32.0/11.1; 34.0/11.6 mm)) from the South Atlantic Ocean (29°S 16°45′E, 84 m), the rostral lateral margins extend backward onto the gastric region as lateral carinae, bearing 2-3 spines; the A1 peduncle reaches the distal two-thirds of the A2 penultimate segment; in the larger cheliped the cutting edge of the dactylus bears a broad median concavity, followed distally by a triangular tooth and a denticulate distal third, and the cutting edge of the fixed finger proximally bears a conical tooth, followed

TABLE V
Spines on rostral lateral margins, gastric lateral carinae, and divergent median carinae on dorsal surface of telson as defined for *Calocaris macandreae* Bell

Cat. No.	TL/CL (mm)	Localities	Spines on rostral lateral margins and gastric lateral carinae (left + right sides)	Spines on median carinae of telson (left + right sides)
		Specimens det. as *Calocaris barnardi* Stebbing		
SAMC A 10697	28.03/11.2	29°S 16°45′E, 84 m	2 + 2	5 + 5
SAMC A 10697	ca. 32.0/11.1	29°S 16°45′E, 84 m	3 + 3	4 + 4
SAMC A 10697	34.0/11.6	29°S 16°45′E, 84 m	2 + 2	4 + 6
ZMB 26194	30.0/9.4	S. Atlantic, 20°16′S 12°16′E	2 + 2	7 + 6
ZMB 26195	50.0/15.6	S. Atlantic, 26°38′S 13°54′E, 410-375 m	2 + 2	5 + 4

distally by denticulation; in the smaller cheliped the dactylus is smooth on the cutting edge, the fixed finger is denticulate on the cutting edge; and the dorsal surface of the telson is concave medially between the divergent carinae, each with 4-6 sharp spinules (table V).

In the specimen of *C. barnardi* (ZMB 26194, TL/CL, 30.0/9.4 mm) from the South Atlantic (20°16′S 12°16′E, off Namibia), the rostral lateral margins extend backward onto the gastric region as gastric lateral carinae with one sharp spine followed by spinules and another sharp spine. The telson is provided with a proximal lobe with a spine on the lateral margin, followed posteriorly by three spinules only on the left, but no spinules on the right, and the dorsal surface is concave medially between the divergent carinae, each with 6-7 interspaced, sharp spinules.

In the larger specimen of *C. barnardi* (ZMB 26195, 1 ovig., TL/CL, 50.0/15.6 mm) from the South Atlantic (26°38′S 13°54′E, 410-375 m, off Namibia), the rostral lateral margins extend backward onto the gastric region as lateral carinae with two spines. The telson is provided with a proximal lobe with a spine on the lateral margin, followed posteriorly by three spinules only on the left, but no spinules on the right (fig. 46D); the dorsal surface is concave medially between the diviergent carinae, each with 4-5 interspaced sharp spinules.

As shown above, *C. barnardi* is almost the same in morphological features as *C. macandreae*, except for the difference in the number of spines both on the

rostral lateral margin and the gastric lateral carinae, and on the dorsal median carinae of the telson, and there seems to be no significant difference between the two species. Therefore, *C. barnardi* Stebbing, 1914 is safely **synonymized** with *C. macandreae* Bell, 1846.

Type locality. — Loch Fyne and Mull of Galloway, Scotland.

Distribution. — North Atlantic Ocean — Canada — Gulf of St. Lawrence; Iceland (Hansen, 1908); Norway — Trondheim Fjord, Christiania Fjord; Kattegat (Stephensen, 1910a; Poulsen, 1940); North Sea — (Poulsen, 1940; Sakai & De Saint Laurent, 1989), Gullmar fjord, Sweden (Gustafson, 1934); Norway — Mangerfjord, Bergen; Sweden — Kristineberg, and Skagerrak (Dworschak, 1992); Scotland — Loch Fyne and Mull of Galloway (Bell, 1846); Ireland (Selbie, 1914; De Man, 1925d); England — Plymouth; Sweden — Kristineberg, Bahusia [= Bohüslan]; Spain — Bay of Biscay (Sakai & De Saint Laurent, 1989), Gulf of Cadiz (Bouvier, 1917).

Mediterranean — Sicilia and south of Monaco (Bouvier, 1917), Gulf of Napoli (Caroli, 1921a), Marseille (Bouvier, 1940), Rosas, Arenys de Mar, Badalona, Barcelona, and Melilla (Zariquiey Alvarez, 1968), Sardinia Island (Manning & Froglia, 1982), south of Marseille and Canal of Mallorca (Sakai & De Saint Laurent, 1989); Adriatic Sea (Adensamer, 1898; Dworschak, 1992; Števčić, 1998); Aegean Sea (Koukouras et al., 1992); Turkey, Sea of Marmara.

South Atlantic Ocean — Mauritania (Sakai & De Saint Laurent, 1989); Senegal — Dakar (Sakai & De Saint Laurent, 1989); Congo — Pointe-Noire (Sakai & De Saint Laurent, 1989); Namibia (Macpherson, 1983, det. as *C. barnardi*); South Africa — Cape Castle (Stebbing, 1914, det. as *C. barnardi*), near Port Nolloth (Barnard, 1950, det. as *C. barnardi*) 84-180 m.

Calocaris sp. Kensley, 1996

Calocaris macandreae — Alcock, 1901: 189.
Calocaris sp., Kensley, 1996d: 163 (list).

Remarks. — *Calocaris macandreae* Bell, 1846 was described by Alcock (1901: 189) based on specimens from the Arabian Sea, 636 fathoms (1163 m); Bay of Bengal, off Ceylon, 800-637 fathoms (1463-1165 m) as follows: “the rostrum reaches the end of the basal joint of the antennal peduncle, and is sharply serrated on the lateral border”. However, those characteristics described by Alcock (1901) are different from those of *C. macandreae* Bell, 1846, in which the rostrum overreaches the A1 basal segment, and the lateral margins of the rostrum are not serrated. Kensley (1996d: 163) distinguished *Calocaris macandreae* from the Arabian Sea (Alcock, 1901: 189) from

C. macandreae from the Atlantic Ocean, and defined the former as *Calocaris* sp. Indian 'form'.

Distribution. — Arabian Sea; Bay of Bengal; 1163-1464 m.

Genus **Calocarisopsis** gen. nov.

Diagnosis. — Rostrum acutely triangular, lateral margins with 3-4 spines extending posteriorly onto gastric region as lateral carinae with 4-5 spines, and reaching cervical groove. Gastric region convex; median carina smooth, originating from anterior part of rostrum and running to cervical groove; submedian carinae absent. Cervical groove present at full length. Postcervical carina present. Eyes and eyestalks not differentiated, cornea unpigmented, flattened anteriorly, and contiguous along midline. A2 scaphocerite reduced. P1 subequal in length and similar in shape; palm of larger cheliped with dorsodistal spine; fingers longer than palm. P2 fingers longer than palm. Ps3-4 propodi without spinous rows. Ps3-5 dactyli simple. Ps3 and 5 coxae with genital pore. Abdominal pleura convex or rounded ventrally, and distinguished from terga by obscure longitudinal convexity. Plp1 uniramous and unsegmented, fusiform in proximal half and spatulate in distal half. Plp2 biramous and slender, endopod bearing mesiomedially slender appendix interna, but no appendix masculina. Plp3 endopod with appendix interna. Telson longer than wide, bearing proximal lobe with spine followed posteriorly by denticles on lateral margins, and no median spine on posterior margin. Uropodal exopod with transverse suture. Hermaphroditic.

Remarks. — The present new genus *Calocarisopsis* gen. nov. is different from *Calocaris*, because in *Calocarisopsis* the carapace bears gastric lateral carinae extending posteriorly to cervical groove, the median carina is developed anteriorly to the dorsal surface of the rostrum, Plp1 is unsegmented and spatulate in its distal half, and Plp2 is biramous, the endopod is elongate, bearing mesiomedially an appendix interna, but no appendix masculina. Whereas in *Calocaris* the carapace bears gastric lateral carinae in the anterior half of the gastric region, the median carina is not developed anteriorly to the rostrum, Plp1 is bisegmented, the distal segment is pear-shaped, and Plp2 is biramous, the endopod bearing distally a distinct appendix masculina and a small appendix interna.

Type species. — *Calocaris templemani* Squires, 1965, by present designation and monotypy. The gender of the new name, *Calocarisopsis*, is feminine.

Species included. — *Calocarisopsis templemani* (Squires, 1965).

Etymology. — The new genus is named *Calocarisopsis*, by adding a Greek suffix "-opsis", meaning "appearance", to the generic name *Calocaris*, from which the new genus is different, though it is similar in appearance.

Calocarisopsis templemani (Squires, 1965)

Calocaris templemani Squires, 1965: 2, figs. 1, 2A-B, Ct, 3Ct, 4, 5Ct, 6, table 1; Sakai & De Saint Laurent, 1989: 58; Kensley, 1996d: 163 (list); Ngoc-Ho, 2003: 465; Heard et al., 2007: 20, fig. 8.

Calocaris macandreae — Whiteaves, 1901: 257 [not *C. macandreae* Bell, 1846].

Diagnosis. — Rostrum acutely triangular, lateral margins with 3-4 spines extending posteriorly onto gastric region as lateral carinae with 4-5 spines, and reaching cervical groove. Gastric region convex; median carina smooth, originating from anterior part of rostrum and running to cervical groove. Cornea unpigmented and flattened obliquely laterally. A1 about half length of A2, and about equal to total length of carapace and abdomen. A2 proximal segment with 4 ventral spines. Mouthparts and chelae of pereiopods with profuse, long setae. P1 chelate and unequal, in both chelipeds dactylus dorsally carinate, bearing profuse long setae on each side, and fixed finger fringed with profuse long setae ventrally, bearing somewhat oblique lower carina also with profuse long setae running from distal part of fixed finger to proximal part of palm. Abdomen rather longer than carapace and somewhat flattened laterally; abdominal somites 2-6 fringed with long fine setae ventrally, dorsally bearing two clumps of fine setae. Plp1 uniramous and unsegmented, fusiform in proximal half and spatulate in distal half; Plp2 biramous and slender, endopod bearing mesiomedially a slender appendix interna, but no appendix masculina; Plp3 endopod with appendix interna. Telson longer than wide and slightly convergent posteriorly, bearing proximal lobe with spine followed posteriorly by two spinules on lateral margin, and divergent carinae with 2-3 spines medially on dorsal surface; posterior margin unarmed. Uropodal exopod with transverse suture. Hermaphroditic. [Adapted from Squires, 1965.]

Remarks. — Squires (1965: 9) described in his holotype specimen, determined as *Calocaris templemani*, that the Plp1 is undivided and somewhat spatulate with a light fringe of setae and a curved foliaceous apex; Plps2-5 are biramous, and the endopod has a long narrow appendix interna, and both exopod and endopod are fringed by long plumous setae (Squires, 1965, fig. 6 PL2). However, those features of Plps1-2 are different from those of the other species of *Calocaris*, in which Plp1 is uniramous and bisegmented, and the distal segment is pear-shaped, apically with a small lobe with a patch of hooklets (Sakai, 1991, fig. 5C); Plp2 is biramous with the exopod elongate, and the

endopod distally bears an elongate appendix masculina and a small, slender appendix interna. Therefore, *Calocaris templemani* Squires, 1965 is reclassified under the new genus *Calocarisopsis* gen. nov. as *Calocarisopsis templemani* (Squires, 1965).

Type locality. — Hermitage Bay, Newfoundland, 260 m.

Distribution. — Canada — Newfoundland, Hermitage Bay (Squires, 1965); 260 m, soft mud; northwest Atlantic, from Newfoundland, Gulf of Maine to North Carolina, 200-785 m (Kensley, 1996d).

Genus **Eucalastacus** Sakai, 1992

Eucalastacus Sakai, 1992a: 170; Poore, 1994: 98 (key).

Diagnosis. — Rostrum styliform, lateral margins with 4 spines including supraorbital spine, extending posteriorly onto gastric region as lateral carinae; median and submedian carinae present; postcervical carina absent. Anterolateral margin of carapace unarmed. Eyes quadrate and contiguous mesially; cornea unpigmented. A2 scaphocerite slenderly protruded. P1 symmetrical, fingers gaping proximally. Plp1 uniramous and bisegmented; proximal segment elongate, and distal segment subtriangular with two apical setae and patch of hooklets medially on convex mesial margin; Plp2 biramous and slender; endopod distally bearing slender appendix masculina with setae, provided proximally with small appendix interna with patch of hooklets; Plps3-5 biramous with slender endopod and exopod; endopods bearing mesiomedially appendix interna. Genital pores on Ps3 and 5 coxae. Telson longer than wide, and convergent posteriorly, bearing proximal lobe with spine followed by two spinules on right lateral margin but unarmed on left lateral margin, and divergent carinae with two spines medially on dorsal surface; posterior margin rounded without median spine. Uropodal endopod with median carina. Uropodal exopod without transverse suture. Hermaphroditic. [Adapted from Sakai, 1992a.]

Remarks. — The present genus *Eucalastacus* is closely similar to *Calocaris* in Plps1-2, but differs in that the uropodal exopod bears no transverse suture.

Type species. — *Eucalastacus torbeni* Sakai, 1992a, by original designation and monotypy. The gender of the generic name, *Eucalastacus*, is masculine.

Species included. — *Eucalastacus torbeni* Sakai, 1992a.

Eucalastacus torbeni Sakai, 1992

Eucalastacus torbeni Sakai, 1992a: 170, figs. 11-13.

Type locality. — Milford Sound, New Zealand, 44°37′S 167°52′E, 290 m.

Distribution. — Tasman Sea (Sakai, 1992a); New Zealand — Milford Sound (Sakai, 1992a); 290-341 m.

Genus **Lophaxiopsis** gen. nov.

Diagnosis. — Rostrum triangular, lateral margins extending short posteriorly onto gastric region as lateral carinae each with 1-2 spines including supraocular spine. Carapace covered with short, stiff, yellowish, forwardly directed setae, and carinate dorsomedially in gastric and cardiac regions; gastric region with series of antrorse [= directed forward and upward] spines arranged in form of a horseshoe with the convexity forward. Postcervical carina with irregular tubercles present. Cornea small and irregularly pigmented. A2 scaphocerite short. Abdominal somites with dorsal carina; pleura 3-5 somewhat angular ventrally. Male Plps1-2 unknown. Telson longer than wide. Uropodal exopod with non-dentate transverse suture. Hermaphroditic. [Adapted from Alcock & Anderson, 1899; Alcock, 1900, pl. 42 fig. 3.]

Remarks. — It has turned out that *Calaxiopsis felix* (Alcock & Anderson, 1899) (cf. Sakai & De Saint Laurent, 1989) is not to be included in *Calaxiopsis*, because it is different from the type species of the genus, *C. serrata* Sakai & De Saint Laurent, 1989. In *Calaxiopsis felix* the gastric region is covered with short stiff, yellowish, forwardly-directed setae, bearing a series of antrorse [this term was used by Alcock (1901)] spines arranged in the form of an elongate horseshoe, a median carina originating from the base of the rostrum and running to the posterior margin of the carapace, and short lateral carinae with a couple of spines, submedian rows of spines, and the abdominal somites bear a dorsal carina. In *Calaxiopsis serrata*, however, the gastric region is smooth, bearing a median carina running short from the base of the rostrum, and smooth submedian carinae, and the abdominal somites lack a dorsal carina.

Calaxiopsis felix is rather similar to the type species of *Lophaxius*, *L. rathbunae*, but it is also different from *L. rathbunae*, in which the gastric region is tuberculate, and the abdominal somites lack a dorsal carina. Unfortunately, inaccessibility to the type specimen of *Calaxiopsis felix* prevents further examination of its Plps1-2, of which no description was made, but those differences mentioned above are sufficient to differentiate *C. felix* from *L. rathbunae* at the generic level, and a new genus *Lophaxiopsis* gen. nov. is thus propopsed for *Calaxiopsis felix*.

Type species. — *Calastacus felix* Alcock & Anderson, 1899, by present designation and monotypy. The gender of the generic name, *Lophaxiopsis*, is feminine.

Species included. — *Lophaxiopsis felix* (Alcock & Anderson, 1899).

Etymology. — The new generic name *Lophaxiopsis* is composed of a generic name, *Lophaxius*, and a Latin suffix, -opsis, meaning "similar".

Lophaxiopsis felix (Alcock & Anderson, 1899)

Calastacus felix Alcock & Anderson, 1899: 287; Alcock, 1900, pl. 42 fig. 3; Balss, 1925: 209.
Calocaris (*Calastacus*) *felix* — Alcock, 1901: 192; Borradaile, 1903: 539; De Man, 1925d: 8 (list), 117 (key).
Calaxiopsis felix — Sakai & De Saint Laurent, 1989: 64.

Diagnosis. — Rostrum triangular, lateral margins with two subdistal spines, extending short posteriorly onto gastric region as outstanding lateral carinae with two spines. Carapace covered with scanty growth of short, stiff, yellowish, forwardly-directed setae, springing either singly or in groups of two or three setae from the bottom of small pits. Gastric region with series of antrorse spines arranged in the form of an elongate horseshoe, median carina originating from base of rostrum and running to posterior margin of carapace, and submedian carinae absent. Cornea small and irregularly pigmented. Abdominal somites carinate dorsally, most prominent on anterior three somites, gradually widening and becoming less and less marked on posterior three somites. Abdominal pleura 3-5 rounded ventrally. Plps1-2 unknown. Telson longer than wide. [Adapted from Alcock & Anderson, 1899: 287; Alcock, 1900, pl. 42 fig. 3.]

Type locality. — Off Cape Comorin, Arabian Sea, 430 m.

Distribution. — Arabian Sea — off Cape Comorin (Alcock & Anderson, 1899); 430-785 m.

Genus **Lophaxius** Kensley, 1989

Lophaxius Kensley, 1989: 962; Poore, 1994: 98 (key).

Diagnosis. — Rostrum triangular, lateral margins extending short posteriorly onto gastric region, bearing 1-2 spines including supraocular spine; submedian carinae absent. Carapace carinate dorsomedially in gastric region, and postcervical carina present with irregular tubercles. Eyes rounded and not mesially contiguous; cornea unpigmented. A2 scaphocerite short. Mxps1-3 with exopod and epipod; large podobranch on Mxps2 and 3; 2 arthrobranchs on Mxp3. P1 symmetrical, fingers of chela gaping proximally. P2 subchelate. Ps3-5 dactyli simple. Abdominal somites with pleura rounded ventrally. Plp1 uniramous and bisegmented, distal segment spatulate, distally with patch of hooklets; Plp2 biramous, endopod bearing distally elongate appendix masculina and

slender appendix interna; Plps3-5 biramous, endopods with appendix interna. Telson longer than wide, dorsally bearing non-articulating spines. Uropodal exopod with non-dentate transverse suture. Hermaphroditic. [Adapted from Kensley, 1989.]

Remarks. — Kensley (1989: 962-963) established a new genus, *Lophaxius* Kensley, 1989 for *Calastacus rathbunae* Kensley, 1989 [= *Calocaris investigatoris* (Rathbun, 1904) from Alaska and Oregon, not Anderson, 1896 from Arabian Sea, 1733 m], and characterized his new genus *Lophaxius* as "the eyes are rounded and not mesially contiguous" (Kensley, 1989: 963), which distinguishes *Lophaxius* from *Calocaris*, in which the eyes are flattened, and mesially contiguous, though in those two genera *Lophaxius* and *Calocaris* the male Plps1-2 are almost the same in shape as follows: the male Plp1 is uniramous and bisegmented; the proximal segment is elongate, and the distal segment is pear-shaped, apically bearing a small lobe with a patch of hooklets. Plp2 is biramous, the exopod is elongate, and the endopod distally bears an elongate appendix masculina and a small, slender appendix interna.

Type species. — *Calastacus rathbunae* Kensley, 1989, by original designation. The gender of the generic name, *Lophaxius*, is masculine.

Species included. — *Lophaxius investigatoris* (Anderson, 1896); *L. rathbunae* Kensley, 1989.

KEY TO THE SPECIES OF THE GENUS *LOPHAXIUS*

1 – Carapace covered with small granules; lateral margins of rostrum extending short posteriorly as gastric lateral carinae, bearing acute tooth posteriorly followed by another considerably larger tooth; eyestalks short and conical, and cornea unpigmented; distributed in the Arabian Sea ..... *L. investigatoris*
– Carapace tuberculate; distributed from Alaska to California ..... *L. rathbunae*

Lophaxius investigatoris (Anderson, 1896)

Calastacus investigatoris Anderson, 1896: 97; Balss, 1925: 209; Rathbun, 1904: 151.
Axius (*Eiconaxius*) *Investigatoris* — Alcock & Anderson, 1896, pl. 25 fig. 1.
Calocaris (*Calastacus*) *investigatoris* — Alcock, 1901: 191; Borradaile, 1903: 539.
Calastacus investigatoris — Schmitt, 1921: 112 (partim), fig. 75a-b.
Calocaris (*Calastacus*) *Investigatoris* — De Man, 1925d: 8 (list), 117 (key).
Calocaris investigatoris — Hart, 1982: 48, fig. 10; Sakai & De Saint Laurent, 1989: 58.
Lophaxius investigatoris — Kensley, 1989: 963.
Not: *Calastacus investigatoris* — Rathbun, 1904: 151; Schmitt, 1921: 112 (not fig. 75a-b), [= *Lophaxius rathbunae* Kensley, 1989].

Diagnosis. — Carapace covered with granules. Rostrum triangular and dorsally flattened, and lateral margins extending short posteriorly onto gastric region as lateral carinae with acute tooth followed posteriorly by another considerably larger tooth. Eyestalks short and conical, and cornea unpigmented.

Dorsal margin of P1 merus armed with one large distal and 3 or 4 small spines. [Adapted from Alcock & Anderson, 1896: 97-98.]

Type locality. — Arabian Sea, off the coast of Sind, 1733 m.

Distribution. — Arabian Sea — off the coast of Sind (Anderson, 1896); 1733 m.

Lophaxius rathbunae Kensley, 1989

Calastacus investigatoris — Rathbun, 1904: 151 (partim); Schmitt, 1921: 112 (partim, not fig. 75a-b) [not Anderson, 1896].
Lophaxius rathbunae Kensley, 1989: 963.

Diagnosis. — Gastric region tuberculate, bearing smooth median carina and short lateral carinae with 1-2 spines; submedian carina absent; postcervical carina present. Plp1 uniramous and bisegmented, distal segment pear-shaped, apically bearing a small patch of hooklets. Plp2 biramous, endopod bearing distally setose appendix masculina and appendix interna. [Adapted from Kensley, 1989.]

Remarks. — *Calastacus investigatoris* Rathbun, 1904, distributed from Alaska to California, and *Calastacus investigatoris* Anderson, 1896 distributed in the Arabian Sea, were reclassified by Kensley (1989: 963) under the new genus *Lophaxius*, as *Lophaxius investigatoris* and *Lophaxius rathbunae*, because he considered that *L. investigaroris* (cf. Rathbun, 1904), is not conspecific with *L. investigatoris* (Anderson, 1896).

Type locality. — South of Sannak Islands, Alaska, 483 fathoms (883 m).

Distribution. — Alaska — south of Sannak Islands, 883 m (Rathbun, 1904); Oregon — off Cascade Head, 631 m (Rathbun, 1904); California — off San Diego, 763 m (Rathbun, 1904).

Genus **Nipponcalaxiopsis** gen. nov.

Diagnosis. — Rostrum narrowly elongate, lateral margins armed with two spines, extending posteriorly onto gastric region as lateral carinae with supraorbital spine. Anterolateral margins of carapace unarmed. Gastric region convex with median and submedian carinae. Cervical groove present only on dorsal surface; no postcervical carina. Eyes rounded, cornea unpigmented and contiguous to carapace. P1 subequal. Ps3 and 5 coxae with genital pores. Abdominal pleura 2-5 truncate and unarmed ventrally. Pleurobranchs absent. Plp1 uniramous and bisegmented; proximal segment stem-shaped, and distal segment bilobed distally, bearing proximal lobe with patch of hooklets. Plp2 biramous, endopod bearing distally slender, curved, unsegmented appendix

masculina with setae on mesial margin and apical tuft of setae, and appendix interna with patch of hooklets; exopod consisting of proximal segment and multiarticulate flagellum. Plps3-5 endopods with appendix interna. Telson longer than wide, bearing 6-8 spines on lateral margin, and no median spine on rounded posterior margin. Uropodal endopod with distolateral spine and unarmed median carina dorsally. Uropodal exopod bearing fixed and movable spines at distolateral angle, and median carina with a few tufts of setae and distal spine, and transverse suture on dorsal surface.

Remarks. — It is found that *Calaxiopsis manningi* Komai, 2000a is not to be included in *Calaxiopsis* Sakai & De Saint Laurent, 1989, to which, though, it seems closely similar, because *C. manningi* is fundamentally different from the type species of *Calaxiopsis*, *C. serrata* Sakai & De Saint Laurent, 1989. In *Calaxiopsis manningi* the male Plp2 appendix masculina is unsegmented, and pleura 2-5 are unarmed ventrally, whereas in *C. serrata* the male Plp2 appendix masculina is bisegmented, and pleura 2-5 are armed with 1-2 spines ventrally. Therefore, a new genus, *Nipponcalaxiopsis* is erected for *Calaxiopsis manningi* Komai, 2000a.

Type species. — *Calaxiopsis manningi* Komai, 2000 by present designation and monotypy. The gender of the new name, *Nipponcalaxiopsis*, is feminine.

Species included. — *Nipponcalaxiopsis manningi* (Komai, 2000).

Etymology. — The new generic name *Nipponcalaxiopsis* is a combination of "Nippon" meaning "Japan", where the type specimen was collected, and the generic name *Calaxiopsis*.

Nipponcalaxiopsis manningi (Komai, 2000)
(fig. 43F)

Calaxiopsis manningi Komai, 2000a: 218, figs. 1-5.

Material examined. — CBM-ZC 4934, holotype (TL/CL, 19.2/7.1 mm), off Takeoka, Uchibo coast of Boso Peninsula, 80-100 m, burrowing on clay rock, leg. J. Takayama, det. T. Komai.

Remarks. — Komai (2000: 226) requested the late M. De Saint Laurent to examine the type specimens of *Calaxiopsis serrata* Sakai & De Saint Laurent, 1989 (cf. Komai, 2000a: 226), and defined his specimen as a new species, *Calaxiopsis manningi*.

Komai mentioned by comparing his new species *Calaxiopsis manningi* with *C. serrata* that "In addition to the development of the podobranchs, *Calaxiopsis manningi* is readily distinguished from *C. serrata* in the unarmed gastric submedian carinae, unarmed pleura of the second to fourth abdominal

somites, and much shorter antennal acicles". However, he failed to pay attention to the distinct difference in the form of the male Plp2 between the two species *C. manningi* and *C. serrata*. Namely, those two species are fundamentally different from each other, because in *C. serrata* the male Plp2 endopod bears a bisegmented appendix masculina (fig. 43C), whereas in *C. manningi* it bears an unsegmented appendix masculina (Komai, 2000a, fig. 3L) (fig. 43F). The characteristics of the abdominal pleura described by Komai and in the Plp2 appendix masculina pointed out herein are safely considered to be sufficient to distinguish the specimens on the generic level, which suggests that *C. manningi* does not belong to *Calaxiopsis*, but to the new genus *Nipponcalaxiopsis* established for *C. manningi*.

Type locality. — Off Takeoka, Uchibo coast of Boso Peninsula, Tokyo Bay.

Distribution. — Only known from the type locality.

Genus **Paracalocaris** Sakai, 1991

Paracalocaris Sakai, 1991: 30.

Diagnosis. — Carapace studded with tubercles. Rostrum elongate and styliform, lateral margins with three spines, extending posteriorly onto gastric region as lateral carinae, each with a distinct spine. Gastric region convex, bearing three longitudinal carinae; median carina smooth; submedian carinae absent. Anterolateral margin unarmed. Postcervical carina smooth. Eyestalks not contiguous mesially; cornea unpigmented and upraised. A2 scaphocerite present as minute spine. Mxps1-3 with exopod and epipod; Mxp2 with small podobranch; Mxp3 with large podobranch. Pereiopods lacking exopod; epipod present on Ps1-4; large podobranch on Ps1-3; pleurobranchs absent. P1 chelate and subequal; palm armed with dorsal spines. P2 chelate. Ps3-4 propodi with rows of spinules on ventrolateral surface. Plp1 uniramous and bisegmented, distal segment leaf-like and trilobed distally, distomesial lobe with apical cluster of hooklets. Plp2 biramous and elongate, endopod with slender setose appendix masculina provided proximally with appendix interna; exopod consisting of proximal segment and multiarticulate flagellum. Plps3-5 endopods with appendix interna. Telson longer than wide, bearing median concavity between divergent carinae with 8-9 spines. Uropodal exopod bearing fixed and movable spines at posterolateral angle, and transverse suture on dorsal surface. Hermaphroditic. [Adapted from Sakai, 1991.]

Type species. — *Paracalocaris sagamiensis* Sakai, 1991, by original designation and monotypy. The gender of the generic name, *Paracalocaris*, is feminine.

Species included. — *Paracalocaris sagamiensis* Sakai, 1991.

Paracalocaris sagamiensis Sakai, 1991

Calocaris (*Calocaris*) *granulosus* — Sakai, 1987a: 300, 303 (list) [not Grebenjuk, 1975].
Paracalocaris sagamiensis Sakai, 1991: 30, figs. 1-5, table 1; Tsang et al., 2008: 218, 219; Chu et al., 2008.

Remarks. — The holotype was described as a female, however, the presence of the genital pore on Ps3 and 5 coxae shows that it is a hermaphroditic specimen (Sakai, 1999c: 30, fig. 5A, B).

Type locality. — Off Ohiso, Sagami Bay, Japan, 250-280 m (Sakai, 1987a: 300).

Distribution. — Japan — Sagami Bay (Sakai, 1987a, 1991); 250-280 m.

FAMILY CORALAXIIDAE SAKAI & DE SAINT LAURENT, 1989

Coralaxiinae Sakai & De Saint Laurent, 1989: 10.

Diagnosis. — Carapace with supraocular spine. Rostrum short, acutely triangular, and deflexed, bearig 0-1 spine on lateral margin. Gastric region bearing median carina with or without spines extending short or to posterior third of gastric region, and anteriorly teeth arranged in circle or not. No linea thalassinica. Cervical groove distinct. Postcervical carina absent. Posterior margin of carapace with lateral lobes. Eyestalks stout; cornea pigmented. A2 scaphocerite present or absent. Maxilla 2 scaphognathite with posterior whip. Mxp3 exopod present; distal segment with flagellum deflexed from proximal segment with acute angle. P1 chelate and unequal. P2 chela ovate. Ps3-4 propodi slender, bearing spines on ventral margin. Ps3-5 dactyli biunguiculate. Epipods vestigial on Ps1-2, and absent on Ps3-5. Abdominal pleura 2-4 convex or truncate ventrally. Male Plp1 uniramous and bisegmented; proximal segment long, and distal one ovate and bilobed distally; male Plp2 biramous, endopod bearing appendices masculina and interna mesiomedially; male Plps3-5 biramous, endopods with appendix interna. Telson subtriangular, bearing proximal lobe with or without spine, and stiff setae posterolaterally, and median spine on posterior margin. Uropodal exopod with serrated transverse suture.

Remarks. — The family Coralaxiidae Sakai & De Saint Laurent, 1989 was established on the basis of the genus *Coralaxius* Kensley & Gore, 1981, which had been included in the family Axiidae Huxley, 1879 just because those two families have some characteristics in common as follows. The carapace bears no linea thalassinica, the maxilla 2 scaphognathite bears a posterior whip, and they are gonochoristic. However, the family Coralaxiidae is clearly different from the family Axiidae as follows. In the Coralaxiidae the Mxp3 exopod bears a distal segment deflected from the un- or bisegmented proximal segment as in pagurid species; the P2 chela is ovate in shape; Ps3-5 dactyli are biunguiculate; the male Plp1 is uniramous and bisegmented, the proximal segment is long, and the distal one is ovate; the male Plp2 is biramous, and the endopod bears a stout appendix masculina and a small appendix interna; the telson bears stiff setae on the posterolateral margin. However, in the Axiidae the Mxp3 exopod is straight, consisting of a proximal segment and

a multiarticulate flagellum; the P2 chela is slender in shape, and Ps3-5 dactyli are simple; the male Plp1 is absent or present, and when present, uniramous and unsegmented or bisegmented; the male Plp2 is biramous, and the endopod bears both appendices masculina and interna, or only an appendix interna, or rarely neither of them; the telson bears no stiff setae posterolaterally.

Type genus. — *Coralaxius* Kensley & Gore, 1981, by original designation.

Genera included. — *Coralaxius* Kensley & Gore, 1981; *Meinertaxius* gen. nov.

KEY TO THE GENERA OF THE FAMILY CORALAXIIDAE

1 – Gastric region with teeth arranged in circle anteriorly; male Plp2 endopod with broad bilobed appendix masculina with numerous distal setae and small appendix interna . . . . . *Coralaxius*

– Gastric region without teeth arranged in circle anteriorly; male Plp2 endopod with broad and ovate appendix masculina and small appendix interna . . . . . *Meinertaxius* gen. nov.

Genus **Coralaxius** Kensley & Gore, 1981

Coralaxius Kensley & Gore, 1981: 1278; Sakai & De Saint Laurent, 1989: 2 (list), 10; Kensley, 1994: 813; Poore, 1994: 97 (key).

Diagnosis. — Rostrum short, triangular, and deflexed on dorsal surface. Gastric region bearing teeth arranged in circle anteriorly behind rostrum, and median carina developed short, with or without spines, bearing medially pyramidal hepatic convexity. Cervical groove distinct. Eyestalks stout; cornea pigmented. A2 scaphocerite small. Mxp3 exopod consisting of proximal segment and deflected distal segment with flagellum. P1 chelate and unequal. P2 chelate; chela ovate in shape. Abdominal pleuron 2 rounded ventrally and broadened, and protruded antero- and posteroventrally. Male Plp1 uniramous and bisegmented, proximal segment elongate, and distal one ovate and slightly bilobed distally, mesiodistally bearing hooklets; male Plp2 biramous, endopod bearing mesiomedially appendices masculina and interna; appendix masculina longitudinally bilobed in distal half, and provided proximally with appendix interna with distal patch of hooklets; male Plps3-5 biramous, endopods with appendix interna. Female Plp1 consisting of proximal segment and multiarticulate flagellum. Female Plps3-5 endopods with appendix interna. Telson subtriangular and converging posteriorly, bearing stiff setae posterolaterally and two pairs of teeth medially on dorsal surface; posterior margin fringed with elongate setae, bearing median spine. Uropodal exopod bearing strong, movable spine at posterolateral angle, and spinous transverse suture on dorsal surface. [Adapted from Sakai & De Saint Laurent, 1989.]

Remarks. — Kensley (1994) examined the type specimen of *Axius nodulosus* Meinert, 1877 from the North Sea, and synonymized the species *Coralaxius abelei* Kensley & Gore, 1981 from the Caribbean Sea, with Meinert's species. However, the present re-examination of Meinert's type specimen has revealed that Meinert's species is clearly different from Kensley & Gore's species, as mentioned in the remarks of *Meinertaxius* gen. nov.

Type species. — *Coralaxius abelei* Kensley & Gore, 1981 by original designation and monotypy. The gender of the generic name, *Coralaxius*, is masculine.

Species included. — *Coralaxius abelei* Kensley & Gore, 1981; *C. galapagensis* Kensley, 1994; *C. indopacificus* Kensley, 1994.

KEY TO THE SPECIES OF THE GENUS *CORALAXIUS*

1 – Rostrum elongate and triangular, reaching distal margin of eyestalks; gastric region with median carina with 2-3 spines, and lateral carinae with 2-3 teeth; pleurobranchs present ..... *C. indopacificus*
– Rostrum short and triangular, reaching proximal third to half of eyestalks; gastric region with short median carina, and teeth arranged in circle; pleurobranchs absent 2

2 – P2 palm and dactylus unarmed on dorsal margin; rostrum with one lateral tooth ..... *C. galapagensis*
– P2 palm and dactylus armed with denticles on dorsal margin; rostrum unarmed ..... *C. abelei*

Coralaxius abelei Kensley & Gore, 1981
(fig. 48)

Axiopsis sp. B, Coelho, 1971: 231.
Axiopsis (*Paraxiopsis*) sp. B, Coelho & Ramos, 1972: 160.
Coralaxius abelei Kensley & Gore, 1981: 1278, figs. 1-6, 2 tables; Abele & Kim, 1986: 26, 289, 291 (fig.); Sakai & De Saint Laurent, 1989: 2 (list), 11; Coelho & Ramos-Porto, 1985: 68; Werding & Müller, 1989: 252; Melo, 1999: 316, figs. 213-214. [Type locality. — Atlantic Ocean, French Reef, off Key Largo, Monroe Co., Florida, 25°02′N 80°19′W, 76 m.]

Material examined. — SMF 16575, 1 spm., coral protection area, Punta de Betin, Santa Marta, Dept. Magdalena, Colombia, 6 m, 4.viii.1985, leg. H.G. Müller; SMF 16576, 1 spm., Punta de Betin, Santa Marta, Dept. Magdalena, Colombia, 13 m, 3.vi.1985, leg. H.G. Müller; SMF 16577, 5 spms., Punta de Betin, Dept. Magdalena, Colombia, 13 m, 15.ix.1985, leg. H.G. Müller; SMF 16578, 1 spm., Punta de Betin, Santa Marta, Dept. Magdalena, Colombia, 30 m, 10.ii.1986, leg. H.G. Müller; SMF 16579, 10 spms., Isla del Morro, Santa Marta, Dept. Magdalena, Colombia, 25 m, 18.ix.1985, leg. H.G. Müller; SMF 16580, 3 spms., Salva Clengue, ca. 15 km N.E. of Santa Marta, Bahia Chengue, Dept. Magdalena, Colombia, 27.ix.1985, leg. H.G. Müller; SMF 16581, 3 spms., coral protection area, ca. 25 km N.E. of Santa Marta, Bahia Nenguangue, Dept. Magdalena, Colombia, 11-16 m, 23.ix.1985, leg. H.G. Müller; SMF 16582, 1 spm., coral protection area, ca. 25 km N.E. of Santa Marta, Bahia Nenguangue, Dept. Magdalena, Colombia, 16 m, 10.x.1985, leg. H.G. Müller; SMF 16583, 3 spms., coral protection area, ca. 5 km E. of Santa Marta, Bahia Nenguangue, Punta Ancon near

Taganga, Dept. Magdalena, Colombia, 15 m, 2.viii.1985, leg. H.G. Müller; SMF 16584, 1 spm., coral protection area, ca. 4 km E. of Santa Marta, Punta de Aguja, Dept. Magdalena, Colombia, 10 m, 24.ix.1985, leg. H.G. Müller; SMF 16585, 1 male (TL/CL, 8.0/2.1 mm), 1 ovig. female (TL/CL, 9.0/2.9 mm), 3 females (TL/CL, 8.0/2.3-9.0/2.9 mm), coral protection area, ca. 4 km E. of Santa Marta, Punta de Aguja, Dept. Magdalena, Colombia, 16-18 m, 16.ix.1985, leg. H.G. Müller; SMF 16586, 2 spms., ca. 4 km E. of Santa Marta, Punta de Aguja, Dept. Magdalena, Colombia, 18 m, 2.x.1985, leg. H.G. Müller; ZMB 26888, 1 male (TL/CL, 7.0/2.0 mm), 1 ovig. female (TL/CL, 9.0/2.9 mm), eggs with nauplius eyes, 3 females (TL/CL, 9.0/2.9-12.0/3.9 mm), Morro Grande, Santa Marta, Colombia, 25 m, coral protection area, 18.ix.1985, leg. H.G. Müller; RMNH D 32920, 2 males, 3 females, paratypes, Caribbean Sea, Carrie Bow Cay, Belize, 65 feet, 22.iii.1979 (B. Kensley: male gonopods illustrated in publication as *C. abelei*); RMNH D 41748, 3 spms., Pillsbury Sta. P-1196, west Atlantic, N.E. of Jamaica, 17°27.5′N 75°57′W, 26 m, 10′ ottertrawl, 3.vii.1970, USNM Acc. No. 381702; RMNH D 41749, 1 spm., Pillsbury Sta. P-1317, west Atlantic, off Panama, 09°59′N 82°55′W, 55-69 m, 10′ ottertrawl, 27.i.1971, USNM Acc. No. 381702; RMNH D 41750, 1 spm., Pillsbury Sta. P-1252, west Atlantic, S.W. of Jamaica, 17°09′N 78°57′W, 26 m, 10′ ottertrawl, 14.vii.1970, USNM Acc. No. 381702; RMNH D 41751, 1 spm., Pillsbury Sta. P-1202, west Atlantic, N. of Jamaica, 17°51.1′N 76°23.8′W, 18 m, 10′ ottertrawl, 4.vii.1970, USNM Acc. No. 381702; RMNH D 41752, 1 spm., Pillsbury Sta. P-1204, west Atlantic, N. of Jamaica, 17°46.1′N 76°46.0′W, 37-92 m, 10′ ottertrawl, 4.vii.1970, USNM Acc. No. 381702; RMNH D 41753, 1 spm., Pillsbury Sta. P-1196, west Atlantic, N. of Jamaica, 17°23.6′N 76°02.2′W, 9-18 m, 10′ ottertrawl, 3.vii.1970, USNM Acc. No. 381702.

Diagnosis. — Rostrum (fig. 48A, B) short, acutely triangular, and deflexed on dorsal surface. Gastric region bearing short unarmed median carina with pyramidal hepatic convexity, and teeth arranged in circle posteriorly behind rostrum; submedian carinae absent. Cervical groove distinct. A1 peduncle with proximal segment equal in length to two distal segments, bearing three denticles on ventral margin, and small distal denticle on somewhat inflated stylocerite; segment 3 slightly shorter than segment 2; flagella about three times as long as carapace. A2 peduncle with basal segment bearing small tooth ventral to aperture of antennal gland; segment 2 with broad, distally-bifurcate or obscurely-trifurcate scaphocerite; segment 3 set obliquely on segment 2; segments 4 and 5 subequal in length; flagellum about 3 times as long as carapace. Maxilla 2 scaphognathite bearing modified setal whip. Mxp3 ischium and merus each bearing about 6 spines on mesial margin, increasing in size distally; carpus with a single distal spine on mesial margin; exopod consisting of proximal segment and deflected distal segment with multiarticulate flagellum. P1 larger cheliped bearing ischium with 5 low spines on ventral margin; merus with about 9 strong spines ventrally; carpus denticulate on dorsal margin, lateral surface tuberculate; palm robust, lateral surface tuberculate, dorsal margin dentate; fixed finger irregularly denticulate on cutting edge; dactylus strongly denticulate on dorsal margin, cutting edge

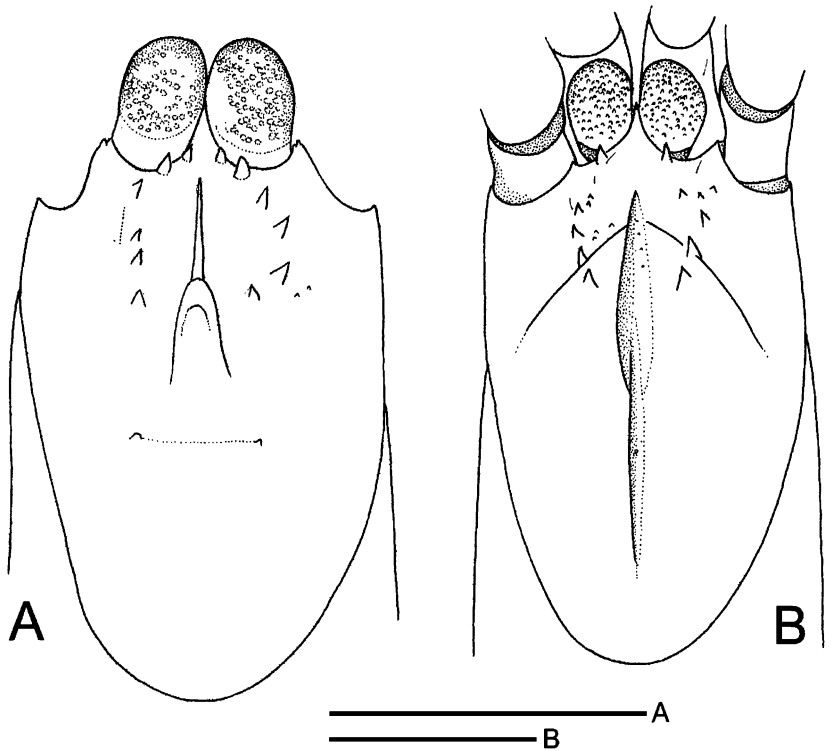

Fig. 48. *Coralaxius abelei* Kensley & Gore, 1981. A, B, gastric region, dorsal view. A, B, ZMB 26888, female (TL/CL, 12.0/3.9 mm), Murro Grande, Santa Marta, Colombia, 25 m. Scales 1 mm.

denticulate. P1 smaller cheliped with ischium, merus, and carpus shaped as in larger cheliped; chela markedly less broad than in larger cheliped; palm about two-thirds length of fingers, mesial and lateral surfaces tuberculate, dorsal margin spinose; cutting edge of fixed finger denticulate, medially with two large, acutely triangular teeth; dactylus denticulate on dorsal margin, cutting edge denticulate. P2 chela broad, fingers longer than palm. Ps3-5 dactyli biunguiculate distally. Abdominal pleuron 2 broadened, protruding antero- and posteroventrally. Male Plp1 uniramous and bisegmented, distal segment ovate and bilobed distally, bearing patch of hooklets mesiodistally. Male Plp2 biramous, exopod bearing marginal plumose setae; endopod pestle-shaped, bearing mesiomedially short appendix interna and broad, strongly bilobed appendix masculina with stout marginal setae. Female Plp1 uniramous and bisegmented, distal segment elongate, consisting of two articles with plumose distal setae. In female Plp2, and Plps3-5 of both sexes, exopod slightly shorter than endopod; endopod with short appendix interna mesiomedially.

Telson subtriangular and convergent posteriorly, bearing proximal lobe with spine followed posteriorly by movable spine in middle on lateral margin, and two spines on posterolateral margin with stiff setae, of which distal one long and strong; dorsal surface with two pairs of teeth medially; posterior margin fringed with elongate setae, bearing median spine. Uropodal endopod with three spines on lateral margin, bearing dorsal carina with five spines including distalmost marginal spine. Uropodal exopod bearing 3-4 spines on lateral margin and large movable spine at distolateral angle; dorsal surface with two spines on dorsal carina, and transverse suture with 6-8 spines. [Adapted from Kensley, 1994.]

Remarks. — In *Coralaxius abelei*, the female Plp1 is uniramous and bisegmented; the distal segment is elongate and bisegmented, but in the other species of *Coralaxius*, *C. galapagensis* Kensley, 1994 and *C. indopacificus* Kensley, 1994, it is an unsegmented ramus with distal setae (Kensley, 1994, figs. 1L, 3L).

Type locality. — Florida — Key Largo, 25°02′N 80°19′W, 76 m.

Distribution. — Florida — Key Largo (Kensley & Gore, 1981), Looe Key, and southwest of Alligator Light (Sakai & De Saint Laurent, 1989); Strait of Florida (Kensley, 1994); off Jamaica (Kensley, 1994); off Costa Rica (Kensley, 1994); Belize (Sakai & De Saint Laurent, 1989); Carrie Bow Cay, Belize (Kensley & Gore, 1981), Glovers Reef, Curlew Cay, Belize (Kensley, 1994); Colombia; Bahia, Espírito Santo & Rocas, Brazil (Coelho & Ramos-Porto, 1985); 6-230 m.

Coralaxius galapagensis Kensley, 1994

Coralaxius galapagensis Kensley, 1994: 815, figs. 1, 2.

Diagnosis. — Rostrum short, triangular, and deflexed on dorsal surface. Gastric region bearing short unarmed median carina with pyramidal hepatic convexity medially, and teeth arranged in circle posteriorly behind rostrum; submedian carinae absent. Cervical groove distinct. A2 basal segment with two short spines ventral to aperture of antennal gland; segment 2 with distally bifid scaphocerite. Mxp3 ischium with a few small teeth and a single large distal tooth on mesial margin; merus with three large mesiodistal teeth; carpus with a single large mesiodistal tooth; exopod consisting of proximal segment reaching distal margin of merus, and deflected distal segment with flagellum. In P1 larger cheliped, ischium serrate on ventral margin; merus roughly serrate and armed with strong distal tooth; carpus scattered with acute tubercles on lateral surface, and serrate and armed with strong distal tooth on dorsal margin;

palm 1.5 times length of fingers, strongly serrate on dorsal and ventral margins, lateral surface fairly densely tuberculate, several tubercles acute; cutting edge of fixed finger with a single moderately strong tubercle in middle; dactylus strongly serrate on dorsal margin, bearing a row of tubercles and several ones scattered on lateral surface, cutting edge with broad, rounded tubercles at base. In P1 smaller cheliped, ischium denticulate on ventral margin; merus with 10 teeth on ventral margin, increasing in size distally; carpus scattered with acute tubercles on lateral surface and strong denticles on dorsal margin; palm about three-fifths length of fingers, and strongly serrate dorsally, bearing numerous acute tubercles scattered on lateral surface, and strongly serrate on ventral margin; fixed finger denticulate on cutting edge, bearing two distinct teeth in distal half; dactylus strongly serrate on dorsal margin, and cutting edge denticulate. Abdominal pleura rounded ventrally. Telson subtriangular, about 1.4 times as long as wide, bearing two teeth laterally, a single strong, movable spine at posterolateral angle, and two pairs of blunt teeth on dorsal surface. Uropodal endopod bearing three obtuse teeth including distal one on lateral margin, and 4 teeth on dorsomedian carina. Uropodal exopod bearing 4 teeth on lateral margin and strong spine at distolateral angle; dorsal surface with two teeth on sublateral carina and transverse suture with 6 teeth. [Adapted from Kensley, 1994.]

Type locality. — Sullivan Bay, James Is., San Salvador, Galapagos.

Distribution. — Galapagos Islands (Kensley, 1994).

Coralaxius indopacificus Kensley, 1994

Coralaxius indopacificus Kensley, 1994: 820, figs. 3, 4.

Diagnosis. — Rostrum short, triangular, and deflexed on dorsal surface. Gastric region bearing short median carina with 2-3 spines and pyramidal hepatic convexity medially, and lateral carinae with 2-5 teeth, submedian carinae absent. Cervical groove distinct. A1 peduncle reaching far beyond eyestalks, proximal segment equal in length to two distal segments, bearing three small spines on dorsal margin; stylocerite somewhat inflated and terminating with a single small distal spine on ventral margin; segment 2 slightly longer than segment 3. A2 proximal segment with a single short spine ventral to aperture of antennal gland; segment 2 bearing distally bifid scaphocerite. Mxp3 ischium with 4 small teeth on mesial margin; merus with two small proximal and two large distal teeth on mesial margin; carpus with small distal spine; exopod consisting of proximal segment and deflected distal segment with flagellum.

In larger cheliped ischium denticulate on ventral margin; merus roughly serrate on dorsal margin, and 6 small spines and a strong distal one on ventral margin; carpus with ventral spine proximally, dorsal and lateral surfaces scattered with acute tubercles; palm 1.3 times as long as fingers, bearing acute tubercles on lateral surface and dorsal and ventral margins; fixed finger irregularly tuberculate on cutting edge; dactylus roughly serrate on dorsal margin, and scattered with acute denticles on lateral surface, cutting edge irregularly tuberculate. In smaller cheliped, merus serrate and armed with two or three distal teeth on dorsal margin, bearing 9 small teeth and a strong distal one on ventral margin; carpus serrate on dorsal margin and scattered with acute denticles on lateral surface; palm 0.6 times as long as fingers and strongly serrate on ventral margin, bearing acute denticles on lateral surface; fixed finger with two strong teeth and some small ones on cutting edge; dactylus strongly serrate on dorsal margin, and barely serrate on cutting edge. Abdominal pleura rounded ventrally. Telson hexagonal, bearing two pairs of teeth in distal half of dorsal surface; lateral margins with two teeth, two small and one strong movable spines, and stiff setae posterolaterally; posterior margin with median spine. Uropodal endopod with three teeth including distal one on lateral margin. Uropodal exopod with three teeth including distal tooth on lateral margin, movable spine at distolateral angle, and transverse suture with 6 teeth dorsally. [Adapted from Kensley, 1994.]

Type locality. — Astrolabe Reef, Kandavu, Fiji, 5-8 m.

Distribution. — Comoro Islands (Kensley, 1994); Fiji (Kensley, 1994); 5-20 m.

Genus **Meinertaxius** gen. nov.

Diagnosis. — Rostrum short and acutely triangular. Gastric region with median carina originating from base of rostrum and running to anterior half of gastric region; posterior half of median carina forming elongate triangular swelling in dorsal view, submedian and lateral carinae absent. Anterior margin of carapace with three spines including supraocular spine on each side of small rostrum. Cervical groove distinct. Eyestalks thick; cornean pigments faded in yellow colour. Mxp3 exopod consisting of proximal segment and deflexed distal segment with flagellum. P1 unequal. P2 chelate; chela ovate in shape. Ps3-4 simple, propodi elongate, bearing spines on ventral margin; dactyli biunguiculate. No pleurobranchs. Abdominal pleuron 1 rounded ventrally; pleuron 2 protruded antero- and posteroventrally, and truncate ventrally. Male Plp1 uniramous and bisegmented, distal segment bilobed distally; male Plp2

biramous, endopod with stout appendix masculina and small bisegmented appendix interna, distal segment with patch of hooklets distally; male Plps3-5 biramous, endopods bearing appendix interna. Telson subtriangular and convergent posteriorly, and denticulate on posterolateral margin with stiff setae, bearing median spine on convex posterior margin. Uropodal exopod bearing spines distally on lateral margin, and denticulate transverse suture.

Remarks. — It has turned out that *Coralaxius nodulosus* (Meinert, 1877) (cf. Sakai & De Saint Laurent, 1989) is not included in *Coralaxius*, though it is similar to the type species of *Coralaxius*, *Coralaxius abelei* Kensley & Gore, 1981 in that the gastric region bears a median carina originating from the base of the rostrum and running to the anterior half of the gastric region, and also in the shapes of the eyestalks, A1-2 peduncles, Mxp3, Ps1-2, dactyli of Ps3-4 (probably also of P5), abdominal pleura 1-6, and male Plp1. However, they are different from each other at the generic level as follows: in *Coralaxius nodulosus* the gastric region bears no teeth arranged in a circle or semicircle anteriorly behind the rostrum, the Mxp3 exopod consists of a bisegmented proximal segment and a deflexed distal segment with a flagellum, the male Plp2 appendix masculina is simple on its distal margin, and the Plp2 exopod is larger than the endopod. In contrast, in *Coralaxius abelei* the gastric region bears teeth arranged in a circle or semicircle anteriorly behind the rostrum, the Mxp3 exopod consists of an unsegmented proximal segment and a deflexed distal segment with a flagellum, the male Plp2 appendix masculina is bilobed distally, and the Plp2 exopod is shorter than the endopod. Therefore, *Coralaxius nodulosus* is reclassified under the new genus *Meinertaxius*, and distinguished from the other species included in *Coralaxius*.

Type species. — *Axius nodulosus* Meinert, 1877, by present designation and monotypy. The gender of the new name, *Meinertaxius*, is masculine.

Species included. — *Meinertaxius nodulosus* (Meinert, 1877).

Etymology. — The new genus is named *Meinertaxius* in honour of F. Meinert, a Danish carcinologist who described this species in 1877, by adding his name as a prefix to *-axius*.

Meinertaxius nodulosus (Meinert, 1877)
(figs. 49, 50)

Axius nodulosus Meinert, 1877: 212; Stephensen, 1910a: 276, figs. 1-5; Stephensen, 1910b: 75, fig. 49; De Man, 1925d: 5, 18; Balss, 1926: 26; Poulsen, 1940: 208, 236 (key), fig. 2; Ingle & Christiansen, 2004: 77.

?*Axiopsis nodulosus* — Borradaile, 1903: 539.

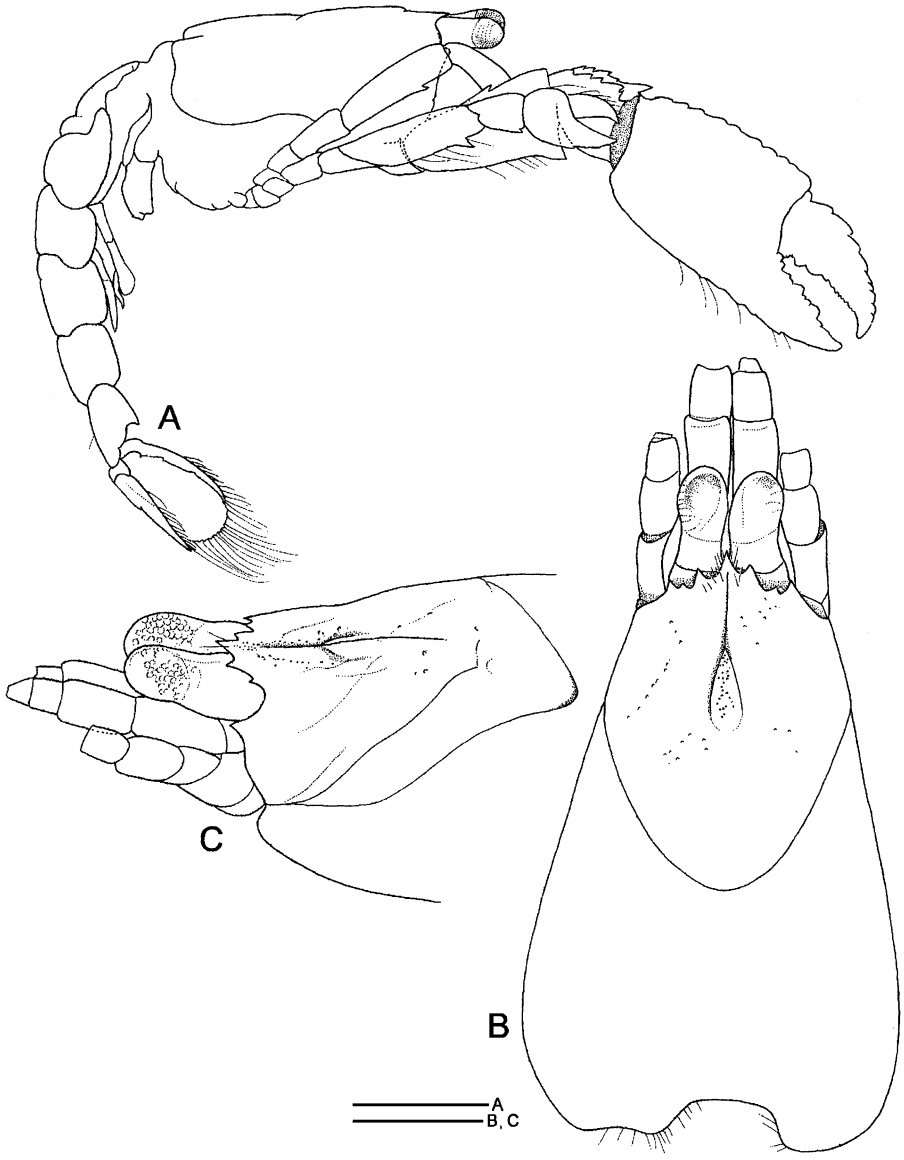

Fig. 49. *Meinertaxius nodulosus* (Meinert, 1877). A, whole body, lateral view; B, carapace, dorsal view; C, gastric region, dorsolateral view. A-C, ZMC CRU-587, lectotype, male (TL/CL, 6.5/2.2 mm), off Nymindegab, North Sea. Scales 0.5 mm.

Coralaxius nodulosus — Sakai & De Saint Laurent, 1989: 2 (list), 11 [typing error, p. 101, *abelei*], table 2; Kensley, 1994: 822, figs. 5, 6; Robles et al., 2009: 316.

Material examined. — ZMC CRU-587, lectotype male (TL/CL, 6.5/2.2 mm), off Nymindegab, North Sea, ca. 1840, leg. H. Krøyer.

Diagnosis. — Rostrum (fig. 49B, C) short, triangular in dorsal view, unarmed laterally, protruded to nearly proximal fourth of eyestalks. Anterior margin of carapace with three spines including distinct supraocular spine on each side of rostrum. Gastric region bearing median carina running from base of rostrum to anterior half of gastric region, posterior half of median carina forming elongate triangular swelling with fine tubercles on surface in dorsal view (considered a deformation of the hepatic tubercle), submedian and lateral carinae absent. Cervical groove distinct. No postcervical carina. Eyestalks thick; cornean pigments faded in yellow colour. A1 peduncle not reaching distal margin of A2 penultimate segment. Mxp3 merus with strong subdistal spine on ventral margin; propodus finely serrate on ventral margin; dactylus with long setae ventrally; exopod consisting of bisegmented proximal segment not reaching distal margin of merus, and deflected distal segment with multiarticulate flagellum. P1 chelate and unequal. In larger (right) cheliped (figs. 49A, 50A), merus with 2-3 low teeth on dorsal margin and 4 strong teeth distally on ventral margin; carpus with 4 distally-directed spines on dorsal margin; palm distinctly crenulate on dorsal margin but indistinctly on ventral margin; dactylus crenulate dorsally and distinctly denticulate on cutting edge; cutting edge of fixed finger armed with teeth. In smaller (left) cheliped (fig. 50B), merus with two lower teeth on dorsal margin and two distinct teeth distally on ventral margin; carpus bearing distal spine on dorsal margin but smooth on ventral margin; palm smooth on dorsal margin, but 4 lower teeth medially on ventral margin; cutting edge of fixed finger bearing 6 sharp, distally-directed teeth; dactylus twice length of palm, bearing 5 lower, distally-directed teeth. P2 (figs. 49A, 50C) ischium with subdistal tooth on ventral margin; merus denticulate with distinct subdistal tooth on ventral margin, but smooth on dorsal margin; carpus with triangular subdistal tooth on ventral margin; chela rounded in shape, and fixed finger proximally with three distinct spines on cutting edge; dactylus 1.8 times as long as palm and unarmed on cutting edge. Ps3-4 simple, propodi elongate, bearing ventral spines; dactyli blade-shaped and biunguiculate distally, carrying about 4-5 teeth and a couple of setae on ventral margin. No pleurobranchs. Abdominal pleuron 1 (fig. 50D) rounded ventrally; pleuron 2 protruded antero- and posteroventrally, and rounded ventrally. Male Plp1 uniramous and bisegmented, distal segment emarginate distally. Male Plp2 (fig. 50F) biramous, endopod shorter than exopod, bearing mesiomedially distinct appendix masculina and small bisegmented appendix interna with distal hooklets. Plps3-5 biramous, endopods with appendix interna. Telson (fig. 50E) subtriangular and convergent, bearing laterally a low proximal lobe followed

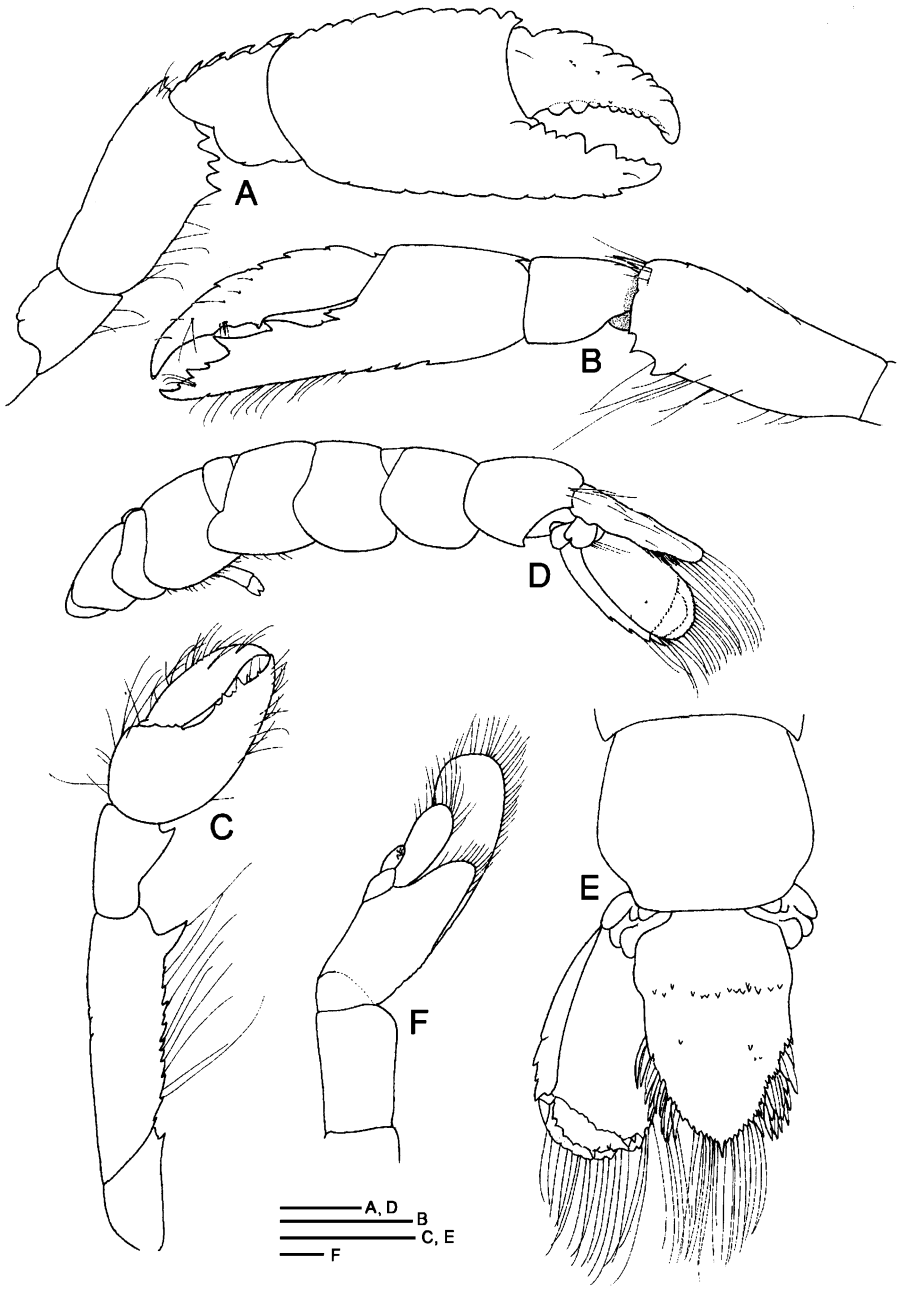

Fig. 50. *Meinertaxius nodulosus* (Meinert, 1877). A, larger cheliped; B, smaller cheliped; C, P2; D, abdomen and tail-fan, lateral view; E, abdominal somite 6, telson, and uropod on left side; F, male Plp2. A-F, ZMC CRU-587, lectotype, male (TL/CL, 6.5/2.2 mm), off Nymindegab, North Sea. Scales A, B, C, D, E, 1 mm; F, 0.1 mm.

by followed by denticles with stiff setae at posterolateral angle, and median spine on convex posterior margin; dorsal surface bearing transverse row of irregularly-arranged spinules at proximal third. Uropodal exopod with transverse suture.

Remarks. — Poulsen (1940: 208) described the present species, *Meinertaxius nodulosus* as a young post-larval specimen of *Axius nodulosus* because of its small size in comparison with other axiid specimens, which fact was referred to also by Ingle & Christiansen (2004: 77).

Kensley (1994: 822) considered his species *Coralaxius abelei* Kensley & Gore, 1981 from the Florida Keys and the western Caribbean Sea, to be synonymous with *Axius nodulosus* Meinert, 1877 from Nymindegab, North Sea, by developing his theory as follows; "a more likely scenario, however, is that the evolution reflects a tethyan distribution from tropical Indo-West Pacific to Western Atlantic and Eastern Pacific before the raising of the Isthmus of Panama" (Kensley, 1994: 827). This theory of his prevented him, unfortunately, from paying attention to the morphological differences between the two species, *Axius nodulosus* Meinert, 1877 and *Coralaxius abelei* Kensley & Gore, 1981. The mophological differences found between them make it possible to distinguish the one from the other. It is also safely said even, that those two species are clearly different in morphology from each other at the generic level, because in *A. nodulosus* the gastric region bears no teeth arranged in a circle posterior to the rostrum, and the male Plp2 endopod is provided with a simple appendix masculina, whereas in *C. abelei* the gastric region bears teeth arranged in a circle posteriorly behind the rostrum, and the male Plp2 endopod bears a setose appendix masculina which is distally bilobed. As a result, *Axius nodulosus* Meinert, 1877 from Nymindegab, North Sea is reclassified under the new genus *Meinertaxius* as a valid species *Meinertaxius nodulosus* (Meinert, 1877), and is distinguished from *Coralaxius abelei* Kensley & Gore, 1981.

Type locality. — Nymindegab, North Sea.

Distribution. — North Sea — west coast of Jutland (Meinert, 1877; Poulsen, 1940; Kensley, 1994).

FAMILY EICONAXIIDAE SAKAI & OHTA, 2005

Eiconaxiidae Sakai & Ohta, 2005: 69.

Diagnosis. — Rostrum stout, conspicuous, and pointed or rounded apically, and carinate medially with or without denticles; rostral median carina extending posteriorly as gastric median carina with or without bifurcate posterior end; and rostral lateral margins extending posteriorly onto gastric region as gastric lateral carinae; gastric submedian carinae absent. Carapace convex on dorsal surface, linea thalassinica absent, cervical groove usually indistinct, posterior margin of carapace with lateral lobes. Eyestalks indiscernible in lateral view; eyes rounded or ovate, cornea pigmented or unpigmented. A1 segment 1 as long as segment 2. Scaphocerite strong. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischial crest crenulate, exopod present. Ps1-2 chelate. Ps3-5 dactyli short, subspatulate in form, and spinulate on ventral margin. P4 coxa slightly flattened. Abdominal somite 1 with pleuron slightly protruded posteroventrally; abdominal somites without carina between tergum and pleuron. Male Plp1 absent; male Plp2 biramous and narrow, endopod with appendices interna and masculina or only with appendix interna; male Plps3-5 biramous, endopods with appendix interna. Female Plp1 uniramous and bisegmented; distal segment and flagellum with setae; Plps2-5 slender and biramous, endopods with appendix interna. Telson longer than wide, bearing no proximal lobe on lateral margin. Uropodal exopod without transverse suture.

Remarks. — The family Eiconaxiidae Sakai & Ohta, 2005 is separated from the family Axiidae Huxley, 1878, because it is very characteristic in that Ps3-5 are short, subspatulate in shape, and spinulate on the ventral margin; maxilla 2 bears no posterior whip; and the Mxp3 ischial crest is crenulate, which features are not observed in the Axiidae. The Eiconaxiidae are divided into two genera, *Eiconaxius* and *Eiconaxiopsis* gen. nov., by the distinct morphological differences between them, especially in Plp1. They are different from each other as follows. In *Eiconaxius* the eyes are rounded, and the cornea is pigmented; male Plp1 is absent; and the telson bears a median spine on the posterior margin. In *Eiconaxiopis* gen. nov. the eyes are ovate laterally, and the cornea is unpigmented; male Plp1 is present as a uniramous and bisegmented appendage, and the distal segment is elongate and slightly convex on its mesial margin with setae; the telson bears no median spine on the posterior margin.

Type genus. — *Eiconaxius* Bate, 1888, as the nominate genus.

Genera included. — *Eiconaxius* Bate, 1888.

Genus **Eiconaxius** Bate, 1888

Eiconaxius Bate, 1888: 40; Ortmann, 1891: 49; Stebbing, 1893: 188; Lagerberg, 1908: 48 (partim); Sakai & De Saint Laurent, 1989: 15; Sakai, 1992a: 158; Poore, 1994: 97 (key); Kensley, 1996e: 474; Sakai & Ohta, 2005: 69; Poore & Collins, 2009: 255.

Iconaxiopsis Alcock, 1901: 193 [type species: *Eiconaxius kermadeci* var. *laccadivensis* Alcock & Anderson, 1894, through subsequent designation by Borradaile, 1903]; Borradaile, 1903: 537; Balss, 1925: 210.

Iconaxius Alcock, 1901: 193 (miss-spelling).

Iconaxiopsis s. str. — Borradaile, 1903: 537.

Axius (*Eiconaxius*) — Borradaile, 1903: 537; De Man, 1925d: 1 (key), 14 (in key); Sakai, 1987a: 303 (list).

Diagnosis. — Rostrum distinct, triangular, and concave dorsally, bearing median carina extending posteriorly onto gastric region as gastric median carina, and bifurcate posteriorly; rostral apex acute or rounded, and lateral margins armed or unarmed, extending posteriorly onto gastric region. Cervical groove inconspicuous. Eyestalks indiscernible, eyes ovate, cornea pigmented or not. A2 peduncular segment 2 with distinct distodorsal spine; A2 scaphocerite conspicuously elongate. P1 subequal or unequal. P2 chelate. Ps3-5 dactyli short, subspatulate, and spinulose on ventral margin. Pleurobranchs present on Ps2-4. Pleura and terga entire. Male Plp1 absent; male Plp2 biramous and foliaceous, endopod with appendices interna and masculina mesiomedially, or with appendix interna but without appendix masculina. Male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and bisegmented; proximal segment and distal flagellum; female Plps2-5 biramous, endopods with appendix interna. Telson longer than wide and denticulate on lateral margin, bearing median spine on posterior margin. Uropodal exopod without transverse suture. Deep-water habitat.

Remarks. — In the present genus *Eiconaxius*, the male Plp2 has two types: (1) the appendices interna and masculina are present as in *E. agassizi* Bouvier, 1905, *E. albatrossae* Kensley, 1996, *E. antillensis* Bouvier, 1905, and *E. consobrinus* (De Man, 1907); (2) the appendix interna is present, but the appendix masculina is absent as in *E. acutifrons* Bate, 1888.

Type species. — *Eiconaxius acutifrons* Bate, 1888, subsequently designated by Borradaile, 1903. The gender of the generic name, *Eiconaxius*, is masculine.

Species included. — *Eiconaxius acutifrons* Bate, 1888; *E. agassizi* Bouvier, 1905; *E. albatrossae* Kensley, 1996e; *E. andamanensis* (Alcock, 1901);

E. antillensis Bouvier, 1905; *E. asper* Rathbun, 1906; *E. baja* Kensley, 1996e; *E. bandaensis* sp. nov.; *E. borradailei* Bouvier, 1905; *E. caribbaeus* Faxon, 1896; *E. carinatus* Bouvier, 1925; *E. consobrinus* (De Man, 1907); *E. cristagalli* Faxon, 1893; *E. demani* Sakai, 1992a; *E. farreae* Ortmann, 1891; *E. faxoni* sp. nov.; *E. hakuhou* Sakai & Ohta, 2005; *E. indicus* (De Man, 1907); *E. indonesicus* sp. nov.; *E. kermadeci* Bate, 1888; *E. kimbla* Kensley, 1996e; *E. laccadivensis* (Alcock & Anderson, 1894); *E. mallacoota* Poore & Collins, 2009; *E. mortenseni* Sakai, 1992a; *E. parvus* Bate, 1888; *E. rotundifrons* Bouvier, 1905; *E. singularis* (Zarenkov, 1983); *E. spiniger* (MacGilchrist, 1905); *E. weberi* (De Man, 1907).

KEY TO THE SPECIES OF THE GENUS *EICONAXIUS*

1 – Rostrum with smooth and rounded apex 2
– Rostrum with arcuate or triangular apex 10

2 – Merus of larger cheliped with lateral carina . . . . . *E. carinatus*
– Merus of larger cheliped without lateral carina 3

3 – Cutting edge of fixed finger of larger cheliped smooth . . . . . *E. andamanensis*
– Cutting edge of fixed finger of larger cheliped denticulate 4

4 – Rostral median carina armed with denticles . . . . . *E. bandaensis* sp. nov.
– Rostral median carina unarmed 5

5 – Rostrum denticulate on lateral margins 6
– Rostrum unarmed on lateral margins 7

6 – Cutting edge of fixed finger of larger cheliped with convexity with distinct tooth . . . . . *E. rotundifrons*
– Cutting edge of fixed finger of larger cheliped with two proximal covexities . . . . . *E. borradailei*

7 – Palm of larger cheliped armed with denticles ventrally on distal margin 8
– Palm of larger cheliped unarmed ventrally on distal margin 9

8 – Palm of larger cheliped with two denticles ventrally on distal margin . . . . . *E. demani*
– Palm of larger cheliped denticulate ventrally on distal margin . . . . . *E. parvus*

9 – Dactylus of larger cheliped with median tooth on cutting edge . . . . . *E. mortenseni*
– Dactylus of larger cheliped proximally convex on cutting edge . . . . . *E. caribbaeus*

10 – Palm of larger cheliped denticulate on dorsal margin 11
– Palm of larger cheliped smooth on dorsal margin 16

11 – Chela of larger cheliped setose . . . . . *E. spinigerus*
– Chela of larger cheliped not setose 12

12 – Palm of larger cheliped unarmed on ventrodistal margin . . . . . *E. faxoni*
– Palm of larger cheliped convex on ventrodistal margin 13

13 – Rostral median carina denticulate . . . . . *E. indicus*
– Rostral median carina smooth 14

14 – Dorsal margin of palm of smaller cheliped unarmed . . . . . *E. indonesicus* sp. nov.

– Dorsal margin of palm of smaller cheliped denticulate 15

15 – Rostrum turned-up distally . . . . . *E. baja*
– Rostrum not turned-up distally . . . . . *E. albatrossae*

16 – Rostrum unarmed on lateral margins 17
– Rostrum serrate on lateral margins 18

17 – Rostral median carina smooth . . . . . *E. kimbla*
– Rostral median carina denticulate . . . . . *E. hakuhou*

18 – Pleura 2-4 less sharply pointed 19
– Pleura 2-4 almost sharply pointed 20

19 – Cutting edge of dactylus of larger cheliped unarmed . . . . . *E. laccadivensis*
– Cutting edge of dactylus of larger cheliped proximally with cusp . . . . . *E. asper*

20 – Rostrum short and as long as wide at base . . . . . *E. weberi*
– Rostrum more than half length of width at base 21

21 – Rostral median carina denticulate 22
– Rostral median carina smooth 23

22 – Cutting edge of fixed finger of larger cheliped proximally notched . . . . . *E. cristagalli*
– Cutting edge of fixed finger of larger cheliped widely concave proximally . . . . . *E. antillensis*

23 – Cutting edge of fixed finger with row of denticles . . . . . *E. singularis*
– Cutting edge of fixed finger distintly serrated or denticulate, or armed with a cusp 28

24 – Cutting edge of fixed finger of larger cheliped strongly or moderately serrated, or denticulate 25
– Cutting edge of fixed finger of larger cheliped bearing a cusp 27

25 – Cutting edge of fixed finger of larger cheliped irregularly denticulate in proximal half . . . . . *E. mallacoota*
– Cutting edge of fixed finger of larger cheliped distinctly serrated 26

26 – Cutting edge of fixed finger of larger cheliped strongly serrated . . . . . *E. acutifrons*
– Cutting edge of fixed finger of larger cheliped compactly serrated . . . . . *E. kermadeci*

27 – Merus of larger cheliped with distinct median tooth on ventral margin . . . . *E. agassizi*
– Merus of larger cheliped distally with denticles or unarmed 28

28 – Cutting edge of fixed finger of larger cheliped notched proximally, and followed by small cusp . . . . . *E. consobrinus*
– Cutting edge of fixed finger of larger cheliped proximally with convexity bearing distal cusp . . . . . *E. farreae*

Eiconaxius acutifrons Bate, 1888

Eiconaxius acutifrons Bate, 1888: 40, fig. 4, pl. 5 fig. 2d, g, h, I, k, l, q; Sakai & De Saint Laurent, 1989: 16 (partim); Hendrickx, 1995: 390 (list); Kensley, 1996e: 475 (list).

Axius (*Eiconaxius*) *acutifrons* — Borradaile, 1903: 538.

Iconaxius acutifrons — Balss, 1925: 209 (partim).

Not: *Axius acutifrons* — Faxon, 1895: 103, pl. 28 fig. 2 [= *Eiconaxius faxoni* sp. nov.].

Not: *Axius* (*Eiconaxius*) *acutifrons* — De Man, 1925d: 4 (list), 15 (key), 37, pl. 3 fig. 5-5e [= *Eiconaxius indonesicus* sp. nov.].

Diagnosis. — Male Plp2 biramous, endopod with appendix interna, but without appendix masculina. [From Bate, 1888, pl. 5 fig. 2q.]

Remarks. — *Eiconaxius acutifrons* was reported by Bate in 1888 from the Banda Sea for the first time, and was next reported by Faxon in 1895 from southern Panama (Sta. 3358, 3359, 4°31′S 129°57.20′E, 360 fathoms (658 m)), and thirdly reported by De Man in 1925 from the southeast coast of Great Kei Island. However, it seems that those three *acutifrons* are different from one another.

Bate's specimens and De Man's specimen are different from each other, even though they were reported from almost the same locality, Indonesia, in the forms of the rostrum and chelipeds. In Bate's *E. acutifrons* (male) the rostrum is narrowly triangular in males, or broadly triangular in females (Bate, 1888: 40), and in the male larger cheliped on the left side (Bate, 1888, pl. 5 fig. 2kl), the cutting edge of the fixed finger is strongly serrated, the dactylus is broad, and the cutting edge bears proximally a convexity and is then curved in S-shape distally. In De Man's *E. acutifrons* (male), by contrast, the rostrum is triangular and acuminate at the tip, and a little longer than wide at its base; in the male larger cheliped on the left side (De Man, 1925d: 39, fig. 5b), the cutting edge of the fixed finger bears a median cusp followed distally by denticulation toward the tip, and the cutting edge of the dactylus carries a distinct, truncate proximal convexity in its proximal third, and then concave and smooth. Accordingly, it is proposed that De Man's *E. acutifrons* is renamed *E. indonesicus* sp. nov.

Faxon's *E. acutifrons* from Panama is geographically and morphologically different from Bate's and De Man's *E. acutifrons*, as shown in the figure of the right cheliped given by Faxon (1895, pl. 28 fig. 2), in that the palm is armed with 4 teeth including a distodorsal tooth on the distal half of the dorsal margin, and the cutting edge of the fixed finger bears a distinct triangular tooth at its proximal third, and then denticulate toward the tip, and the cutting edge of the dactylus bears a broad, truncate convexity in its proximal third, and then is further concave with a small median tooth in its distal third, which suggests that Faxon's *E. acutifrons* is also to be differentiated from Bate's and De Man's *E. acutifrons*, and is here renamed *E. faxoni* sp. nov.

Type locality. — Off Banda, Challenger Sta. 194A, 4°31.0′S 129°57.20′E, 360 fathoms (658.4 m), volcanic mud.

Distribution. — Off Banda, Challenger Sta. 194A, 360 fathoms [ca. 658 m] (Bate, 1888); Banda, 660 m (Balss, 1925); southeast coast of Great Kei Island,

"Siboga" Sta. 266, 5°56.5′S 132°47.7′E, 595 m, grey mud with coral and stones (De Man, 1925d).

Eiconaxius agassizi Bouvier, 1905

Eiconaxius Agassizi Bouvier, 1905: 803.
Iconaxius Agassizi — Balss, 1925: 209.
Axius (*Eiconaxius*) *agassizi* — Bouvier, 1925: 458, fig. 22, pl. 7 fig. 5, pl. 9 fig. 2.
Axius (*Eiconaxius*) *Agassizi* — De Man, 1925d: 4 (list), 17 (key).
Eiconaxius agassizi — Sakai & De Saint Laurent, 1989: 20; Kensley, 1996e: 475 (list).

Material examined. — RMNH D 41754, 3 males (TL/CL, 17.0/5.6-18.0/6.6 mm), Pillsbury Sta. P-1187, west Atlantic, N. of Jamaica, 18°17′N 75°07′W, 1033 m, 10′ ottertrawl, 2.vii.1970, USNM Acc. No. 381702.

Diagnosis. — Male Plp1 absent, male Plp2 biramous, and endopod bearing appendices interna and masculina; male Plps3-5 biramous, and endopods with appendix interna.

Type locality. — West Indies to Gulf of Mexico, 523-1548 m.

Distribution. — Only known from the type locality.

Eiconaxius albatrossae Kensley, 1996

Eiconaxius albatrossae Kensley, 1996e: 475, figs. 4, 5.

Diagnosis. — Male Plp1 absent, male Plp2 biramous, endopod with appendices interna and masculina at proximal third.

Type locality. — Pacific Panama, 6°22′20″N 81°52′11″W, "Albatross" Sta. 3359, 851 m.

Distribution. — Pacific Panama, 851-1016 m.

Eiconaxius andamanensis (Alcock, 1901)

Iconaxiopsis andamanensis Alcock, 1901: 196, pl. 2 fig. 1; Alcock & McArdle, 1902, pl. 58 fig. 2; Balss, 1925: 209.
Axius (*Iconaxiopsis*) *andamanensis* — Borradaile, 1903: 537.
Axius (*Eiconaxius*) *andamanensis* — De Man, 1925d: 4 (list), 16 (key).
Eiconaxius andamanensis — Sakai & De Saint Laurent, 1989: 20; Kensley, 1996e: 475 (list).

Remarks. — Alcock (1901: 196) mentioned that this species is closely similar to *E. laccadivensis* (Alcock & Anderson, 1894), but is distinguished from the latter as follows. In *E. andamanensis* the rostrum is smooth on the lateral margins, and the cutting edges of the dactylus and fixed finger are smooth (Alcock, 1901: 196, pl. 2 fig. 1), whereas in *E. laccadivensis* the rostrum is microscopicallly serrulate on the lateral margins, and the cutting

edge of the dactylus is concave to correspond with a slightly enlarged proximal tooth on the cutting edge of the fixed finger (Alcock & MacGilchrist, 1905, pl. 71 fig. 3).

Type locality. — Off the west coast of Andaman Islands, 428-522 m.

Distribution. — Only known from the type locality.

Eiconaxius antillensis Bouvier, 1905

Eiconaxius crista-galli var. *antillensis* Bouvier, 1905: 803.
Iconaxius cristagalli var. *antillensis* — Balss, 1925: 210.
Axius (*Eiconaxius*) *crista-galli antillensis* — Bouvier, 1925: 456, pl. 8 fig. 3, pl. 9 fig. 1.
Axius (*Eiconaxius*) *crista-galli* var. *antillensis* — De Man, 1925d: 4 (list), 33.
Econaxius antillensis — Sakai & De Saint Laurent, 1989: 21; Kensley, 1996e: 475 (list).

Material examined. — RMNH D 41756, 1 ovig. female (TL/CL, 17.0/6.3 mm), Pillsbury Sta. P-1262, west Atlantic, S. of Jamaica, 17°21.1′N 77°34.8′W, 805-1089 m, 10′ ottertrawl, 10.vii.1970, USNM Acc. No. 381702; RMNH D 41757, 1 male (TL/CL, 17.0/6.3 mm), Pillsbury Sta. P-944, west Atlantic, N. of Guadeloupe, 16°33.2′N 61°36.8′W – 16°34.4′N 61°37.2′W, 360-421 m, 5′ Black trawl, 17.vii.1969, USNM Acc. No. 381702.

Diagnosis. — Male Plp1 absent; male Plp2 biramous, endopod with appendix masculina and short appendix interna; Plps3-5 endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and flagellum; female Plps2-5 endopods with appendix interna.

Type locality. — Antilles and Gulf of Mexico, 518-536 m.

Distribution. — Gulf of Mexico (Bouvier, 1905); Antilles (Bouvier, 1905); 518-536 m.

Eiconaxius asper Rathbun, 1906

Eiconaxius asper Rathbun, 1906: 895, fig. 52; Sakai & De Saint Laurent, 1989: 22; Kensley, 1996e: 475 (list).
Iconaxius asper — Balss, 1925: 209.
Axius (*Eiconaxius*) *asper* — De Man, 1925d: 4 (list), 14 (key).

Type locality. — Off Kauai Island, Hawaiian Islands, 752-950 m.

Distribution. — Hawaiian Islands — Kauai Island (Rathbun, 1906); 752-950 m.

Eiconaxius baja Kensley, 1996

Eiconaxius baja Kensley, 1996e: 478, fig. 6, table 3.

Remarks. — The present species, *Eiconaxius baja* is closely similar to *E. albatrossae*, because, as shown by Kensley (1996e), the external characteristics

of the rostrum, median and lateral carinae on the gastric region, the shape and denticulation of P1, pleura, and tail-fan, are fundamentally the same between the two species. However, they differ as follows. In *E. baja* the rostrum is vertically turned up at the apex, and the lateral surface of the P1 palm is armed with strong tubercles with setae, whereas in *E. albatrossae* the rostrum is not turned up at the apex, and the lateral surface of the P1 palm bears no setose tubercles.

Type locality. — Baja California, 28°57′00″N 118°14′30″W, "Albatross" Sta. 2986, 1252 m.

Distribution. — So far only known from the type locality.

Eiconaxius bandaensis sp. nov.

Eiconaxius sibogae — Sakai, 1992a: 163, fig. 6 [not: De Man, 1925a: 218; De Man, 1925b: 34, fig. 4-4L].

Material examined. — ZMC, holotype, female (TL/CL, 19.0/6.2 mm, with chelipeds); paratype, female (TL/CL, 19.0/6.2 mm, without chelipeds), Banda Sea, 5°47′S 132°51′E, 348 m, trawl, KIE Sta. 51, 7.v.1922, leg. Danish Expedition to Kei Islands, 1922.

Diagnosis of female holotype. — Rostrum triangular with rounded apex and unarmed on lateral margins, rostral median carina with 1-4 denticles extending onto gastric region to form bifurcate gastric median carina with denticles anterior to junction. In larger cheliped, ischium with subdistal spine on ventral margin; merus 1.3 times as long as wide, lateral surface convex, ventral margin straight with minute serration and triangular distal spine, dorsal margin largely rounded; carpus less than half length of merus, half as long as wide, bearing obtuse spine on ventral angle; chela about six times as long as carpus; palm 1.3 times as long as wide, lateral surface carinate along ventral margin, distal margin convex medially and concave at ventral corner, then continued to cutting edge of fixed finger; fixed finger half length of palm, cutting edge with proximal tubercle in smooth proximal half, and armed in distal half with denticles reducing in size distally; dactylus incurved at tip, cutting edge with two obtuse teeth in proximal two-fifths, proximal tooth much larger than distal one. Telson longer than wide, armed with 4-6 denticles on lateral margin, and rounded on posterior margin with median spine. Uropodal endopod protruded on serrated distolateral margin. [Adapted from Sakai, 1992a.]

Remarks. — The two female specimens from the Banda Sea, which were identified as *E. sibogae* (De Man, 1925) (cf. Sakai, 1992a: 164, fig. 6), have turned out to be different from *E. sibogae*, because the morphological differences found between the female specimens and the holotype of *E.*

sibogae are as follows. In the female specimens, the rostrum is smooth and rounded at the apex, bearing 1-4 denticles on the median carina. In *E. sibogae* the rostrum is subacute apically and smooth on the median carina. Therefore, the females from the Banda Sea are distinguishable from the type specimens of *E. sibogae* from the Sulu Sea, and are here renamed *E. bandaensis* sp. nov. as a new species. In addition, *Econaxius sibogae* is transferred to the genus *Eiconaxiopsis* by the presence of male Plp1 (see p. 295).

Type locality. — Banda Sea, 5°47′S 132°51′E, 348 m.

Distribution. — Only known from the type locality, Banda Sea.

Eiconaxius borradailei Bouvier, 1905

Eiconaxius Borradailei Bouvier, 1905: 803.
Iconaxius Borradailei — Balss, 1925: 209.
Axius (*Eiconaxius*) *borradailei* — Bouvier, 1925: 465, pl. 7 figs. 7, 8, pl. 9 fig. 4.
Axius (*Eiconaxius*) *Borradailei* — De Man, 1925d: 4 (list), 17 (key).
Eiconaxius borradailei — Sakai & De Saint Laurent, 1989: 21; Kensley, 1996e: 475 (list).

Type locality. — Caribbean Sea, 172-243 m.

Distribution. — 22°09′N 82°21′E (off the south of Cuba), Martinique, Dominica, Grenada, and Barbados (Bouvier, 1905, 1925); 172-243 m.

Eiconaxius caribbaeus Faxon, 1896

Iconaxius caribbaeus Faxon, 1896: 155, pl. 1 figs. 1-4; Balss, 1925: 209.
Eiconaxius communis Bouvier, 1905: 803. [Type locality. — Antilles Islands and Gulf of Mexico.]
Iconaxius communis — Balss, 1925: 210.
Axius (*Eiconaxius*) *caribbaeus* — Bouvier, 1925: 461, pl. 7 fig. 6; De Man, 1925d: 4 (list), 16 (key).
Axius (*Eiconaxius*) *communis* — De Man, 1925d: 4 (list), 17 (key).
Eiconaxius caribbaeus — Sakai & De Saint Laurent, 1989: 19; Kensley, 1996e: 475 (list).

Material examined. — RMNH D 41758, 1 female (TL/CL, 11.0/4.0 mm), Pillsbury Sta. P-991, west Atlantic, N.E. of Anguilla, 18°47′N 64°46.8′W, 205-380 m, 5′ Black trawl, 23.vii.1970, USNM Acc. No. 381702.

Diagnosis. — Female Plp1 uniramous and slenderly elongate, consisting of proximal segment and flagellum with setae; female Plps2-5 endopods with appendix interna.

Type locality. — Caribbean Sea, 434 m.

Distribution. — Gulf of Mexico — Milligan Key (Bouvier, 1925), Milligan Key and Havana (Sakai & De Saint Laurent, 1989); Guadeloupe (Bouvier, 1925; Sakai & De Saint Laurent, 1989); St. Lucia (Bouvier, 1925); St. Vincent (Bouvier, 1925); Grenadines, Barbados (Bouvier, 1925; Sakai & De Saint Laurent, 1989); Venezuela — Cariaco (Bouvier, 1925); 158-426 m.

Eiconaxius carinatus Bouvier, 1925

Axius (*Eiconaxius*) *caribbaeus carinatus* Bouvier, 1925: 465, pl. 9 fig. 3; Schmitt, 1935a: 191, fig. 52.
Eiconaxius carinatus — Sakai & De Saint Laurent, 1989: 23.

Type locality. — Off St. Croix, Caribbean Sea, 158-536 m.

Distribution. — Milligan Key (Bouvier, 1925); Montana (Bouvier, 1925); St. Croix (Bouvier, 1925); St. Vincent (Bouvier, 1925), 158-536 m.

Eiconaxius consobrinus (De Man, 1907)
(fig. 51)

Iconaxius (*Iconaxiopsis*?) *consobrinus* De Man, 1907: 129.
Axius (*Eiconaxius*) *consobrinus* — De Man, 1925d: 4 (list), 16 (key), 40, pl. 3 fig. 6-6d.
Eiconaxius consobrinus — Sakai & De Saint Laurent, 1989: 23 (partim); Kensley, 1996e: 475 (list).
Not: *Iconaxiopsis consobrina* — Balss, 1925: 209, 211, fig. 15 [= *Eiconaxiopsis heinrichi* sp. nov.].

Material examined. — ZMA Crust. De. 102874, lectotype, male (TL/CL, 24.0/8.5 mm, carapace and abdomen separated), paralectotype, 1 ovig. female (TL/CL, 25.5/8.4 mm), Indonesia between east point of Timor and Leti Island, 8°17.4′S 127°30.7′E, "Siboga" Sta. 280, 1224 m.

Diagnosis. — Rostrum elongate and three times as long as wide, lateral margins armed with three obtuse denticles in male, or obscurely denticulate in female; rostral median carina smooth, extending to anterior part of gastric region. In larger cheliped fixed finger proximally notched (fig. 51A, B). Abdominal somites smooth on surfaces (fig. 51C, D). Male Plp1 absent. Male Plp2 biramous, endopod bearing appendices interna and masculina mesially at proximal fourth.

Remarks. — The type specimens preserved in the Zoological Museum, Amsterdam are a male and a female; the male is here designated as the **lectotype**, and the ovigerous female as the **paralectotype** in order to avoid confusion with the material of *Iconaxiopsis consobrina* in Balss (1925) (= *Eiconaxiopsis heinrichi* sp. nov.).

Type locality. — Indonesia, between east point of Timor and Leti Island, 8°17.4′S 127°30.7′E, "Siboga" Sta. 280, 1224 m.

Distribution. — Indonesia — between east point of Timor and Leti Island (De Man, 1925d); 1224 m.

Eiconaxius cristagalli (Faxon, 1893)

Axius crista-galli Faxon, 1893: 193; Faxon, 1895: 104, pl. 28 fig. 1-1h.

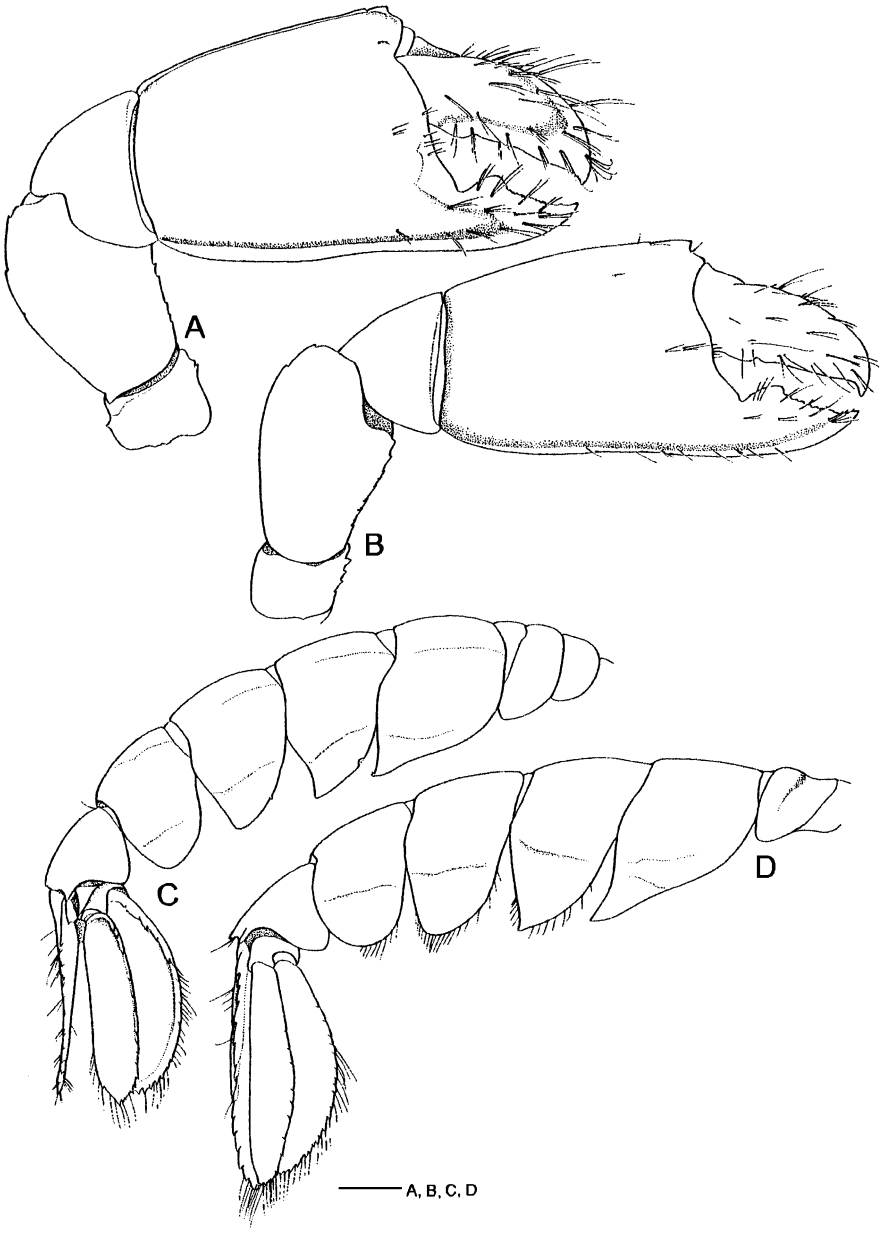

Fig. 51. *Eiconaxius consobrinus* (De Man, 1907). A, larger cheliped in male, lateral view; B, same in female; C, abdomen and tail-fan in male, lateral view; D, same in female. A, C, ZMA Crust. De. 102874, lectotype, male (TL/CL, 24.0/8.5 mm), Indonesia, between east point of Timor and Leti Island, 8°17.4′S 127°30.7′E, "Siboga" Sta. 280, 1224 m; B, D, ZMA Crust. De. 102874, paralectotype, 1 ovig. female (TL/CL, 25.5/8.4 mm), same data. Scale 1 mm.

Axius (*Eiconaxius*) *crista-galli* — Borradaile, 1903: 538; De Man, 1925d: 4 (list), 14 (key).
Eiconaxius crista-galli — Rathbun, 1906: 895.
Iconaxius cristagalli — Balss, 1925: 210.
Eiconaxius cristagalli — Sakai & De Saint Laurent, 1989: 18; Hendrickx, 1995: 390 (list); Kensley, 1996e: 475 (list), 481, fig. 7.

Remarks. — The present species, *Eiconaxius cristagalli* from south of Panama, west coast of America, 837 m, is almost the same as *E. asper* from the vicinity of Kauai Island, Hawaii, 418-528 m, except that in *E. cristagalli* the dactylus of the larger cheliped is simply convex proximally on the cutting edge, as shown by Kensley (1966e, fig. 7), whereas in *E. asper* it bears a prominent tooth proximally on the cutting edge (Rathbun, 1906, fig. 52).

Type locality. — South off Panama, west coast of America, 837 m.

Distribution. — Panama (Faxon, 1893); 837 m.

Eiconaxius demani Sakai, 1992

Axius (*Eiconaxius*) *parvus* — De Man, 1925d: 42, pl. 3 fig. 7-7f [not: *E. parvus* Bate, 1888].
Eiconaxius demani Sakai, 1992a: 158, figs. 1, 2; Kensley, 1996e: 475 (list).

Type locality. — Kei Is., 5°46′S 132°50′E, 352 m.

Distribution. — Indonesia — Kepulauan Kai (De Man, 1925d; Sakai, 1992a); Arafura Sea (Sakai, 1992a); 352-560 m.

Eiconaxius farreae Ortmann, 1891

Eiconaxius farreae Ortmann, 1891: 49, pl. 1 fig. 4; Sakai & De Saint Laurent, 1989: 18; Sakai, 1992a: 162, fig. 5; Kensley, 1996e: 475 (list); Komai, 1999: 63; Sakai & Ohta, 2005: 70, figs. 1, 2.
"?*Axius* (*Iconaxiopsis*) *farreae*" — Borradaile, 1903: 537.
Axius (*Eiconaxius*) *farreae* — Balss, 1914: 88; De Man, 1925b: 125, fig. 3-3d; De Man, 1925d: 4 (list), 16 (key); Yokoya, 1933: 52; Miyake, 1982: 192 (list); Sakai, 1987a: 303 (list).
Iconaxiopsis farreae — Balss, 1925: 209, 211.
Axius farreae — Sakai, 1987a: 304, table 1.

Material examined. — Paralectotypes, MZS 313, 7 males (TL/CL: 19.0/5.7-12.0/3.8), 1 ovig. female (20.0/6.5), 2 females (21.0/6.5-17.0/5.9), 1 juv. (8.0/2.5). Lectotype, MZS 314 (1 specimen inside a sponge*). Paralectotype, MZS 315 (1 specimen inside a sponge*), Sagami Bay, Japan; NSMT-Cr R547, fragments, Kannonzuka-dashi, Amadaiba, Sagami-Bay, Japan, R/V "Hayama-Maru", 400 m, 8.vi.1950, leg. His Majesty the Emperor of Japan, Hirohito et al.; BLT 18245, 3 males (TL/CL, 19.0/6.4-2.4/7.9 mm), 1 ovig. female (TL/CL, 2.6/8.0 mm), Sagami Bay, S. flank of Merase, 34°50.06′N 139°43.10′E – 34°50.10′N 139°43.24′E, 517-528 m depth, R/V "Tansei-Maru", Sta. MR-1-2, 13.v.2004, 08:03-08:12 h, 1 m, biological dredge.

(**Farrea occa* Bowerbank, 1862, Hexasterophora, det. C. Eckert.)

Type locality. — Sagami Bay, Japan, 182-364 m.

Distribution. — Japan — Sagami Bay (Ortmann, 1891; De Man, 1925b; Sakai, 1992a), Tokyo Bay and Sagami Bay (Balss, 1914), Omae-zaki and Goto-retto (Yokoya, 1933); 77-732 m.

Eiconaxius faxoni sp. nov.

Axius acutifrons, Faxon, 1895: 103, pl. 28 fig. 2; Wicksten, 1982: 246 [not: Bate 1888].

Material considered. — Types, MCZ, 2 males and 4 ovig. females from R/V "Albatross" Sta. 3358; 3 males, 3 females (2 ovig.) from Sta. 3359, southern Panama. [From Faxon, 1895.]

Remarks. — The type locality of *E. acutifrons* Bate, 1888 is the Banda Sea, Indonesia, so that the specimens from southern Panama reported by Faxon (1895) are geographically and morphologically different from those described as *E. acutifrons* Bate, as shown in the Remarks on that species (p. 271).

Type locality. — South off Panama, 6°30′N 81°44′W to 6°22.20′N 81°52′W.

Distribution. — South of Panama; 850-1000 m (Faxon, 1895).

Etymology. — The new species is named *Eiconaxius faxoni* in honour of Dr. W. Faxon, who described "*Eiconaxius acutifrons*" on the basis of specimens from off southern Panama. The name thus is a noun in the genitive singular.

Eiconaxius hakuhou Sakai & Ohta, 2005

Eiconaxius hakuhou Sakai & Ohta, 2005: 78, figs. 6, 7.

Type locality. — Sulu Sea; 1981-2019 m.

Distribution. — Only known from the type locality.

Eiconaxius indicus (De Man, 1907)
(fig. 52)

Iconaxius crista-galli var. *indica* De Man, 1907: 128.
Iconaxius cristagalli var. *indica* — Balss, 1925: 210.
Axius (*Eiconaxius*) *crista-galli* var. *indica* — De Man, 1925d: 4 (list), 15 (key), 31, pl. 2 fig. 3-3b.
Eiconaxius indica — Sakai & De Saint Laurent, 1989: 22.
Eiconaxius indicus — Kensley, 1996e: 475 (list); Sakai & Ohta, 2005: 73, figs. 3-5; Chu et al., 2008.

Material examined. — ZMA Crust. De. 102465, holotype, ovig. female (TL/CL, 32.0/10.6 mm) (fig. 52), off southeast coast of Great Kei Island, Indonesia, "Siboga" Sta. 267, 5°54′S 132°56.7′S, 984 m.

Type locality. — Off southeast coast of Great Kei, Indonesia, 5°54′S 132°56.7′E, "Siboga" Sta. 267, 984 m.

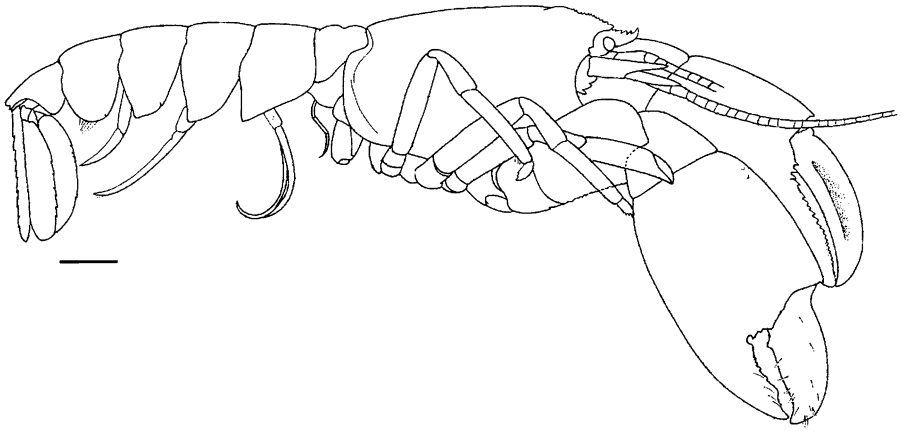

Fig. 52. *Eiconaxius indicus* (De Man, 1907). Whole body, lateral view. ZMA Crust. De. 102465, holotype, ovig. female (TL/CL, 32.0/10.6 mm), off south-east coast of Great-Kei island, Indonesia, "Siboga" Sta. 267, 5°54′S 132°56.7′E, 984 m. Scale 1 mm.

Distribution. — Indonesia — Kepulauan Kai (De Man, 1907, 1925); 984 m; Sulu Sea, Philippines, R/V "Hakuhou-Maru" Sta. 08°06.36′N 118°26.49′E – 08°07.04′N 118°26.06′E, 688-693 m; 08°07.72′N 118°34.76′E – 08°08.51′N 118°34.44′E, 1012-1015 m; 08°06.41′N 118°29.18′E – 08°07.32′N 118°28.44′E, 796-804 m; 08°22.77′N 118°56.11′E – 08°24.31′N 118°55.61′E, 1981-2019 m (Sakai & Ohta, 2005).

Eiconaxius indonesicus sp. nov.

Axius (*Eiconaxius*) *acutifrons* — De Man, 1925d: 4 (list), 15 (key), 37, pl. 3 fig. 5-5e.

Material. — Holotype, male, south-east coast of Great Kei Island, "Siboga" Sta. 266, 5°56.5′S 132°47.7′E, 595 m, from a hexactinellid sponge; grey mud with coral and stones.

Diagnosis. — Rostrum stout and triangular, with apical tubercle, bearing denticles on lateral margins. Eyestalks rounded. Gastric median carina unarmed. Mxp3 ischial crest crenulate. In male larger cheliped palm with distal tooth on dorsal margin. Cutting edge of fixed finger with median cusp followed distally by denticulation toward tip. Ps3-5 short, subspatulate in shape, and spinulate on ventral margin. Male Plp1 absent. Male Plp2 biramous and foliaceous, endopod with appendices interna and masculina mesiomedially. Telson rectangular, bearing median spine on posterior margin.

Remarks. — De Man (1925d: 37) described *E. acutifrons* on the basis of specimens from the south of Great Kei Island, Indonesia, but his species is clearly different from Bate's *E. acutifrons* from the Banda Sea and Faxon's *E. acutifrons* from Panama, as descibed in the remarks of Bate's *acutifrons*

(p. 271). Therefore, De Man's *E. acutifrons* is distinguished from Bate's and Faxon's *E. acutifrons*, and here renamed *Eiconaxius indonesicus* sp. nov.

Type locality. — South-east coast of Great Kei Island, "Siboga" Sta. 266, 5°56.5′S 132°47.7′E, 595 m, grey mud with coral and stones.

Distribution. — Only known from the type locality.

Etymology. — The new species is named *E. indonesicus*, derived from the type locality, Great Kei Island, Indonesia.

Eiconaxius kermadeci Bate, 1888

Eiconaxius kermadeci Bate, 1888: 43, pl. 5 fig. 3-3l; Balss, 1925: 210; Sakai & De Saint Laurent, 1989: 16, fig. 5; Kensley, 1996e: 475 (list).
Axius (*Eiconaxius*) *kermadeci* — Borradaile, 1903: 538; De Man, 1925d: 4 (list), 16.
Iconaxius kermadeci — Balss, 1925: 210.

Type locality. — North of Kermadec Islands, 1080 m.

Distribution. — Kermadec Islands (Bate, 1888; Sakai & De Saint Laurent, 1989); 1080-1100 m.

Eiconaxius kimbla Kensley, 1996
(fig. 53)

Eiconaxius kimbla Kensley, 1996e: 481, fig. 8; Poore & Collins, 2009: 258.

Material examined. — AM P.25015, holotype, female (TL/CL, 16.0/4.8 mm); paratypes, 2 males (TL/CL, 13.0/4.9; 13.0/3.0 mm), 1 female (TL/CL, 16.0/5.5 mm), 14.5 km off Moreton Bay, Queensland, Australia, 27°06′S 153°37′E, Sta. 6/6.9-1, 148 m, vi.1969, leg. HMAS "Kimbla", det. B. Kensley.

Diagnosis. — P1 chelate and unequal (fig. 53A, B). Male Plp1 absent; male Plp2 with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous, elongate, and bisegmented; female Plps2-5 endopods with appendix interna.

Remarks. — The present species is closely similar to *Eiconaxiopsis sibogae* (De Man, 1925d) from the Sulu Sea, but they are different as follows. In *E. kimbla*, the rostrum bears no apical spinule and the telson is subsquare, whereas in *Eiconaxiopsis sibogae* the rostrum bears an apical spinule, and the telson is longer than wide.

Type locality. — Fourteen-and-a-half (14.5) km off Moreton Bay, Australia, 27°06′S 153°37′E, 140-148 m.

Distribution. — Australia — off Moreton Bay (Kensley, 1996e); 140-148 m.

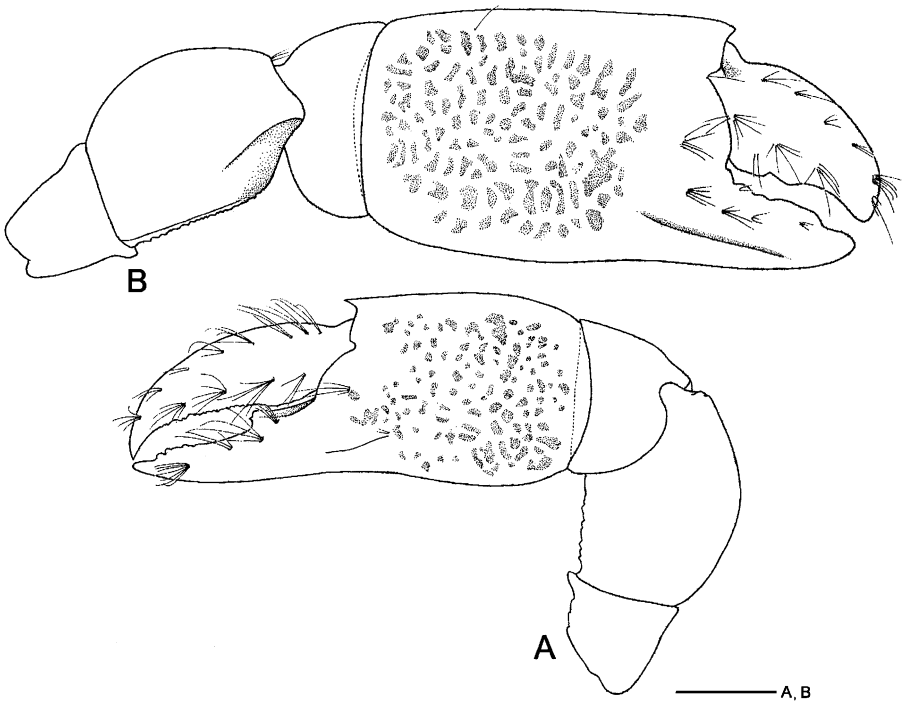

Fig. 53. *Eiconaxius kimbla* Kensley, 1996. A, larger cheliped on right side; B, smaller cheliped on left side. A, B, AM P.25015, holotype, female (TL/CL, 16.0/4.8 mm), 14.5 km off Moreton Bay, Queensland, Australia, 27°06′S 153°37′E, 148 m. Scale 1 mm.

Eiconaxius laccadivensis (Alcock & Anderson, 1894)

Eiconaxius kermadeci var. *laccadivensis* Alcock & Anderson, 1894: 162.
Iconaxiopsis laccadivensis — Alcock, 1901: 195; Alcock & MacGilchrist, 1905, pl. 71 fig. 3; Balss, 1925: 209, 211.
Axius (*Iconaxiopsis*) *laccadivensis* — Borradaile, 1903: 537.
Axius (*Eiconaxius*) *laccadivensis* — De Man, 1925d: 4 (list), 16 (key).
Eiconaxius laccadivensis — Sakai & De Saint Laurent, 1989: 20; Kensley, 1996e: 475 (list).

Remarks. — The rostrum is microscopically serrated on the lateral margins; the fixed finger of the larger cheliped bears on the cutting edge two enlarged teeth separated by a characteristic notch (Alcock, 1901: 195).

Type locality. — Arabian Sea near Laccadive and Travancore, 1285 m (705 fms).

Distribution. — Laccadive Islands (Alcock & Anderson, 1894); India — Travancore coast (Alcock & Anderson, 1894); 1285 m.

Eiconaxius mallacoota Poore & Collins, 2009

Eiconaxius mallacoota Poore & Collins, 2009: 258, fig. 24.

Diagnosis. — Rostrum 0.3 times length of front-to-posterior margin of carapace, concave dorsally, parallel-sided over eyes, then tapering to acute tip, with 10 marginal lateral tubercles on oblique margins, depressed below level of median carina, anteriorly directed, continuous with lateral carinae. Supraocular spines absent. Eyestalk 0.5 length of rostrum; cornea unpigmented. A1 peduncle reaching to end of A2 segment 4; segment 1 unarmed. A2 segment 1 unarmed; segment 2 stylocerite as vertical blade, reaching to midpoint of segment 5; scaphocerite as vertical blade, overreaching end of segment 5; segment 3 with mesial tooth on ventral margin; segment 4 as long as segment 2; segment 5 about half length of segment 4. Carapace smooth; gastric lateral carina unarmed; gastric submedian carina smooth, together semicircular and converging on median carina; gastric median carina obsolete, only at base of rostrum. Mxp3 coxa-ischium unarmed; crista dentata with about 15 similar teeth; merus and carpus unarmed.

P1 asymmetrical and robust. In larger cheliped coxa with spinule; basis unarmed; ischium with few irregular teeth on ventral margin; merus with two small teeth on strongly convex dorsal margin, and 6 small teeth on ventral margin; carpus with distal tooth on ventral margin; propodus with distal tooth on dorsal margin and 5 small teeth on lateral submarginal ridge ventrally; greatest depth equal to length of dorsal margin; fixed finger 0.7 times as long as dorsal palm, cutting edge with irregular teeth in shallow proximal concavity, and irregular small teeth distally; dactylus curved distally, and cutting edge smooth. Smaller cheliped less robust; coxa with spinule; basis unarmed; ischium with few irregular teeth on ventral margin; merus with two small teeth on strongly convex dorsal margin, and 5 small teeth on ventral margin; carpus with distal tooth on ventral margin; propodus with distal tooth on dorsal margin, and 4 small teeth on lateral submarginal ridge ventrally; greatest depth 1.1 times length of dorsal margin; fixed finger 1.2 times as long as dorsal palm, bearing lateral ridge along proximal half of cutting edge, cutting edge armed proximally with irregular teeth; dactylus tapering, cutting edge smooth. P2 ischium and merus unarmed on ventral margin; carpus slightly shorter than chela; propodus dorsal margin three times as long as dactylus. P3 merus unarmed; propodus 2.5 times as long as dactylus, bearing 6 rows of 1-2 robust setae; dactylus spatulate, bearing 13 robust setae along oblique margin, plus unguis. P4 identical with P3; propodus 2.5 times as long as dactylus, bearing 6 rows of 1-3 robust setae; dactylus spatulate, bearing 11 robust setae along

oblique margin, plus unguis. P5 propodus 2.8 times as long as dactylus, simple, densely setose distally, bearing no robust setae; dactylus spatulate, bearing 8 robust setae along oblique margin, plus unguis.

Abdominal somite 1 pleuron rounded-truncate ventrally; pleuron 2 obliquely angled, acutely produced posteroventrally; pleura 3-4 acutely produced posteroventrally; pleuron 5 less so; all with anteroventral tooth; pleuron 6 subacute; abdominal somite 6 with pairs of lateral teeth dorsally on posterior margin at base of telson, and 3 (uneven) denticles dorsally along dorsal posterior margin. Plp2-5 each with appendix interna, and 0.3 length of endopod. Male Plp2 appendix masculina 0.7 times as long as appendix interna. Telson 1.5 times as long as wide, widest proximally, then tapering distally, bearing 8-10 small lateral teeth and weak posterolateral teeth, but no median spine on posterior margin; dorsal surface with obsolete longitudinal ridges. Uropodal endopod 2.4 times as long as wide and oval, bearing 12 small irregular lateral teeth, last tooth distal, but no longitudinal ridge. Uropodal exopod 1.6 times as long as wide, oval, bearing 14-20 small irregular lateral teeth over distal two-thirds, last tooth distal, but no longitudinal rib. [Adapted from Poore & Collins, 2009.]

Type locality. — South of Point Hicks, Victoria, Australia, 930-951 m.

Distribution. — Off eastern Victoria, Australia; 930-1000 m.

Eiconaxius mortenseni Sakai, 1992

Eiconaxius mortenseni Sakai, 1992a: 160, figs. 3, 4; Kensley, 1996e: 475 (list).

Type locality. — Misaki, Sagami Bay, Japan, 366 m.

Distribution. — Japan — Sagami Bay (Sakai, 1992a); 366-732 m.

Eiconaxius parvus Bate, 1888

Eiconaxius parvus Bate, 1888: 44, pl. 5 figs. 4, 5; Sakai & De Saint Laurent, 1989: 18; Kensley, 1996e: 475 (list).

Axius (*Eiconaxius*) *parvus* — Borradaile, 1903: 538; De Man, 1925d: 4 (list), 16.

Iconaxius parvus — Balss, 1925: 210.

Not: *Axius* (*Eiconaxius*) *parvus* — De Man, 1925d: 42, pl. 3 fig. 7-7f [= *Eiconaxius demani* Sakai, 1992a].

Remarks. — Bate (1888: 44, fig. 4) described from his specimen that the rostrum is wanting, however, his figure shows that the rostrum is unarmed. The female with 7 ova (not 7 ovig. females as in Sakai & De Saint Laurent, 1989: 18) was designated as the lectotype of the present species.

Type locality. — Off Kermadec Islands, 952 m, hard ground.

Distribution. — Kermadec Islands (Bate, 1888; Sakai & De Saint Laurent, 1989); 520-950 m.

Eiconaxius rotundifrons Bouvier, 1905

Eiconaxius rotundifrons Bouvier, 1905: 803; Sakai & De Saint Laurent, 1989: 21, fig. 6.
Iconaxius rotundifrons — Balss, 1925: 210.
Axius (*Eiconaxius*) *caribbaeus rotundifrons* — Bouvier, 1925: 463, figs. 23-25, pl. 10 figs. 3, 4.
Axius (*Eiconaxius*) *rotundifrons* — De Man, 1925d: 4 (list), 17 (key).

Material examined. — RMNH D 41759, 1 male (TL/CL, 15.0/4.9 mm), 2 females (TL/CL, 18.0/6.5-21.0/6.4 mm), Pillsbury Sta. P-944, west Atlantic, N. of Guadeloupe, 16°33.2′N 61°36.8′W – 16°34.4′N 61°37.2′W, 360-421 m, 5′ Black trawl, 17.vii.1969, USNM Acc. No. 381702.

Diagnosis. — Male Plp1 absent; male Plp2 endopod with appendices interna and masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous and bisegmented, consisting of proximal segment and flagellum with setae; female Plps2-5 endopods with appendix interna.

Type locality. — West Indies to Gulf of Mexico.

Distribution. — Gulf of Mexico (Bouvier, 1905); Martinique (Bouvier, 1925); St. Lucia (Bouvier, 1925; Sakai & De Saint Laurent, 1989); Barbados (Bouvier, 1925; Sakai & De Saint Laurent, 1989); Venezuela — Cariaco (Bouvier, 1925; Sakai & De Saint Laurent, 1989); 277-2506 m.

Eiconaxius singularis Zarenkov, 1983

Axius (*Eiconaxius*) *singularis* Zarenkov, 1983: 83, fig. 2.
Eiconaxius singularis — Sakai & De Saint Laurent, 1989: 23; Kensley, 1996e: 475 (list).

Type locality. — Around submarine mountains Marcus-Necker near Hawaii, 100-1350 m.

Distribution. — Submarine mountains Marcus-Necker near Hawaii (Zarenkov, 1983); 100-1350 m.

Eiconaxius spiniger (MacGilchrist, 1905)

Iconaxiopsis spiniger MacGilchrist, 1905: 240; Alcock et al., 1907, pl. 78 fig. 1; Balss, 1925: 209.
Axius (*Eiconaxius*) *spiniger* — De Man, 1925d: 4 (list), 15 (key).
Eiconaxius spiniger — Sakai & De Saint Laurent, 1989: 22; Kensley, 1996e: 475 (list).

Type locality. — Bay of Bengal, “Investigator” Sta. 310, 1755 m.

Distribution. — Bay of Bengal (MacGilchrist, 1905); 1755 m.

Eiconaxius weberi (De Man, 1907)
(fig. 54)

Iconaxius Weberi De Man, 1907: 127; Balss, 1925: 210.
Axius (*Eiconaxius*) *Weberi* — De Man, 1925d: 5 (list), 17 (key), 44, pl. 3 fig. 8-8a, pl. 4 fig. 8b-o.
Eiconaxius weberi — Sakai & De Saint Laurent, 1989: 22; Sakai, 1992a: 163; Kensley, 1996e: 475 (list).

Material examined. — ZMA Crust. De. 102464, lectotype, male (TL/CL, 16.5/5.49), leg. "Siboga" Sta. 267, 5°54′S 132°56.7′E, 984 m; paralectotypes, 1 male (TL/CL, 17.0/5.6 mm), 2 ovig. females (TL/CL, 21.5/6.6; 21.0/7.1 mm), 3 females (TL/CL, 10.5/3.1-14.0/4.6 mm), leg. "Siboga" Sta. 266, 5°56′S 132°47.7′E, 595 m; RMNH D 1172, 1 male (TL/CL, 18.0/6.0 mm), 1 female (TL/CL, 12.0/4.2 mm), 5°56′S 132°47.7′E, "Siboga" Sta. 266, vii.1929.

Diagnosis of male lectotype. — Rostrum stoutly triangular with obtuse apex, lateral margins armed with 8-9 subacute denticles, extending posteriorly onto anterior third of gastric region as lateral carinae. P1 asymmetrical in shape, but almost same in size; in larger cheliped (fig. 54A) ischium with two spines and denticles distally on ventral margin, and unarmed on dorsal margin; merus unarmed on dorsal margin and serrated on ventral margin; carpus divergent distally and twice as wide as long, bearing subdistal tooth on ventral margin; chela length twice its width, palm 1.2 times as long as wide, bearing one distal and 0-2 subdistal denticles on dorsal margin, and carinate on ventral margin; fixed finger armed with 5 irregular teeth on proximal half on cutting edge, and medially a distinct, conical tooth followed distally by denticles (fig. 54A); dactylus furrowed along dorsal margin on lateral surface, cutting edge armed with distinct tooth at proximal third, but smooth in distal two-thirds. Abdominal pleuron 1 small, and rounded on distal margin (fig. 54C); pleuron 2 broadened and protruded posteroventrally with acute angle; pleuron 3 protruded posteroventrally with almost right angle, bearing denticle anteriorly on ventral margin; pleuron 4 protruded posteroventrally with right angle, bearing denticle anteriorly on ventral margin; pleuron 5 rounded, bearing denticle anteriorly on ventral margin. Male Plp1 absent; male Plp2 biramous, endopod bearing appendices interna and masculina mesiomedially; male Plps3-5 endopods with appendix interna. Female Plp1 slender and bisegmented, bearing setae distally; female Plps2-5 biramous, endopods with appendix interna.

Female P1. — In smaller female, P1 (fig. 54B) ischium with two distal spines on ventral margin and two closely-located distal denticles on dorsal margin; merus with two distal spines on dorsal margin, and 4 distal denticles on ventral margin; carpus twice as wide as long, bearing tooth on ventral margin; chela 2.5 times as long as wide, palm 1.3 times as long as wide,

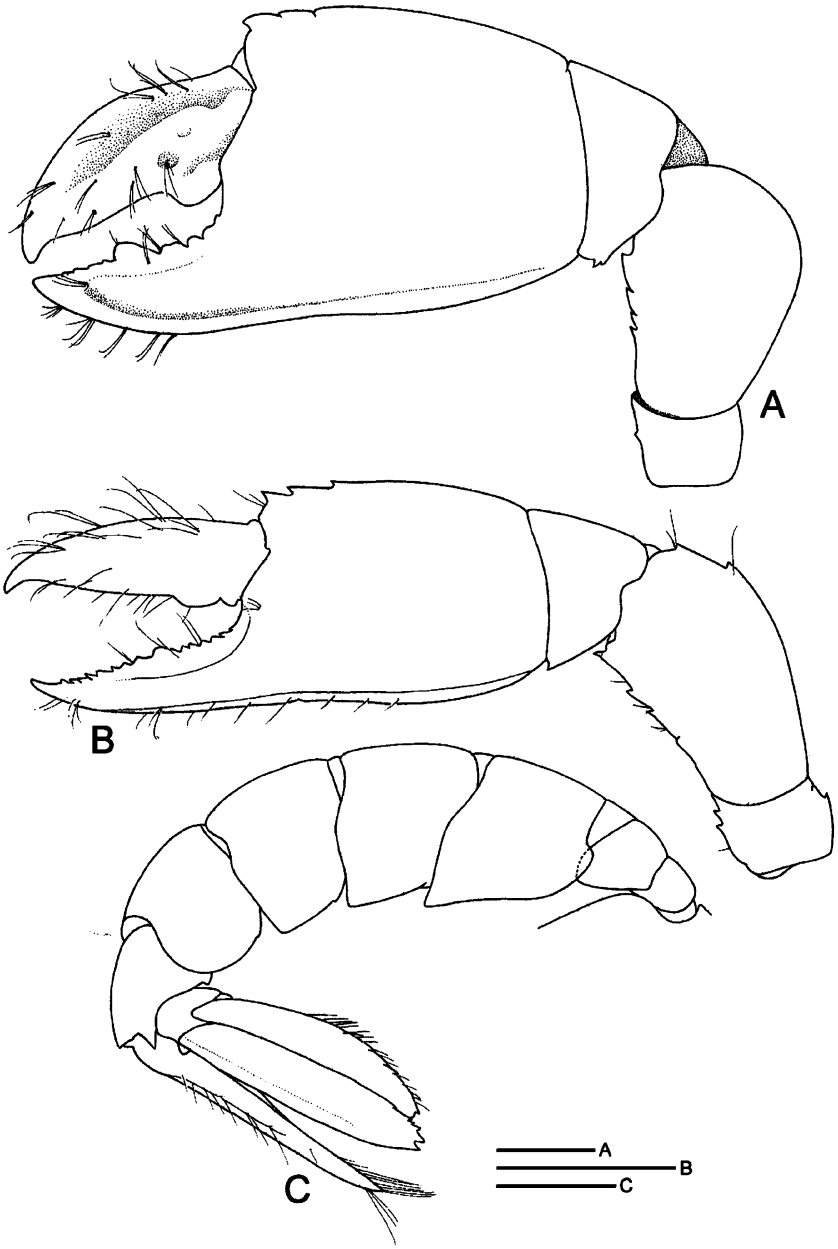

Fig. 54. *Eiconaxius weberi* De Man, 1907. A, larger cheliped in male; B, smaller cheliped in female; C, abdomen and tail-fan, lateral view. A, ZMA Crust. De. 102464, paralectotype, ovig. female (TL/CL, 21.0/7.1 mm); B, ZMA Crust. De. 102464, female (TL/CL, 10.5/3.1 mm), leg. "Siboga" Sta. 266, 5°56′S 132°47.7′E, 595 m; C, ZMA Crust. De. 102464, lectotype, male (TL/CL, 16.5/5.49), leg. "Siboga" Sta. 267, 5°54′S 132°56.7′E, 984 m. Scales 1 mm.

bearing three distal teeth on dorsal margin, and carinate on ventral margin; fixed finger denticulate on cutting edge, bearing distinct, obtuse conical tooth at proximal two-fifths; dactylus bearing two teeth proximally on cutting edge, proximal one small and triangular, distal one distinct and broad.

Remarks. — De Man (1925a: 44) described *E. Weberi* on the basis of 5 specimens (two males and three females) of the type series. In the present revision, all the specimens composing the type series were examined, including the 5 specimens that De Man described: two males, two ovigerous females, and 4 non-ovigerous females deposited in the Zoological Museum Amsterdam (ZMA Crust. De. 102464), and another male separately deposited in the National Museum of Natural History, Naturalis, Leiden (RMNH D 1172), of which the male from "Siboga" Sta. 267 is designated the lectotype, and the others as the paralectotypes.

Type locality. — Off south-west coasts of Great Kei Island, Indonesia, 5°54′S 132°56.7′E, 984 m.

Distribution. — Indonesia — Kepulauan Kai (De Man, 1907, 1925a), Java Sea (Sakai, 1992a); 200-984 m.

FAMILY EICONAXIOPSIDIDAE FAM. NOV.

Diagnosis. — Rostrum stout, conspicuous, and pointed apically; dorsal surface concave, lateral margins extending posteriorly onto gastric region as lateral carinae up to cervical groove. Gastric region bearing median carina gradually broadening posteriorly, but no submedian carinae; cervical groove usually indistinct; no linea thalassinica; posterior margin of carapace with lateral lobes. Eyestalks indiscernible in lateral view; eyes rounded or ovate, cornea pigmented or unpigmented. A1 segment 1 as long as segments 2-3 combined. Scaphocerite strong. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischial crest crenulate, exopod present. Ps1-2 chelate. Ps3-5 dactyli short, tapering, and pointed distally. Abdominal somite 1 with pleuron slightly protruded posteroventrally; abdominal somites without carinae between terga and pleura. Male Plp1 uniramous and bisegmented; male Plp2 biramous and slender, endopod with appendices interna and masculina mesially at proximal third; Plps3-5 biramous, endopods with appendix interna. Female Plp1 uniramous and bisegmented; distal segment and flagellum with setae; Plps2-5 slender and biramous, endopods with appendix interna. Telson longer than wide, bearing no proximal lobe laterally. Uropodal endopod oval. Uropodal exopod without transverse suture.

Remarks. — The new genus *Eiconaxiopsis* gen. nov. is closely similar to the type genus of the family Eiconaxiidae Sakai & Ohta, 2005, *Eiconaxius* in the shapes of the rostrum, A2 scaphocerite, abdominal somites, and tail-fan, but they differ from each other as follows. In *Eiconaxiopsis* gen. nov. the gastric region of the carapace bears a median carina gradually broadening posteriorly, the Ps3-5 dactyli are simple, tapering distally, and pointed at the tip, the male Plp1 is present as a bisegmented appendage, and the telson lacks a median spine on the posterior margin. In *Eiconaxius*, however, the gastric region of the carapace bears a linear median carina with or without denticles, which is simple or bifurcate posteriorly, the Ps3-5 dactyli are subspatulate and are spinulose on the ventral margin, the male Plp1 is absent, and the telson bears a median spine on the posterior margin. For those reasons, a new family Eiconaxiopsididae fam. nov. is established for *Eiconaxiopsis* gen. nov.

Type genus. — *Eiconaxiopsis* gen. nov., by being the nominate genus.

Genus included. — *Eiconaxiopsis* gen. nov.

Etymology. — The new family is named Eiconaxiopsididae by adding the Latin suffix "idae", to the stem of the generic name *Eiconaxiopsis*, as indicated in the ICZN (2000).

Genus **Eiconaxiopsis** gen. nov.

Diagnosis. — Rostrum triangular and furrowed dorsally, lateral margins extending posteriorly onto gastric region as lateral carinae. Gastric region convex, bearing median carina gradually broadening posteriorly, but no submedian carinae. Cervical groove indistinct. Eyestalks indiscernible, eyes ovate, cornea unpigmented. A2 peduncular segment 2 with distinct distodorsal spine; scaphocerite conspicuously developed. P1 subequal. P2 chelate. Ps3-5 dactyli short and simple. No longitudinal carinae between abdominal pleura and terga. Pleurobranchs present on Ps2-4. Male Plp1 uniramous and bisegmented; male Plp2 biramous, endopod bearing appendices interna and masculina mesially at proximal third; male Plps3-5 endopods with appendix interna. Telson longer than wide and denticulate on lateral margins, bearing no median spine on posterior margin. Uropodal exopod without transverse suture. Deep-water habitat.

Remarks. — De Man (1907) listed a male (now lectotype) from Timor as *Iconaxius* (*Iconaxiopsis*?) *consobrinus* De Man, 1907, and later listed that same male (now lectotype) and a female (now paralectotype) from Timor as *Axius* (*Eiconaxius*) *consobrinus* (cf. De Man, 1925d). Balss (1925) recorded a male from Nias as *Iconaxiopsis consobrina* De Man, 1925d. It has turned out, however, through the present careful examination of De Man's male specimen from Timor (ZMA Crust. De. 102874, lectotype) and Balss's male specimen from Nias (ZMB 19345, now holotype of *E. heinrichi*) that the former is distinctly different from the latter. In De Man's specimen, the Ps3-4 dactyli are short, subspatulate in form, and spinulose on the ventral margin, the male Plp1 is absent (De Man, 1925d: 42) as in the other species in the genus *Eiconaxius*, whereas in Balss's specimen the Ps3-4 dactyli are simple, tapering, and pointed distally, the male Plp1 is present as a uniramous and bisegmented appendage, and the distal segment is elongate and slightly convex on its mesial margin with setae (fig. 57C), which suggests that Balss's *Iconaxiopsis consobrina* is a misidentified species and different from De Man's *Axius* (*Eiconaxius*) *consobrinus*, so that Balss's male from Nias is to be distinguished from De Man's male from Timor at the generic level. Accordingly, a new genus *Eiconaxiopsis* gen. nov. is established based on *Eiconaxius consobrinus* (cf. Balss, 1925: 209), and Balss's species is renamed *Eiconaxiopsis heinrichi* sp.

nov., distinguished from *Iconaxius* (*Iconaxiopsis*?) *consobrinus* De Man, 1907 from Timor, which is named *Eiconaxius consobrinus* (De Man, 1907).

Type species. — *Eiconaxiopsis heinrichi* sp. nov., by present designation. The gender of the new name, *Eiconaxiopsis*, is feminine.

Species included. — *Eiconaxiopsis heinrichi* sp. nov.; *E. sibogae* (De Man, 1925c).

Etymology. — The new generic name *Eiconaxiopsis* is composed of a generic name, *Eiconaxius* and a Latin suffix "-opsis", meaning "similar".

Eiconaxiopsis heinrichi sp. nov.
(figs. 55-57)

Iconaxiopsis consobrina — Balss, 1925: 209, 211, fig. 15. [Not: *Iconaxius* (*Iconaxiopsis*?) *consobrinus* De Man, 1907.]

Eiconaxius consobrinus — Sakai & De Saint Laurent, 1989: 23 (partim).

Material examined. — ZMB 19345, holotype, male (TL/CL, 24.0/9.0 mm, eyestalks of right side missing), South Canal, Nias, west coast of Sumatra, Deutsche Tiefsee Exped., 2.ii.1899, Sta. 198, 677 m, trawl, det. Balss as *Iconaxiopsis consobrinus* De Man, 1907.

Diagnosis. — Carapace (figs. 55A, 56A) smooth. Rostrum lanceolate in dorsal view and convex medially, with distinct smooth median carina originating from anterior third of rostrum, increasing in breadth, and extending

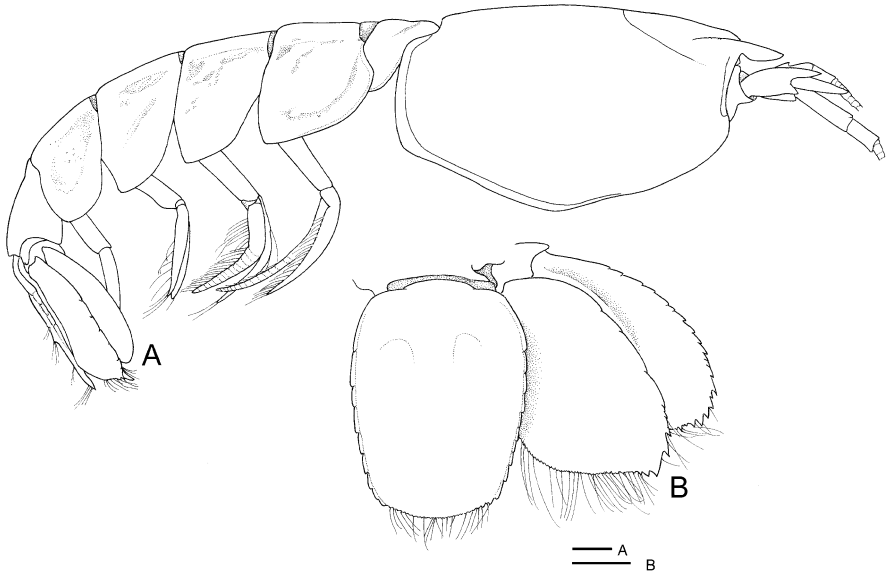

Fig. 55. *Eiconaxiopsis heinrichi* sp. nov. A, whole body, lateral view; B, telson and uropod on right side. A-B, ZMB 19345, holotype, male (TL/CL, 24.0/9.0 mm, eyestalks of right side missing), Nias, west coast of Sumatra, Deutsche Tiefsee Expedition. Scales 1 mm.

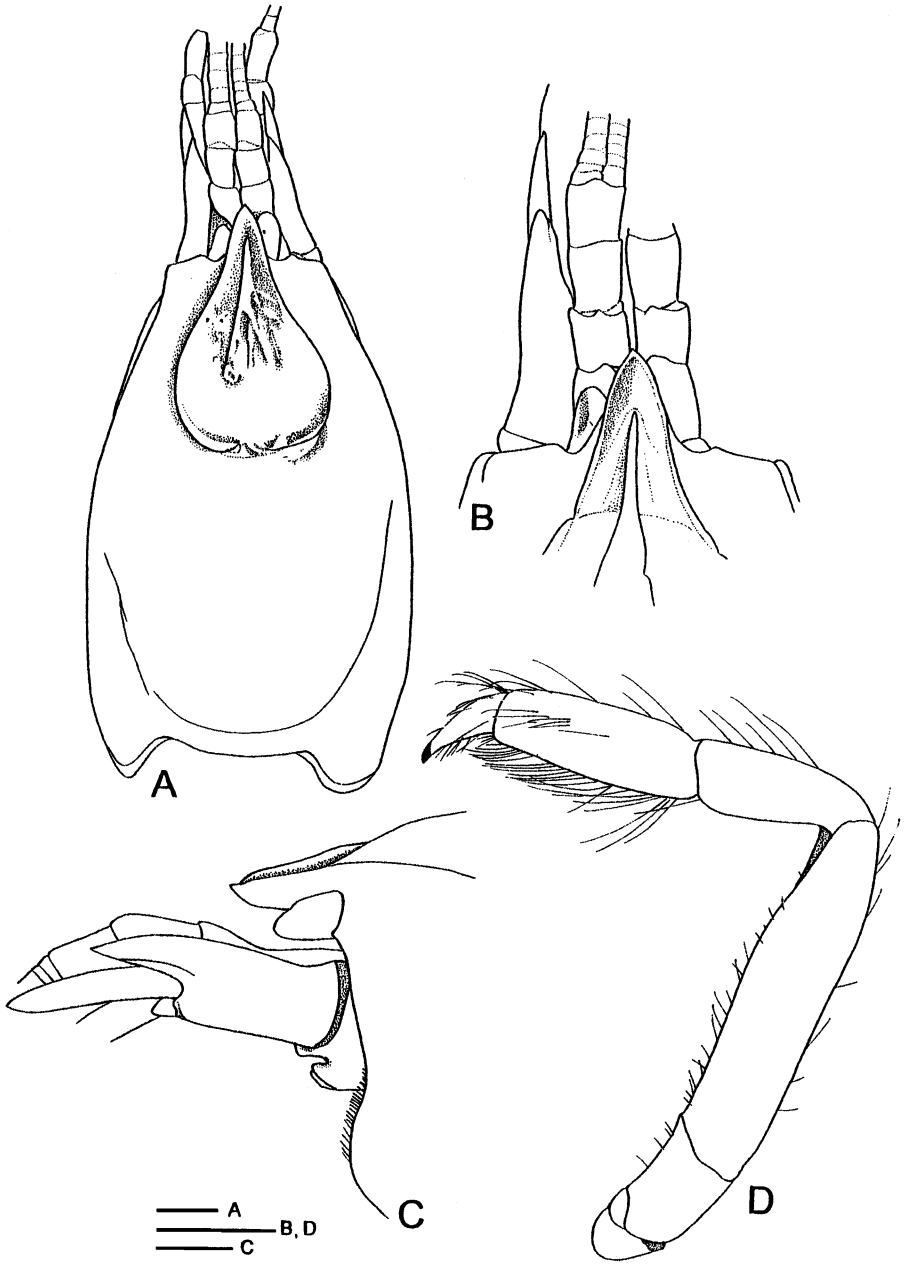

Fig. 56. *Eiconaxiopsis heinrichi* sp. nov. A, carapace dorsal view; B, anterior part of carapace; C, anterior part of carapace, lateral view; D, P3, lateral view. A-D, ZMB 19345, holotype, male (TL/CL, 24.0/9.0 mm, eyestalk of right side missing), Nias, west coast of Sumatra, Deutsche Tiefsee Expedition. Scales 1 mm.

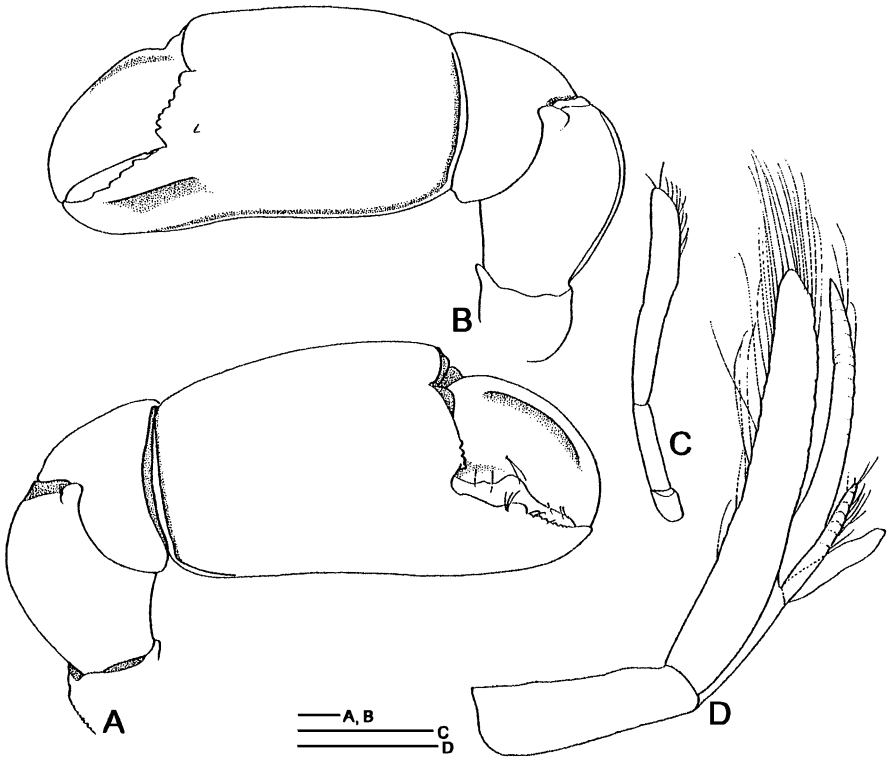

Fig. 57. *Eiconaxiopsis heinrichi* sp. nov. A, P1 lateral view; B, same, mesial view; C, male Plp1; D, male Plp2. A-D, ZMB 19345, holotype, male (TL/CL, 24.0/9.0 mm, eyestalk of right side missing), Nias, west coast of Sumatra, Deutsche Tiefsee Expedition. Scales 1 mm.

posteriorly along dorsal line in gastric region; rostral tip turned up and subacute apically, not reaching distal end of A1 proximal segment; lateral margins indistinctly dentate, extending posteriorly onto anterolateral part of gastric region as lateral carinae; submedian carinae absent (fig. 56A, B, C). Cervical groove indistinct. Eyestalks indiscernible, eyes ovate, cornea unpigmented. A1 proximal segment subequal in length to segments 2-3 combined. A2 segment 1 short and unarmed, and segment 2 elongate. Scaphocerite extending forward beyond dorsodistal spine of A2 segment 2; segment 5 twice length of segment 4. A2 flagellum about 1.3 times as long as A1 flagella. Mxp3 coxa, basis, and ischium each with sharp mesiodistal tooth; ischial crest denticulate; merus to dactylus unarmed; exopod consisting of proximal segment and flagellum, reaching distal margin of merus.

P1 subequal and asymmetrical in shape. In larger cheliped (fig. 57A), ischium with denticles on dorsal margin; merus about 1.2 times as long as wide, and armed with distal tooth on ventral margin; carpus wider than long,

two-thirds length of merus on dorsal margin, and armed with obtuse, low tooth subterminally on ventral margin; chela wide and slightly less than twice as long as wide; palm 1.3 times as long as wide, distal margin convex and denticulate; cutting edge of fixed finger smooth in proximal half, bearing medially a convexity followed posteriorly by denticles diminishing in size in distal half; dactylus carinate along dorsal margin on lateral surface, cutting edge armed with low obtuse double tooth in proximal half, and then distinctly concave, smooth, and incurved distally. In smaller cheliped (fig. 57B) coxa and basis unarmed, ischium armed with distal tooth on ventral margin; merus 1.8 times as long as wide, bearing distal tooth on ventral margin; carpus two-thirds length of merus on dorsal margin; palm 2.8 times as long as carpus and 1.5 times as long as wide, convex and roughly denticulate on distal margin; fixed finger double-edged on cutting edge, lateral edge armed with low, irregularly-shaped denticles, and mesial edge with sharp teeth; dactylus two-thirds length of palm, and smooth and incurved distally on cutting edge. P2 chelate and unarmed. P3 (fig. 56D) simple, propodus 1.2 times length of carpus, bearing transverse rows of spinules ventrally; dactylus tapering and pointed distally. P4 simple, propodus 1.5 times length of carpus, bearing rows of transverse spinules ventrally. P5 simple, propodus twice length of carpus, bearing a row of setae at ventrodistal angle.

Abdominal somites (fig. 55A) smooth, abdominal somite 1 short, somites 2-6 subequal dorsally; pleuron 1 narrow; pleuron 2 large and protruded posteroventrally to form subacute angle; pleura 3-5 subacute at posteroventral angle; pleuron 6 triangular ventrally and smooth on posterior margin. Male Plp1 uniramous and bisegmented, distal segment with setae distally (fig. 57C); male Plp2 biramous, endopod with appendices interna and masculina (fig. 57D); male Plps3-5 biramous, endopods with appendix interna. Telson (fig. 55B) longer than wide, and much longer than somite 6; lateral margins nearly parallel and denticulate; posterior margin rounded without median spine. Uropodal endopod serrate on lateral margin, and armed with two distinct teeth at distolateral angle. Uropodal exopod largely convex and serrated on lateral margin to lateral half of distal margin.

Remarks. — The present new species, *Eiconaxiopsis heinrichi* sp. nov. is established on the male specimen from Nias, an island off the western coast of Sumatra, Indonesia, 677 m, which was identified by Balss (1925) as *Iconaxiopsis consobrina* De Man, 1907. The present review shows that Balss's male specimen of "*I. consobrina*" from Sumatra has turned out to be clearly different from De Man's male specimen of *Iconaxius consobrinus* from Timor,

"Siboga Sta. 280", 1224 m, in that the rostrum is lanceolate, and male Plp1 is present. Those differences between the two specimens mean that Balss's specimen is a new species and it is here renamed as *Eiconaxiopsis heinrichi* sp. nov.

Type locality. — Nias, west coast of Sumatra, 677 m.

Distribution. — Only known from the type locality.

Etymology. — The new species is named *Eiconaxiopsis heinrichi* sp. nov. in honour of Dr. Heinrich Balss, who described the holotype specimen with figures of the larger cheliped in 1925. The name is a noun in the genitive singular.

Eiconaxiopsis sibogae (De Man, 1925)
(fig. 58)

Axius (*Eiconaxius*) *Sibogae* De Man, 1925c: 218; De Man, 1925d: 4 (list), 15 (key), 34, pl. 2 fig. 4-4l.

Axius (*Eiconaxius*) *sibogue* — Estampador, 1937: 500 (misspelling).

Eiconaxius sibogae — Sakai & De Saint Laurent, 1989: 23; Sakai, 1992a: 163, fig. 6; Kensley, 1996e: 475 (list).

Eiconaxius sibogae — Sakai, 1992a: 163, fig. 6.

Material examined. — ZMA Crust. De. 102525, lectotype, male (TL/CL, 13.0/4.6 mm), Sulu Sea, "Siboga" Sta. 95, 5°43.5′N 119°40′E, 522 m; paralectotype, female (TL/CL, 14.0/4.8 mm, with left small cheliped, larger cheliped missing); Sulu Sea, "Siboga" Sta. 95, 5°43.5′N 119°40′E, 522 m.

Diagnosis. — Rostrum triangular and obtuse at tip with (male) or without (female) apical spinule (fig. 58B), bearing smooth median carina extending posteriorly onto gastric region as gastric median carina with bifurcate posterior end. A2 scaphocerite slightly overreaching A2 penultimate segment. P1 chelate and unequal. Abdominal somites smooth laterally, somites 3-5 each with anteroventral spine (fig. 58A). Male Plp1 uniramous, slender, and trisegmented; male Plp2 endopod with appendices interna and masculina. Telson (fig. 58C) longer than wide, bearing 3-4 denticles on lateral margins, and movable spine at posterolateral angle; convex posterior margin with (male) or without (female) median spine.

Type locality. — Sulu Sea, 5°43.5′N 119°40′E, "Siboga" Sta. 95, 522 m.

Distribution. — Sulu Sea (De Man, 1925d; Estampador, 1937); 348-522 m.

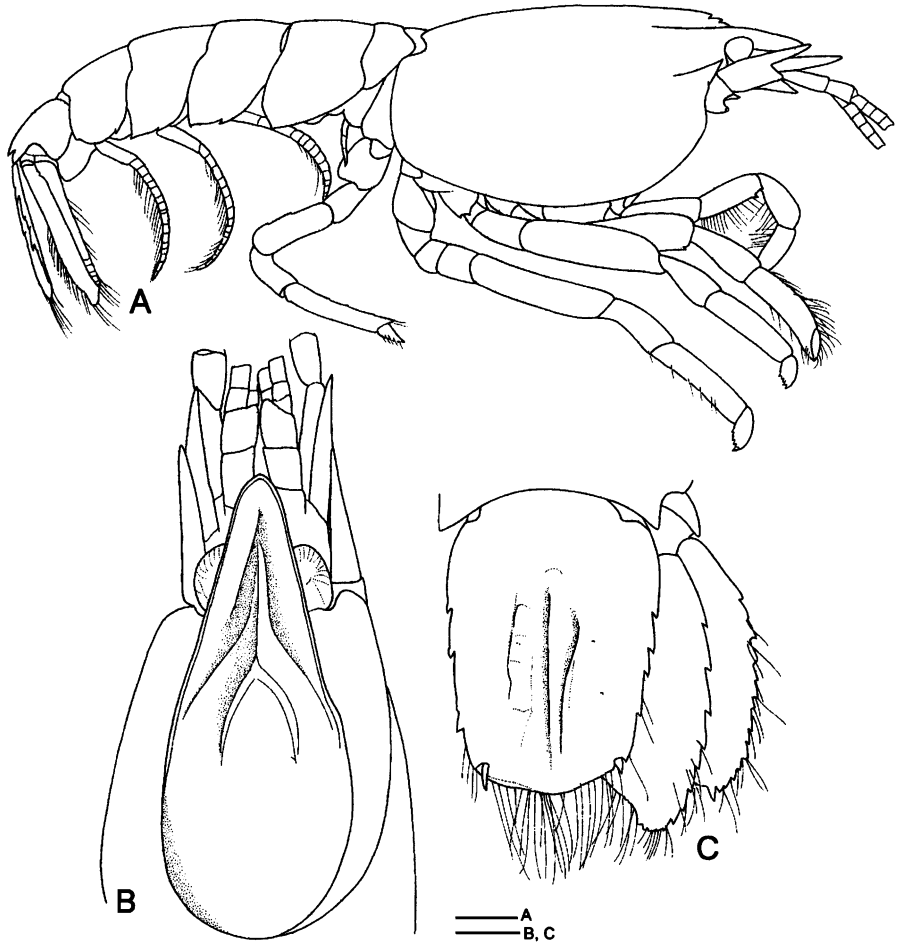

Fig. 58. *Eiconaxius sibogae* De Man, 1925. A, whole body, lateral view; B, anterior part of carapace, dorsal view; C, telson and uropod on right side. A-C, ZMA Crust. De. 102525, female (TL/CL, 14.0/4.8 mm, with left small cheliped, larger cheliped missing), Sulu Sea, "Siboga" Sta. 95, 5°43.5′N 119°40′E, 522 m. Scales 1 mm.

FAMILY METICONAXIIDAE SAKAI, 1992

Meticonaxiinae Sakai, 1992c: 19.

Diagnosis. — Rostrum triangular; dorsal surface flat with median carina, and lateral margins extending posteriorly onto gastric region as lateral carinae. Carapace compressed, bearing posterolateral lobes; linea thalassinica absent; cervical groove distinct. Eyestalks deformed. Maxilla 2 scaphognathite with 1-2 posterior whips. P3 propodus rounded. P4 propodus oblong, P4 coxa flattened. P5 subchelate. Abdominal somite 1 with anterolateral lobe. Male Plp1 uniramous and bisegmented, distal segment cleaver-shaped; male Plp2 biramous, endopod with appendices interna and masculina; male Plps3-5 biramous, endopods with appendix interna. Pleopodal filament absent. Uropodal exopod bearing neither distal flap nor lateral notch. Setal rows present on carapace, abdomen, and pereiopods.

Remarks. — Kensley & Heard (1991: 534, fig. 25) showed by the cladograms resulting from PAUP analysis of 22 characters and 11 taxa, that *Michelea* is distinguished from *Marcusiaxius* and *Meticonaxius*. Sakai (1992c) established a subfamily Meticonaxiinae for the genera *Marcusiaxius* and *Meticonaxius*, and another subfamily Micheleinae for the genus *Michelea*. Poore (1997: 354), however, included the subfamilies Meticonaxiinae Sakai, 1992c and Micheleinae Sakai, 1992c (not Poore, 1994) in the family Micheleidae Sakai, 1992c, because the phylogenetic analysis suggests that the Meticonaxiinae are polyphyletic, and must therefore be synonymized with the Micheleinae. Poore (1997: 356) also mentioned that "there are so many synapomorphies linking the genera that this division cannot be sustained. Further, the cladistic analysis (Poore, 1994) hypothesized that *Michelea* is a terminal taxon and not a sister group to other genera in the family". However, such characteristics as "length of Mxp2 exopod; setal rows on abdominal somite 6; Mxp3 ischial crest dentate; and Mxp3 meral spine" used for his phylogenetic analysis (Poore, 1994: 109) are of no significance in comparing the genera *Marcusiaxius*, *Meticonaxius*, and *Michelea*. In the present revision, the characteristics of rostrum, pleopods, Ps3-4 propodi, pleurobranchs, telson, and uropodal endopod are, instead, applied in defining the family Meticonaxiidae for the genera *Marcusiaxius*, *Meticonaxius*, and *Tethisea*, and the family Micheleidae for the genus *Michelea*.

Michelea, the type genus of the family Micheleidae, is clearly different from *Meticonaxius*, the type genus of the family Meticonaxiidae, i.e., in *Michelea vandoverae* (Gore, 1987), type species of *Michelea*, the rostrum is short and bluntly triangular; the Ps3-4 propodi are rectangular, bearing transverse rows of spinules, P5 is not chelate but simple, pleopodal filaments are present, and pleurobranchs are absent. Whereas in *Meticonaxius monodon* De Man, 1905, type species of *Meticonaxius*, the rostrum is conspicuous and acutely triangular, with lateral margins extending posteriorly, the P3 propodus is rounded, bearing no transverse rows of spinules, and the P4 propodus is broadened without transverse rows of spinules, P5 is chelate, pleopodal filaments are absent, and pleurobranchs are present above Ps2-4. As mentioned above, the two families Meticonaxiidae and Micheleidae are clearly different from each other.

Poore (1994: 109, table 1) showed character transformations used in the phylogenetic analysis of 22 taxa of the Thalassinidea, and this genus-character matrix (27 genera by 93 characters) was used in a Hennig 86 cladistic analysis of the genera of the Thalassinidea (his table 2; see table VI herein), showing (0) for *Tethisea*, *Marcusiaxius*, *Meticonaxius*, and *Michelea*. However, the number of the matrix does not always show correctly the characteristics of the genera, because in the case of No. 43, Maxilliped 2 exopod: almost reaching end of merus (0); reduced or absent (1), in the type species of *Michelea*, *M. vandoverae* (Gore, 1987) (cf. Kensley & Heard, 1991, fig. 21F) it is distinct (0), but in *M. pillsburyi* Kensley & Heard, 1991 (cf. Kensley & Heard, 1991, fig. 19J), it is reduced (1), which suggests that the character is not valid as a generic one, because those two species, belonging to the same genus, do not have the character in common, which means that those matrix numbers are unreliable. In the case of No. 47, Mxp3 meral spine: present (0); absent (1), the matrix of *Michelea* is shown as (1) in the table, meaning that the Mxp3 meral spine is absent, but in *M. vandoverae* the meral spine is really present (Kensley & Heard, 1991, fig. 21G), so that it should be shown as (0). As a result, the genus-character matrix has not been composed completely correctly.

Type genus. — *Meticonaxius* De Man, 1905, as the nominate genus.

Genera included. — *Marcusiaxius* Rodrigues & De Carvalho, 1972; *Meticonaxius* De Man, 1905; *Tethisea* Poore, 1994.

KEY TO THE GENERA OF THE FAMILY METICONAXIIDAE

1 – Rostrum acutely triangular and flat, with median carina . . . . . *Meticonaxius*
– Rostrum triangular with obtuse apex, bearing middorsally a raised area with flat surface 2

TABLE VI

Genus-character matrix as used by Poore (1994), and generic differences on male Plps1-5

	Length of Mxp2 exopod: almost reaching to end of merus (0); reduced or absent (1)	Mxp3 ischial crista dentata: prominent toothed ridge (0); obsolete or absent (1)	Mxp3 meral spine: present (0); absent (1)	Male Plp1	Male Plp2	Male Plps3-5
Tethisea (type sp.: *T. indica*)	(0), extending to end of merus (Poore, 1997, fig. 26B)	(0), present (Poore, 1997, fig. 26C)	(1), absent (Poore, 1997, fig. 26C)	composed of stem-like proximal segment and sub-ovate distal segment bearing mesial lobe with patch of hooklets	exopod ovate and endopod elongate, leaf-like, with appendices interna and masculina	with appendix interna
Marcusiaxius (type sp.: *M. lemoscastroi*)	(1), in *M. lemoscastroi* (cf. Kensley et al., 1991, fig. 9G); (0) distinct in *M. colpos*, over-reaching carpus (Kensley et al., 1991, fig. 7I)	(1), absent (Kensley et al., 1991: 507)	(1), absent	composed of stem-like proximal segment and cleaver-shaped distal segment	exopod broad and ear-shaped; endopod broadly triangular, with appendices interna and masculina	with appendix interna

TABLE VI
(Continued; *) in present classification transferred to family Micheleidae)

	Length of Mxp2 exopod: almost reaching to end of merus (0); reduced or absent (1)	Mxp3 ischial crista dentata: prominent toothed ridge (0); obsolete or absent (1)	Mxp3 meral spine: present (0); absent (1)	Male Plp1	Male Plp2	Male Plps3-5
Meticonaxius (type sp.: *M. monodon*)	(1), in *M. monodon* (Kensley & Heard, 1991, fig. 15M); (0), in *M. bouvieri* (Kensley & Heard, 1991, fig. 11I)	(0), present in *M. monodon* (cf. Kensley et al., 1991, fig. 15G)	(0), in *M. monodon* (cf. Kensley et al., 1991, fig. 15G); *M. longispina* (cf. Kensley et al., 1991, fig. 13L)	composed of stem-like proximal segment and cleaver-shaped distal segment (*M. bouvieri*, cf. Kensley & Heard, 1991, fig. 11J)	earshaped exopod and oval endopod with appendices interna and masculina (*M. bouvieri*, cf. Kensley & Heard, 1991, fig. 11K)	with appendix interna (*M. bouvieri*, cf. Kensley & Heard, 1991, fig. 11L)
*Michelea**) (type sp.: *Callianidea vandoverae*)	(0), in *M. vandoverae*; (1), in *M. pillsburyi*, reduced (Kensley & Heard, 1991, fig. 17f)	(0), in *M. vandoverae* (cf. Gore, 1983, fig. 3B)	(1), in *M. lamellosa* (cf. Kensley et al., 1991, fig. 17G); in *M. microphylla* (cf. Poore, 1997, fig. 20F)	composed of stem-like proximal segment and cleaver-shaped distal segment	broadened triangular exopod, and ovate, elongate endopod bearing appendices interna and masculina, both exopod and endopod bearing frond-like bisegmented filaments marginally	endopods with appendix interna, both exopods and endopods bearing frond-like bisegmented filaments marginally

2 – Uropodal endopod trapezoid ..... *Marcusiaxius*
– Uropodal endopod oval ..... *Tethisea*

Genus **Marcusiaxius** De Carvalho & Rodrigues, 1973

Marcusiaxius De Carvalho & Rodrigues, 1973: 553; Kensley & Heard, 1991: 506, fig. 2C; Sakai, 1992c: 25; Poore, 1994: 99 (key); Poore, 1997: 357.

Diagnosis. — Rostrum prominent and triangular with obtuse apex, bearing middorsally raised triangular area with flat surface. Carapace bearing anterolaterally short submarginal setal row on each side. Linea thalassinica absent. Eyestalks deformed and subacute apically. Anterolateral cephalothorax with two vertical rows of setae, anterior row shorter than posterior one. P1 chelate and symmetrical. Abdominal somite 1 with a longitudinal row of setae, abdominal somite 2 with longitudinal row of setae and transverse one, abdominal somites 3-5 with transverse row of setae laterally, and abdominal somite 6 with three rows of setae, converging posteroventrally; abdominal somites 3-5 with dorsal patch of dense plumose setae. A1 peduncular segment 1 elongate. Scaphocerite less than half length of A2 peduncular segment 4. Mxp3 without crista dentata; merus mesially with weak row of setae; exopod absent or rudimentary. P1 fixed finger with distinct, curved tooth on proximal third of cutting edge. P2 chelate, fixed finger with denticles on cutting edge. Ps3-4 simple, propodi ovate. Pleurobranchs on Ps2-4. Male Plp1 uniramous and bisegmented, distal segment cleaver-shaped; male Plp2 biramous, endopod broadly triangular, bearing mesiomedially appendices interna and masculina, exopod broad; male Plps3-5 endopods with appendix interna. Male Plps2-5 without marginal lamellae. Telson broader than long and rounded on posterior margin without median spine. Uropodal endopod longer than wide and tear-shaped or subtriangular with acute distolateral angle. Uropodal exopod broader than endopod, bearing neither distal flap nor lateral notch. [Adapted from Sakai, 1992c; Poore, 1997.]

Remarks. — *Meticonaxius longispina* (Stebbing, 1920) and *M. microps* (Bouvier, 1905), which were included in the genus *Meticonaxius* by Kensley & Heard (1991), have turned out to be more properly included in *Marcusiaxius*, because in those two species the rostrum is not so acutely triangular as in *Meticonaxius*, but obtusely triangular as in *Marcusiaxius*.

Type species. — *Marcusiaxius lemoscastroi* De Carvalho & Rodrigues, 1973, by original designation and monotypy. The gender of the generic name, *Marcusiaxius*, is masculine.

Species included. — *Marcusiaxius colpos* Kensley & Heard, 1991; *M. lemoscastroi* De Carvalho & Rodrigues, 1973; *M. longispina* (Stebbing, 1920);

M. microps (Bouvier, 1905); *M. minutus* (Coelho, 1973); *M. torbeni* Sakai, 1992; *M. wamsoi* Poore, 1997; *M.* sp. Poore, 1997.

KEY TO THE SPECIES OF THE GENUS *MARCUSIAXIUS**)

1 – Rostrum with crenulate margin, median carina broad with rounded anterior end ..... *M. longispina*
– Rostrum with smooth margin, median carina convergent toward anterior end 2

2 – Telson slightly longer than wide ..... *M. microps*
– Telson wider than long 3

3 – Telson rounded on posterior margin 4
– Telson pentagonal in shape 5

4 – Mxp3 exopod overreaching distal margin of ischium ..... *M. wamsoi*
– Mxp3 exopod rudimentary ..... *M. torbeni*

5 – Mxp3 exopod lacking ..... *M. lemoscastroi*
– Mxp3 exopod reaching to distal margin of ischium ..... *M. colpos*

*) The present key does not include *M. minutus*, because it has been described only briefly.

Marcusiaxius colpos Kensley & Heard, 1991

Marcusiaxius colpos Kensley & Heard, 1991: 506, figs. 7, 8, tab. 1C; Poore, 1997: 358.

Diagnosis. — Male Plp1 uniramous and bisegmented, proximal segment stem-like, distal segment cleaver-shaped; male Plp2 biramous, endopod broadly triangular, bearing mesiomedially appendices interna and masculina, appendix masculina twice as long as appendix interna; male Plps3-5 biramous, endopods with appendix interna. [Cf. Kensley & Heard, 1991, fig. 8G, H, I.]

Type locality. — Gulf of Mexico, 29°40′N 86°17′W, 73 m.

Distribution. — Gulf of Mexico (Kensley & Heard, 1991); 43-175 m.

Marcusiaxius lemoscastroi De Carvalho & Rodrigues, 1973

Marcusiaxius lemoscastroi Rodrigues & De Carvalho, 1972: 337 [nomen nudum]; De Carvalho & Rodrigues, 1973: 553, figs. 1-21; Kensley & Heard, 1991: 507, figs. 9, 10, tab. 1D; Blanco-Rambla, 1995: 60, figs. 5, 6; Poore, 1997: 358, fig. 5; Rodrigues et al., 1998: 381; Melo, 1999: 336, figs. 225-226.

Meticonaxius lemoscastroi — Coelho et al., 1980: 39; Coelho, 1987: 63, 68; Coelho & Ramos-Porto, 1987: 32 (key), 33.

Diagnosis. — Male Plp1 uniramous and bisegmented, proximal segment stem-like and distal segment cleaver-shaped; male Plp2 biramous, endopod and exopod broad, endopod with appendices interna and masculina, exopod broad and ear-shaped; male Plps3-5 endopods with appendix interna. [Cf. Kensley & Heard, 1991, fig. 9I, J, K.]

Type locality. — Amapá, north coast of Brazil, 03°40′N 49°55.5′W, littoral.

Distribution. — Honduras, off Limóns (Poore, 1997); Panama, Culebra Island (Poore, 1997); Colombia — Santa Marta (Poore, 1997); Venezuela — Gulf of Venezuela (Kensley & Heard, 1991), N. of Margarita Island (Poore, 1997); Brazil — (Poore, 1997), Amapá, north coast of Brazil (De Carvalho & Rodrigues, 1973), Amapá and Pará (Coelho & Ramos-Porto, 1987), Fortaleza (Kensley & Heard, 1991); littoral to 73 m.

Marcusiaxius longispina (Stebbing, 1920)
(fig. 59A)

Axius longispina Stebbing, 1920: 265, pls. 106B, 107.
Meticonaxius ? *longispina* — De Man, 1925d: 5 (list).
Meticonaxius longispina — Barnard, 1950: 500, fig. 93a-c; Kensley, 1981b: 30; Coelho, 1987: 63; Kensley & Heard, 1991: 514, fig. 13, tab. 1F; Poore, 1997: 365 (key), 369.

Material examined. — SMA-A2754, 1 male (TL/CL, 14.0/4.4 mm), Pieter Faure Sta. 13039, off East London, South Africa, 91 m.

Remarks. — Male Plp1 is missing and inaccessible, however, Kensley & Heard (1991, fig. 13N) show in their figure that the male Plp1 consists of a

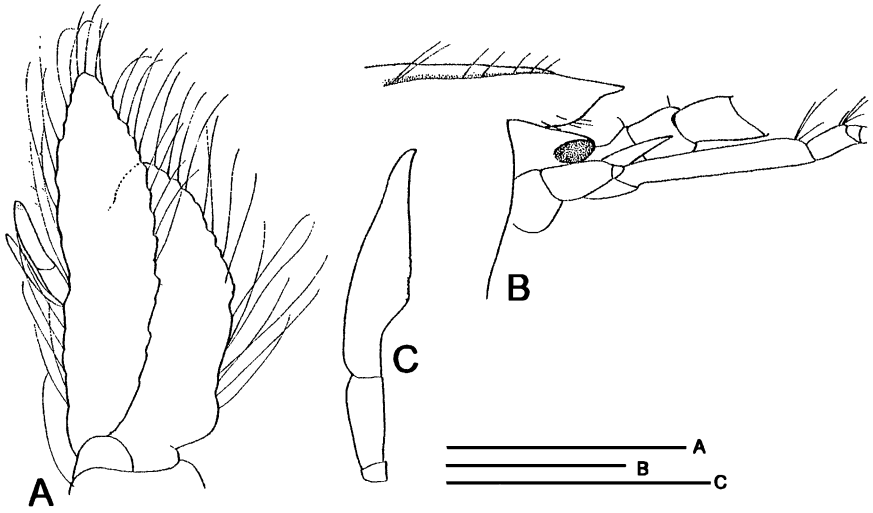

Fig. 59. *Marcusiaxius longispina* (Stebbing, 1920), *Meticonaxius dentatus* Lin, 2006, and *Michelea abranchiata* Poore, 1997. A, male Plp2; B, anterior part of carapace; C, male Plp1. A, *Marcusiaxius longispina*, SMA-A2754, 1 male (TL/CL, 14.0/4.4 mm), Pieter Faure Sta. 13039, off East London, South Africa, 91 m; B, *Meticonaxius dentatus*, MNHN Th 1464, holotype, hermaphroditic female (TL/CL, 66.0/17.0 mm), New Caledonia, 20°57.5′S 165°35.9′E, BATHUS 1 (French Expedition), 302-335 m; C, *Michelea abranchiata*, USNM 291184, paratype, 1 male (TL/CL, 22.0/4.3 mm), Puerto Rico, Caribbean Sea. Scales 1 mm.

stem-like proximal segment and a cleaver-shaped distal segment. Male Plp2 (fig. 59A) endopod bears appendices interna and masculina, and male Plps3-5 endopods bear an appendix interna.

Type locality. — Off Cape Morgan, South Africa, 95 m.

Distribution. — South Africa, Cape Morgan (Stebbing, 1920; Poore, 1997), off East London (Barnard, 1950; Kensley & Heard, 1991); 91-126 m.

Marcusiaxius microps (Bouvier, 1905)

Metaxius microps Bouvier, 1905: 804; Bouvier, 1925: 470, fig. 28; Balss, 1925: 210; De Man, 1925d: 8 (list); De Man, 1928b: 18, 20, 21; Schmitt, 1935a: 192, fig. 53; Balss, 1957: 1582.
Meticonaxius microps — Kensley & Heard, 1991: 516, fig. 14, tab. 1G; Poore, 1997: 365 (key), 369.

Diagnosis. — Male Plp1 consisting of stem-like proximal segment and cleaver-shaped distal segment; male Plp2 biramous (probably endopod bearing appendices interna and masculina), and male Plps3-5 endopods with appendix interna. [Cf. Kensley & Heard, 1991, fig. 14I, J.]

Type locality. — Off St. Croix, Antilles, 210 m.

Distribution. — St. Croix (Bouvier, 1905, 1925; Kensley & Heard, 1991; Poore, 1997); 210 m.

Marcusiaxius minutus (Coelho, 1973)

Meticonaxius minutus Coelho, 1973: 345; Coelho et al., 1980: 58; Coelho, 1987: 63, 68; Coelho & Ramos-Porto, 1987: 32; Kensley & Heard, 1991: 516.
Marcusiaxius minutus — Poore, 1997: 358 (key), 360; Rodrigues et al., 1998: 381; Melo, 1999: 338, figs. 227-228.

Type locality. — Off Amapá, Brazil, 04°18′S 50°17′W, “Almirante Saldanba” Sta. 2413, 89-90 m.

Distribution. — Only known from the type locality.

Marcusiaxius torbeni Sakai, 1992

Marcusiaxius torbeni Sakai, 1992c: 26, figs. 9, 11; Poore, 1997: 358 (key), 360, fig. 6.

Diagnosis. — Eyestalks triangular and flattened on lateral surface, cornea small and discrete subapically. [Cf. Sakai, 1992c: 27.]

Type locality. — West coast of Malay Peninsula, 9°13′22″N 97°50′11″E, 70 m.

Distribution. — Only known from the type locality.

Marcusiaxius wamsoi Poore, 1997

Marcusiaxius wamsoi Poore, 1997: 358 (key), 361, figs. 7, 8.

Material examined. — RMNH D 45521, holotype, female (TL/CL, 48.0/13.4 mm, damaged, Mxp1-3, Ps1-5, Plps2-5 on left side, Plps4-5 on right side picked off), Irian Jaya, 1 mile east of Dauwi, Wamsoi Lagoon, Padaid Island, Indonesia, Adaido Group, 54-90 m, National Science Foundation, Ostheimer, 4.ii.1956, leg. Orr. Powell.

Diagnosis. — Male Plps1-2 unknown. Female Plp1 uniramous and bisegmented; female Plps2-3 (4-5 missing) endopods with appendix interna.

Remarks. — It is observed, as Poore (1997: 364) mentioned, that the female Plp1 is bisegmented: a proximal segment and a distal segment with distal setae.

Type locality. — One mile E. of Dauwi, Wamsoi lagoon, Padaido Islands, Irian Jaya, Indonesia, 01°17′S 136°46′E, 54-90 m.

Distribution. — Indonesia — Padaido Islands, Irian Jaya (Poore, 1997); 54-90 m.

Marcusiaxius sp. Poore, 1997

Marcusiaxius sp., Poore, 1997: 364.

Distribution. — England, Gault, Folkestone (Poore, 1997).

Genus **Meticonaxius** De Man, 1905

Meticonaxius De Man, 1905: 592; De Man, 1925d: 2 (key), 53; De Man, 1928b: 18, 21, 30; Barnard, 1950: 498 (key), 499; Balss, 1957: 1579; De Saint Laurent, 1973: 515; Le Loeuff & Intès, 1974: 23; De Saint Laurent, 1979: 1397; Sakai & De Saint Laurent, 1989: 9; Kensley & Heard, 1991: 510; Sakai, 1992c: 20; Poore, 1994: 99 (key); Poore, 1997: 357 (key), 364.

Metaxius Bouvier, 1905: 804; Bouvier, 1925: 469; De Man, 1925d: 2, 8 (list); De Man, 1928b: 18, 20, 21, 30; Balss, 1957: 1582.

Diagnosis. — Rostrum acutely triangular, usually carinate medially. Carapace with cardiac prominence, but without cardiac sulcus and linea thalassinica. Eyestalks visible in dorsal view, shorter than rostrum, rounded or truncate-flattened distally; cornea weakly or moderately pigmented. Anterolateral cephalothorax with at least one vertical row of setae close to each lateral carina. Cervical groove distinct. Postcervical carina present posteriorly. A1 peduncular segment 1 elongate. Scaphocerite less than half length of A2 penultimate segment. Mxp3 crista dentata reduced; merus with strong mesial row of setae; exopod very short or absent. P1 chelate and symmetrical; fixed finger with at least one sharp, curved tooth on distal third of cutting edge. P2 fixed finger with spinules on cutting edge; dactylus as long as fixed finger. Ps3-4 propodi and dactyli without lateral spiniform setae (rarely one or two on P4 dactylus); P4 propodus with one or two transverse rows of setae

laterally. Pleurobranchs present above Ps2-4. Abdominal somite 1 with longitudinal row of setae laterally, abdominal somites 2-5 with vertical rows of setae laterally, and abdominal somite 6 with 2-3 rows of setae converging posteroventrally; abdominal somites 3-5 with dense plumose setae laterally. Male Plp1 uniramous and bisegmented, proximal segment stem-like and distal segment cleaver-shaped; male Plp2 biramous, endopod bearing mesiomedially appendices interna and masculina, exopod ear-shaped; male Plps3-5 biramous, endopods with appendix interna, male Plps2-5 endopods without marginal lamellae. Telson longer than wide, lateral margins each with small proximal lobe, posterior margin rounded, without median spine. Uropodal endopod shorter than wide and subtriangular with acute distolateral angle. Uropodal exopod bearing neither distal flap nor lateral notch. [Adapted from Sakai, 1992c; Poore, 1997.]

Type species. — *Meticonaxius monodon* De Man, 1905, by original designation and monotypy. Gender of generic name, *Meticonaxius*, masculine.

Species included. — *Meticonaxius bouvieri* Kensley & Heard, 1991; *M. capricorni* Coelho, 1987; *M. dentatus* Lin, 2006; *M. monodon* De Man, 1905; *M. noumea* Poore, 1997; *M. soelae* Sakai, 1992c; *M. spicatus* Poore, 1997; *M.* sp. Poore, 1997.

KEY TO THE SPECIES OF THE GENUS *METICONAXIUS*

1 – Dorsal surface of rostrum with divergent dorsomedian carina 2
– Dorsal surface of rostrum with lineal dorsomedian carina 4

2 – P1 fixed finger with one tooth on cutting edge . . . . . *M. capricorni*
– P1 fixed finger with 4-5 sharp spines on cutting edge 3

3 – Eyestalks overreaching rostrum . . . . . *M. spicatus*
– Eyestalks reaching half of rostrum . . . . . *M. dentatus*

4 – P1 fixed finger with one distinct median tooth on cutting edge . . . . . *M. monodon*
– P1 fixed finger with one distinct median tooth and proximal denticles on cutting edge 5

5 – Mxp3 merus urnarmed on mesial margin . . . . . *M. bouvieri*
– Mxp3 merus with one spine on mesial margin 6

6 – Telson longer than wide . . . . . *M. soelae*
– Telson wider than long . . . . . *M. noumea*

Meticonaxius bouvieri Kensley & Heard, 1991

Meticonaxius bouvieri Kensley & Heard, 1991: 512, figs. 11, 12, tab. 1E; Poore, 1997: 365 (key), 366, figs. 9, 10.

Diagnosis. — Male Plp1 uniramous and bisegmented, distal segment cleaver-shaped; male Plp2 biramous, endopod triangular, bearing appendices interna and masculina, appendix masculina elongate and more than twice as long

as appendix interna; male Plps3-5 biramous, endopods with appendix interna. [Cf. Kensley & Heard, 1991, fig. 11J, K, L.]

Type locality. — Off Jamaica, 17°13′N 77°45′W, 722-768 m.

Distribution. — Caribbean Sea (Poore, 1997); Bahamas, north of Long Island (Kensley & Heard, 1991); off Jamaica (Kensley & Heard, 1991); 180-768 m.

Meticonaxius capricorni Coelho, 1987

Meticonaxius sp., Coelho & Ramos-Porto, 1987: 32 (key), 33.
Meticonaxius capricorni Coelho, 1987: 64, figs. 1-3; Kensley & Heard, 1991: 513; Poore, 1997: 365 (key), 369, fig. 11A; Rodrigues et al., 1998: 381; Melo, 1999: 340, figs. 229-230.

Remarks. — The present species, *M. capricorni* is similar to *M. monodon* in that the fixed finger of the larger cheliped bears a distinct tooth on the cutting edge, but differs in that in *M. capricorni* the P3 propodus is as long as wide, convex on the dorsal margin, rounded on the ventral margin, and bilobed distally, and the uropodal endopod is wider than long and trapezoid, while in *M. monodon* the P3 propodus is subsquare, and the uropodal endopod is as long as wide.

Type locality. — Brazil, 23°52′S 43°11′W, 156 m.

Distribution. — Brazil, Baia da Guanabara, Rio de Janeiro (Coelho & Ramos-Porto, 1987), off Rio de Janeiro and Cabo de São Tomé (Coelho, 1987; Poore, 1997); 139-214 m.

Meticonaxius dentatus Lin, 2006
(fig. 59B)

Meticonaxius dentatus Lin, 2006: 234, figs. 1, 2.

Material examined. — MNHN Th 1464, holotype, hermaphroditic female (TL/CL, 66.0/17.0 mm), New Caledonia, 20°57.5′S 165°35.9′E, BATHUS 1 (French expedition), 302-335 m, 18.iii.1993, leg. B. Richer de Forges.

Diagnosis. — Rostrum convex ventrally (fig. 59B). Plp1 uniramous, consisting of proximal segment and flagellum; Plps2-5 endopods with appendix interna. Genital pore on Ps3 and 5 coxae (MNHN Th 1464). Hermaphroditic.

Type locality. — New Caledonia, 20°57.5′S 165°35.9′E, 302-335 m.

Distribution. — Only known from the type locality.

Meticonaxius monodon De Man, 1905

Meticonaxius monodon De Man, 1905: 593; De Man, 1925d: 5 (list), 54, pl. 4 fig. 10, pl. 5 fig. 10a-t; Balss, 1925: 210; De Man, 1928b: 19, 21, 30; Kensley & Heard, 1991: 516, fig. 15, tab. 1H; Poore, 1997: 365 (key), 369.

Callianassa (*Calliactites*) *coeca* Balss, 1921: 175. [Type locality. — Dar es Salaam, Tanzania.]
Callianassa (?*Scallasis*) *coeca* — Balss, 1925: 212, fig. 16; De Man, 1928b: 30.

Material examined. — ZMA Crust. De 240583 (not RMNH), 1 female (damaged), off northeast of Java, 7°46′S 114°30.5′E, "Siboga" Sta. 5, 330 m.

Diagnosis. — Rostrum triangular and pointed at apex, median carina extending posteriorly onto slightly concave gastric region; lateral margins extending posteriorly a bit onto gastric region. A2 scaphocerite overreaching midlength of penultimate segment. P1 equal and chelate. Telson subsquare, bearing proximal lobe on each of parallel lateral margins, posterior margin straight, without median spine. Uropodal exopod bearing neither distal flap nor lateral notch.

Type locality. — Off northeast Java, 7°46′S 114°30.5′E, "Siboga" Sta. 5, 330 M.

Distribution. — Tanzania — Dar es Salaam (Balss, 1921, 1925; Poore, 1997); Indonesia — northeast of Java (De Man, 1905, 1925; Kensley & Heard, 1991; Poore, 1997); 330-404 m.

Meticonaxius noumea Poore, 1997

Meticonaxius noumea Poore, 1997: 365 (key), 370, fig. 11B-K.

Type locality. — SSE of Yaté, New Caledonia, 22°13′S 167°08′E, 275-320 m.

Distribution. — New Caledonia (Poore, 1997); 275-320 m.

Meticonaxius soelae Sakai, 1992

Meticonaxius soelae Sakai, 1992c: 21, figs. 6-8; Poore, 1997: 365 (key), 370; Tsang et al., 2008: 218, 219.

Type locality. — Coral Sea, E. Australia, 17°59.4′S 147°64′E, 298-300 m.

Distribution. — Only known from the type locality.

Meticonaxius spicatus Poore, 1997

Meticonaxius spicatus Poore, 1997: 365 (key), 370, fig. 12.

Type locality. — Caribbean Sea, "Atlantis" Sta. 3418, exact location unknown, 351 m.

Distribution. — Caribbean Sea (Poore, 1997); 351 m.

Meticonaxius sp. Poore, 1997

Meticonaxius sp. Poore, 1997: 327.

Distribution. — Philippines (“Albatross” Sta.).

Genus **Tethisea** Poore, 1994

Tethisea Poore, 1994: 99; Poore, 1997: 357 (key), 393.

Diagnosis. — Rostrum prominent and flat. Linea thalassinica absent. Eyestalks invisible in dorsal view. P1 chelate and symmetrical; fixed finger with thickened setae in proximal gape. Pleurobranchs present above Ps2-4. Ps3-4 without lateral spiniform setae. Male Plp1 uniramous and bisegmented; male Plp2 biramous, endopod elongate and leaf-like, bearing appendices interna and masculina, exopod small and ovate; male Plps3-5 biramous, endopods with appendix interna. Telson longer than wide and trapezoid. Uropodal endopod oval, uropodal exopod longer than wide, slightly concave on lateral margin and broadly rounded on distal margin. Rows of setae present laterally on carapace and abdominal somites 1-2 and 6. [Adapted from Poore, 1994.]

Type species. — *Tethisea indica* Poore, 1994, by original designation and monotypy. The gender of the generic name, *Tethisea*, is feminine.

Species included. — *Tethisea indica* Poore, 1994; *T. mindoro* Poore, 1997.

Tethisea indica Poore, 1994

Tethisea indica Poore, 1994: 100; Poore, 1997: 394, figs. 25, 26.

Material examined. — MNHN Th 1216, paratypes, 1 male (TL/CL, 18.0/6.0 mm); 1 female (TL/CL, 20.0/6.5 mm), Indonesia, Macassar Strait, 0°54.2′S 119°28.7′E, det. G. Poore.

Diagnosis. — Rostrum triangular and 1.5 times as long as wide at base of eyes. Carapace anterolaterally with a row of three setae. Mxp3 merus without mesial tooth; exopod minute. P1 merus with two spines on ventral margin. Male Plp1 uniramous and bisegmented, consisting of stem-like proximal segment and subovate distal segment bearing small mesioproximal lobe with hooklets; male Plp2 biramous, exopod ovate, and endopod elongate and leaf-like, bearing mesiomedially appendices interna and masculina; male Plp3 with appendix interna. Female Plp1 uniramous, slender, and three-segmented; female Plps2-5 endopods with appendix interna. Telson longer than wide and trapezoid. Uropodal endopod oval; uropodal exopod subtriangular, slightly concave on lateral margin, and broadly rounded distally.

Type locality. — Mozambique, 24°64′S 35°20′E, 165 m.

Distribution. — Mozambique (Poore, 1994, 1997); La Réunion; Indonesia; New Caledonia; 165-460 m.

Tethisea mindoro Poore, 1997

Tethisea mindoro Poore, 1997: 398, fig. 27; Komai, 2000b: 346 (list); Robles et al., 2009: 316.

Material examined. — MNHN Th 1222, holotype, female (CL 51.0 mm), Philippines, W. of Mindoro, 12°31.2′N 120°39.3′E, MUSORSTOM Sta. DR 117, 92-97 m, 3.vi.1985.

Diagnosis. — Male Plps1-2 uncertain. Female Plp1 uniramous and bisegmented, consisting of proximal segment and flagellum; female Plps2-5 endopods with appendix interna.

Type locality. — W. of Mindoro, Philippines, 12°31.2′N 120°39.3′E, 92-97 m.

Distribution. — Philippines — W. of Mindoro (Poore, 1997); Australia — North-West Shelf (Poore, 1997); 92-134 m.

FAMILY MICHELEIDAE SAKAI, 1992

Micheleinae Sakai, 1992c: 18; Poore, 1994: 99; Poore, 1997: 454; Felder, 2001: 440; Poore, 2004: 176.

Diagnosis. — Rostrum small, short, and triangular between orbits, located between branchiostegals protruded to proximal half of eyestalks. Linea thalassinica absent; carapace with posterolateral lobes. A1 segment 1 extremely elongate. Scaphocerite distinct. Maxilla 2 scaphognathite with 1-2 posterior whips. P1 chelate, subequal, and similar in male and female. P2 chelate. Ps3-4 propodi rectangular. P4 coxa flattened. P5 simple. Abdominal somite 1 with anteriorly-directed lobe laterally. Male Plp1 uniramous and un- or bisegmented, distal segment cleaver-shaped; male Plp2 biramous, endopod with appendices interna and masculina, or with appendix interna but without appendix masculina; male Plps3-5 endopods with appendix interna. Male pleopods 2-5 with respiratory lamellae. Uropodal exopod bearing neither distal flap nor lateral notch. Rows of setae present on carapace, abdominal somites 1-6, and Ps2-3 propodi.

Remarks. — Poore (1994: 99, 1997: 354) included four genera, *Marcusiaxius* Rodrigues & De Carvalho, 1973, *Meticonaxius* De Man, 1905, *Tethisea* Poore, 1994, and *Michelea* Kensley & Heard, 1991 in the family Micheleidae Sakai, 1992c. However, the genus *Michelea* is different from the other three genera, *Marcusiaxius*, *Meticonaxius*, and *Tethisea*, because in *Michelea* the rostrum is small, short, and triangular between the orbits, located between the protruded branchiostegals, and the pleopods bear frond-like respiratory lamellae, whereas in the other three genera, the rostrum is prominent and protruded anteriorly to form a flat triangular plate; and the pleopods lack frond-like respiratory lamellae. Therefore, *Michelea* is to be distinguished from the other three genera at the family level.

Type genus. — *Michelea* Kensley & Heard, 1991, as the nominate genus.

Genus included. — Only the genus *Michelea* Kensley & Heard, 1991.

Genus **Michelea** Kensley & Heard, 1991

Michelea Kensley & Heard, 1991: 519; Poore, 1994: 99 (key); Poore, 1997: 357 (key), 373; Poore, 2004: 176.

Diagnosis. — Rostrum small, short, obtusely triangular between orbits, and shorter than eyestalks. Eyestalks visible in dorsal view. A1 peduncle segment 1 extremely elongate. A2 scaphocerite distinct. Mxp3 with crista dentata; merus lacking mesial spine; but with strong mesial row of setae; exopod exceeding end of ischium. P1 chelate, subequal, and similar in male and female. P2 chelate. Ps3-4 propodi rectangular. Ps2-3 propodi with row of setae. P4 propodus with two transverse rows of setae. Pleurobranchs usually absent. Male Plp1 uniramous and un- or bisegmented, distal segment cleaver-shaped; male Plp2 biramous, endopod elongate and ovate, bearing appendices interna and masculina at proximal third, or bearing appendix interna but no appendix masculina, and exopod broadened and triangular; male Plps3-5 biramous, endopods with appendix interna and frond-like respiratory lamellae marginally. Uropodal endopod and exopod ovate. Telson convergent to form rounded triangle. [Adapted from Poore, 1997.]

Type species. — *Callianidea vandoverae* Gore, 1987, by original designation. Gender of generic name, *Michelea*, feminine.

Species included. — *Michelea abranchiata* (Poore, 1997); *M. dampieri* Poore, 2008; *M. devaneyi* Poore, 1997; *M. hortus* Poore, 1997; *M. lamellosa* Kensley & Heard, 1991; *M. lepta* (Sakai, 1987a); *M. leura* (Poore & Griffin, 1979); *M. microphylla* Poore, 1997; *M. novaecaledoniae* Poore, 1997; *M. paraleura* Poore, 1997; *M. pillsburyi* Kensley & Heard, 1991; *M. vandoverae* (Gore, 1987); *M.* sp., Robles et al., 2009: 316.

KEY TO THE SPECIES OF THE GENUS *MICHELEA*

1 – Plps2-5 endopods with respiratory lamellae, but exopods without respiratory lamellae 2
– Plps2-5 endopods and exopods with respiratory lamellae 4

2 – Telson parallel-sided in proximal half and tapering toward convex posterior margin . . . . . *M. lepta*
– Telson tapering toward broadly rounded posterior margin 3

3 – Rostrum short . . . . . *M. novaecaledoniae*
– Rostrum distinct, reaching middle of eyestalks . . . . . *M. hortus*

4 – Plp2 endopod and exopod with respiratory lamellae on whole margin 5
– Plp2 endopod and exopod with respiratory lamellae in some parts only 6

5 – Respiratory lamellae bisegmented; maxilla 2 scaphognathite with two posterior whips . . . . . *M. vandoverae*
– Respiratory lamellae unsegmented; maxilla 2 scaphognathite with a single posterior whip . . . . . *M. lamellosa*

6 – Mxp3 merus without mesial tooth 7

– Mxp3 merus with mesial tooth 9

7 – A1 peduncles reaching distal margin of A2 peduncles . . . . . *M. abranchiata*
– A1 peduncles overreaching distal margin of A2 penultimate segment 8

8 – A1 elongate proximal segment reaching distal fifth of A2 penultimate segment . . . . . *M. dampieri*
– A1 elongate proximal segment reaching proximal third of A2 penultimate segment . . . . . *M. microphylla*

9 – Cervical groove present at full length 10
– Cervical groove short in median region of carapace 11

10 – Uropodal exopod with short marginal spiniform setae . . . . . *M. leura*
– Uropodal exopod with distinct dense marginal spiniform setae . . . . . *M. paraleura*

11 – A1 peduncle reaching end of A2 peduncle . . . . . *M. devaneyi*
– A1 peduncle not reaching end of A2 penultimate segment . . . . . *M. pillsburyi*

Michelea abranchiata Poore, 1997
(fig. 59C)

Michelea abranchiata Poore, 1997: 374 (key), 375, figs. 13, 14.

Material examined. — USNM 291184, paratype, 1 male (TL/CL, 22.0/4.3 mm), Puerto Rico, Caribbean Sea, 23.vi.1916, det. G. Poore.

Remarks. — The paratype (USNM 291184) examined seems to be different from the holotype in the shape of Plp1, because it is bisegmented, and the distal segment is cleaver-shaped with a patch of hooklets mesioproximally (fig. 59C), though Poore described for *M. abranchiata* "Pleopod 1 of male with a triangular distal blade" and showed by his figure that Plp1 is unsegmented and the distal half is ovate, with a patch of hooklets medially on the convex mesial margin (Poore, 1997, fig. 14L).

Type locality. — British West Indies, Barbuda, Spanish Point, Caribbean Sea, 17°41′N 61°48′W, shore.

Distribution. — Caribbean Sea — Barbuda and Puerto Rico (Poore, 1997), intertidal.

Michelea dampieri Poore, 2008

Michelea dampieri Poore, 2008: 175, figs. 6, 7.

Diagnosis. — Rostrum small, short, obtusely triangular between orbits, flat, as long as broad at base, and about one-third as long as eyestalks. Cervical groove weakly defined, reaching 0.6 length of cephalothorax, longitudinal row of 4 setae level with lateral margin of eyestalk; marginal row of three setae at base of eyestalks; lateral row of three setae. Eyestalks visible in

dorsal view. A1 peduncle segment 1 extremely elongate and waisted, and half as long as cephalothorax. A2 scaphocerite distinct, peduncle reaching to middle of A1 penultimate segment. Mxp3 ischium without crista dentata; merus with strong mesial row of setae; exopod exceeding end of ischium. P1 chelate and equal, ischium with weak ventral tooth; merus with weak mid-tooth on slightly convex ventral margin, dorsal margin strongly convex, especially proximally; carpus unarmed; propodus almost cylindrical; fixed finger 0.4 length of propodus, cutting edge with obsolete tooth on proximal half; dactylus with cutting edge irregular, curved distally, and equal to fixed finger. P2 chelate, merus-propodus with rows of long setae on ventral margin; carpus 0.6 length of merus; propodus little longer than carpus, with row of 7 short setae; fixed finger with 4 short spiniform setae on cutting edge; dactylus longer than fixed finger, with 5 short spiniform setae on distal half of cutting edge; each finger with corneous tip. P3 propodus twice as long as wide, bearing 4 spiniform setae and long setae on ventral margin, plus two on distoventral and two on distodorsal mesial face, and two transverse rows of 4 setae on lateral face; dactylus with spiniform seta on dorsomesial margin. P4 propodus 2.8 times as long as wide, 4-6 weakly aligned transverse rows of spiniform setae on mesial face, concentrated near margins and strongest on ventral margin and distally, and two transverse rows of 5 and 3 setae; propodus with setae on ventral margin transforming to strongly pectinate distally; dactylus with about 11 spiniform setae in weak rows on dorsomesial margin.

Male Plp1 curved mesially and expanded distally, bearing 8 minute hooklets along mesiodistal margin; Plp2 endopod with probably 7 marginal lamellae laterally; appendix interna saclike, and 3 times as long as wide, appendix masculina 6 times as long as wide, and 1.7 times as long as appendix interna, bearing 8 setae on distal third; exopod with 3 lamellae distolaterally. Plps3-4 endopods with 17 lamellae and exopods with 5 lamellae. Plp5 endopod with 5 lamellae and exopod with 2 lamellae. Telson 0.9 times as long as wide, almost semicircular. Uropodal endopod ovate, and 1.3 times as long as wide, bearing minute distal tooth. Uropodal exopod oval with oblique mesiodistal margin, and 1.7 times as long as wide, bearing short spiniform setae on lateral to rounded distolateral corner. [Adapted from Poore, 2008.]

Type locality. — Dampier Archipelago, Western Australia.

Distribution. — Only known from the type locality.

Michelea devaneyi Poore, 1997

Michelea devaneyi Poore, 1997: 375 (key), 376, fig. 15.

Type locality. — North of Sand Island, Eniwetok Atoll, Marshall Islands, 11°30′S 162°15′E, 2 m.

Distribution. — Marshall Islands — Eniwetok Atoll (Poore, 1997), subtidal.

Michelea hortus Poore, 1997

Michelea hortus Poore, 1997: 374 (key), 378, fig. 16; Poore, 2004: 177.

Type locality. — One-and-a-half (1.5) miles west of south end of Garden Island, Western Australia, 32°12′S 115°40′E.

Distribution. — Western Australia — Garden Island (Poore, 1997); shelf.

Michelea lamellosa Kensley & Heard, 1991

Michelea lamellosa Kensley & Heard, 1991: 519, figs. 16, 17, tab. 1I; Poore, 1997: 374 (key), 381.

Type locality. — Off Jamaica, 17°36.3′N 77°02.6′W, 24 m.

Distribution. — Only known from the type locality.

Michelea lepta (Sakai, 1987)

Callianidea lepta Sakai, 1987a: 300, 303 (list), fig. 3.
Michelea lepta — Kensley & Heard, 1991: 519; Poore, 1997: 374 (key), 381.

Material examined. — USNM 231419, holotype, male (TL/CL, 18.0/3.0 mm), Ryukyu Islands, Japan, leg. S. Shokita, det. K. Sakai.

Diagnosis. — Plp2 biramous, exopod ovate and shorter than endopod, endopod with marginal setae except on proximal margin and several simple frond-like respiratory lamellae, bearing proximally slender appendix interna with distal hooklets, and slender appendix masculina. Plp4 endopod with marginal setae, but without frond-like respiratory lamellae.

Type locality. — Chatan, Okinawa Island, low tidal zone.

Distribution. — Japan — Okinawa Island (Sakai, 1987a); low tidal zone.

Michelea leura (Poore & Griffin, 1979)

Callianidea leura Poore & Griffin, 1979: 281, figs. 40, 41; Sakai, 1984: 104.
Michelea leura — Kensley & Heard, 1991: 519; Poore, 1997: 374 (key), 381, figs. 17-19.

Type locality. — Masthead Is., Capricorn Group, Queensland, Australia.

Distribution. — Australia — Masthead Island and Holbourne Island (Poore & Griffin, 1979), Heron Island (Sakai, 1984), Masthead Island and Heron Island (Poore, 1997).

Michelea microphylla Poore, 1997

Michelea microphylla Poore, 1997: 374 (key), 386, figs. 20, 21; Poore, 2004: 177, fig. 47 (from Poore, 1997).

Type locality. — Crib Point, Western Port, Victoria, Australia, 38°19.92′S 145°13.95′E, 19 m.

Distribution. — Only known from the type locality.

Michelea novaecaledoniae Poore, 1997

Michelea novaecaledoniae Poore, 1997: 374 (key), 388, fig. 22.

Type locality. — Baie de Prony, Île Ouen, New Caledonia, 22°24′S 166°50′E, 37 m.

Distribution. — New Caledonia — Île Ouen (Poore, 1997); 37-52 m.

Michelea paraleura Poore, 1997

Michelea paraleura Poore, 1997: 375 (key), 390, figs. 23, 24.

Type locality. — Holbourne Island, Queensland, Australia, 19°42′S 148°21′E.

Distribution. — Australia — Holbourne Island, Queensland, and Oxley Island, Northern Territory (Poore, 1997); intertidal to 2 m.

Michelea pillsburyi Kensley & Heard, 1991

Michelea pillsburyi Kensley & Heard, 1991: 522, figs. 18, 19, tab. 1J; Poore, 1997: 374 (key), 393.

Type locality. — Caribbean Sea, off Panama, 9°22.6′N 78°08.4′W, 59 m.

Distribution. — Caribbean coast of Panama (Kensley & Heard, 1991); 28-59 m.

Michelea vandoverae (Gore, 1987)

Callianidea vandoverae Gore, 1987: 186, figs. 1-4.

Michelea vandoverae — Kensley & Heard, 1991: 523, figs. 20, 21, tab. 1K; Poore, 1997: 374 (key), 393.

Diagnosis. — Male Plp1 uniramous and bisegmented, distal segment cleaver-shaped, bearing mesiomedially a patch of hooklets. Male Plp2 biramous, with broadened triangular exopod, and elongate ovate endopod, bearing appendices interna and masculina at proximal third on mesial margin, both exopod and endopod with numerous frond-like bisegmented filaments marginally;

male Plps3-5 biramous, endopods with appendix interna, both exopods and endopods bearing numerous frond-like bisegmented filaments marginally. [Cf. Gore, 1987: 191; Kensley & Heard, 1991: 523, fig. 21I, J.]

Type locality. — Florida, east of St. Lucie Inlet, 27°10.5′N 80°00.2′W, 58 m.

Distribution. — Gulf of Mexico (Kensley & Heard, 1991) and S.W. Caribbean Sea (Poore, 1997); 37-162 m.

Michelea sp. Robles et al., 2009

Michelea sp., Robles et al., 2009: 316.

FAMILY STRAHLAXIIDAE POORE, 1994

Strahlaxiidae Poore, 1994: 100; Felder, 2001: 440; Poore, 2004: 178.

Diagnosis. — Rostrum narrowly or broadly rounded, with bifurcate apex; gastric region flattened, bearing neither median nor submedian carinae; cardiac sulcus and cardiac prominence absent. Cervical groove distinct; no linea thalassinica; postcervical carina absent. Eyestalks distinct, cornea usually pigmented. A1 peduncular segment 1 as long as segments 2-3 combined. Scaphocerite distinct. Maxilla 2 scaphognathite with or without posterior whip. Mxp3 with exopod. P1 chelate and unequal. P2 chelate. Ps3-4 simple; P3 propodus broadly rectangular, and setose ventrally, lacking vertical rows of spinules; P4 propodus elongate, lacking transverse rows of spinules, coxa more or less flattened. P5 chelate. Pleurobranchs present or not. Abdominal pleuron 1 protruded ventrally; abdominal pleuron 2 twice as long as pleuron 3; abdominal pleura 3-5 with tufts of setae ventrally. Male Plp1 present or absent; male Plp2 biramous, endopod bearing appendix interna, but no appendix masculina; Plps3-5 biramous, endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum; female Plps2-5 biramous, endopods with appendix interna. Uropodal exopod bearing neither distal flap nor lateral notch.

Remarks. — The family Strahlaxiidae Poore, 1994 was established based on the genera *Neaxius* Borradaile, 1903, *Neaxiopsis* Sakai & De Saint Laurent, 1989, and *Strahlaxius* Sakai & De Saint Laurent, 1989 (type genus of the Strahlaxiidae). Poore (1994: 100) mentioned that "the three strahlaxiid genera are superficially similar to some members of the Axiidae where they have traditionally been placed. The most significant diagnostic characters are the acute outer angle of the uropodal endopod, the bifid rostrum, rugose gastric region of the carapace, broad pleopodal rami, and possession of some setal-rows on some pereopods and abdominal somites. Absence of the appendix masculina is a synapomorphy but this is shared with some axiid genera".

Type genus. — *Strahlaxius* Sakai & De Saint Laurent, 1989, as the nominate genus.

Genera included. — *Neaxiopsis* Sakai & De Saint Laurent, 1989; *Neaxius* Borradaile, 1903; and *Strahlaxius* Sakai & De Saint Laurent, 1989.

KEY TO THE GENERA OF THE FAMILY STRAHLAXIIDAE

1 – Male Plp1 present; maxilla 2 scahphognathite with posterior whip ..... *Strahlaxius*
– Male Plp1 absent; maxilla 2 scahphognathite without posterior whip 2

2 – Rostrum rounded and dentate anteriorly, bearing apical notch. Telson without transverse carinae; uropodal endopod simple on distolateral margin; uropodal exopod unarmed on lateral margin ..... *Neaxiopsis*
– Rostrum narrow and bifurcate anteriorly. Telson with transverse carinae; uropodal exopod denticulate on lateral margin ..... *Neaxius*

Genus **Neaxiopsis** Sakai & De Saint Laurent, 1989

Neaxiopsis Sakai & De Saint Laurent, 1989: 32; Poore, 1994: 100 (key).

Diagnosis. — Rostrum broad and distinct, dentate on semicircular anterior margin, with median notch, lateral margins extending posteriorly onto gastric region. Gastric region flattened, bearing median carina anteriorly, but no submedian carinae. Anterolateral margin of carapace unarmed. Cervical groove distinct, bearing no teeth. Eyestalks subglobose; cornea pigmented. Scaphocerite simple and distinct. Maxilla 2 scaphognathite without posterior whip. Mxp3 with exopod. Pl unequal. P2 chelate. P3 propodus without transverse rows of setae and spines. No pleurobranchs. Male Plp1 absent; male Plp2 biramous, endopod bearing appendix interna, but no appendix masculina; male Plps3-5 biramous, endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and elongate multiarticulate flagellum; female Plps2-5 endopods with appendix interna. Telson wider than long, or about as long as wide, bearing median tooth on posterior margin. Uropodal endopod rounded distolaterally; uropodal exopod bearing neither series of strong teeth laterally, nor transverse suture.

Type species. — *Callianidea gundlachi* Von Martens, 1872, designated by Sakai & De Saint Laurent, 1989. The gender of the generic name, *Neaxiopsis*, is feminine.

Species included. — *Neaxiopsis euryrhyncha* (De Man, 1905); *N. gundlachi* (Von Martens, 1872).

KEY TO THE SPECIES OF THE GENUS *NEAXIOPSIS*

1 – Telson longer than wide, and slightly longer than uropods ..... *N. euryrhyncha*
– Telson wider than long, and slightly shorter than uropods ..... *N. gundlachi*

Neaxiopsis euryrhyncha (De Man, 1905)
(fig. 60A-C)

Axius (*Neaxius*?) *euryrhynchus* De Man, 1905: 590.
Axius (*Neaxius*) *euryrhynchus* — De Man, 1925d: 3 (list), 12 (key), 25, pl. 1 fig. 2-2e, pl. 2 fig. 2f-k; Sakai, 1987a: 303 (list).
Neaxiopsis euryrhynchus — Sakai & De Saint Laurent, 1989: 33.
Not: *Axius* (*Neaxius*) *euryrhynchus* — Miyake, 1982: 90, 192 (list), pl. 30 fig. 5 [= *Neaxiopsis gundlachi* (Von Martens, 1872)].

Material examined. — ZMA Crust. De 202879 (syntypes of *Neaxiopsis euryrhynchus* (De Man, 1905)), two males (TL/CL, 11.0/4.2; 11.0/4.8 mm).

Diagnosis. — Male Plp1 absent; male Plp2 endopod with appendix interna, but without appendix masculina. Male Plps3-5 biramous, endopods with appendix interna.

Remarks. — De Man (1925d: 25-31) described this species as *Axius* (*Neaxius*?) *euryrhynchus*, based on two young female specimens measuring TL/CL, 11.06/4.56 and 10.5/4.34 mm. However, the present examination of these has revealed that those two specimens regarded as females, are males. De Man (1925d) mentioned that "*A. euryrhynchus* (= *Axius* (*Neaxius*) *euryrhynchus*) should be considered as the young stage of the former (*N. gundlachi* var. *N. orientalis*) or as a proper species (= *N. gundlachi*)". However, *N. euryrhyncha* is clearly different in morphology from *N. gundlachi* as follows. In *N. euryrhyncha* the rostrum is truncate anteriorly with a median notch, and dentate on the anterior margin (fig. 60A), the A1 peduncle overreaches the distal margin of the P2 penultimate segment (fig. 60A, B), the telson is longer than wide, slightly convergent toward the posterior margin, with a median tooth, and distinctly longer than the uropodal endopod (fig. 60C), and the gastric region is elevated with a smooth and flattened surface bearing a short median carina posterior to the flat rostrum (fig. 60A). In *N. gundlachi* in contrast, the rostrum is broadly rounded posteriorly, with a median notch, and dentate on the anterior margin (fig. 60D), the A1 peduncle fails to reach the distal margin of the A2 penultimate segment (fig. 60D); the telson is wider than long and slightly convergent towards the posterior margin, with a median tooth, and not longer than the uropoal endopod (fig. 60E), and the gastric region is elevated with a flattened surface with tubercles along the edge, the rostral median carina extends short posteriorly onto the elevated gastric region as a short gastric median carina, and the rostral lateral margins extend onto the gastric region as 7-8 emarginated gastric lateral carinae (fig. 60D). Therefore, *N. euryrhyncha* is not to be considered as the young stage of *N. gundlachi*.

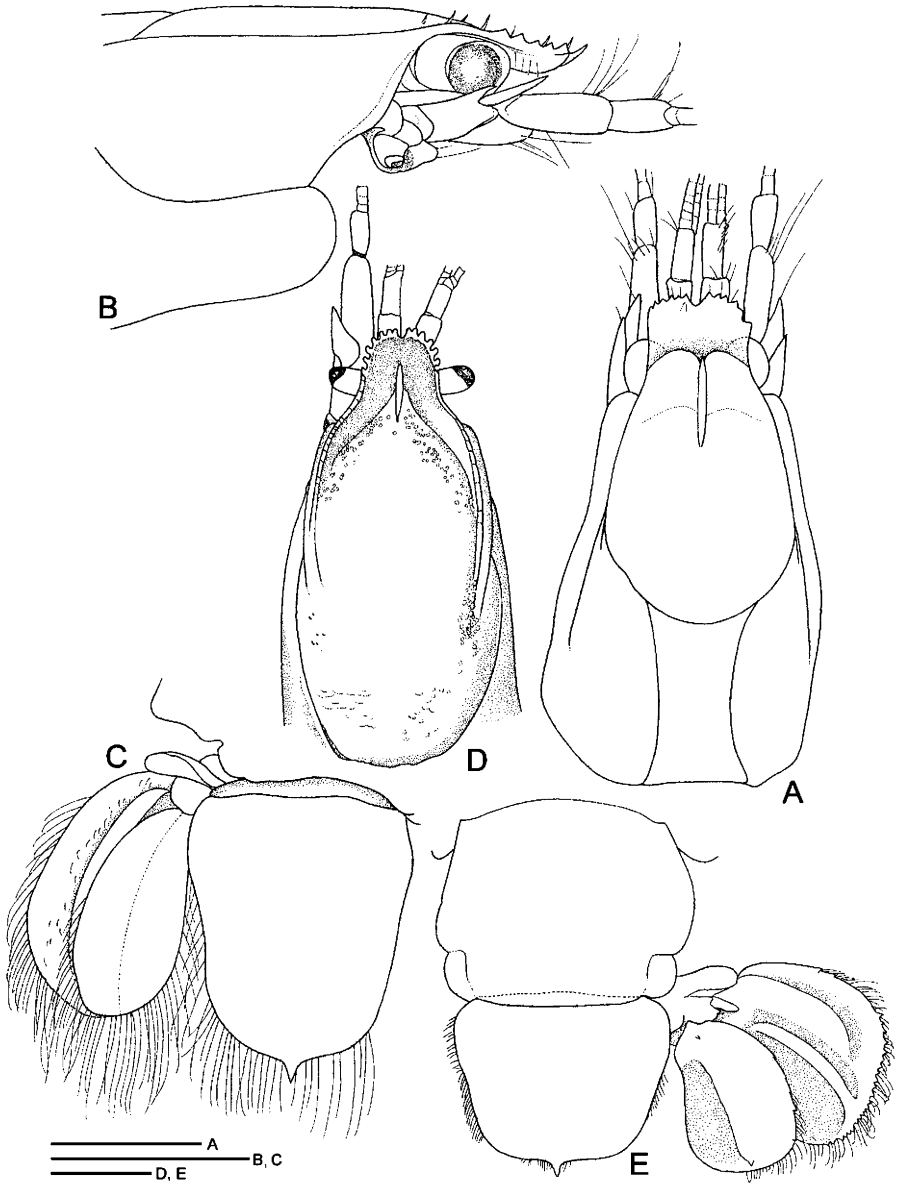

Fig. 60. *Neaxiopsis euryrhyncha* (De Man, 1905) and *Neaxiopsis gundlachi* (Von Martens, 1872). A, D, carapace, dorsal view; B, anterior part of carapace, lateral view; C, E, telson and uropod. A, B, C, *Neaxiopsis euryrhyncha*, ZMB 8915, male (TL/CL, 58.0/21.4), Maupi, New Pomerania; D, E, *Neaxiopsis gundlachi*, ZMB 4572, holotype, female (TL/CL, 92.0/32.0 mm), Cuba. Scales 1 mm.

Type locality. — Anchorage off Dongala, Palos-bay, Sulawesi, Indonesia, "Siboga" Sta. 86, 36 m.

Distribution. — Indonesia — off Dongala, Sulawesi (De Man, 1905, 1925); New Britain — Matupi near Rabaul (De Man, 1925b); 36 m.

Neaxiopsis gundlachi (Von Martens, 1872)
(fig. 60D-E)

Callianidea Gundlachi Von Martens, 1872: 132, pl. 5 figs. 15, 15b-c.
?*Axius* (*Neaxius*) *Gundlachi* — Borradaile, 1903: 537.
Axius gundlachi — Boas, 1880: 187; Rathbun, 1920: 327.
Axius (*Neaxius*) *Gundlachi* — De Man, 1925b: 120, fig. 1; De Man, 1925d: 4 (list), 9, 12 (key), 31.
Axius (*Neaxius*) *Gundlachi* var. *orientalis* De Man, 1925b: 122, fig. 2-2b; De Man, 1925d: 4 (list), 12 (key), 31. [Type locality. — Matupi near Rabaul, New Britain, Bismarck Archipelago.]
Axius (*Neaxius*) *euryrhynchus* — Miyake, 1982: 90, 192 (list), pl. 30 fig. 5.
Neaxiopsis gundlachi — Sakai & De Saint Laurent, 1989: 32.
Neaxiopsis orientalis — Sakai & De Saint Laurent, 1989: 33.

Material examined. — ZMB 4572, holotype, female (TL/CL, 92.0/32.0 mm), Cuba, leg. J. Gundlach; RMNH D 2300, 1 male (TL/CL, 83.0/28.5 mm), harbour of Willemstad, Curaçao, 31.iii.1905, leg. Boecke; ZMB 8915 (syntypes of *Neaxiopsis orientalis* (De Man, 1925b)), 2 males (TL/CL, 58.0/21.4; CL 22.1 mm, posterior part of abdomen missing), 2 females (TL/CL, 48.0/17.1-74.0/25.9 mm), Matupi, New Pommerania (= Matupit Island near Rabaul, New Britain, Bismarck Archipelago, Papua New Guinea), leg. Finsch.

Diagnosis. — Rostrum broadly rounded anteriorly, with median notch, and dentate on anterior margin (fig. 60D). Male Plp1 absent; male Plp2 biramous, endopod with appendix interna, but without appendix masculina. Female Plp1 uniramous, consisting of proximal segment and multiarticulate flagellum; Plps2-5 endopods broad and leaf-like in shape, bearing appendix interna. No pleurobranchs. Telson wider than long and slightly convergent toward posterior margin, with median tooth, and not longer than uropodal endopod (fig. 60E).

Remarks. — The syntypes of *N. orientalis* from Matupi (= Matupit Island near Rabaul, New Britain, Bismarck Archipelago, Papua New Guinea) were examined, and it was found that in *N. orientalis* the ventral margin of the P1 palm is carinate ventrally, with a row of tubercles along the carina as in *N. gundlachi* (De Man, 1925b, fig. 1), but not as in *N. euryrhynchus*, in which it is carinate without any row of tubercles along the carina. De Man (1925b) described the difference between *N. orientalis* and *N. gundlachi* as "die Palmarportion der grösseren Schere des Männchens, deren Aussen-und Innenseite ein wenig minder fein gekörnt sind als bei der westindischen Art

(= in *N. gundlachi*)" ["the lateral and mesial surfaces of the male Pl palm are a little less granulate than those in the western Indian species (= in *N. gundlachi*)"]. However, such a difference is not to be regarded as characteristic enough to distinguish one species from the other. So, it seems that *N. orientalis* is synonymous with *N. gundlachi*.

Miyake (1982: 90) described *Axius* (*Neaxius*) *euryrhynchus* on the basis of a large female specimen measuring TL/CL, 69.0/28.0 mm from Tanabe Bay, west coast of Kii Peninsula, Japan, sandy-mud, 20 m. The Japanese female, which is much larger than the male syntypes of *Neaxiopsis euryrhyncha* from Celebes, 36 m, measuring TL/CL, 11.0/4.2 and 11.0/4.8 mm, was described in Japanese as follows: "the gastric region bears tubercles along the 7-8 emarginated lateral carinae extended from the rostral lateral margins, and the telson is slightly longer than the uropods", though his colour photo (Miyake, 1982, pl. 30 fig. 5) shows that the uropods on the left side slightly overreach the telson (= the telson is slightly shorter than the uropods), and additionally the A1 peduncle is shorter than the distal end of the A2 penultimate segment as in *N. gundlachi*. Those characteristics suggest that his large Japanese specimen regarded as *N. euryrhyncha* should be considered to be *N. gundlachi*, but not *N. euryrhyncha*, in which the gastric region bears neither tubercles nor emarginated lateral carinae, and the telson is distinctly longer than the uropods. In consequence, the Japanese female specimen is safely identified as *N. gundlachi*.

Type locality. — Cuba.

Distribution. — Cuba (Von Martens, 1872); Curaçao (De Man, 1925b), Schottegat and harbour of Willemstad (Rathbun, 1920), Schottegat (Sakai & De Saint Laurent, 1989), Tanabe Bay, west coast of Kii Peninsula (on the Pacific side), Japan, sandy-mud (Miyake, 1982); 20 m.

Genus **Neaxius** Borradaile, 1903

Neaxius s. str. Borradaile, 1903: 537; De Man, 1925d: 1 (key), 3 (list), 12 (key); Sakai, 1987a: 303 (list).

Neaxius — Sakai & De Saint Laurent, 1989: 29; Poore, 1994: 100 (key); Sakai, 1994: 176, 200 (key).

Diagnosis. — Rostrum narrow and bifurcate distally, lateral margins armed with teeth, and median carina extending onto gastric region. Gastric region flattened. Anterolateral margin of carapace armed with teeth. Cervical groove distinct almost at full length, and usually armed with lateral teeth. Eyestalks subglobose; cornea pigmented. A2 scaphocerite elongate and either unarmed, or armed with marginal teeth. Maxilla 2 scaphognathite without posterior whip.

Pl unequal. P2 chelate. Ps3-4 simple. P3 propodus broadened and setose on ventral margin. P4 propodus elongate. P5 chelate. Ps2-5 with pleurobranch. Abdominal pleura 3-5 with stout tuft of setae ventrally. Male Plp1 absent; male Plp2 biramous, endopod with appendix interna but without appendix masculina; male Plps3-5 biramous, endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and flagellum; Plps2-5 biramous, broad and setose, endopods with appendix interna. Telson usually wider than long, bearing 1-3 transverse carinae. Uropodal endopod protruded distolaterally; uropodal exopod denticulate on lateral margin, bearing no transverse suture.

Type species. — *Axius glyptocercus* Von Martens, 1869 [= synonym, *Axia acanthus* A. Milne-Edwards, 1878, designated by Borradaile, 1903], by original designation and monotypy. Gender of the generic name, *Neaxius*, masculine.

Species included. — *Neaxius frankeae* Lemaitre & Ramos, 1992; *N. glyptocercus* (Von Martens, 1869) [= *Neaxius acanthus* (A. Milne-Edwards, 1878); *N. trondlei* Ngoc-Ho, 2005]; *N. mclaughlinae* Ngoc-Ho, 2006; *N. vivesi* (Bouvier, 1895).

KEY TO THE SPECIES OF THE GENUS *NEAXIUS*

1 – Both carpus and palm of male larger cheliped armed with spines on dorsal margins 2
– Both carpus and palm of male larger cheliped unarmed on dorsal margins 3

2 – Telson with three transverse carinae, second and third carinae curved posteriorly at both ends ..... *N. frankeae*
– Telson with three transverse carinae, second carina straight, and third one interrupted medially and curved posteriorly at both ends ..... *N. vivesi*

3 – Telson with three transverse carinae ..... *N. mclaughlinae*
– Telson with two transverse carinae ..... *N. glyptocercus* (= *N. acanthus*; *N. mauritianus*; *N. taliliensis*; *N. trondlei*)

Neaxius frankeae Lemaitre & Ramos, 1992

Neaxius frankeae Lemaitre & Ramos, 1992: 344, fig. 1; Lemaitre & León, 1992: 44; Hendrickx, 1995: 390 (list).

Type locality. — La Barra, Gorgona Island, Pacific coast of Colombia.

Distribution. — Only known from the type locality.

Neaxius glyptocercus (Von Martens, 1869)
(figs. 61, 62)

Axius glyptocercus Von Martens, 1869: 613; Haswell, 1882: 165. [Type locality. — Cape York, Australia.]
Axia acantha A. Milne-Edwards, 1878: 110. [Type locality. — New Caledonia.]
Eiconaxius acanthus — De Man, 1896: 491; De Man, 1898: 700, pl. 34 fig. 57-57a.

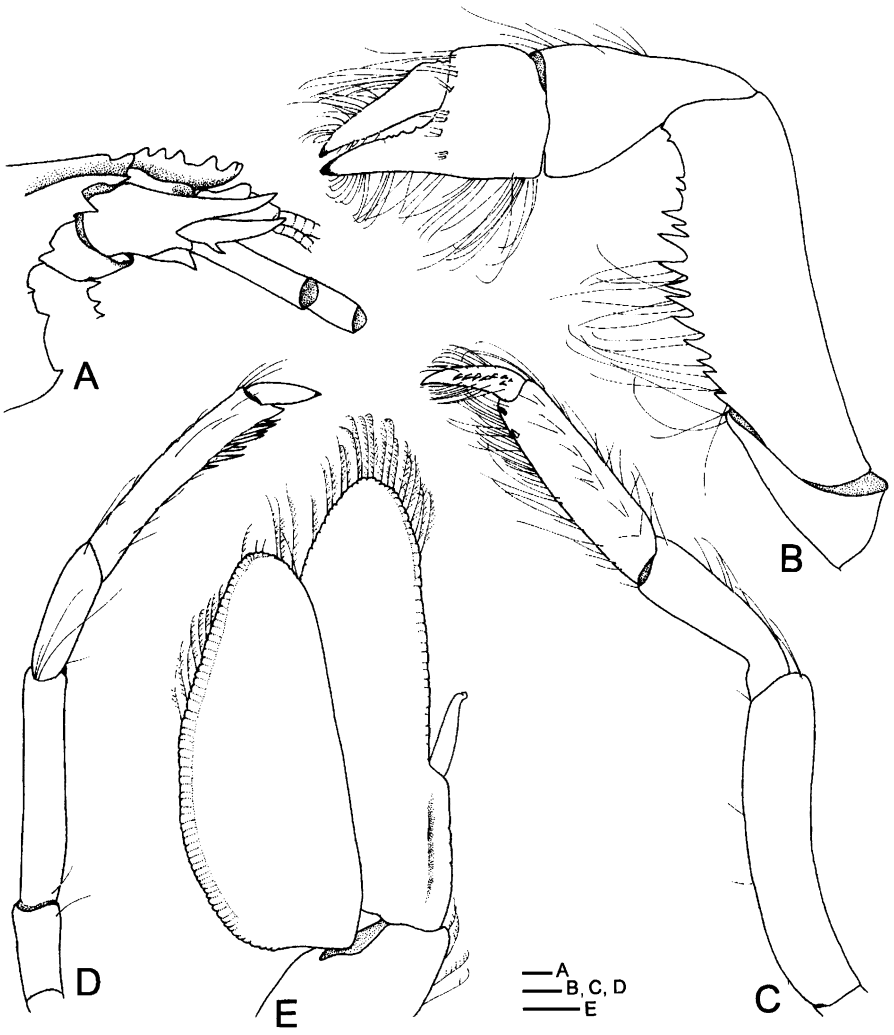

Fig. 61. *Neaxius glyptocercus* (Von Martens, 1869). A, anterior part of carapace and A2 peduncle; B, P2, lateral view; C, P4, lateral view; D, P5, lateral view; E, male Plp2. A-E, ZMB 2973, holotype, male (TL/CL, 82.0/ 26.4 mm), Cape York, Australia. Scales 1 mm.

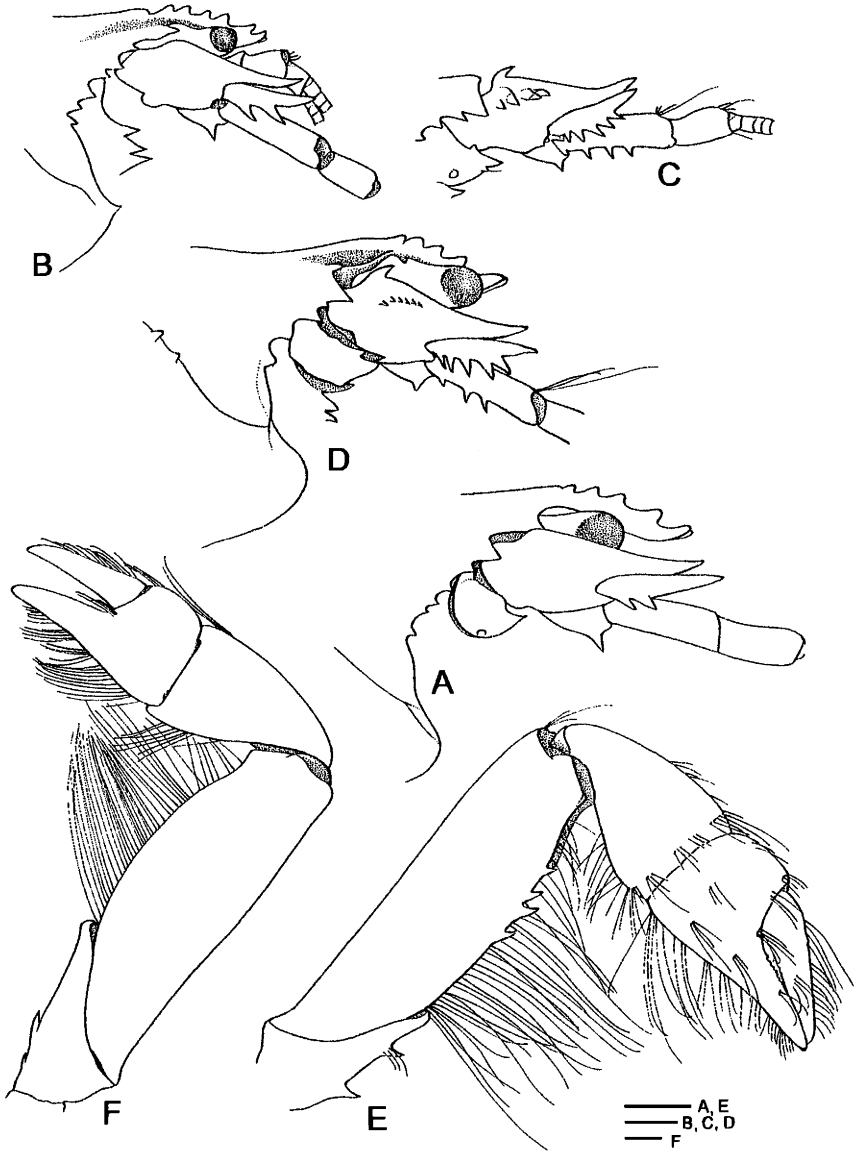

Fig. 62. *Neaxius glyptocercus* (Von Martens, 1869) (= *Neaxius acanthus* (A. Milne-Edwards, 1878)). A-D, anterior parts of carapace and A2 peduncles; E-F, P2, lateral view. A, ZMH K 8392 (Godeffroy No. 7430), male (TL/CL, 44.0/14.3 mm), Viti-Levu Island; B, ZMH K 41226 (Museum Godeffroy 16193), male (TL/CL, 88.0/27.3 mm), Tahiti; C, RMNH 42448, male (TL/CL, 94.0/30.6 mm), island of Barang Lompo, off Ujung Pandang, Sulawesi, Indonesia, reefflat, in seagrass bed of *Thalassia hemprichii* Aschers; D, F, ZMH K 8411, female (TL/CL, 55/1.07.1 mm), Palau Island; E, ZMH K 8392 (Godeffroy No. 7430), male (TL/CL, 44.0/14.3 mm), Viti-Levu Island. Scales 1 mm.

Axius (*Neaxius*) *acanthus* — Borradaile, 1903: 537; Bouvier, 1915b: 196, fig. 7; De Man, 1925d: 3 (list), 10-12, 14 (key), 74; Holthuis, 1953b: 51; Poore & Griffin, 1979: 235, fig. 7; Miyake, 1982: 192 (list); Tirmizi, 1983: 85, figs. 1, 2; Sakai, 1987a: 303 (list).

Eiconaxius taliliensis Borradaile, 1900: 420, fig. 15a-c. [Type locality. — Talili Bay, New Britain.]

?*Axius* (*Neaxius*) *glyptocercus* — Borradaile, 1903: 537.

Axius acanthus var. *mauritianus* Bouvier, 1915: 196, fig. 7; Bouvier, 1914: 704; Fourmanoir, 1955: 31, fig. 4. [Type locality. — Mauritius.]

Axius (*Neaxius*) *acanthus* var. *mauritianus* — Bouvier, 1915b: 196, fig. 7.

Axius (*Neaxius*) *glyptocercus* — De Man, 1925a: 50, fig. 1; De Man, 1925d: 4 (list), 9, 11-13 (key); Poore & Griffin, 1979: 236, fig. 8.

Axius (*Neaxius*) *acanthus* var. *mauritiana* — De Man, 1925a: 50; De Man, 1925d: 3 (list), 10, 14 (key).

Neaxius glyptocercus — Sakai & De Saint Laurent, 1989: 30; Sakai, 1994: 176, 200 (key); Tudge & Cunningham, 2002: 844; Tsang et al., 2008: 218, 219.

Neaxius acanthus — Sakai & De Saint Laurent, 1989: 30; Mukai & Sakai, 1992c: 47, figs. 1-3; Sakai, 1994: 200 (key); Kensley et al., 2000: 212, figs. 5, 7F; Kensley, 2003: 383; Sakai & Sawada, 2006: 1357; Tsang et al., 2008: 218, 219; Robles et al., 2009: 316.

Neaxius trondlei Ngoc-Ho, 2005: 59, figs. 6, 7. [Type locality. — Ua Huka, Hane Bay, Marquesas Islands.]

Material examined. — ZMB 2973, holotype, male (TL/CL, 82.0/ 26.4 mm), Cape York, Australia, leg. Daemel; ZMH K 41226 (Museum Godeffroy 16193), 1 male (TL/CL, 88.0/27.3 mm), Tahiti; ZMH K 8392 (Godeffroy No. 7430), 1 male (TL/CL, 44.0/14.3 mm), Viti-Levu Island.

Determined as *E. acanthus*: MNHN Th 812 (dry specimen), lectotype, female (TL/CL, 75.0/27.0 mm), New Caledonia; MNHN Th 190, paralectotype, 1 female (CL, 29.0; abdomen and telson 48.0 mm), New Caledonia; MNHN Th 458, 1 female (TL/CL, 92.0/27.5 mm), Tuléar, Madagascar, leg. et don. B. Thomassin; RMNH L 42446, 1 female (TL/CL, 95.0/26.1 mm); RMNH L 42447, 1 male (TL/CL, 73.0/23.8 mm); RMNH L 42448, 1 male (TL/CL, 94.0/30.6 mm); RMNH L 42449, 1 male (TL/CL, 91.0/29.0 mm, rostrum missing); RMNH L 42450, 1 male (TL/CL, 84.0/28.2 mm); RMNH L 42451, 1 female (TL/CL, 89.0/28.5 mm), RMNH L 42452, 1 female (TL/CL, 90.0/26.8 mm), Island of Barang Lompo, off Ujung Pandang, Sulawesi, Indonesia, reefflat, in sea grass bed of *Thalassia hemprichii*, 16.xi.1992, leg. P.L.A. Erfterneijer; ZMH K 8411, 1 female (TL/CL, 55.0/17.1 mm), Palau Island; SMF 31836 (BLT 18243), 4 males (TL/CL, 64.0/20.4-70.0/24.0 mm), Iriomote-jima, 13.vi.2003, leg. Y. Hirano et al., det. K. Sakai; SAM A10614, 1 male (TL/CL, 71.0/25.0 mm), Nosi Bé, Madagascar; MNHN (?), 1 male (TL/CL, 41.0/14.0 mm), Lon-Rumphius 1973, Sta. Na-1, 19.i.1973, leg. D. Sapri, Cat. No. Ca. 798, det. De Saint Laurent.

Determined as *Neaxius trondlei* Ngoc-Ho, 2005: MNHN Th 1419, holotype, male (TL/CL, 90.0/29.0 mm); MNHN Th, paratype, female (TL/CL, 66.0/22.0 mm), Hane bay, Ua Huka Island, Marquesas Islands, MUSORSTOM 9, Sta. 19, with algae, corals, pebbles, 5.x.1997, leg. R. von Cosel, J. Trondl & J. Tardy.

Diagnosis. — Rostrum bifurcate anteriorly, and dentate on lateral margins. Anterolateral margin of carapace with or without spines between rostral base and supraorbital spine. Dorsal margin of A2 segment 2 armed with one proximal spine or unarmed, and armed with 2-6 spines or unarmed laterally; scaphocerite with 1-5 ventral spines, A2 penultimate segment unarmed or armed with three spines ventrally (fig. 62C, D). P2 fixed finger unarmed (fig. 62F) or den-

TABLE VII
Branchial formula of *Neaxius glyptocercus* (Von Martens)

	Maxillipeds			Pereiopods				
	1	2	3	1	2	3	4	5
Podobranch	—	—	1	1	1	1	1	—
Arthrobranch	—	—	2	2	2	2	2	—
Pleurobranch	—	—	—	—	1	1	1	1

ticulate (fig. 62E) on the cutting edge. Abdominal somites 2-6, Plps2-5, and tail-fan beset with thick setae. Male Plp1 absent; male Plp2 biramous, endopod with appendix interna, but without appendix masculina; male Plps3-5 endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and flagellum; Plps2-5 biramous, endopods with appendix interna. Branchial formula as shown in table VII. Telson trapezoid, posterior margin with median tooth, dorsal surface with two transverse carinae in anterior half. Uropodal endopod broad with convex mesial margin, bearing three distinct teeth on distolateral margin and median carina with two teeth including one on distal margin. Uropodal exopod armed with a series of distinct teeth on broad distal margin.

Remarks. — Poore & Griffin (1979: 235) compared *N. acanthus* with *N. glyptocercus*, and mentioned that those two species are different from each other on four points: (1) *N. glyptocercus* bears a spine on the anterior border of the carapace between the rostrum and the supra-antennal spine (missing in *N. acanthus*), (2) *N. acanthus* bears 2-4 spines along the cervical groove (missing in *N. glyptocercus*), (3) the dorsal ridge with spine on article 2 of antenna 2 of *N. acanthus* is armed near its base, mesially with one spine and laterally with 2-5 spines (*N. glyptocercus* is unarmed there), and (4) the lateral spination on the meri of Ps1-2 is much more pronounced in *N. acanthus* than in *N. glyptocercus*. However, the present examination of the specimens regarded as *N. acanthus* from the Ryukyu Islands (SMF 31836) shows that the anterolateral margin of the carapace between the rostral base and the supraorbital spine is armed with a spine, though the dorsal margin of A2 segment 2 is armed with one proximal spine and 2-5 lateral spines as mentioned by Poore & Griffin (1979), and it was also found in the other specimens examined from various localities that the anterolateral margin of the carapace between the rostral base and the supraorbital spine is armed with one spine (fig. 62A, male, ZMH K 8392; fig. 62B, male, ZMH 41226; fig. 62D, female, ZMH K 8411), though usually unarmed; the dorsal margin of A2 segment 2 is

armed with one proximal spine (fig. 62C, male, RMNH L 42448; fig. 62D, female, ZMH K 8411) or unarmed proximally (fig. 61A, male, ZMB 2973, *N. glyptocercus*; fig. 62A, male, ZMH 41226; fig. 62B, male, ZMH K 41226), and with 2-6 spines laterally (fig. 62C, D) or unarmed laterally (fig. 62A, B); the scaphocerite is armed with one ventral spine (fig. 61A, male, ZMB 2973, *N. glyptocercus*), two ventral spines (fig. 61A, ZMB 8392; fig. 62B, ZMH K 41226), or five ventral spines (fig. 62C, male, RMNH 42448; fig. 62D, female, ZMH K 8411); the A2 penultimate segment is smooth ventrally (fig. 61A, male, ZMB 2973, *N. glyptocercus*; fig. 62A, male, ZMB 2972; fig. 62B, male, ZMH K 41226), or armed with three ventral spines (fig. 62C, male, RMNH 42448; fig. 62D, female, ZMH K 8411); the P2 fixed finger is finely denticulate on the cutting edge (fig. 61B, male, ZMB 2973, *N. glyptocercus*; fig. 62E, male, ZMH K 8392), or unarmed (fig. 62F, ZMH K 8411), and the P2 merus is denticulate on the ventral margin (fig. 62E, ZMH K 8392) or unarmed (fig. 62F, female, ZMH K 8411), which suggests that the difference in spinulation is not to be considered a specific characteristic, but as mere intraspecific variation.

Mukai & Sakai (1992: 47) confirmed, after examining 50 specimens of *N. acanthus* from Papua New-Guinea, that the spinulation on the rostrum and scaphocerite behind the cervical groove, and on the ventral margins of the P1 merus is varied in morphology and number, and there are also a number of variations in the burrow diameter of their dwelling holes, carapace length, body length, and ash-free dry weight, so that *N. acanthus* (= *N. acanthus* var. *N. mauritiana* Bouvier, 1914) is not different from *N. glyptocercus*, namely *N. acanthus* is synonymous with *N. glyptocercus*.

Ngoc-Ho (2005) described *Neaxius trondlei* Ngoc-Ho, 2005 from the Marquesas Islands, mentioning that though *N. trondlei* is similar to *N. glyptocercus* from Cape York, Australia in the morphology and spinulation of the rostrum and gastric region, as well as in the morphology of the telson and uropods, it differs from *N. acanthus* as follows: "(1) the second article of A2 peduncle is armed near its base with one or two upper spines and unarmed laterally (same article armed with one upper spine, four or five lateral spines in *N. acanthus*, fig. 7L, M); (2) the third article of A2 peduncle bears a lower spine (unarmed in *N. acanthus* fig. 7L); (3) one spine on the lower border of Mxp3 carpus (three to five spines in *N. acanthus*); (4) the distal half of the lower border of P1 merus and all lower border of P2 merus are unarmed (spines present in *N. acanthus*); and (5) the telson with three well marked transverse carinae equally distant from one another (distal carina often faint and apart from the others in *N. acanthus*)". However, the differences summed up by that author are regarded as variations permissible at the species level. Regarding diffe-

rence (5), it would be better to consider as follows: one of those transverse carinae developed very close along the posterior margin, is, though it is faint or marked, to be regarded as a carinated posterior margin rather than as the distal carina of the three carinae of these two species, because it is apart from the others, and bear a median spine, so that their telsons are safely considered to bear two transverse carinae on the dorsal surface.

Type locality. — Cape York, Australia (Von Martens, 1869).

Distribution. — Kenya — Mombasa (Sakai & De Saint Laurent, 1989); Comoros — Mayotte, Moheli, and Anjouan (Fourmanoir, 1955); Madagascar — Îles Glorieuses, Nosy Iranja, Nosy Bé, and Tuléar (Sakai & De Saint Laurent, 1989); Mauritius — Port Louis and Le Chaland (Bouvier, 1914; Sakai & De Saint Laurent, 1989); Indonesia — west Celebes (De Man, 1896, 1898); Papua New Guinea — Talili Bay, New Britain (Borradaile, 1900, as *E. taliliensis*), Motupore Island near Port Moresby (Mukai & Sakai, 1992c); Australia — Cape York, Queensland (Von Martens, 1869 as *E. glyptocercus*), Fly Point, Cape York, Magnetic Island, Townsville, Bowen, Norwest Island, Moreton Bay, Amity Point, and Stradbroke Island (Poore & Griffin, 1979), Murray Island, Torres Strait (Poore & Griffin, 1979); Darwin, Northern Territory (Sakai, 1994); Queensland (Poore & Griffin, 1979 as *E. glyptocercus*); New Caledonia (A. Milne-Edwards, 1878; Sakai & De Saint Laurent, 1989); Tahiti; Viti-Levu Islands, Republic of the Fiji Islands (as *E. glyptocercus* by Godeffroy); Hane Bay, Ua Huka Island, and west of Haamamao Bay, Marquesas Islands (Ngoc-Ho, 2005); Cebu Channel, Philippines (Kensley et al., 2000); Mariana Islands — W. Susupe, Saipan (Holthuis, 1953b); Pago Bay, Guam (Kensley, 2003); Kenting, Ping-Tong County, southern Taiwan (Kensley et al., 2000); Japan — Ishigaki-jima (Sakai & De Saint Laurent, 1989, as *E. acanthus*).

Neaxius mclaughlinae Ngoc-Ho, 2006

Neaxius mclaughlinae Ngoc-Ho, 2006a: 410, figs. 1, 2.

Material examined. — MNHN Th 1196, holotype, male (TL/CL, 74.0/24.0 mm), Gulf of Guinea, Principe Island, Praia Pequena, 3.vii.1956, CALYPSO 1956, Sta. P 18, diving, 3-4 m; MNHN Th 1195, paratype, male (TL/CL, 55.0/18.0 mm), 28.vi.1956, ibidem, Sta. P 13, diving, 3 m.

Remarks. — *Neaxius mclaughlinae* Ngoc-Ho, 2006a from the Gulf of Guinea, and *N. glyptocercus* (Von Martens, 1869) from the Indo-West Pacific are similar, but they differ in that in *N. mclaughlinae* the telson bears three transverse carinae on the dorsal surface, whereas in *N. glyptocercus* it bears two transverse carinae.

Type locality. — Gulf of Guinea; Principe Island, Praia Pequena.

Distribution. — Only known from the type locality.

Neaxius vivesi (Bouvier, 1895)

Eiconaxius Vivesi Bouvier, 1895: 7.
Axius (*Neaxius*) *Vivesi* — De Man, 1925a: 56, fig. 2; De Man, 1925d: 4 (list), 14 (key).
Neaxius vivesi — Sakai & De Saint Laurent, 1989: 31; Hendrickx, 1995: 390 (list), 393, 397, figs; Hendrickx et al., 2005: 171.

Remarks. — *Neaxius vivesi* from the eastern Pacific coast is closely similar to *N. frankeae* from Gorgona Island, Pacific coast of Colombia, in that the dorsal margins of the carpus and palm of the larger cheliped are armed with spines, but they are different in that in *N. vivesi* the dorsal surface of the telson bears three transverse carinae, of which the anterior and median ones are straight but the posterior one is interrupted medially, and each half with an anteriorly curved median end is also curved posteriorly at its midpoint (De Man, 1925a, fig. 2), whereas in *N. frankeae* the dorsal surface of the telson bears three transverse carinae, of which the anterior one is, however, straight but posteriorly curved at both ends, and the median one is curved posteriorly to surround halfway the posterior one, which is short and posteriorly curved at both ends (Lemaitre & Ramos, 1992: 346, fig. 1).

Type locality. — Lower California.

Distribution. — Lower California (Bouvier, 1895; De Man, 1925a; Sakai & De Saint Laurent, 1989); Gorgona Island, Pacific coast of Colombia (Lemaitre & Ramos, 1992).

Genus **Strahlaxius** Sakai & De Saint Laurent, 1989

Strahlaxius Sakai & De Saint Laurent, 1989: 24; Poore, 1994: 100 (key); Sakai, 1994: 200 (key).

Diagnosis. — Rostrum bifurcate anteriorly, lateral margins denticulate, extending posteriorly onto gastric region. Anterolateral margins of carapace unarmed. Gastric region convex. Cervical groove distinct, but unarmed. Eyestalks subglobose; cornea pigmented. A2 scaphocerite simple and distinct. P1 unequal. P3 propodus setose, bearing no transverse rows of setae or spines. Maxilla 2 scaphognathite with posterior whip. No pleurobranchs. Male Plp1 uniramous and unsegmented, with distal setae; male Plp2 biramous, endopod bearing appendix interna with patch of hooklets distally, but no appendix masculina; male Plps3-5 biramous, endopods with appendix interna. Female Plp1

uniramous, consisting of proximal segment and flagellum; female Plps2-5 biramous, endopods with appendix interna. Telson wider than long, trapezoid, and unarmed on lateral margin, tapering toward posterior margin, with median spine or convexity, dorsal surface smooth. Uropodal endopod wider than long and trapezoid, with acute distolateral angle. Uropodal exopod largely rounded on distolateral margin, bearing proximolateral tooth, but no transverse suture dorsally. [Adapted from Sakai & de Saint Laurent, 1989.]

Type species. — *Axius plectrorhynchus* Strahl, 1862a, designated by Sakai & De Saint Laurent (1989). The gender of the generic name, *Strahlaxius*, is masculine.

Species included. — *Strahlaxius plectrorhynchus* (Strahl, 1862a); *S. waroona* (Poore & Griffin, 1979).

KEY TO THE SPECIES OF THE GENUS *STRAHLAXIUS*

1 – Rostrum triangular and bifurcate anteriorly, and armed irregularly with obtuse denticles on lateral margins; gastric median carina short and marked . . . . . *S. plectrorhynchus*
– Rostrum stoutly triangular and rounded on anterior margin, and denticulate on lateral margins; gastric median carina indistinct and shorter than in *S. plectrorhynchus* . . . . . *S. waroona*

Strahlaxius plectrorhynchus (Strahl, 1862)

Axius plectrorhynchus Strahl, 1862a: 1060, figs. 2-4, 11; Strahl, 1862b: 387; Miers, 1884b: 282; De Man, 1888a: 251; De Man, 1888b: 463, pl. 19 fig. 5; Dworschak, 1992: 214.
Axius plectorhynchus [sic!] — Zehntner, 1894: 195.
Axius (*Neaxius*) *plectorhynchus* [sic!] — Borradaile, 1903: 537.
Axius (*Neaxius*) *plectrorhynchus* — De Man, 1925: 4 (list), 13 (key); McNeill, 1926: 304; Estampador, 1937: 500; Poore & Griffin, 1979: 238, fig. 9; Sakai, 1984: 96.
Strahlaxius plectrorhynchus — Sakai & De Saint Laurent, 1989: 24; Sakai, 1994: 200 (key); Poore, 2004: 178, fig. 48a, b, c.
Axius plectrohynchus [sic!] — Coleman, 1977: 135.
Not: *Axius plectrorhynchus* — Fulton & Grant, 1902: 60, pl. 5 figs. 7, 8 [= *Strahlaxius waroona* (Poore & Griffin, 1979)].
Not: *Axius plectorhynchus* [sic!] — Hale, 1927a: 84, fig. 81; Hale, 1927b: 309 [= *Strahlaxius waroona* (Poore & Griffin, 1979)].

Material examined. — ZMH K 41227, 1 male (TL/CL, 40.0/13.2 mm), 1 ovig. female (TL/CL, 34.0/11.1 mm), Tahiti (Museum Godeffroy 16193); ZMB 1130 lectotype, ovig. female (TL/CL, 21.0/7.2 mm), Luzon, Albay, leg. Jagor; MB 5617 (TL/CL, 16.0/5.2 mm), Luzon, Philippines, leg. Jagor; ZMG 211, 1 male (TL/CL, 26.0/7.8 mm), 1 ovig. female (TL/CL, 29.0/8.7 mm), Bohol, Philippines, 4.vi.1863, leg. C. Semper; NHM 81.31, 1 female (TL/CL, 40.0/11.5 mm), Queensland, Portmolle Beach, between tide marks, v.1881, leg. De Coppingee.

Diagnosis. — Male Plp1 uniramous and unsegmented, with distal setae; male Plp2 biramous, endopod with appendix interna, but without appendix

masculina, male Plps3-5 biramous, endopods with appendix interna. Female Plp1 uniramous, consisting of proximal segment and flagellum; Plps2-5 biramous, endopods with appendix interna. Telson wider than long and trapezoid, tapering toward posterior margin. Uropodal endopod trapezoid and wider than long. Uropodal exopod without transverse suture. Eggs few in number but large in size, measuring 0.6-0.7 mm in diameter.

Type locality. — Luzon, Philippines.

Distribution. — Philippines — (Dworschak, 1992), Luzon (Strahl, 1862b; Estampador, 1937); Indonesia — Ambon (De Man, 1888b), Yapen Island, Irian Jaya (Sakai & De Saint Laurent, 1989); New Caledonia (Sakai & De Saint Laurent, 1989); Australia — Fly Point, Hayman Island, Norwest Islet, Heron Island, Port Curtis, Sellicks Beach, Great Francis Island, and Kingscote (Poore & Griffin, 1979), Heron Island, Queensland (Sakai, 1984; Sakai & De Saint Laurent, 1989), Yorketown, S. Australia (Dworschak, 1992), Port Molle, New South Wales, Beaumaris, Victoria, South Australia, Western Australia.

Strahlaxius waroona (Poore & Griffin, 1979)

Axius plectrorhynchus — Fulton & Grant, 1902: 60, pl. 5 figs. 7, 8. [Not Strahl, 1862b.]
Axius plectorhynchus [sic!] — Hale, 1927a: 84, fig. 81; Hale, 1927b: 309. [Not Strahl, 1862b.]
Axius (*Neaxius*) *waroona* Poore & Griffin, 1979: 240, fig. 10.
Strahlaxius waroona — Sakai & De Saint Laurent, 1989: 25; Sakai, 1994: 200 (key); Poore, 2004: 175, fig. 48d, e, f.

Type locality. — North side of Cape Naturaliste, Western Australia, mud tube under intertidal zone.

Distribution. — Australia — Cape Naturaliste, Murry Island, Beaumaris, and Flinders (Poore & Griffin, 1979); Tasmania — Jacobs Boat Harbour (Poore & Griffin, 1979).

SUPERFAMILY CALLIANASSOIDEA DANA, 1852

Callianassidae Dana, 1852a: 12, 14, 19.
Callianassoidea — Sakai, 2005a: 1125; Sakai & Sawada, 2006: 1357.

Diagnosis. — Rostral carina present or not. Carapace with or without cardiac sulcus(i), cardiac prominence, and dorsal oval. Linea thalassinica present. Maxilla 2 scaphognathite with or without posterior whip. Uropodal exopod without distal flap, and dorsal plate and lateral notch present or not.

Remarks. — Manning & Felder (1991: 766) included two families, Callianassidae and Ctenochelidae in the superfamily Callianassoidea, and distinguished them from each other by their key: male Plp2 with an appendix masculina; uropodal exopod longitudinally carinate dorsally, lacking dorsal plate; carapace usually with cardiac prominence (in Ctenochelidae); and male Plp2 without an appendix masculina; uropodal exopod not longitudinally carinate dorsally, bearing dorsal plate; carapace without cardiac prominence (in Callianassidae). In their classification, Callianassidae included 4 subfamilies and 15 genera: Callianassinae (*Biffarius*, *Callianassa*, *Calliapagurops*, *Neotrypaea*, *Notiax*, and *Trypaea*); Cheraminae (*Cheramus* and *Scallasis*); Callichirinae sensu nov. (*Callichirus*, *Corallianassa*, *Glypturus*, *Lepidophthalmus*, and *Neocallichirus*); and Eucalliacinae (*Calliax* and *Eucalliax*); and Ctenochelidae included three subfamilies and 6 genera: Ctenochelinae (*Ctenocheles*, *Gourretia*, *Paracalliax*, and *Dawsonius*); Anacalliacinae (*Anacalliax*); and Callianopsinae (*Callianopsis*).

However, it has turned out that their taxa are not in accordance with the definitions of their characteristics. For example, *Gourretia* bears no cardiac prominence, but was included in one of the subfamilies of the Ctenochelidae, in which the cardiac prominence is present, and *Callianopsis* bears a dorsal plate on the uropodal exopod, but was included in one of the subfamilies of the Ctenochelidae, in which the dorsal plate is absent on the uropodal exopod.

Though Manning & Felder's (1991) taxa comprise two families, Callianassidae (Callianassinae, Cheraminae, Callichirinae sensu nov., Eucalliacinae) and Ctenochelidae (Ctenochelinae, Anacalliacinae, and Callianopsinae), and 7 subfamilies, the present system proposed here comprises 10 families and 8 subfamilies: Anacalliacidae, Bathycalliacidae (Bathycalliacinae and

Vulcanocalliacinae), Callianassidae (Callianassinae and Callichirinae sensu nov.), Callianopsidae (Callianopsinae and Neocallianopsinae subfam. nov.), Ctenochelidae, Eucalliacidae (Calliapaguropinae and Eucalliacinae), Gourretiidae, Lipkecallianassidae (new status), Pseudogourretiidae (new status), and Thomassiniidae.

The subfamilies Anacalliacinae Manning & Felder, 1991 and Callianopsinae Manning & Felder, 1991 were included in the Ctenochelidae by Manning & Felder (1991), but in the present revision, the Anacalliacinae Manning & Felder, 1991 are not included in the Ctenochelidae Manning & Felder, 1991, because the carapace bears a dorsal oval, so that this taxon is elevated to family level as Anacalliacidae.

The Callianopsinae Manning & Felder, 1991 are characterized as follows: the carapace bears a rostral carina and a cardiac prominence as in Ctenochelidae, but the Mxp3 dactylus is oval, and the uropodal exopod bears neither a dorsal plate nor a lateral notch, not as in the Ctenochelidae, in which the Mxp3 dactylus is digitiform, and the uropodal exopod bears a lateral notch, so that the Callianopsinae are elevated to family level and called Callianopsidae now. In the Callianopsidae, however, two species, *Callanopsis goniophthalma* (Rathbun, 1902) and *C. anovalis* Lin et al., 2007b are fundamentally different from each other, because the carapace bears a dorsal oval in *C. goniophthalma*, but lacks this in *C. anovalis*, so that *C. anovalis* is reclassified and included in the genus *Neocallianopsis* gen. nov. in Neocallianopsinae subfam. nov., distinguished from *C. goniophthalma* in the Callianopsinae, so that those two subfamilies are integrated under the Callianopsidae Manning & Felder, 1991.

The Callianassinae Dana, 1852a and the Callichirinae Manning & Felder, 1991, are included in the family Callianassidae, because the carapace bears a dorsal oval, and the uropodal exopod bears a dorsal plate, though Mxp3 propodus and dactylus are slender in the Callianassinae, while the Mxp3 propodus is broadened and the dactylus is slender in the Callichirinae.

The Calliapaguropinae Sakai, 1999c and the Eucalliacinae Manning & Felder, 1991 are characterized as follows: the carapace lacks a dorsal oval and the uropodal exopod bears a dorsal plate, so that both subfamilies are included in the family Eucalliacidae Manning & Felder, 1991, but they differ from each other in that in the Calliapaguropinae the Mxp3 dactylus is digitiform, while in the Eucalliacinae it is ovate.

The Bathycalliacinae Sakai & Türkay, 1999 and Vulcanocalliacinae Dworschak & Cunha, 2007, are integrated under Bathycalliacidae Sakai & Türkay, 1999, because the carapace lacks a dorsal oval, but bears a cardiac

prominence, the Mxp3 propodus is broadened, the dactylus is subtriangular, and the uropodal exopod bears neither a dorsal plate nor a lateral notch, though they are different from each other in that in the Bathycalliacinae the carapace bears two transverse cardiac sulci, while in the Vulcanocalliacinae it lacks transverse cardiac sulci.

Poore (1994) included 6 families (Laomediidae, Upogebiidae, Callianideidae, Thomassiniidae, Ctenochelidae, and Callianassidae) in the superfamily Callianassoidea, but the Laomediidae and Upogebiidae are excluded from the Callianassoidea, because the morphology of the propyloric ossicle of the gastric mill is different from that of the Callianassoidea and, therefore, they are included in the superfamily Thalassinoidea. The Callianideidae are also excluded from the Callianassoidea and included in the Axioidea, because the linea thalassinica is absent in Callianideidae, though it is present over a short length in *Paracallianidea*.

In the present revision, the taxa of Callianassoidea and Axioidea are grouped by the presence or absence of the dorsal oval on the carapace, and the dorsal plate and lateral notch on the uropodal exopod, and also by the shapes of the male Plps1-2 and Mxp3 propodus and dactylus.

In consequence, the historical taxa of the Callianassidae and Ctenochelidae as established by Manning & Felder (1991) must fundamentally be changed in this new way of classification. This holds especially for the genera of the subfamily Callianassinae, because little attention had been paid before to the male Plps1-2 and the uropodal exopod, which are now considered very important and, therefore, helpful for the classification of the genera and species, because of their distinct characteristics.

As a consequence, I have also had to reconsider my own earlier classification (Sakai, 2005b) and for that reason I am here giving the new scheme for the superfamily Callianassoidea, in the following chapters.

Families included. — Anacalliacidae Manning & Felder, 1991; Bathycalliacidae Sakai & Türkay, 1999; Callianassidae Dana, 1852a; Callianopsidae Manning & Felder, 1991; Ctenochelidae Manning & Felder, 1991; Eucalliacidae Manning & Felder, 1991; Gourretiidae Sakai, 1999a; Lipkecallianassidae Sakai, 2005b (new status); Pseudogourretiidae Sakai, 2005b (new status); and Thomassiniidae De Saint Laurent, 1979.

The new classification as here proposed in families, subfamilies, and genera is as follows:

1. Anacalliacidae Manning & Felder, 1991 (genera *Anacalliaopsis* gen. nov.; *Anacalliax* De Saint Laurent, 1973; *Capecalliax* gen. nov.)

TABLE VIII

Four major characteristics of the families/subfamilies of the superfamily Callianassoidea

	Dorsal oval	Mxp3 propodus	Mxp3 dactylus	Uropodal exopod
Anacalliacidae	+	subrectangular	digitiform	without dorsal plate, but with lateral notch
Bathycalliacidae				
Bathycalliacinae	−	subrectangular	subtriangular	without dorsal plate or lateral notch
Vulcanocalliacinae	−	subrectangular	subtriangular	with dorsal plate, but without lateral notch
Callianassidae				
Callianassinae	+	subovate or subrectangular	digitiform	with dorsal plate, but without lateral notch
Callichirinae	+	subquadrate	digitiform or subovate	with dorsal plate, but without lateral notch
Callianopsidae				
Callianopsinae	+	subrectangular	ovate	without dorsal plate or lateral notch
Neocallianopsinae	−	subrectangular	ovate	without dorsal plate or lateral notch
Ctenochelidae	−	rectangular	digitiform	without dorsal plate, but with lateral notch
Eucalliacidae				
Calliapaguropinae	−	subtriangular	digitiform	with dorsal plate; without lateral notch
Eucalliacinae	−/+	subrectangular or subquadrate	subovate or subtriangular	with dorsal plate; without lateral notch
Gourretiidae	−	rectangular	digitiform	without dorsal plate, with or without lateral notch
Lipkecallianassidae	−	rectangular	digitiform	without dorsal plate or lateral notch
Pseudogourretiidae	−	rectangular	digitiform	unknown
Thomassiniidae	−	rectangular	ovate	with or without dorsal plate, without lateral notch

2. Bathycalliacidae Sakai & Türkay, 1999
    i. Bathycalliacinae Sakai & Türkay, 1999 (genus *Bathycalliax* Sakai & Türkay, 1999)
    ii. Vulcanocalliacinae Dworschak & Cunha, 2007 (genus *Vulcanocalliax* Dworschak & Cunha, 2007)
3. Callianassidae Dana, 1852a
    i. Callianassinae Dana, 1852a (genera *Callianassa* Leach, 1814; *Cheramoides* gen. nov.; *Cheramus* Bate, 1888; *Gilvossius* Manning & Felder, 1992; *Notiax* Manning & Felder, 1991; *Trypaea* Dana, 1852a)
    ii. Callichirinae Manning & Felder, 1991 (genera *Balsscallichirus* gen. nov.; *Barnardcallichirus* gen. nov.; *Callichirus* Stimpson, 1866; *Corallichirus* Manning, 1992; *Forestcallichirus* gen. nov.; *Glypturoides* gen. nov.; *Glypturus* Stimpson, 1866; *Grynaminna* Poore, 2000; *Lepidophthalmoides* gen. nov.; *Lepidophthalmus* Holmes, 1904; *Michaelcallianassa* Sakai, 2002; *Neocallichirus* Sakai, 1988; *Podocallichirus* Sakai, 1999c; *Sergio* Manning & Lemaitre, 1994 [sensu nov.]; *Thailandcallichirus* gen. nov.; *Tirmizicallichirus* gen. nov.)
4. Callianopsidae Manning & Felder, 1991
    i. Callianopsinae Manning & Felder, 1991 (genera *Callianopsis* De Saint Laurent, 1973; *Pleurocalliax* gen. nov.)
    ii. Neocallianopsinae subfam. nov. (genus *Neocallianopsis* gen. nov.)
5. Ctenochelidae Manning & Felder, 1991 (genus *Ctenocheles* Kishinouye, 1926)
6. Eucalliacidae Manning & Felder, 1991
    i. Calliapaguropinae Sakai, 1999c (genus *Calliapagurops* De Saint Laurent, 1973)
    ii. Eucalliacinae Manning & Felder, 1991 (genera *Andamancalliax* gen. nov.; *Calliax* De Saint Laurent, 1973; *Calliaxina* Ngoc-Ho, 2003 [sensu nov.]; *Eucalliax* Manning & Felder, 1991; *Eucalliaxiopsis* gen. nov.; *Paraglypturus* Türkay & Sakai, 1995; *Pseudocalliax* gen. nov.)
7. Gourretiidae Sakai, 1999a (genera *Dawsonius* Manning & Felder, 1991; *Gourretia* De Saint Laurent, 1973; *Laurentgourretia* Sakai,

2004b; *Paracalliax* De Saint Laurent, 1979; *Paragourretia* Sakai, 2004b)

8. Lipkecallianassidae Sakai, 2005b (new status) (genus *Lipkecallianassa* Sakai, 2002)
9. Pseudogourretiidae Sakai, 2005b (new status) (genus *Pseudogourretia* Sakai, 2005b)
10. Thomassiniidae De Saint Laurent, 1979 (genera *Crosniera* Kensley & Heard, 1991; *Garyia* gen. nov.; *Heardaxius* gen. nov.; *Mictaxius* Kensley & Heard, 1991; *Thomassinia* De Saint Laurent, 1979)

KEY TO THE FAMILIES OF THE SUPERFAMILY CALLIANASSOIDEA

1 – Maxilla 2 scaphognathite with posterior whip ..... Thomassiniidae
– Maxilla 2 scaphognathite without posterior whip 2

2 – Carapace with cardiac sulcus(i) 3
– Carapace without cardiac sulcus 5

3 – Mxp3 propodus slender ..... Anacalliacidae
– Mxp3 propodus broadened 4

4 – Uropodal exopod without dorsal plate ..... Bathycalliacidae
– Uropodal exopod with dorsal plate ..... Eucalliacidae

5 – Fingers of larger cheliped elongate and pectinate ..... Ctenochelidae
– Fingers of larger cheliped neither elongate nor pectinate 6

6 – P4 elongate, overreaching P2 ..... Lipkecallianassidae
– P4 elongate, not overreaching P2 7

7 – Pleurobranchs present on Ps2-4 ..... Pseudogourretiidae
– Pleurobranchs absent 8

8 – Uropodal exopod with dorsal plate ..... Callianassidae
– Uropodal exopod without dorsal plate 9

9 – Mxp3 dactylus ovate or subovate ..... Callianopsidae
– Mxp3 dactylus digitiform ..... Gourretiidae

FAMILY ANACALLIACIDAE MANNING & FELDER, 1991

Anacalliinae Manning & Felder, 1991: 786 [misspelling for Anacalliacinae].

Diagnosis. — Rostrum triangular, with rostral carina. Carapace with dorsal oval, cardiac prominence, and linea thalassinica, but without cardiac sulcus. Eyestalks dorsoventrally flattened and contiguous. A2 scaphocerite small. Mxp3 ischium-merus pediform, without meral distal spine; propodus subrectangular; and dactylus digitiform; exopod absent. P1 chelate, unequal in size and dissimilar in shape, lacking meral hook in both chelipeds. P2 chelate. P3 propodus broadened. P4 subchelate. P5 chelate. Abdominal somite 6 lacking lateral projections. Male Plp1 uniramous and bisegmented. Male Plp2 (fig. 63A, B, C) biramous, endopod distally bearing distinct appendix masculina and small appendix, or only appendix interna. Uropodal exopod with lateral notch.

Remarks. — The family Anacalliacidae Manning & Felder, 1991 is similar to Callianassidae Dana, 1852a, because in both families the carapace bears a dorsal oval and Mxp3 propodus and dactylus are slender. However, they are different in that in Anacalliacidae the carapace bears a rostral carina, whereas in the Callianassidae the carapace bears no rostral carina.

The Anacalliacidae include three genera, *Anacalliax*, *Anacalliaopsis* gen. nov., and *Capecalliax* gen. nov. In *Anacalliax* the telson is wider than long and slightly convergent posteriorly, bearing a median concavity on the rounded posterior margin, the male Plp1 is uniramous and bisegmented, and the distal segment is expanded distally with the complex distal margin as described and figured by Biffar (1971b: 232, fig. 2l), though my present figure (fig. 63A) is drawn from another direction. In *Anacalliaopsis*, the telson is slightly wider than long, trapezoid, and convergent toward the almost straight posterior margin, and the male Plp1 is uniramous and bisegmented and chelate distally. In *Capecalliax* the telson is wider than long, lateral margins convex, and posterior margin broadly concave, the male Plp1 is uniramous and bisegmented, and the distal segment is tapering distally.

Type genus. — *Anacalliax* De Saint Laurent, 1973.

Genera included. — *Anacalliaopsis* gen. nov.; *Anacalliax* De Saint Laurent, 1973; *Capecalliax* gen. nov.

KEY TO THE GENERA OF THE FAMILY ANACALLIACIDAE

1 – Telson wider than long, posterior margin straight; male Plp1 uniramous and bisegmented, distal segment chelate distally ..... *Anacalliaopsis* gen. nov.
– Telson wider than long, posterior margin concave 2

2 – Male Plp1 uniramous and bisegmented, distal segment expanded distally ... *Anacalliax*
– Male Plp1 uniramous and bisegmented, distal segment tapering distally ..... *Capecalliax* gen. nov.

Genus **Anacalliaopsis** gen. nov.

Diagnosis. — Rostrum with rostral carina; carapace with dorsal oval. A1 peduncle reaching distal end of A2 penultimate segment. Mxp3 ischium-merus pediform, propodus subrectangular, and dactylus digitiform; exopod absent. Male Plp1 uniramous and bisegmented, distal segment chelate distally; male Plp2 biramous, endopod bearing mesiodistally appendices interna and masculina; male Plps3-5 similar, and larger than and different from Plp2, endopods with stubby appendix interna. Telson slightly wider than long, trapezoid, and almost straight on posterior margin. Uropodal exopod broad, with lateral notch.

Type species. — *Callianassa agassizi* Biffar, 1971b, by present designation and monotypy. Gender of generic name, *Anacalliaopsis*, feminine.

Species included. — *Anacalliaopsis agassizi* (Biffar, 1971b).

Etymology. — A Greek suffix "opsis", meaning "appearance" is added to the generic name *Anacalliax*, from which the new genus is different, though in gross appearance it is similar to that genus.

Anacalliaopsis agassizi (Biffar, 1971)

Callianassa agassizi Biffar, 1971b: 233, fig. 3.

Anacalliax agassizi — Manning, 1987: 397; Manning & Felder, 1991: 787 (list); Blanco Rambla, 1995: 61-62, figs. 9-10; Sakai, 1999c: 127; Sakai, 2005b: 211; Tudge et al., 2000: 142.

Diagnosis. — Rostrum spinous, with rostral carina. Carapace with dorsal oval and cardiac prominence. Mxp3 ischium-merus pediform; propodus subrectangular; dactylus digitiform; exopod absent. P1 unequal. Male Plp1 uniramous and bisegmented, distal segment chelate distally; male Plp2 biramous, endopod bearing mesiodistally appendices interna and masculina. Telson slightly wider than long, widest proximally, and trapezoid, bearing small proximal lobe on lateral margin. Uropodal exopod with lateral notch. [Cf. Biffar, 1971b: 233, fig. 3f, k, l, m.]

Type locality. — Cumana, Venezuela.

Distribution. — Only known from the type locality.

Genus **Anacalliax** De Saint Laurent, 1973

Anacalliax De Saint Laurent, 1973: 515; Manning, 1987: 397; Manning & Felder, 1991: 786, figs. 2-3, 17; Sakai, 1999c: 126; Sakai, 2005b: 208.

Diagnosis. — Rostrum with rostral carina; carapace with dorsal oval. A1 peduncle slightly overreaching A2 penultimate segment. Mxp3 ischium-merus pediform; propodus subrectangular; and dactylus digitiform; exopod absent. Male Plp1 uniramous and bisegmented, distal segment expanded distally, with complex distal margin; male Plp2 biramous, endopod bearing mesiodistally appendices interna and masculina; male Plps3-5 similar, and larger than and different from Plp2, endopods with stubby appendix interna. Telson slightly wider than long, convergent posteriorly, posterior margin with median concavity. Uropodal exopod with lateral notch.

Type species. — *Callianassa argentinensis* Biffar, 1971b, by original designation and monotypy. The gender of the generic name, *Anacalliax*, is feminine.

Species included. — *Anacalliax argentinensis* (Biffar, 1971b).

Anacalliax argentinensis (Biffar, 1971) (fig. 63A-C)

Callianassa argentinensis Biffar, 1971b: 229, fig. 2.

Anacalliax argentinensis — Boschi, 1979: 137; Manning, 1987: 397 (list); Manning & Felder, 1991: 787 (list), figs. 2, 3, 17; Sakai, 1999c: 127; Tudge et al., 2000: 142 (list); Sakai, 2005b: 211.

Material examined. — USNM 133056, paratype, male (TL/CL, 12.0/4.3 mm), "Enfondedoarena" [= En fondo de arena = deep [in] sand bottom], Bajo de Los Huesos, Argentina, South Atlantic, 43°15′S 64°54′W, 13 m, 26.vi.1963, det T. Biffar.

Diagnosis. — Rostrum with rostral carina. Carapace with dorsal oval and cardiac prominence. Mxp3 ischium-merus pediform; propodus subrectangular; dactylus digitiform; exopod absent. Male Plp1 uniramous and bisegmented, distal segment expanded distally, with complex distal margin; male Plp2 (fig. 63A-C) biramous, endopod elongate, bearing mesiodistally pestle-shaped appendix masculina and small appendix interna. Telson slightly wider than long, convex on lateral margins, and convergent toward posterior margin with median concavity. Uropodal exopod with lateral notch. [Cf. Biffar, 1971b: 229, fig. 2g, k, I, m.]

Type locality. — Sandy beach on the north coast of Isla del Rey, Rio Deseado, Province of Santa Cruz, Argentina, 47°42′S 66°W.

Distribution. — Only known from the type locality.

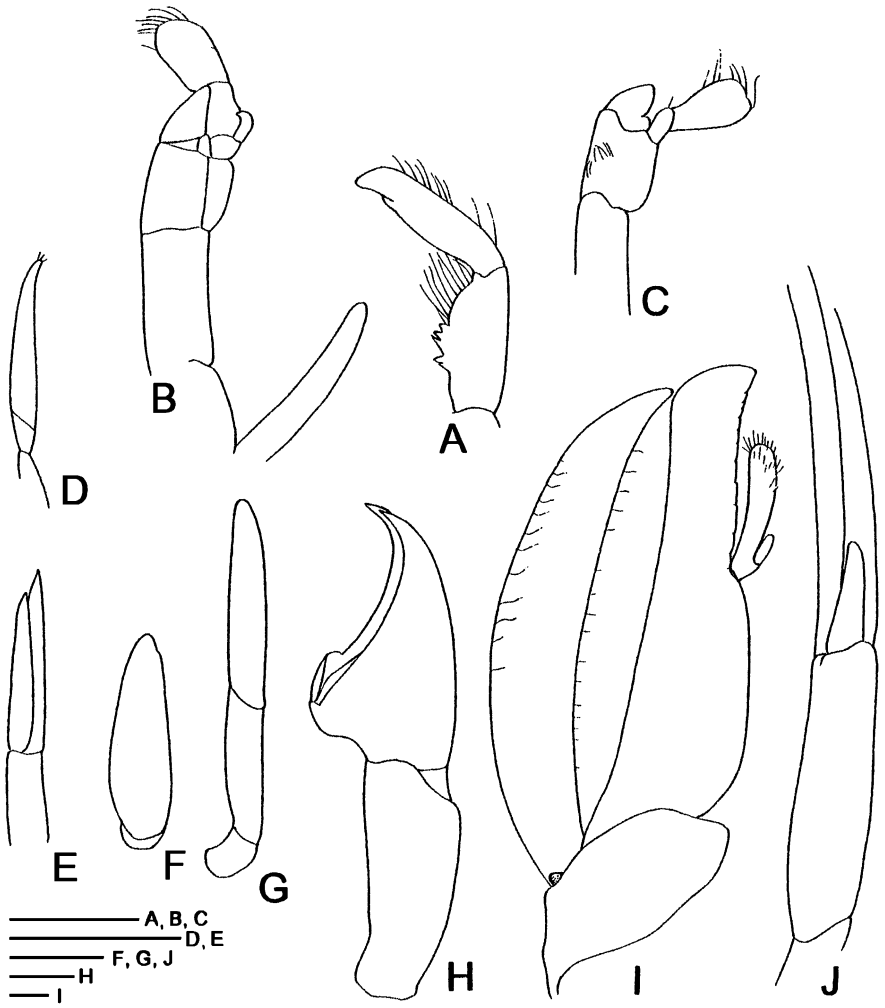

Fig. 63. *Anacalliax argentinensis* (Biffar, 1971), *Cheramus gaucho* (Rodrigues & Manning, 1992) (syn. *Poti gaucho*), *Notiax brachyophthalma* (A. Milne-Edwards, 1870), and *Callianopsis goniophthalma* (Rathbun, 1902). A, D, F, H, male Plp1; B, C, E, G, I, male Plp2, J, male Plp3. A-C, *Anacalliax argentinensis*, USNM 133056, paratype, male (TL/CL, 12.0/4.3 mm), "En fondo de arena" [= in/on sandy bottom], Bajo de Los Huesos, Argentina, South Atlantic, 43°15′S 64°54′W, 13 m; D, E, *Cheramus gaucho*, USNM 256376, paratype, male (CL, 4.0 mm), off Chui, near the border between Brazil and Uruguay, 33°43′S 51°13′W, 150 m; F, G, *Notiax brachyophthalma*, USNM 252309, 1 male (TL/CL, 67.0/19.0 mm), River Maullin estuary, Lalanguithue, Chili; H, I, J, *Callianopsis goniophthalma* (Rathbun, 1902), USNM 25238, type, male, damaged, off Point Conception, California, 278 fms [508 m].

Genus **Capecalliax** gen. nov.

Diagnosis. — Rostrum triangular with rostral carina. Carapace with dorsal oval and cardiac prominence; cardiac sulcus absent. Eyestalks flattened and contiguous. Abdominal somite 6 lacking lateral projections. A2 scaphocerite small. Mxp3 ischium-merus pediform; propodus subrectangular; and dactylus digitiform; exopod absent. P1 chelate, unequal in size and dissimilar in shape, lacking meral hook in both chelipeds. P2 chelate. P3 propodus broadened. P4 subchelate. P5 chelate. Male Plp1 uniramous and bisegmented, distal segment tapering distally to form slender triangle; male Plp2 biramous, endopod bearing mesiodistally appendices interna and masculina. Telson wider than long, convex on lateral margins, and broadly concave on posterior margin. Uropodal exopod with lateral notch.

Remarks. — Sakai (1999c, 2005b) redescribed *Anacalliax pixii* (Kensley, 1975), which had been included in *Callianassa* as *C. pixii* Kensley, 1975. However, it has turned out that *A. pixii* is different from the type species of *Anacalliax*, *A. argentinensis*, because in *A. pixii* the male Plp1 is uniramous and bisegmented, and the distal segment is tapering distally to form a slender triangle, the telson is distinctly wider than long, the lateral margins are convex, and the posterior margin is broadly concave; whereas in *A. argentinensis* the male Plp1 is uniramous and bisegmented, but the distal segment is expanded distally with a complex distal margin, the telson is slightly wider than long, the lateral margins are convergent posteriorly, and the posterior margin bears a small median concavity. Therefore, *A. pixii* is excluded from *Anacalliax* and reclassified under the new genus *Capecalliax* gen. nov. in the family Anacalliacidae, as *Capecalliax pixii*.

Type species. — *Callianassa pixii* Kensley, 1975, by present designation and monotypy. The gender of the generic name, *Capecalliax*, is feminine.

Species included. — *Capecalliax pixii* (Kensley, 1975).

Etymology. — The new generic name is a combination of *Calliax* and the type locality, the Cape Province, South Africa.

Capecalliax pixii (Kensley, 1975)

Callianassa pixii Kensley, 1975: 53, figs. 4A-H, 5A-K; Tudge et al., 2000: 143.
Anacalliax pixii — Sakai, 1999c: 127; Sakai, 2005b: 210.

Diagnosis. — Rostrum triangular, with rostral carina. Carapace with dorsal oval. A1 peduncle about as long as A2 peduncle. Mxp3 ischium-merus pediform; propodus subrectangular; dactylus digitiform; exopod absent. Male

Plp1 uniramous and bisegmented, distal segment tapering to form slender triangle; male Plp2 biramous, endopod bearing mesiodistally appendices interna and masculina. Telson wider than long, lateral margins convex, and posterior margin broadly concave. Uropodal exopod with lateral notch. [Adapted from Kensley, 1975.]

Type locality. — Kowie River estuary, Cape Province, South Africa.

Distribution. — Only known from the type locality.

FAMILY BATHYCALLIACIDAE SAKAI & TÜRKAY, 1999

Bathycalliacinae Sakai & Türkay, 1999: 204.

Diagnosis. — Rostrum triangular, without rostral carina. Carapace with cardiac prominence and linea thalassinica, with or without narrow dorsomedian carina and two transverse cardiac sulci, and without dorsal oval. Eyestalks flattened, rhombic, and contiguous; cornea absent. Abdominal somite 6 without lateral projections. A2 peduncle longer than A1 peduncle, scaphocerite developed as a small process. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus subpediform; propodus broadened; dactylus subtriangular; exopod rudimentary, or absent. P1 chelate, unequal in size, and dissimilar in shape, lacking meral hook in both chelipeds. P2 chelate, fingers longer than palm. P3 propodus broadened; epipods present on Mxp3 and Ps1-4. Male Plp1 present or absent. Male Plp2 biramous, endopod bearing distally appendix masculina with marginal setae, and mesiodistally small and slender appendix interna, or only with appendix interna; and exopod reaching distal end of appendix masculina. Male Plps3-5 biramous and foliaceous, endopods with appendix interna. Telson longer than wide, and rounded or straight on posterior margin without median spine. Uropodal exopod with or without dorsal plate in proximal half.

Subfamilies included. — Bathycalliacinae Sakai & Türkay, 1999; Vulcanocalliacinae Dworschak & Cunha, 2007.

KEY TO THE SUBFAMILIES OF THE FAMILY BATHYCALLIACIDAE

1 – Two transverse cardiac sulci and postcervical carina present . . . . . Bathycalliacinae
– Transverse cardiac sulcus and postcervical carina absent . . . . . Vulcanocalliacinae

Subfamily BATHYCALLIACINAE Sakai & Türkay, 1999

Bathycalliacinae Sakai & Türkay, 1999: 204; Sakai, 2005b: 213.

Diagnosis. — Rostrum triangular, without rostral carina. Carapace with narrow dorsomedian carina, cardiac prominence, two transverse cardiac sulci, and linea thalassinica, but without dorsal oval. Eyestalks flattened, rhombic, and contiguous; cornea absent. Abdominal somite 6 without lateral projections. A2 peduncle longer than A1 peduncle, scaphocerite developed as a

small process. Mxp3 ischium-merus subpediform; propodus broadened; dactylus subtriangular; exopod rudimentary. P1 chelate, unequal in size, and dissimilar in shape, lacking meral hook in both chelipeds. P2 chelate, fingers longer than palm. P3 propodus broadened; epipods present on Mxp3 and Ps1-4. Male Plp1 absent. Male Plp2 biramous, endopod bearing distally appendix masculina with marginal setae, and mesiodistally small and narrow appendix interna, and exopod reaching distal end of appendix masculina. Plps3-5 foliaceous and biramous, endopods with appendix interna. Uropodal exopod bearing neither dorsal plate nor lateral notch.

Remarks. — Dworschak & Cunha (2007) mentioned that "*Vulcanocalliax arutyunovi* n. gen. & n. sp. is most closely related to *Bathycalliax geomar*" and "It should be noted that only the male holotype of *B. geomar* (SMF 23866) has Plp1 as descibed and figured by Sakai & Türkay (1999: 208, fig. 1). The male paratype (SMF 23867) lacks any signs of Plp1." However, it has already turned out by the present re-examination of the type specimens of *B. geomar* Sakai & Türkay, 1999 (SMF 23866, holotype, female (not male), TL/CL 57.0/13.0 mm; 44°40.146′N 125°06.685′E, 625 m, R/V "Sonne"; SMF 23867, allotype (not paratype), male, Aleutian subduction-zone off Oregon, U.S.A., 44°40.193′N 125°06.605′W, 627 m) that the holotype of *B. geomar* is not a male, but a female, and the other male specimen is not the paratype but the allotype. Considering that they described, as cited above, that the male holotype of *B. geomar* has the male Plp1, one of the authors may have failed to make a careful examination of the type specimens of *B. geomar*, and erroneously defined the female holotype as a male, and the other male specimen as the paratype. The fact is, that there are distinct differences between the two species: in *B. geomar* the male Plp1 is absent; the male Plp2 is biramous, the endopod bears distally an appendix masculina with marginal setae, and mesiodistally a small and narrow appendix interna; and the exopod reaches the distal end of the appendix masculina; whereas in *V. arutyunovi* the male Plp1 is present, vestigial and bisegmented; the male Plp2 is biramous, and the endopod bears an appendix interna mesiomedially, but no appendix masculina.

They (Dworschak & Cunha, 2007) also mentioned that the subfamily Bathycalliacinae shares unique characteristics with the subfamily Vulcanocalliacinae as follows: epipods are present on Mxp3 and Ps1-4, and abdominal somite 1 bears anterolateral projections. However, those two subfamilies are clearly different from each other as follows: in the type species of *Bathycalliax*, *B. geomar*, the carapace bears two cardiac sulci and a dorsomedian carina, the male Plp1 is absent, and the uropodal exopod lacks a dorsal plate; whereas in

the type species of *Vulcanocalliax*, *V. arutyunovi*, the carapace bears neither cardiac sulci nor a dorsomedian carina, the male Plp1 is vestigial and bisegmented, and the uropodal exopod bears a dorsal plate in the proximal half. [Cf. Dworschak & Cunha, 2007, fig. 1g.]

Type genus. — *Bathycalliax* Sakai & Türkay, 1999.

Genus included. — *Bathycalliax* Sakai & Türkay, 1999.

Genus **Bathycalliax** Sakai & Türkay, 1999

Bathycalliax Sakai & Türkay, 1999: 204.

Diagnosis. — Carapace without dorsal oval, bearing narrow dorsomedian carina originating from gastric region and extending to posterior margin of carapace; cardiac prominence with median pit; two transverse cardiac sulci present. Eyestalks rhombic and contiguous, without corneas, dorsal surfaces depressed. Maxilla 2 scaphognathite without long posterior whip. Mxp3 ischium-merus subpediform; propodus and dactylus broadened; exopod rudimentary. P1 unequal in size and dissimilar in shape. P2 chelate. P3 propodus broadened. Ps4-5 subchelate. Epipods present at each base of Mxp3 to P4. Abdominal somite 6 without lateral projections. Male Plp1 absent; male Plp2 biramous, endopod bearing distally appendix masculina with marginal setae, and mesiodistally small and slender appendix interna, and exopod reaching distal end of appendix masculina; male Plps3-5 biramous, endopod with appendix interna. Uropodal exopod oval, lacking dorsal plate. [Adapted from Sakai & Türkay, 1999.]

Type species. — *Bathycalliax geomar* Sakai & Türkay, 1999, by original designation. The gender of the name, *Bathycalliax*, is feminine.

Species included. — *Bathycalliax geomar* Sakai & Türkay, 1999.

Bathycalliax geomar Sakai & Türkay, 1999

Bathycalliax geomar Sakai & Türkay, 1999: 204, 1-3 figs., 1 tab.

Material examined. — SFM 23867, allotype, male (TL/CL, 48.0/11.5 mm) So-109/119 (44°4.193′N 125°06.605′W), Aleutian subduction-zone off Oregon, U.S.A., 627 m, GTV, 25.vi.1996, leg. R/V “Sonne”.

Diagnosis. — Carapace without dorsal oval, but with narrow dorsomedian carina originating from gastric region and extending to posterior margin of carapace, cardiac prominence with median pit, and two cardiac sulci. Eyestalks flattened, cornea absent. Mxp3 ischium-merus subrectangular; propodus subrectangular; dactylus subtriangular; exopod rudimentary. P1 unequal. Telson subquadrate, and posterior margin truncate. Uropodal exopod ovate, lacking dorsal plate. [Cf. Sakai & Türkay, 1999: 203, figs. 1f, g.]

Remarks. — The holotype, SFM 23866, of the present species, *Bathycalliax geomar*, which was described in 1999 (Sakai & Türkay, 1999) as a male, has turned out to be a female, because the Plp1 is uniramous, consisting of a proximal segment and a flagellum.

Type locality. — Aleutian subduction-zone off Oregon, U.S.A., 44°40.146′N 125°06.685′W, 625 m.

Distribution. — Only known from the type locality.

Subfamily VULCANOCALLIACINAE Dworschak & Cunha, 2007

Vulcanocalliacinae Dworschak & Cunha, 2007: 37.

Diagnosis. — Rostrum triangular. Carapace with cardiac promincence and linea thalassinica, but without dorsal oval, low dorsomedian carina, and transverse cardiac sulcus. Eyestalks flattened and contiguous; cornea absent. Mxp3 ischium-merus subrectangular, lacking meral tooth; propodus subrectangular; dactylus subtriangular; exopod absent. P1 chelate, unequal in size, and dissimilar in shape, lacking meral hook in both chelipeds. Epipods present on Mxp3 and Ps1-4. Male Plp1 vestigial and bisegmented. Male Plp2 biramous, endopod bearing appendix interna with hooklets distally, but without appendix masculina. Male Plps3-5 biramous and foliaceous, endopods bearing appendix interna. Telson longer than wide, slightly narrowing posteriorly, and almost straight on posterior margin. Uropodal exopod elevated to form dorsal plate in lateral half. [Adapted from Dworschak & Cunha, 2007.]

Type genus. — *Vulcanocalliax* Dworschak & Cunha, 2007, as the nominate genus.

Genus included. — Only the genus *Vulcanocalliax* Dworschak & Cunha, 2007.

Genus **Vulcanocalliax** Dworschak & Cunha, 2007

Vulcanocalliax Dworschak & Cunha, 2007: 37.

Diagnosis. — Rostrum triangular. Carapace with cardiac prominence, but without dorsal oval, low dorsal carina, cardiac prominence, and transverse cardiac sulci. Eyestalks flattened and contiguous; cornea absent. Abdominal somite 6 without lateral projections. A2 peduncle longer than that of A1, scaphocerite developed as a small process. Mxp3 ischium-merus subrectangular, lacking meral tooth; propodus subrectangular; dactylus subtriangular. P1 chelate, unequal in size, and dissimilar in shape, lacking meral hook in both

chelipeds. P2 chelate. P3 propodus broadened. Male Plp1 vestigial and bisegmented. Male Plp2 biramous, endopod bearing appendix interna with small hooklets distally, but no appendix masculina. Male Plps3-5 biramous and foliaceous, endopods bearing appendix interna. Uropodal endopod oval. Uropodal exopod oval, and elevated in lateral half to form dorsal plate, the edge of which is lined submarginally with short, thick spiniform setae and simple setae, curved and descending to distal margin, with anterior part of plate depressed, and lacking lateral notch. [Adapted from Dworschak & Cunha, 2007.]

Type species. — *Vulcanocalliax arutyunovi* Dworschak & Cunha, 2007. The gender of the generic name, *Vulcanocalliax*, is feminine.

Species included. — Only the type species, *Vulcanocalliax arutyunovi* Dworschak & Cunha, 2007.

Vulcanocalliax arutyunovi Dworschak & Cunha, 2007

Vulcanocalliax arutyunovi Dworschak & Cunha, 2007: 37, figs. 1-5, table 1; Robles et al., 2009: 317.

Type locality. — Atlantic Ocean, Gulf of Cádiz, Captain Arutyuno mud volcano, 35°39.805′N 07°19.997′W, 1339 m.

Distribution. — Only known from the type locality.

FAMILY CALLIANASSIDAE DANA, 1852

Callianassidae Dana, 1852a: 12, 14, 19; Dana, 1852b: 508; ICZN, 1987: 9; Manning & Felder, 1991: 766; Poore, 1994: 101; Sakai, 1999c: 7; Sakai, 2005b: 9; Sakai & Sawada, 2006: 1357; Poore, 2007: 168.

Cheraminae Manning & Felder, 1991: 780; Tudge et al., 2000: 136.

Diagnosis. — Rostrum either weakly or well developed, and unarmed laterally, lacking rostral carina. Carapace with dorsal oval and linea thalassinica; cardiac prominence and cardiac sulcus present or absent. Eyestalks usually flattened. A2 scaphocerite reduced. Median tooth of urocardiac ossicle simple, with smooth posterior surface. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus pediform, subpediform, suboperculiform, or operculiform; propodus slender or broadened; and dactylus digitiform or ovate. P1 chelate, equal, subequal, or unequal in size, and similar or dissimilar in shape; larger cheliped with or without proximal meral hook, palm rectangular; and fingers moderate in length and not pectinate. P2 chelate. P3 propodus often broadened to form heel-shape, or rectangular. Abdominal somites 3-5 with tuft of setae laterally. Male Plp1 present or absent; male Plp2 present or absent, when present, endopod bearing both appendices interna and masculina, either appendix interna or appendix masculina [or neither appendices interna nor masculina]. Male Plps1-2, when present, smaller than Plps3-5. Female Plp1 uniramous; female Plps2-5 biramous and similar in shape, endopods with or without appendix interna. Uropodal exopod with dorsal plate.

Remarks. — In Manning & Felder's (1991) classification, three subfamilies (Anacalliacinae, Callianopsinae, and Ctenochelinae, in which the genus *Gourretia* was included) were included in the Ctenochelidae, though *Gourretia* was later elevated to subfamily level as Gourretiinae by Sakai (1999a). However, the Anacalliacinae and Callianopsinae are not included in the Ctenochelidae, because they bear a dorsal oval on the carapace, whereas the Ctenochelinae bear no dorsal oval on the carapace. In the present study the Anacalliacinae are elevated to family level as Anacalliacidae, the Callianopsinae as Callianopsidae, and the Gourretiinae as Gourretiidae.

The subfamily Cheraminae was defined as "Carapace with dorsal oval. Mxp3 pediform, propodus and dactylus slender. Male Plps3-5 with finger-like

appendices internae" (Manning & Felder, 1991: 780), and the subfamily Callianassinae was defined as "Carapace with dorsal oval. Mxp3 pediform, subpediform, or operculiform, propodus and dactylus slender, Plps3-5 with stubby appendices internae" (Manning & Felder, 1991: 767), which means that the difference between Cheraminae and Callianassinae is only whether or not the Plps3-5 appendices internae are finger-like (in Cheraminae) or stubby (in Callianassinae). However, such a difference is not characteristic enough to make a clear distinction between the two subfamilies, because the present examination of the specimens of those subfamilies shows that Plps3-5 appendices internae vary in form from stubby to finger-like, and are not always distinguished by the definition of finger-like or stubby, for example, in *Trypaea costaricensis* (Sakai, 2005b), *Trypaea brevirostris* (Sakai, 2002), *Trypaea tabogensis* (Sakai, 2005b), *Trypaea lewtonae* (Ngoc-Ho, 1994), *Trypaea amplimaxilla* (Sakai, 2002), *Trypaea nieli* (Sakai, 2002), and *Trypaea thailandica* (Sakai, 2005b), all of which are included in the Callianassinae, the Plps3-5 endopods bear a finger-like, projecting appendix interna, though *Trypaea* was defined by Manning & Felder as "Plps3-5 are foliaceous and biramous in both sexes, with stubby, projecting appendices internae" (Manning & Felder, 1991: 774). Therefore, the Cheraminae are not differentiated from the Callianassinae, so that Cheraminae is safely considered synonymous with Callianassinae.

According to Manning & Felder (1991: 767-781), the subfamily Callianassinae is based on the type genus *Callianassa* Leach, 1814, which is characterized by "Carapace with dorsal oval. Mxp3 pediform, sub-pediform, or operculiform, propodus and dactylus slender. Plps3-5 with stubby appendices internae". The subfamily Cheraminae is based on the type genus *Cheramus* Bate, 1888, which is characterized by "Carapace with dorsal oval. Mxp3 pediform, propodus and dactylus slender. Plps3-5 with finger-like appendices internae". The subfamily Callichirinae sensu nov. is based on the type genus *Callichirus* Stimpson, 1886, which is characterized by "Carapace with dorsal oval. Mxp3 subpediform or operculiform, propodus ovate, dactylus slender. Plps3-5 with stubby appendices internae". The subfamily Eucalliacinae, finally, is based on the type genus *Eucalliax*, which is characterized by "Carapace lacking dorsal oval. Mxp3 propodus and dactylus ovate. Plps3-5 with finger-like appendices internae". However, it is hardly possible to distinguish the four subfamilies from one another by the characteristics shown by Manning & Felder (1991), because such characteristics are not always decisive in the classification, as follows. (1) Mxp3 ischium-merus is pediform, subpediform, or operculiform (subfamilies Callianassinae, Callichirinae sensu nov.,

and Eucalliacinae); (2) Mxp3 propodus and dactylus are slender (subfamily Callianassinae); (3) Mxp3 propodus is broadened, and Mxp3 dactylus is subtriangular or ovate (subfamilies Callichirinae sensu nov. and Eucalliacinae). This confused system was analysed in the world-wide revision of the Callianassidae by Sakai (Sakai, 1999c, 2005b), who divided the Callianassidae into two groups. The first group, in which the carapace bears a dorsal oval, comprised five subfamilies (Callianassinae, Callichirinae sensu nov., Eucalliacinae, Calliapaguropinae, and Anacalliacinae), and the second group, in which the carapace lacks a dorsal oval, included three subfamilies (Lipkecallianassinae, Bathycalliacinae, and Paracalliacinae). The Callianassinae included only one genus, *Callianassa*, because in the Callianassinae the Mxp3 ischium-merus, P3 propodus, Plps3-5 appendices internae, and uropodal exopod have a variety of intermediate forms, which made it difficult to determine the taxonomic positions of these callianassid species. In the present revision, the Callianassinae are classified into 6 genera by the types of Plps1-2. In the first group, Plps1-2 are absent (genus *Gilvossius*); in the second group Plp1 is present, but Plp2 is absent (genus *Trypaea*); in the third group Plps1-2 are present (genera *Callianassa*, *Cheramus*, and *Notiax*); and in the fourth group Plp1 is present and Plp2 is rudimentary (*Cheramoides* gen. nov.). As I mentioned, male Plps1-2 are considered morphologically important in the classification of the callianassid genera, and are also considered to have no relation with other morphological characteristics such as the forms of Mxp3 and telson (Sakai, 2005b: 24-25).

The genus *Callianassa* Dana, 1852a is distinctly different from the other genera included in the subfamily Callianassinae (table IX). In the type species

TABLE IX
Features of male Plps1-2 in the genera of the subfamily Callianassinae

	Male Plp1	Male Plp2
Callianassa sensu nov.	uniramous, bisegmented	uniramous, protopod rarely protruded short distolaterally
Cheramus sensu nov.	absent or uniramous, bisegmented	biramous, slender exopod and endopod
Cheramoides gen. nov.	uniramous, bisegmented	rudimentary and hooklet-shaped
Gilvossius sensu nov.	absent	absent
Notiax sensu nov.	uniramous, unsegmented, or bisegmented	uniramous, unsegmented, or bisegmented
Trypaea sensu nov.	uniramous, unsegmented, bisegmented, or trisegmented	absent

of *Callianassa*, *C. subterranea* (Montagu, 1808), the male Plp1 is uniramous and bisegmented, the male Plp2 is uniramous, the protopod is rarely protruded short distolaterally, whereas in the other genera of the Callianassinae, male Plps1-2 are varied in shape, and are different from those of *Callianassa* as follows. In *Cheramus* the male Plp1 is absent or uniramous and bisegmented; male Plp2 is biramous, bearing a slender exopod and endopod. In *Notiax* the male Plp1 is uni- or biramous; the male Plp2 is uniramous, and unsegmented or bisegmented. In *Cheramoides* gen. nov. the male Plp1 is uniramous and bisegmented; the male Plp2 is rudimentary. In *Trypaea* the male Plp1 is uni-, bi-, or tri-segmented, and the male Plp2 is absent. In *Gilvossius* male Plps1-2 are absent.

The genus *Podocallichirus* Sakai, 1999c was established on the base of the type species *Podocallichirus madagassus* (Lenz & Richters, 1881), and included *P. balssi* (Monod, 1933); *P. foresti* (Le Loeuff & Intès, 1974); *P. guineensis* (De Man, 1928); *P. tenuimanus* (De Saint Laurent & Le Loeuff, 1979); *P. gilchristi* (Barnard, 1946); *P. madagassus* (Lenz & Richters, 1881); *P. masoomi* (Tirmizi, 1970); and *P. tamakii* (Poore, 2000). However, their male Plps1-2 are too varied in form to be integrated in one genus *Podocallichirus*, so that in the present revision, those species which were included in *Podocallichirus* are grouped into 6 genera, and reclassified as follows. *Podocallichirus*, based on *P. madagassus*, in which the male Plp1 is uniramous and bisegmented, and the distal segment is short and chelate distally; the male Plp2 is biramous, and the endopod bears mesiodistally a fusiform appendix masculina with a small appendix interna in its middle. *Balsscallichirus* gen. nov., based on *P. balssi*, in which the male Plp1 is uniramous and bisegmented; and the male Plp2 is uniramous, lacking appendices masculina and interna. *Barnardcallichirus* gen. nov., based on *P. gilchristi*, in which the male Plp1 is uniramous and bisegmented, and the distal segment is longitudinally furrowed, mesial part rounded distally, and lateral part sharply protruded distally over the mesial part; and the male Plp2 is uniramous and unsegmented, lacking appendices masculina and interna. *Forestcallichirus* gen. nov. based on *P. foresti*, in which the male Plp1 is uniramous and bisegmented, and the distal segment is longer than the proximal and w-shaped distally; and the male Plp2 is uniramous and obscurely bisegmented. *Grynaminna* Poore, 2000, based on *G. tamakii* Poore, 2000, in which the male Plp1 is uniramous and bisegmented, and the distal segment is chelate distally; the male Plp2 is biramous, and the endopod distally bears a subsquare appendix masculina with setae distally and a small appendix interna mesiomedially. *Tirmizicallichirus* gen. nov. based on

P. masoomi, in which the male Plp1 is uniramous and bisegmented, and the distal segment is obtuse distally; the male Plp2 is biramous, and the endopod is obtuse distally, bearing no appendices interna or masculina.

In this revision, the new way of classification by applying the difference in shape of the Mxp3 propodus, and the status of male Plps1-2, has made it possible to distinguish the subfamilies from each other more clearly than ever. In the present classification, the family Callianassidae comprises two subfamilies (Callianassinae and Callichirinae sensu nov.), the Callianassinae includes 6 genera with 89 species and 3 spp. inq., and Callichirinae sensu nov. includes 16 genera with 78 species and 1 sp. inquirenda.

Nominate subfamily. — Callianassinae Dana, 1852a.

Subfamilies included. — Callianassinae Dana, 1852a; Callichirinae Manning & Felder, 1991 (sensu nov.).

KEY TO THE SUBFAMILIES OF THE FAMILY CALLIANASSIDAE

1 – Mxp3 propodus slender, subovate in shape; male Plp1 uniramous and simple distally, or absent; Plp2 uniramous or biramous, endopod without appendix interna or appendix masculina, or absent . . . . . Callianassinae

– Mxp3 propodus broadened, subquadrate in shape; male Plp1 uniramous and usually chelate distally, or absent; Plp2 uniramous or biramous, endopod bearing both appendices interna and masculina, either appendix interna or appendix masulina, or neither appendix interna nor appendix masculina . . . . . Callichirinae

Subfamily CALLIANASSINAE Dana, 1852 **(sensu nov.)**

Callianassinae Dana, 1852a: 10; Bouvier, 1940: 100; Balss, 1957: 1582; Băcescu, 1967: 227; De Saint Laurent, 1973: 514; De Saint Laurent, 1979: 1395; Manning & Felder, 1991: 767; Sakai, 1999c: 10.

Cheraminae Manning & Felder, 1991: 780; Tudge et al., 2000: 136. [Type genus, *Cheramus* Bate, 1888.]

Diagnosis. — Rostrum triangular, small, or obsolete, lacking rostral carina. Carapace with dorsal oval, but without cardiac prominence or cardiac sulcus. Eyestalks flattened and contiguous. Abdominal somite 6 lacking lateral projections. A2 scaphocerite developed as a small process. Mxp3 ischium-merus varying from pediform to operculiform; propodus slender, convex or straight on ventral margin; dactylus digitiform. P1 chelate, unequal or subequal in size, and similar or dissimilar in shape; larger cheliped with or without meral hook. P2 chelate. P3 propodus rhombic or rectangular. Male Plp1 present or not, when present, slender and uniramous and unsegmented, bisegmented, or trisegmented. Male Plp2 present or absent, when present, uniramous or biramous, and slender; lacking appendices interna and masculina. Plps3-5 bira-

mous and foliaceous, endopods bearing appendix interna in both sexes. Uropodal exopod with dorsal plate.

Remarks. — In the previous revision of the Callianassidae (cf. Sakai, 2005b), 10 genera from Callianassinae Dana, 1852a: *Callianassa* Leach, 1814; *Trypaea* Dana, 1852a; *Biffarius* Manning & Felder, 1991; *Neotrypaea* Manning & Felder, 1991; *Notiax* Manning & Felder, 1991; *Poti* Rodrigues & Manning, 1992; *Gilvossius* Manning & Felder, 1992; *Nihonotrypaea* Manning & Tamaki, 1998; *Necallianassa* Heard & Manning, 1998; and *Pseudobiffarius* Heard & Manning, 2000; and two genera from Cheraminae Manning & Felder, 1991: *Cheramus* Bate, 1888 and *Scallasis* Bate, 1888; were integrated into one subfamily Callianassinae, because Mxp3 ischium-merus, rostrum, and Plps1-2/3-5 (regardless of sex) are variable and often intermedate in form, which prevented a clear distinction among the genera. In the present revision, however, those genera are reclassified mainly by the types of their male Plps1-2, which are very characteristic in the genera of the Callianassinae. The classification of those genera is revised by the features of male Plps1-2, after examining the following 16 genera and one subgenus:

Callianassa Leach, 1814; *Gebios* Risso, 1822; *Gebius* Agassiz, 1846; *Mesostylus* Bronn & Roemer, 1852; *Trypaea* Dana, 1852a; *Cheramus* Bate, 1888; *Scallasis* Bate, 1888; *Trypaea* s. str. Borradaile, 1903; *Biffarius* Manning & Felder, 1991; *Gilvossius* Manning & Felder, 1991; *Neotrypaea* Manning & Felder, 1991; *Notiax* Manning & Felder, 1991; *Poti* Rodrigues & Manning, 1992b; *Nihonotrypaea* Manning & Tamaki, 1998; *Necallianassa* Heard & Manning, 1998; *Pseudobiffarius* Heard & Manning, 2000 (cf. Sakai, 1999c: 11; Sakai, 2005b: 25). As a result, the following 6 genera: *Callianassa*; *Cheramus*; *Gilvossius*; *Notiax*; *Trypaea*; and *Cheramoides* gen. nov., are admitted as valid members of the subfamily Callianassinae.

Type genus. — *Callianassa* Leach, 1814.

Genera included. — *Callianassa* sensu nov. (not Leach, 1814); *Cheramoides* gen. nov.; *Cheramus* sensu nov. (not Bate, 1888); *Gilvossius* sensu nov. (not Manning & Felder, 1992); *Notiax* sensu nov. (not Manning & Felder, 1991); and *Trypaea* sensu nov. (not Dana, 1852a).

KEY TO THE GENERA OF THE SUBFAMILY CALLIANASSINAE

1 – Male Plp2 absent 2
– Male Plp2 present 3

2 – Male Plp1 absent . . . . . *Gilvossius* (= *Pestarella*; *Paratrypaea*) sensu nov.
– Male Plp1 present, and uniramous, unsegmented, bisegmented, or tri-segmented . . . . . *Trypaea* (= *Biffarius*) sensu nov.

3 – Male Plp2 rudimentary and hooklet-shaped ..... *Cheramoides* gen. nov.
– Male Plp2 uniramous or biramous 4

4 – Mxp3 ischium-merus oval ..... *Notiax* (= *Rayllianassa*) sensu nov.
– Mxp3 ischium-merus subpediform 5

5 – Male Plp2 biramous, endopod and exopod slender ..... *Cheramus* sensu nov.
– Male Plp2 uniramous, protopod rarely protruded short distolaterally .....
..... *Callianassa* sensu nov.

Genus **Callianassa** Leach, 1814 **(sensu nov.)**

Callianassa Leach, 1814: 386, 400; Leach, 1816: 116; Latreille, 1817: 34; Desmarest, 1825: 205; H. Milne Edwards, 1837c: 130; H. Milne Edwards, 1838: 386; Bell, 1846: 217; Nicolet, 1849: 206; Dana, 1852a: 14; Dana, 1852b: 509; Heller, 1863: 201; Stalio, 1877: 105; Boas, 1880: 84; Ortmann, 1899: 1142; Alcock, 1901: 197; Borradaile, 1903: 544; Balss, 1914: 91; Selbie, 1914: 100; Kemp, 1915: 252; Balss, 1916: 33; Pesta, 1918: 201; Schmitt, 1921: 116; De Man, 1928b: 91; Stevens, 1928: 324; Bouvier, 1940: 100; Edmondson, 1944: 44; Barnard, 1950: 505; Vinogradov, 1950: 223; Holthuis, 1954b: 334; Hemming, 1958: 142; Williams, 1965: 100; Băcescu, 1967: 227; Biffar, 1971a: 648, figs. 1, 2; De Saint Laurent, 1973: 514; Le Loeuff & Intès, 1974: 32; De Saint Laurent & Le Loeuff, 1979: 48; ICZN, 1987: 60; Sakai, 1987a: 303; Sakai, 1988: 57; Holthuis, 1991: 239; Manning & Felder, 1991: 767, figs. 1-4, 6, 8; Poore, 1994: 102; Sakai, 1999c: 11; Felder, 2001: 441; Sakai, 2002: 488; Ngoc-Ho, 2003: 465; Sakai, 2005b: 25; Poore, 2008: 172.

Callianassa s. str., Felder, 2001: 440.

Gebios Risso, 1822: 243. [Type species: *Gebios davianus* Risso, 1822 (= junior subjective synonym of *Cancer candidus* Olivi, 1792, by monotypy). Gender of generic name, *Gebios*, feminine.]

Gebius Agassiz, 1846: 160. [Emendation of *Gebios* Risso, 1822. Gender of generic name, *Gebius*, masculine.]

Mesostylus Bronn & Roemer, 1852: 353. [Type species: *Pagurus faujasi* Desmarest, 1822, by monotypy. Gender of generic name, *Mesostylus*, masculine.]

Diagnosis. — Eyestalks depressed. Mxp3 propodus subovate and dactylus digitiform. Male Plp1 uniramous and bisegmented, and male Plp2 uniramous, protopod rarely protruded short distolaterally, lacking appendices interna and masculina; male Plps3-5 biramous, endopods with stubby, embedded appendix interna. Uropodal exopod with dorsal plate.

Remarks. — The present genus, *Callianassa* is defined by the forms of male Plps1-2.

Type species. — *Cancer* (*Astacus*) *subterraneus* Montagu, 1808, by original designation and monotypy. Gender of the generic name, *Callianassa*, feminine.

Species included. — *Callianassa subterranea* (Montagu, 1808) currently is the only known species.

Callianassa subterranea (Montagu, 1808)

Cancer (*Astacus*) *subterraneus* Montagu, 1808: 88, pl. 3 figs. 1, 2.

Callianassa subterranea — Leach, 1814: 400; Leach, 1815: 343; Leach, 1816, pl. 32; Desmarest, 1825, tab. 36, fig. 2; H. Milne Edwards, 1838: 388; Thompson, 1844: 268; Bell, 1846: 219 (not 217, misprint), fig.; White, 1847: 70; A. Milne-Edwards, 1870: 80, 101; Stalio, 1877: 106; Neumann, 1878: 34; Barrois, 1882: 24; Czerniavsky, 1884: 76, 80; Carus, 1885: 489; Giard & Bonnier, 1890: 362 (= *Gilvossius tyrrhenus* (Petagna, 1792); Ortmann, 1891: 55, pl. 1 fig. 10 (partim?) (= *Gilvossius tyrrhenus* (Petagna, 1792)); Adensamer, 1898: 620; Lagerberg, 1908: 53, pl. 1 fig. 15; Bianco, 1909: 603; Blohm, 1913: 17 (partim); Selbie, 1914: 101; Athanassopoulos, 1917: 32; Wiliamson, 1927: 445, figs. 209, 210; Perrier, R., 1929: 197; Gustafson, 1934: 14; Nobre, 1936: 121, pl. 40 fig. 101; Lutze, 1938: 170, figs. 28-51; Makarov, 1938: 62, 63 (partim); Poulsen, 1940: 229, figs. 10-12; Lutze, 1941: 34; Gordon, 1957: 240; Holthuis & Gottlieb, 1958: 115; Holme, 1961: 397; Bourdon, 1965: 1; Holme, 1966: 401; Allen, 1967: 18, 57, fig. 90; Christiansen, 1972: 41, fig. 49; Pastore, 1976: 107; De Saint Laurent & Božić, 1976: 17, figs. 1, 9, 17, 28; Moncharmont, 1979: 71; Števčić, 1979: 282, fig. 1; Domenech et al., 1981: 150; Adema et al., 1982: 23, fig. 6a-c; Christiansen & Greve, 1982: 213; Thessalou-Legaki, 1985: 457; Thessalou-Legaki, 1986: 182; García Socias & Massuti Jaume, 1987: 75; Witbaard & Duineveld, 1989: 209-219, fig. 1; Moyse & Smaldon, 1990: 520, fig. 10-13; Števčić, 1990: 217; Dworschak, 1992: 203; Hayward et al., 1995: 432, fig. 8.52; Stamhuis et al., 1997: 155; Christiansen & Stene, 1998: 75; Nickell et al., 1998: 733; Simboura et al., 1998: 300; Števčić, 1998: 652; Sakai, 1999c: 14 (key), 19; d'Udekem d'Acoz, 1999: 155; Christiansen, 2000: 234; Hughes et al., 2000: 189; Tudge et al., 2000: 143; Costello et al., 2001: 289; Ngoc-Ho, 2003: 468, figs. 9, 10; Atkinson & Taylor, 2004: 45, tabs. 1, 2; Ingle & Christiansen, 2004: 93, figs. 69, 71; Sakai, 2005b: 33; Sakai & Sawada, 2006: 1357, figs. 7, 8.

Cancer (*Astacus*) *subterraneus* — Desmarest, 1825: 205, fig. 2, 2a-c.

Callianassa (*Cheramus*) *subterranea* — Borradaile, 1903: 545; 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 (partim), fig. 67; Gurney, 1942: 243-244, fig. 98; Gurney, 1944: 83; Gordon, 1957: 249; O'Céidigh, 1962: 163.

Cheramus subterraneus — Colosi, 1923: 6.

Callianassa pestae — Lutze, 1938, figs. 10-21 (= *C. subterranea*).

Callianassa algerica Lutze, 1938: 168 (part.), figs. 22-26 [not fig. 22, eyestalks = *C. whitei*], 26a, smaller Mxp3 = *C. subterranea* [not larger Mxp3 = *C. candida*], 26b, smaller Mxp3 = *C. subterranea* [not larger Mxp3 = *C. candida*], [not fig. 27 = *C. candida*] [type locality: Castiglione near Algiers, 36°37′N 02°40′E]; Lutze, 1941: 34 [nomen dubium].

Callianassa helgolandica Lutze, 1938: 174, figs. 52-61; Lutze, 1941: 34. [Type locality. — Helgoland.]

Callianassa stebbingi — Schellenberg, 1928: 78, fig. 59; Lutze, 1938, figs. 10-21 [= *Callianassa subterranea*]; Abel et al., 1963: 279, fig. 94.

Callianassa hertlingi Lutze, 1941: 34 [a junior synonym of *Callianassa helgolandica* Lutze, 1938].

Callianassa tyrrhena [not *Callianassa tyrrhena* Petagna] — Holthuis & Gottlieb, 1958: 62 (partim), fig. 13 (= *C. subterranea*); Pérez, 1995: 136, fig. 78.

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

Callianassa (*Callianassa*) *subterranea* — Zariquiey Alvarez, 1968: 229; Lagardère, 1973: 88, 94.

Callianassa subterranea? — Robles et al., 2009: 316.

Callianassa subterranea australis Kensley, 1974: 271, figs. 3-5. [Type locality. — South Africa, Lüderitzbucht, 180 m.]

Callianassa australis — De Saint Laurent & Le Loeuff, 1979: 51; Sakai, 1999c: 40.

Biffarius australis — Tudge et al., 2000: 42.

Not: *Callianassa subterranea* — H. Milne Edwards, 1837a: 309 [= *Gilvossius tyrrhenus* (Petagna, 1792)]; H. Milne Edwards, 1837c: 130, pl. 48 fig. 3-3e; Heller, 1863: 202, pl. 6 figs. 9, 11; Ortmann, 1891: 55, pl. 1 fig. 10 [= *Gilvossius tyrrhena* (Petagna, 1792)]; Czerniavsky, 1868: 122; Giard & Bonnier, 1890: 362, figs. 1-3 [= *C. pontica* Czerniavsky, 1884 = *Gilvossius candidus* (Olivi, 1792)]; Adensamer, 1898: 620 [= *Gourretia denticulata* (Lutze, 1937)].

Not: *Callianassa* — Kinahan, 1859: 266.

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

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

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

Material examined. — SMF-36910, 3 males (TL/CL: 49.0/10.5-12.0/2.9 mm), 1 female (20.0/4.6 mm), North Sea, German Bight, S. of Helgoland Trench (54°7.4′N 7°56′E), 38 m, Van Veen grab, 8.ix.2004, R/V "Uthörn"; SMF 21879, 1 male (36.0/8.5 mm), North Sea, German Bight (54°39.90′N 6°00.00′E), 42.5 m, 24.v.1987, F/C Senckenberg.

Diagnosis. — Mxp3 ischium-merus subpediform, merus obliquely convex on distal margin. Male Plp1 uniramous and bisegmented; male Plp2 uniramous, protopod rarely protruded short distolaterally, lacking appendix interna. Telson truncate on posterior margin with median spine. Uropodal exopod with dorsal plate.

Remarks. — The male Plp2 can be described as "endopod fused with protopod" as in the male specimens SMF 25800 from the Canary Islands (not SMF 27250 from the Adriatic Sea as in Sakai, 2005b, fig. 7) and SMF 21879 from the North Sea, but possibly also as "endopod absent and hence uniramous" because of the earlier stages of development as in the male specimens in SMF 36910 from the North Sea, as shown by Ngoc-Ho (2003, fig. 9G).

It is here confirmed from examining Kensley's (1974) figures and description that "the close affinity between the European and the South African species cannot be denied", which implies indeed that *Callianassa subterranea australis* Kensley, 1974 from South Africa, Lüderitzbucht, 180 m, is safely synonymized with *C. subterranea*. So, the distribution of the present species, *C. subterranea* distributed mostly in the North Atlantic Ocean, the Mediterranen Sea, and the central Atlantic Ocean, has now expanded further to South Africa through the record of *C. subterranea australis* Kensley, 1974, just as in the case of *Calocaris barnardi* Stebbing, 1914 from Cape Castle, South Africa,

163 m, which is synonymized with *Calocaris macandreae* Bell, 1846 from the North Atlantic in the present study (see p. 234).

Type locality. — Devon, England.

Distribution. — Eastern Atlantic from Scandinavia to Canary Islands and the eastern Mediterranean; usually subtidal, 10-270 m. Most probably also off the west coast of South Africa.

Genus **Cheramoides** gen. nov.

Diagnosis. — Eyestalks flattened. Mxp3 propodus subovate, and dactylus digitiform. Male Plp1 uniramous, slender, and usually bisegmented; male Plp2 rudimentary and hooklet-shaped, lacking appendices interna and masculina; Plps3-5 biramous, endopods with projecting, finger-like appendix interna. Telson subsquare, slightly tapering toward posterior margin, and bearing median concavity with spine. Uropodal exopod elongate, with dorsal plate.

Remarks. — It was found through the present examination of the specimens that *Cheramus marginatus* Manning & Felder, 1991 is different from the type species of *Cheramus*, *C. profundus* (Biffar, 1973) as follows: in *C. marginatus* the male Plp2 is rudimentary and hooklet-shaped, whereas in *C. profundus* it is biramous, bearing a slender exopod and endopod. Therefore, a new genus, *Cheramoides*, is here established.

Type species. — *Callianassa marginata* Rathbun, 1901, by present designation and monotypy. Gender of the new generic name, *Cheramoides*, feminine.

Species included. — *Cheramoides marginata* (Rathbun, 1901).

Etymology. — The new generic name *Cheramoides* is composed of a generic name, *Cheramus* and a Latin suffix, -oides, meaning “similar”.

Cheramoides marginata (Rathbun, 1901)

Callianassa marginata Rathbun, 1901: 92, fig. 15; Schmitt, 1935b: 4; Biffar, 1971a: 654, 689, figs. 15, 16; Coelho & Ramos, 1973: 161; Rabalais et al., 1981: 100; Manning, 1987: 397; Sakai, 1999c: 28; Sakai, 2005b: 46.

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. 6, 14; Blanco Rambla et al., 1994: 18, figs. 2, 3; Coelho, 1997: 150; Melo, 1999: 360, figs. 239-240; Tudge et al., 2000: 145; Coelho et al., 2007: 5 (tab. 2); Heard et al., 2007: 24, fig. 18.

Material examined. — USNM 1071632, male (TL/CL, 19.0/4.4 mm), N.E. of Tintipan Island, Colombia, Caribbean Sea, 108-125 m, 9°56.26′N 75°53.52′W – 9°56.35′N 75°′57.04′W, 108-126 m, 7.viii.1995, leg. R. Lemaitre & N.H. Campos.

Diagnosis. — Mxp3 ischium-merus subsquare, merus straight on distal margin, and rectangular at distomesial corner. Male Plp1 uniramous, slender, and

bisegmented; male Plp2 rudimentary and hooklet-shaped; male Plps3-5 biramous, endopods with projecting, finger-like appendix interna. Telson subsquare, slightly tapering toward posterior margin, bearing median concavity with spine. [Cf. Manning & Felder, 1991: 780, fig. 14b, g, e.]

Remarks. — *Callianassa marginata* was included in *Cheramus* by Manning & Felder (1991), who described that the male Plp2 is absent. However, it was found through the present examination that it is present, though rudimentary and hooklet-shaped, which suggests that *Callianassa marginata* is not to be included in *Cheramus*, but instead should be included in a new genus, *Cheramoides* as here established.

Type locality. — Puerto Rico, Mayagüez harbour, 315 m.

Distribution. — Northeastern Gulf of Mexico; Arrowsmith Bank, Barbados to Puerto Rico; Colombia (in Caribbean Sea); Amapá, Maranhão, Ceará, Alagoas, Rio de Janeiro, Brazil; 55-640 m.

Genus **Cheramus** Bate, 1888 **(sensu nov.)**

Cheramus Bate, 1888: 30; Borradaile, 1903: 545 (partim); De Man, 1928b: 95; Gurney, 1944: 83; Manning & Felder, 1991 [18 Dec.]: 780 (partim) [not figs. 2, 4-6, 14 = *Callianassa*); Holthuis, 1991 [19 Dec.]: 239; Poore, 1994: 101; Davie, 2002: 459.

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

Poti Rodrigues & Manning, 1992: 9. [Type species. — *Poti gaucho* Rodrigues & Manning, 1992.]

Diagnosis. — Eyestalks flattened. Mxp3 ischium-merus subpediform; propodus subovate, and dactylus digitiform. Male Plp1 absent or uniramous, slender, and usually bisegmented; male Plp2 biramous, endopod and exopod elongate, lacking appendices interna and masculina; male Plps3-5 biramous, endopods with projecting, finger-like appendix interna. Telson quadrate, subquadrate, trapezoid, or subovate. Uropodal exopod with dorsal plate.

Remarks. — *Cheramus* Bate, 1888 was based on the type species *Callianassa* (*Cheramus*) *batei* Borradaile, 1903, a replacement name for the preoccupied *Cheramus occidentalis* Bate, 1888 (cf. Manning & Felder, 1991: 780), but *Callianassa batei* is a subjective junior homonym of a fossil species, *Callianassa batei* Woodward, 1868. Therefore, the type species of *Cheramus* is *Callianassa profunda* Biffar, 1973 (a new name for *Callianassa batei* Borradaile, 1903).

Biffar (l973: 229) included five species of *Callianassa* in *Cheramus*: *Callianassa sibogae* De Man, 1905; *C. propinqua* De Man, 1905; *C. modesta* De Man, 1905; *C. intermedia* De Man, 1905, and *C. minima* Rathbun, 1901. Manning & Felder (1991) established the subfamily Cheraminae, and Tudge

et al. (2000: 136) showed that the Cheraminae are composed of three genera: *Poti* including one species (*P. gaucho* Rodrigues & Manning, 1992b); *Callianassa* including 4 species (*C. praedatrix* (De Man, 1905), *C. propinqua*, *C. rectangularis* Ngoc-Ho, 1991, *C. sibogae*); and *Cheramus* including two species (*C. profundus* and *C. marginatus* (Rathbun, 1901)).

However, of the present taxa, *Callianassa sibogae* (cf. *Trypaea*) and *C. intermedia* De Man, 1905 (cf. *Trypaea*) are reclassified under the genus *Trypaea*, because the male Plp2 is absent. *Callianassa marginatus* is now under *Cheramoides* gen. nov., because the male Plp2 is different from that in *Callianassa* and *Cheramus*. *C. minima*, finally, is reclassified as *Crosniera minima* (Rathbun, 1901) under the family Thomassiniidae, because in *Crosniera minima* the antennal region of the anterior carapace bears a vertical row of setal pits; the male Plp1 is uniramous and bisegmented; and the distal segment is slightly expanded into a leaf-like extension; the male Plp2 is biramous, and the endopod bears mesiomedially an appendix masculina articulating mesiomedially with a small appendix interna. *Poti gaucho* is reclassified as a species of *Cheramus*, because male Plps1-2 are the same as those of *Cheramus*.

The following two species, *Callianassa* (*Calliactites*) *longicauda* Sakai, 1967 and *Callianassa* (*Cheramus*) *spinophthalma* Sakai, 1970a, were included for the first time in *Cheramus* by Tudge et al. (2000).

The following two species of *Callianassa*, *Callianassa contipes* Sakai, 2002 and *Callianassa* (*Cheramus*) *lobetobensis* De Man, 1905, are also included in *Cheramus*, though male Plps1-2 are unknown, because the Mxp3 ischium and merus and the P3 propodus of those two species, are similar in morphological features to those of the species of *Cheramus*, such as *C. nigroculata* (Sakai, 2002) and *C. malaccaensis* (Sakai, 2002).

Manning & Felder (1991: 780) defined *Scallasis* in their diagnosis as "Carapace with rostral spine, apparently lacking orbit. Cornea well-formed, terminal, subglobular. Mxp3 with exopod, Plp elongate and slender, with finger-like appendices internae.", and they described in the remarks that "the type specimen of *S. amboinae* was examined by one of us, who verified that it is a member of the Cheraminae". However, Sakai (1999c: 12) also examined the type specimen of *Scallasis amboinae* (NHM 1888: 22), which is preserved at the Natural History Museum, London, and confirmed that the Mxp3 exopod is absent, though the figure of the type specimen drawn by Bate shows that an Mxp3 exopod is present (Bate, 1888, pl. 2 fig. 3a). It turned out later that the type specimen of *Scallasis amboinae* examined by Sakai is different from the type specimen of *Scallasis amboinae* drawn by Bate, because they are different

from each other in the following features. In the type specimen drawn by Bate, the eyestalks are globular (Bate, 1888: 34, pl. 2 fig. 3i), and the Mxp3 exopod is present, whereas in the specimen preserved in the Natural History Museum, London and examined by Sakai, the eyestalks are triangular and depressed (Sakai, 1999c, fig. 5d), and the Mxp3 exopod is absent (Sakai, 1999c: 37, fig. 5f). Those features shown by Sakai's examination suggested that *Scallasis amboinae* should be included in *Callianassa*, though the preserved specimen in London is labelled *Scallasis amboinae* (Bate, 1888). However, it was also noted that *C. amboinae* is different from *C. subterranea*, the type species of *Callianassa*, in the shape of the telson: in *C. amboinae* the telson is concave medially on the posterior margin, without a median spine, whereas in *C. subterranea* the telson is convex medially on the posterior margin, with a median spine. In the present study, *C. amboinae* (Bate, 1888) is reclassified under the genus *Trypaea*, because the male Plp2 is absent (Sakai, 1999c: 37).

Type species. — *Callianassa profunda* Biffar, 1973, new name for *Cheramus occidentalis* Bate, 1888, by subsequent designation. Gender of generic name, *Cheramus*, masculine.

Species included. — *Cheramus anoplourus* (Sakai, 2002); *C. aqabaensis* (Dworschak, 2003); *C. contipes* Sakai, 2002; *C. gaucho* (Rodrigues & Manning, 1992); *C. lobetobensis* (De Man, 1905); *C. longicauda* (Sakai, 1967); *C. malaccaensis* (Sakai, 2002); *C. modestus* (De Man, 1905); *C. nigroculatus* (Sakai, 2002); *C. oblongus* (Le Loeff & Intès, 1974); *C. orientalis* Bate, 1888; *C. parvulus* (Sakai, 1988); *C. praedatrix* (De Man, 1905); *C. profundus* (Biffar, 1973); *C. propinquus* (De Man, 1905); and *C. spinophthalmus* (Sakai, 1970a); *C.* sp. Robles et al., 2009.

KEY TO THE SPECIES OF THE GENUS *CHERAMUS*

1 – Rostrum reaching or overreaching distal end of A1 proximal segment 2
– Rostrum failing to reach distal end of A1 proximal segment 4

2 – P3 propodus oval. From North West Shelf, Western Australia, 83 m . . . . . *C. parvulus*
– P3 propodus rectangular 3

3 – Telson bearing distinct proximal lobe. From Kepulauan Kai, Indonesia, 27 m . . . . . *C. modestus*
– Telson bearing small proximal lobe. From East China Sea . . . . . *C. longicauda*

4 – Mxp3 merus bearing distal spine 5
– Mxp3 merus lacking distal spine 6

5 – Uropodal exopod distinctly longer than uropodal endopod; abdominal somite 6 distinctly longer than wide. From Teluk Kwandang, Sulawesi, Indonesia, 75 m . . . . . *C. propinquus*

– Uropodal exopod slightly longer than uropodal endopod; abdominal somite 6 slightly longer than wide. From between Bowoni and Boetoeng (= Butung = Buton), Indonesia, 75-94 m ..... *C. praedatrix*

6 – Eyestalks pointed apically 7
– Eyestalks triangular or obtuse distally 9

7 – Mxp3 merus slanting on distal margin; telson slightly concave medially on posterior margin. From Arafura Sea, 28 m ..... *C. orientalis*
– Mxp3 ischium convex on distomesial angle 8

8 – Mxp3 ischium-merus about 1.4 times as long as wide; meral hook of male larger cheliped with sharp proximal spine on ventral margin. From Murjan, Aqaba, 10-14 m ..... *C. aqabaensis*
– Mxp3 ischium-merus about 2.1 times as long as wide; meral hook of male larger cheliped with trifurcate proximal spine on ventral margin. From Tsushima Island, Japan, 210 m ..... *C. spinophthalmus*

9 – Mxp3 ischium-merus about 1.8-2.3 times as long as wide 10
– Mxp3 ischium-merus about 3.0-3.3 times as long as wide 13

10 – Telson wider than long, posterior margin concave with median spine .... *C. oblongus*
– Telson longer than wide, posterior margin convex or straight 11

11 – Posterior margin of telson slightly convex, lacking median spine. From off Chui, near border between Brazil and Uruguay, 150 m ..... *C. gaucho*
– Posterior margin of telson bearing median spine 12

12 – Telson largely convex on posterior margin. From Andaman Sea, 60.7 m ..... *C. anoplourus*
– Telson slightly convex on posterior margin. From off Sombrero Is., West Indies, 686-724 m ..... *C. profundus*

13 – Rostrum short, reaching about proximal third of eyestalks ..... *C. nigroculatus*
– Rostrum distinct, reaching to near distal margin of eyestalks 14

14 – Uropodal endopod broadened, uropodal exopod straight on distal margin ..... *C. malaccaensis*
– Uropodal endopod slender 15

15 – Uropodal exopod straight on distal margin ..... *C. lobetobensis*
– Uropodal exopod rounded on distal margin ..... *C. contipes*

Cheramus anoplourus (Sakai, 2002)

Callianassa anoploura Sakai, 2002: 490, fig. 17A-H; Sakai, 2005b: 72.

Diagnosis. — Mxp3 ischium-merus suboperculiform, merus rounded on mesiodistal margin. Male Plp1 uniramous, tri-segmented; male Plp2 small and biramous, endopod and exopod almost equal in length, lacking appendices interna and masculina; male Plps3-5 endopods with projecting, finger-like appendix interna. Telson subquadrate, rounded on posterior margin, with median spine.

Type locality. — Andaman Sea, 9°30.351′N 97°57.168′E, 60.7 m, sandy mud, fine sand, and shell fragments.

Distribution. — Known only from the type locality.

Cheramus aqabaensis (Dworschak, 2003)

Callianassa aqabaensis Dworschak, 2003: 416, figs. 2-36; Robles et al., 2009: 316.

Diagnosis. — Plp1 uniramous and bisegmented (Dworschak, 2006: 424, fig. 26), and male Plp2 biramous with slender, bisegmented endopod and slender unsegmented exopod; and Plps3-5 endopods bearing projecting, finger-like appendix interna. [Cf. Dworschak, 2006: 424, figs. 30, 31.]

Type locality. — Murjan, Aqaba, 10-14 m.

Distribution. — Aqaba to Saudi Border, Jordania.

Cheramus contipes (Sakai, 2002)

Callianassa contipes Sakai, 2002: 523, fig. 35A-E; Sakai, 2005b: 80.

Diagnosis. — Mxp3 ischium-merus pediform, merus straight distally, continuous to convex mesial margin. Male Plps1-2 unknown. Telson quadrate, convex on posterior margin, bearing median concavity with spine.

Type locality. — Andaman Sea, 7°30.006′N 98°56.633′E, 37.5 m, mud.

Distribution. — Andaman Sea, 7°29.921′N 99°00.977′E, 7°44.638′N 98°16.496′E; 20.5-30.5 m, mud.

Cheramus gaucho (Rodrigues & Manning, 1992)
(fig. 63D-E)

Poti gaucho Rodrigues & Manning, 1992b: 9, fig. 1; Rodrigues et al., 1998: 380; Melo, 1999: 380, figs. 255-256; Tudge et al., 2000: 145.
Callianassa gaucho — Sakai, 1999c: 28, fig. 3d-e; Sakai, 2005b: 46.

Material examined. — USNM 256376, paratype, male (CL 4.0 mm), off Chui, near the border between Brazil and Uruguay, 33°43′S 51°13′W, 150 m, Fundacão Universidade do Rio Grande, Cruise Sta. 3-11, leg. F. Dincao.

Diagnosis. — Mxp3 ischium-merus subpediform, merus straight distally, with rounded distolateral angle. Male Plp1 uniramous and bisegmented (fig. 63D); male Plp2 biramous, both endopod and exopod elongate, endopod lacking appendices interna and masculina (fig. 63E). Telson trapezoid, slightly convex on posterior margin, without median spine. [Cf. Rodrigues & Manning, 1992b: 9, fig. 1p, q, j, u.]

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

Distribution. — Known only from the type locality.

Cheramus lobetobensis (De Man, 1905)

Callianassa lobetobensis De Man, 1905: 607; Sakai, 1999c: 48; Tudge et al., 2000: 143; Sakai, 2005b: 91.
Callianassa (*Cheramus*) *lobetobensis* — De Man, 1928b: 26, 93, 98, 137, pl. 13 fig. 20, pl. 14 fig. 20a-d.

Diagnosis. — Mxp3 ischium-merus subpediform, merus declined straight on distal margin. Male Plps1-2 unknown. Telson subovate, distinctly notched medially on posterior margin, with median spine. Male specimens are not reported. [Cf. De Man, 1928b: 138, 140, pl. 14 fig. 20, 20a.]

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 (8°27′S 122°54.5′E); 247 m.

Cheramus longicauda (Sakai, 1967)

Callianassa (*Calliactites*) *longicauda* Sakai, 1967: 324, figs. 3, 4 pl. 11C.
Callianassa longicauda — Sakai, 1987a: 303; Sakai, 1999c: 48.
Cheramus longicaudatus — Tudge et al., 2000: 145.

Diagnosis. — Mxp3 ischium-merus subsquare, merus straight with distinct median tooth on distal margin. Male Plp1 uniramous, slender, and bisegmented; male Plp2 biramous, with short endopod and exopod. Telson subquadrate, convex on posterior margin, with median spine. [Cf. Sakai, 1967: 324-326, figs. 3C, F, 4A, B.]

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

Distribution. — Known only from the type locality.

Cheramus malaccaensis (Sakai, 2002)

Callianassa malaccaensis Sakai, 2002: 492, figs. 18A-D, 19A-K; Sakai, 2005b: 91-92.

Diagnosis. — Mxp3 ischium-merus subpediform, merus obliquely truncate on distal margin. Male Plp1 uniramous and bisegmented; male Plp2 biramous; male Plps3-5 endopods with projecting, finger-like appendix interna. Telson subquadrate, longer than wide, and slightly tapering toward posterior margin, bearing median concavity with spine.

Type locality. — Andaman Sea, 6°45.045′N 99°20.766′E, 38.2 m.

Distribution. — Andaman Sea, 6°45.045′N 99°20.766′E, 38.2 m; 6°45.019′N 98°44.832′E, 82.7 m; 9°30.351′N 97°57.168′E, 60.7 m; muddy sand, sandy mud, fine sand and shell fragments.

Cheramus modestus (De Man, 1905)

Callianassa (*Calliactites*) *modesta* De Man, 1905: 604 (partim); Balss, 1925: 212; De Man, 1928b: 26, 97, 118, pl. 10 fig. 16-16b, pl. 11 fig. 16c-e.
Callianassa modesta — Liu & Zhong, 1994: 562; Sakai, 1999c: 48; Komai, 2000b: 345 (list); Tudge et al., 2000: 143.

Diagnosis. — Mxp3 ischium-merus subpediform, merus straight with median tooth on distal margin. Male Plp1 uniramous and bisegmented; Plp2 biramous. Telson subovate, convex on posterior margin, with median spine.

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

Distribution. — N. South China Sea (Liu & Zhong, 1994); west of Kwandang Bay; Bay of Bima (0°58.5′N 122°42.5′E); Great Kei Island, Indonesia (5°40′S 132°26′E); 27-310 m.

Cheramus nigroculatus (Sakai, 2002)

Callianassa nigroculata Sakai, 2002: 525, figs. 36A-D, 37A-H.; Sakai, 2005b: 94.

Diagnosis. — Mxp3 ischium-merus subpediform, merus rounded at distomesial angle. P3 propodus oval. Male Plps1-2 undescribed; Plps3-5 endopods with projecting, finger-like appendix interna. Telson trapezoid, narrowing and slightly concave in posterior two-thirds, bearing median spine on straight posterior margin, and dorsal surface slightly concave medially. [Cf. Sakai, 2002: 525-528, figs. 36D, 37A.]

Type locality. — Andaman Sea, 7°30.221′N 98°22.005′E – 7°35.932′N 98°25.348′N, 43.2-74.8 m.

Distribution. — Andaman Sea, 7°29.786′N 98°17.348′E; 7°15.061′N 98°34.181′E; 7°35.932′N 98°25.348′N; 60.4-78.7 m, muddy sand.

Cheramus oblongus (Le Loeuff & Intès, 1974)

Callianassa oblonga Le Loeuff & Intès, 1974: 38, fig. 9a-r; De Saint Laurent & Le Loeuff, 1979: 55; Sakai, 1999c: 18; Sakai, 2005b: 32.
Cheramus oblongus — Tudge et al., 2000: 145.

Diagnosis. — Rostrum acutely triangular and slightly shorter than eyestalks. Eyestalks obtuse distally; cornea distinct and centred. A1 peduncle slightly longer than A2 peduncle. Mxp3 ischium-merus subsquare and more than twice as long as wide; merus straight on distal margin. P3 propodus short and subsquare. Male Plp1 uniramous and bisegmented; male Plp2 slightly developed (De Saint Laurent & Le Loeuff, 1979: 55). Telson trapezoid, bearing proximal lobe on lateral margin, and median concavity with spine on posterior margin. [Cf. Le Loeuff & Intès, 1974: 32, fig. 9k, q.]

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

Distribution. — Only known from the type locality.

Cheramus orientalis Bate, 1888

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.
Callianassa orientalis — Sakai, 1999c: 49, fig. 5a-c; Sakai, 2005b: 20, 95.
Cheramus orientalis — Tudge et al., 2000: 145.

Diagnosis. — Mxp3 ischium-merus subpediform, merus obliquely convex on distal margin. Male Plps1-2 unknown; Plps3-5 endopods with projecting, finger-like appendix interna. Telson trapezoid, slightly longer than wide, tapering toward posterior margin, with small and shallow median concavity. [Cf. Bate, 1888: 31, fig. 2.]

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

Distribution. — Known only from the type locality.

Cheramus parvulus (Sakai, 1988)

Callianassa parvula Sakai, 1988: 59, fig. 3; Sakai, 1999c: 50; Tudge et al., 2000: 143; Davie, 2002: 458; Sakai, 2005b: 95-96.

Diagnosis. — Rostrum acutely triangular, overreaching eyestalks. Mxp3 ischium-merus unknown. Male Plp1 uniramous and bisegmented; Plp2 biramous. Telson trapezoid, wider than long, tapering toward posterior margin, with median concavity. [Cf. Sakai, 1988: 59, fig. 3D, E, F.]

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

Distribution. — Known only from the type locality.

Cheramus praedatrix (De Man, 1905)

Callianassa praedatrix De Man, 1905: 607; Sakai, 1988: 59, fig. 4; Ngoc-Ho, 1994: 54, fig. 2; Sakai, 1999c: 51; Sakai, 2005b: 100.
Callianassa (*Cheramus*) *praedatrix* — De Man, 1928b: 26, 97, 99, 146, pl. 15 fig. 22-22d.
Cheramus praedatrix — Tudge et al., 2000: 145; Davie, 2002: 459.

Diagnosis. — Mxp3 ischium-merus subsquare; merus armed with sharp spine on distal margin, and rounded on distomesial margin. Male Plp1 uniramous and bisegmented; male Plp2 biramous; male Plps3-5 endopods with projecting, finger-like appendix interna. Telson subsquare, bearing shallow notch

with median spine on straight posterior margin. [Cf. De Man, 1928b: 147, 148, 149, pl. 15 fig. 22-22a, b.]

Type locality. — Between Bowoni and Boetoeng (= Butung = Buton), Indonesia (4°20′S 122°58′E); 75-94 m.

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

Cheramus profundus (Biffar, 1973)

Callianassa occidentalis Bate, 1888: 29, pl. 2 fig. 2k; Yong, 1900: 425; Borradaile, 1903: 548; Balss, 1925: 212; De Man, 1928b: 115; Schmitt, 1935b: 3; Biffar, 1971a: 649. [Type locality. — 18°29′3N 63°24.6′W, off Sombrero Is., West Indies, 686-724 m.] [Not: *Callianassa occidentalis* Stimpson, 1856.]

Cheramus occidentalis Bate, 1888: 32, pl. 2 fig. 1; Yong, 1900: 246. [Type locality. — 18°29′3N 63°24.6′W, off Sombrero Is., West Indies, 686-724 m.] [Not: *Callianassa occidentalis* Stimpson, 1856 (= subjective junior synonym of *Callianassa californiensis* Dana, 1854).]

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; Biffar, 1971a: 649, 654; Manning, 1987: 398.

Callianassa profunda Biffar, 1973: 225, figs. 1, 2 [New name for *Callianassa batei* Borradaile, 1903.]; Sakai, 1999c: 28; Sakai, 2005b: 46.

Cheramus batei — Manning & Felder, 1991: 780; Coelho, 1997: 150; Melo, 1999: 358, figs. 237-238.

Cheramus profundus — Tudge et al., 2000: 145.

Diagnosis. — Mxp3 ischium-merus subsquare; merus straight distally, with obtuse distomesial angle. Male Plp1 uniramous and bisegmented; male Plp2 biramous; male Plps3-5 biramous, endopods bearing finger-like appendix interna. Telson trapezoid, longer than wide, widest proximally, slightly narrowing toward posterior margin with distinct median spine. [Adapted from Biffar, 1973: 227.]

Type locality. — Off Sombrero Is., West Indies, 18°29′3N 63°24.6′W, 686-724 m.

Distribution. — Off Sombrero Is., West Indies, 686-724 m; Rio Grande do Sul, Brazil (Coelho, 1997).

Cheramus propinquus (De Man, 1905)

Callianassa propinqua De Man, 1905: 609; Ngoc-Ho, 1991: 290, fig. 4; Ngoc-Ho, 1994: 54, fig. 2; Sakai, 1999c: 51; Sakai, 2005b: 100-101.

Callianassa (*Cheramus*) *propinqua* — De Man, 1928b: 27, 98, 127, pl. 12 fig. 18-18d.

Cheramus propinquus — Tudge et al., 2000: 145; Davie, 2002: 459.

Diagnosis. — Mxp3 ischium-merus subpediform; merus armed with sharp spine on distal margin, and rounded at distomesial corner. Male Plp1 uniramous and bisegmented; male Plp2 biramous; and male Plps3-5 endopods with projecting, finger-like appendix interna. Telson quadrate, longer than wide, bearing proximal lobe laterally, two spinules at posterolateral corner, and median spine on convex posterior margin. Uropodal endopod oval and rounded distally; uropodal exopod longer than endopod, and rectangular. [Cf. Ngoc-Ho, 1991: 290, 291, fig. 4d, f, k.]

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

Distribution. — Kwandang Bay, Indonesia; New Caledonia; North-West Shelf, Australia; benthic, continental shelf, continental slope; shelly sand to mud substrates; 75-300 m.

Cheramus spinophthalmus (Sakai, 1970)

Callianassa (*Cheramus*) *spinophthalma* Sakai, 1970a: 40, figs. 2, 3, 4a-b; Sakai, 1987a: 306.
Callianassa spinophthalma — Sakai, 1999c: 52; Sakai, 2005b: 103.
Cheramus spinophthalmus — Tudge et al., 2000: 145; Komai et al., 2002: 39, fig. 7.

Diagnosis. — Mxp3 ischium-merus subsquare, merus truncate on distal margin, and convex on mesial margin. Male Plp1 uniramous and bisegmented; male Plp2 biramous; male Plps3-5 endopods with projecting, finger-like appendix interna. Telson trapezoid, slightly concave on posterior margin, with median spine. [Cf. Sakai, 1970a: 40, figs. 3b, 4a; Komai, 2002, fig. 11.]

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

Distribution. — Known only from the type locality.

Cheramus sp. Robles et al., 2009

Cheramus sp., Robles et al., 2009: 317.

Genus **Gilvossius** Manning & Felder, 1992 **(sensu nov.)**

Gilvossius Manning & Felder, 1992: 558.
Pestarella Ngoc-Ho, 2003: 475 [type species: *Astacus tyrrhenus* Petagna, 1792].
Paratrypaea Komai & Tachikawa, 2008: 36. [Type species. — *Callianassa* (*Trypaea*) *bouvieri* (Nobili, 1904).]

Diagnosis. — Eyestalks depressed. Mxp3 propodus subovate or subrectangular, and dactylus digitiform. Male Plps1-2 absent. Male Plps3-5 biramous,

endopods with projecting, finger-like or embedded appendix interna. Uropodal exopod with dorsal plate.

Remarks. — The genus *Pestarella* Ngoc-Ho, 2003 was established because of the absence of male Plps1-2, but it is synonymous with *Gilvossius* Manning & Felder, 1992, because the type species of *Pestarella*, *Astacus tyrrhenus* Petagna, 1792 has no male Plps1-2 as in the type species of *Gilvossius*, *Gonodactylus setimanus* DeKay, 1844.

Komai & Tachikawa (2008) established a new genus *Paratrypaea* Komai & Tachikawa, 2008 on the basis of the type species, *Callianassa* (*Trypaea*) *bouvieri* Nobili, 1904. However, their new genus is synonymous with the genus *Gilvossius*, because *Paratrypaea* and *Gilvossius* have the same type of male Plps1-2 (Komai & Tachikawa, 2008, fig. 10E).

Type species. — *Gonodactylus setimanus* DeKay, 1844, by original designation of Manning & Felder (1992). The gender of the name, *Gilvossius*, is masculine.

Species included. — *Gilvossius bouvieri* (Nobili, 1904); *G. brachytelson* (Sakai, 2002); *G. candidus* (Olivi, 1792); *G. convexus* (De Saint Laurent & Le Loeuff, 1979); *G. diaphorus* (Le Loeuff & Intès, 1974); *G. gravieri* (Nobili, 1905); *G. marchali* (Le Loeuff & Intès, 1974); *G. persicus* (Sakai, 2005b); *G. rotundicaudatus* (Stebbing, 1902); *G. setimanus* (DeKay, 1844); *G. tyrrhenus* (Petagna, 1792); *G. whitei* (Sakai, 1999c); *G.* sp., Robles et al., 2009: 316.

KEY TO THE SPECIES OF THE GENUS *GILVOSSIUS*

1 – Mxp3 ischium-merus pediform 2
– Mxp3 ischium-merus broadened 4

2 – A2 peduncle distinctly longer than A1 peduncle . . . . . *G. diaphorus*
– A2 peduncle slightly longer than A1 peduncle 3

3 – Telson distinctly convex on posterior margin . . . . . *G. persicus*
– Telson slightly convex on posterior margin . . . . . *G. marchali*

4 – A2 peduncle about as long as A1 peduncle 5
– A2 peduncle shorter than A1 peduncle 6

5 – Telson rounded distally . . . . . *G. rotundicaudatus*
– Telson trapezoid . . . . . *G. candidus*

6 – Uropodal endopod narrow, and longer than telson; uropodal exopod without dorsal plate . . . . . *G. brachytelson*
– Uropodal endopod broadened; uropodal exopod with dorsal plate 7

7 – Telson subsquare 8
– Telson semicircular 10

8 – Larger cheliped setose on dactylus, bearing serrate and convex meral hook . . . . . *G. bouvieri*
– Larger cheliped not setose on dactylus, bearing slender meral hook 9

9 – Rostrum acutely triangular, cornea small and located medially . . . . . *G. gravieri*
– Rostrum obsolete, cornea distinct and occupying definite area medially . . . *G. pacificus*

10 – Meral hook of male larger cheliped convex on ventral margin . . . . . *G. tyrrhenus*
– Meral hook of male larger cheliped sharp 11

11 – Mxp3 merus convex at distomesial corner . . . . . *G. whitei*
– Mxp3 merus rounded at distomesial corner 12

12 – Mxp3 ischium-merus 1.2 times as long as wide . . . . . *G. setimanus*
– Mxp3 ischium-merus more than 1.5 times as long as wide . . . . . *G. convexus*

Gilvossius bouvieri (Nobili, 1904)

Callianassa (*Trypaea*) *Bouvieri* Nobili, 1904: 236; Nobili, 1906b: 105, pl. 6 fig. 3; De Man, 1928b: 27, 107, 146.

Callianassa maldivensis Borradaile; 1904: 753, pl. 58 fig. 3a, 3b; Tudge et al., 2000: 143. [Type locality. — Hulule, Male Atoll, Maldives.]

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 & Pervesler, 1988: 3, fig. 3; Dworschak, 1992: 192; Sakai, 1999c: 40, fig. 6a-c; Tudge et al., 2000: 143; Sakai & Apel, 2002: 276; Itani, 2004, fig. 3; Sakai, 2005b: 78; Itani, 2007: 203.

Callianassa rectangularis Ngoc-Ho, 1991: 292, fig. 5. [Type locality. — Atoll de Surprise, New Caledonia, 36 m.]

Cheramus rectangularis — Tudge et al., 2000: 145.

Paratrypaea bouvieri — Komai, 2008: 36, figs. 10-12. [Comb. with *Callianassa* (*Trypaea*) *maldivensis* Borradaile, 1904.]

Material examined. — SMF 32729, 7 males, 1 female, Maheno-hama, Akajima Island, Kerama Islands, Ryukyu Archipelago, fine sandy beach, rec. 11.i.1992, leg. A. Fukushima.

Diagnosis. — Rostrum acutely triangular, almost reaching distal margin of eyestalks. Mxp3 ischium-merus suboperculiform; merus rounded at distomesial corner. In larger cheliped dactylus setose on lateral surface. Male Plps1-2 absent; male Plps3-5 endopods with projecting, finger-like appendix interna. Telson convex on posterior margin, with small median concavity.

Type locality. — Djibouti.

Distribution. — Egypt, Red Sea; Djibouti, Gulf of Aden; Gulf of Mannar, India; Maldives; Sri Lanka; Mindanao, Philippines; Bali and the Kei Islands, Indonesia; Amami-Ohshima, Amakusa Island, and Tsushima, Japan. Here recorded from Mindanao, the Philippines, and Bali and the Kei Islands, Indonesia.

Gilvossius brachytelson (Sakai, 2002)

Callianassa brachytelson Sakai, 2002: 499, fig. 21A-E; Sakai, 2005b: 79.

Diagnosis. — Rostrum acutely triangular, reaching distal margin of eyestalks. Mxp3 ischium-merus subsquare; merus straight distally, and convex on mesial margin. Male Plps1-2 absent; male Plps3-5 endopods with projecting, finger-like appendix interna. Telson subsquare, and slightly rounded on posterior margin, with distinct median spine. Uropods longer than telson. Uropodal exopod subsquare, and much longer than endopod; dorsal surface carinate medially.

Type locality. — Andaman Sea, 07°45.452′N 97°57.951′E, 70.0 m, coarse and fine sand.

Distribution. — Andaman Sea, 7°45.452′N 97°57.951′E; 08°00.016′N 97°53.927′E; 70.0-76.1 m, muddy sand, coarse and fine sand.

Gilvossius candidus (Olivi, 1792)

[Abbreviated list of synonymy.]

Cancer candidus Olivi, 1792: 51, pl. 3 fig. 3.

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

Callianassa pontica — Cano, 1891: 5-30; Caroli, 1940: 76; Lutze, 1941: 34; Caroli, 1946: 71; Vatova, 1949, table 5; Caroli, 1950: 190; Dolgopol'skaia, 1954: 179, figs. 3, 4; De Saint Laurent & Božić, 1976: 24, figs. 5, 13, 21, 32; Beaubrun, 1979: 84, figs. 58, 59, 68-70; Moncharmont, 1979: 71; García Raso, 1983: 318, fig. 3; Thessalou-Legaki & Zenetos, 1985: 311; Thessalou-Legaki, 1986: 182; Tudge et al., 2000: 143; Makarov, 2004: 289, figs. 131-134, tab. 17.

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

Callianassa pestae — Lutze, 1937: 6; Lutze, 1938: 167 (partim) (not figs. 10-21 = *Callianassa subterranea*); Vatova, 1949, tables, 16, 18, 20, 24, 31; Marcuzzi, 1972: 193; Manning & Števčić, 1982: 295; Froglia & Grippa, 1986: 261.

Callianassa sp., Băcescu, 1949: 9, figs. 20-22.

Callianassa pestai — Holthuis, 1953a: 95, fig. 3; Doldopolski, 1969: 316, pls. 32-34; Kobyakova & Dolgopol'skaia, 1969: 286, pl. 5 fig. 1a-c; Števčić, 1971: 529; Mazmanidi et al., 1998: 129.

Callianassa algerica Lutze, 1938: 168 (partim) [not: fig. 22, eyestalks = *C. whitei*], figs. 26a, larger Mxp3 [not smaller Mxp3 = *C. subterranea*], 26b, larger Mxp3 [not smaller Mxp3 = *C. subterranea*], 27 [nomen dubium]. [Type locality. — Castiglione, near Algiers.]

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

Callianassa candida — Giordani Soika, 1943: 83 (partim); Giordani Soika, 1945: 994; Mikashavidze, 1981: 1415; Lewinsohn & Holthuis, 1986: 20; Števčić, 1990: 217; Dworschak, 1992: 194 (partim); Koukouras et al., 1992: 223; d'Udekem d'Acoz, 1996: 54; Sakai, 1999c: 14, fig. 2a-d; d'Udekem d'Acoz, 1999: 154; Tudge et al., 2000: 143; Costello et al., 2001: 289; Dworschak, 2002: 63, figs. 1, 2, table 1; d'Udekem d'Acoz, 2003, fig. website.

Callianassa (*Callichirus*) *pestae* — Zariquiey Alvarez, 1968: 230; Kattoulas & Koukouras, 1974: 344, fig. 1.
Callianassa candida — Sakai, 1999c: 14, fig. 2a-d; Dworschak, 2002: 63, figs. 1, 2, table 1; Sakai, 2005b: 29.
Callianassa (*Callianassa*) *candida* — Felder, 2001: 441.
Pestarella candida — Ngoc-Ho, 2003: 476, fig. 12; Dworschak, 2004: 15, figs. 1, 3.

Diagnosis. — Male Plps1-2 absent; Plps3-5 endopods with projecting, finger-like appendix interna.

Type locality. — Northern Adriatic lagoons: "nelle lagune sprofondato" (Olivi, 1792).

Distribution. — From Golfo de Cádiz, S.W. Spain, eastern Atlantic, to Alupka, Black Sea; 10 m.

Gilvossius convexus (De Saint Laurent & Le Loeuff, 1979)

Callianassa convexa De Saint Laurent & Le Loeuff, 1979: 53, fig. 10a-e; Sakai, 1999c: 17; Tudge et al., 2000: 143; Sakai, 2005b: 31.

Diagnosis. — Mxp3 ischium-merus subsquare, straight distally, and rounded at distomesial corner. Male Plps1-2 absent. Telson semicircular in form. [Cf. De Saint Laurent & Le Loeuff, 1979: 53, fig. 10d, e.]

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

Distribution. — Gambia; Mauritania.

Gilvossius diaphorus (Le Loeuff & Intès, 1974)

Callianassa diaphora Le Loeuff & Intès, 1974: 32, fig. 7a-v; De Saint Laurent & Le Loeuff, 1979: 49, fig. 9a, b, e, g; Sakai, 1999c: 18; Sakai, 2005b: 32.
Callianassa guineensis — Longhurst, 1958: 31 (partim).
Biffarius diaphora — Tudge et al., 2000: 143.

Diagnosis. — Mxp3 ischium-merus subpediform, with oblique distal margin. Male Plp1 absent; male Plp2 absent or present as feeble papilla; male Plps3-5 endopods with finger-like appendix interna. Telson trapezoid. [Cf. Le Loeuff & Intès, 1974: 32, fig. 7k, q, u.]

Remarks. — Le Loeuff & Intès (1974: 35) described the male Plps1-2 of their species *Callianassa diaphora* with "les pléopodes 1 et 2 sont le plus souvent absents mais le pl2 peut subsister à l'état de faible diverticule". [= Male Plps1-2 are absent in most cases, but Plp2 may be present as a feeble papilla], so that this species may safely be reclassified under the genus *Gilvossius* by the features of male Plps1-2.

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

Distribution. — Siera Leone to Ivory Coast; 10-60 m.

Gilvossius gravieri (Nobili, 1905)

Callianassa (*Trypaea*) *Gravieri* Nobili, 1905: 396 (not 395); Nobili, 1906b: 107, pl. 6 fig. 4; Balss, 1915: 2; De Man, 1928a: 23, pl. 6 fig. 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.
Callianassa gravieri — Sakai, 1999c: 43, fig. 6d-f; Tudge et al., 2000: 143; Sakai, 2005b: 85-86.
Callianassa cristata — Tudge et al., 2000: 143.

Diagnosis. — Rostrum acutely triangular, almost reaching distal margin of eyestalks. Mxp3 ischium-merus subsquare, merus straight distally and rounded at distomesial corner. Male Plps1-2 probably absent (De Man, 1928a: 24). Telson subsquare, and straight on posterior margin, with median spine.

Remarks. — This species probably belongs to the genus *Gilvossius* by the absence of male Plps1-2, as shown above.

Type locality. — Obock, Gulf of Aden.

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

Gilvossius 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; Sakai, 1999c: 18; Tudge et al., 2000: 143.
Callianassa guineensis — Longhurst, 1958: 31 (partim).

Diagnosis. — Mxp3 ischium-merus subpediform, with oblique distal margin. Male Plps1-2 absent. Telson longer than wide and trapezoid, tapering toward posterior margin, with median convexity. [Cf. Le Loeuff & Intès, 1974: 32, fig. 8j, p.]

Type locality. — Cote d'Ivoire, between Vridi and Jacqueville (5°09.5′N 4°09′W), 70 m.

Distribution. — Pointe-Noire, Congo; Ivory Coast; Sierra Leone; Senegal; 70-250 m.

Gilvossius pacificus (Guzmán & Thatje, 2003)

Biffarius pacificus Guzmán & Thatje, 2003: 294, figs. 1, 2.

Diagnosis. — Rostrum obsolete. Mxp3 ischium-merus operculiform. Male Plp1 absent; male Plp2 undescribed, probably absent; Plps3-5 biramous, endopods with stubby appendix interna in both sexes. [Adapted from Guzmán & Thatje, 2003.]

Remarks. — In *Biffarius pacificus*, the male Plp1 is absent, but the male Plp2 is undescribed, so this species is to be reclassified as a species of *Gilvossius*.

Type locality. — Off northern coast of Chile, 22°12′S to 22°45′S, 17-30 m.

Distribution. — Only known from the type locality.

Gilvossius persicus (Sakai, 2005)

Callianassa persica Sakai, 2005b: 97, fig. 21.

Diagnosis. — Male Plps1-2 absent.

Type locality. — Persian Gulf, 28°54′N 50°11′E, 56 m.

Distribution. — Only known from the type locality.

Gilvossius rotundicaudatus (Stebbing, 1902)

Callianassa rotundicaudata Stebbing, 1902: 41, pl. 8; Pearson, 1905: 90; Stebbing, 1910: 369; Kensley, 1974: 277 (key); Dworschak, 1992: 202, fig. 11a-f; Sakai, 1999c: 52; Tudge et al., 2000: 143; Sakai, 2005b: 18, 24, 28, 102.

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

Callianassa (*Calliactites*) *rotundicaudata* — Stebbing, 1910: 369.

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

Distribution. — South Africa — Orange River mouth, Saldanha Bay; St. Francis Bay; Algoa Bay; Kowie, Port Alfred; 10-35 m; Cheval Paar, Sri Lanka.

Gilvossius setimanus (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; Fowler, 1911: 570; 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, a fossil species.]

Callianassa atlantica Rathbun, 1926: 107; Schmitt, 1935b: 4; Biffar, 1971a: 654; Rabalais et al., 1981: 101, fig. 2; Manning, 1987: 397; Squires, 1990: 334, figs. 181-183. [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 stimpsoni — Manning, 1987: 397.

Gilvossius setimanus — Manning & Felder, 1992: 558, fig. 1; Tudge et al., 2000: 143; Sakai, 2005b: 47-48; Heard et al., 2007: 21, fig. 24.

Callianassa setimana — Sakai, 1999c: 28.

Material examined. — USNM 10497, 1 male (TL/CL, 77.0/18.0 mm), New Port, Rhode Island, 1885, leg. R/V "Albatross".

Diagnosis. — Mxp3 ischium-merus broadened and subsquare; merus rounded at distomesial corner. Male Plps1-2 absent. Telson semicircular, lacking median spine on posterior margin. [Cf. Manning & Felder, 1992, fig. 1c, g.]

Remarks. — It is here confirmed that the male Plps1-2 are absent.

Type locality. — New York.

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

Gilvossius tyrrhenus (Petagna, 1792)

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

Alpheus Tyrhenus Risso, 1816: 94 (only reference), not pl. 2 fig. 2.

Callianassa laticauda Otto, 1821: 11; Otto, 1828: 345, pl. 21 fig. 3; Heller, 1863: 203; Stalio, 1877: 107; Carus, 1885: 489; Caroli, 1940: 73; Lutze, 1941: 34; Gurney, 1942: 245; Caroli, 1946: 71; Zariquiey Alvarez, 1946: 106; Caroli, 1950: 189; Holthuis, 1953a: 91; Forest & Gantès, 1960: 348. [Type locality. — Nice, S. France, Mediterranean.]

Gebios Davyanus Risso, 1822: 243; Risso, 1827: 52. [Type locality. — Nice, Mediterranean.]

Callianassa tyrrhena — Risso, 1827: 54 (partim); Holthuis, 1947: 320, fig. 1; Holthuis, 1950: 113 (partim), fig. 40; Holthuis, 1953a: 91, 93, fig. 1; Picard, 1957: 48; Forest & Guinot, 1958: 10; Holthuis & Gottlieb, 1958: 62 (partim), not fig. 13 (= *C. subterranea*); Bourdon, 1965: 1; Forest, 1967: 6 (partim); Glaçon, 1971: 1; Števčić, 1971: 529; Neves, 1974: 13, fig. 4; Pastore, 1976: 107, 111; De Saint Laurent & Božić, 1976: 22, figs. 4, 12, 20, 31; Holthuis, 1977: 57; Zarkanellas & Bogdanos, 1977: 155; Beaubrun, 1979: 90, figs. 55, 60, 61, 66, 67; De Saint Laurent & Le Loeuff, 1979: 53; Domenech et al., 1981: 149; Adema et al., 1982: 26, fig. 7a-c; Manning & Števčić, 1982: 295; Abel et al. 1983: 483, pl. 177; García Raso, 1983: 323, fig. 2; Thessalou-Legaki, 1986: 182; d'Udekem d'Acoz, 1986: 101; Türkay et al., 1987; d'Udekem d'Acoz, 1989: 176; Moyse & Smaldon, 1990: 520, fig. 10.13; Števčić, 1990: 217; Thessalou-Legaki, 1990: 659; Holthuis, 1991: 252, 264, fig. 457; Pérez Sánchez & Moreno Batet, 1991: 1; Dworschak, 1992: 206; Koukouras et al., 1992: 223; Gruner, 1993: 997; Mayoral et al., 1994: 236; Hayward et al., 1995: 432, figs. 8-52; d'Udekem d'Acoz, 1996: 53; Hadjichristophorou et al., 1997: 22; Ingle, 1997: 78, fig. 7.3; Thessalou-Legaki et al., 1997a: 439; Thessalou-Legaki et al., 1997b: 435; Thessalou-Legaki & Kiortsis, 1997: 435; Sakai, 1999c: 21, fig. 3a-c; Thessalou-Legaki et al., 1999: 635; d'Udekem d'Acoz, 1999: 155; Dworschak, 2000b: 155, figs.; Dworschak et al., 2000: 313; Tudge et al., 2000: 143; Costello et al., 2001: 289; Vanhaelen, 2001: 147; d'Udekem d'Acoz, 2003, fig. on website; Ingle & Christiansen, 2004: 96, figs. 70, 72; Sakai, 2005b: 40-42.

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

Gebios davianii — Risso, 1844: 94.

Callianassa Laticauda — Hope, 1851: 14.

Callianassa Candida — Hope, 1851: 14.

Gebia Daviana — Hope, 1851: 15.
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 (partim); O'Céidigh, 1962: 164; O'Riordan, 1983: 72. [Not: *Callianassa laticauda* Otto, 1821.]
Callianassa subterranea laticauda var. — Czerniavsky, 1884: 76, 80.
Callianassa sp., Stebbing, 1893: 184.
Callianassa (*Callichirus*) *Stebbingi* Borradaile, 1903: 547. [Type locality. — Jersey, N.E. Atlantic.]
Callianassa Stebbingi — Selbie, 1914: 100, pl. 14 figs. 8-10.
Callianassa stebbingi — Caroli, 1921a: 245 (not *C. subterranea* after Thessalou-Legaki, 1990); Schellenberg, 1928: 78, figs. 59, 60; Steinitz, 1933: 147; Bodenheimer, 1937: 281; Lutze, 1937: 6, fig.; Lutze, 1938: 165, figs. 1-9; Gottlieb, 1953: 441; Ševčić, 1969b: 347.
Astacus tyrrhenus — Monod, 1931: 123.
Callianassa (*Cheramus*) *subterranea* — Bouvier, 1940: 102 (partim).
Callianassa (*Callichirus*) *tyrrhena* — Zariquiey Alvarez, 1968: 230; Andaloro et al., 1979: 86; Moncharmont, 1979: 72.
Callianassa (*Callianassa*) *tyrrhena* — Felder, 2001: 441.
Pestarella tyrrhena — Ngoc-Ho, 2003: 479, figs. 13, 14; Dworschak, 2004: 15, figs. 2, 3; Dworschak et al., 2006: 1369, figs. 1, 4, 6, tab. 2; Koller et al., 2006: 113; Robles et al., 2009: 316.
Not: *Alpheus Tyrhenus* Risso, 1816: 94 (only references), not pl. 2 fig. 2 (= *Pontonia pinnophylax* (Otto, 1821).

Remarks. — Dworschak et al. (2000) observed that this species was collected by yabby pump together with *Salmoneus erasimorum* Dworschak et al., 2000 (Alpheidae) in Opatja, Kvarner, Adria.

Type locality. — Naples, Italy, Mediterranean.

Distribution. — Eastern Atlantic Ocean, from Isle of Man to Canary Islands; and Zarzis, Tunisia, to Tantura, Israel in the Mediterranean Sea; intertidal, 5-20 m.

Gilvossius whitei (Sakai, 1999)

Callianassa Davyana White, 1847: 70 [not: *Gebios Davyana* Risso, 1822]; De Man, 1928a: 5, 37.
Callianassa (*Callichirus*) *stebbingi* — Pesta, 1918: 201, fig. 63.
Callianassa algerica Lutze, 1938: 168 (partim), fig. 22 (eyestalks = *C. whitei*) [not: figs. 26a (smaller Mxp3, not larger Mxp3), 26b (smaller Mxp3, not larger Mxp3), 27] [nomen dubium].
Callianassa candida — Dworschak, 1992: 194 (partim).
Callianassa whitei Sakai, 1999c: 14 (key), 23, fig. 4a-d; Costello et al., 2001: 289; Dworschak, 2002: 63.
Pestarella whitei — Ngoc-Ho, 2003: 484, fig. 15; Robles et al., 2009: 316.

Diagnosis. — Mxp3 ischium-merus operculiform; merus rounded at distomesial corner. Male Plps1-2 absent. Telson semicircular. [Cf. Sakai, 1999c, fig. 4b.]

Type locality. — Cape Monsena, S. Val Salina, Istria near Rovinj, Croatia, Adriatic Sea.

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

Gilvossius sp., Robles et al., 2009

Gilvossius sp. Robles et al., 2009: 316.

Genus **Notiax** Manning & Felder, 1991 **(sensu nov.)**

Notiax Manning & Felder, 1991: 772.

Raylllianassa Komai & Tachikawa, 2008: 42. [Type species. — *Callianassa amboinensis* De Man, 1888 (= *Neaxius ngochoae* (Sakai, 1999).]

Diagnosis. — Eyestalks flattened. Mxp3 ischium-merus operculiform, suboperculiform, or subpediform; propodus subovate or subrectangular, and dactylus digitiform. Male Plp1 uniramous, and unsegmented or bisegmented; male Plp2 uniramous, and unsegmented or bisegmented, lacking appendices interna and masculina; male Plps3-5 biramous and foliaceous, endopods with stubby appendix interna. Telson trapezoid or subquadrate. Uropodal exopod with dorsal plate.

Remarks. — *Raylllianassa* Komai & Tachikawa, 2008 was established on the basis of *Callianassa amboinensis* De Man, 1888, but is, however, considered a synonym of *Notiax* Manning & Felder, 1991, because the type species of *Raylllianassa* is included in *Notiax* that was established on the basis of *Callianassa brachyophthalma* A. Milne-Edwards, 1870, which has the same type of male Plps1-2 as found in *C. amboinensis*.

Type species. — *Callianassa brachyophthalma* A. Milne-Edwards, 1870. The gender of the generic name, *Notiax*, is feminine.

Species included. — *Notiax amboinensis* (De Man, 1888b); *N. brachyophthalma* (A. Milne-Edwards, 1870); *N. ceramica* (Fulton & Grant, 1906); *N. delicatula* (Rodrigues & Manning, 1992); *N. limosa* (Poore, 1975).

KEY TO THE SPECIES OF THE GENUS *NOTIAX*

1 – Mxp3 ischium-merus rectangular, 2.0 times as long as wide, or suboperculiform, 1.7-1.8 times as long as wide 2
– Mxp3 ischium-merus operculiform, 1.2-1.3 times as long as wide 3

2 – A1 peduncle reaching distal margin of A2 penultimate segment. From Port Phillip Bay, Victoria, Australia . . . . . *N. limosa*
– A1 peduncle reaching distal third of A2 terminal segment. From Chiloé Is., Chile . . . . . *N. brachyophthalma*

3 – Male larger cheliped without meral hook 4

– Male larger cheliped with meral hook 5

4 – Distal segment of A1 peduncle three times as long as penultimate segment .... *N. amboinensis*

– Distal segment of A1 peduncle 1.5-2.0 times as long as penultimate segment .... *N. ngochoae*

5 – Male Plp2 uniramous and unsegmented. From Port Phillip and Western Port, Victoria, Australia ..... *N. ceramica*

– Male Plp2 uniramous and bisegmented. From Praia do Araça, São Sebastião, Brazil... ..... *N. delicatula*

Notiax amboinensis (De Man, 1888)

Callianassa amboinensis De Man, 1888b: 480, pl. 20 fig. 4; Zehntner, 1894: 194; Borradaile, 1903: 545.

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

Diagnosis. — Cornea located distolaterally on eyestalk. Distal segment 3 of A1 peduncle 3 times as long as segment 2. Mxp3 ischium-merus rounded in shape; merus rounded on distomesial margin. Merus of larger cheliped rounded and serrated on ventral margin, lacking ventroproximal lobe. Male Plps1-2 unknown. Telson subquadrate.

Remarks. — The present species, *Notiax amboinensis* (De Man, 1888) was described as *Callianassa amboinensis* on the basis of a single damaged female, and can be characterized as follows, though the type specimen was lost (M. Türkay, in litt.). The A1 distal segment is distinctly elongate as shown by De Man (1888, pl. 20 fig. 4); the P1 merus is convex ventrally with a ventroproximal lobe; and the telson is subsquare. The species, *Callianassa ngochoae* Sakai, 1999c was earlier synonymized with *C. amboinensis*, but the recent survey has indicated that *C. amboinensis* is to be distinguished from *C. ngochoae*, which is here reclassified under the same genus, *Notiax* as *N. ngochoae*.

Type locality. — Ambon (= Amboina), Indonesia.

Distribution. — Only known from the type locality.

Notiax brachyophthalma (A. Milne-Edwards, 1870) (fig. 63F-G)

Callianassa brachyophthalma A. Milne-Edwards, 1870: 85; De Man, 1928b: 115; Sakai, 1999c: 31.

Callianassa (*Trypaea*) *brachyophthalma* — Borradaile, 1903: 546; De Man, 1928b: 27, 94, 115, 134; Holthuis, 1952: 92, fig. 19; Ferrari, 1981: 16, fig. 2.

Notiax brachyophthalma — Manning & Felder, 1991: 772, figs. 6, 11; Tudge et al., 2000: 143.

Material examined. — USNM 252309, 1 male (TL/CL, 67.0/19.0 mm), River Maullin Estuary, Lalanguithue, Chile, 26.iv.1990, leg. A. Bravo.

Diagnosis. — Mxp3 ischium-merus operculiform; merus rounded at mesiodistal corner. Male Plp1 uniramous and unsegmented (fig. 63F); male Plp2 uniramous and bisegmented (fig. 63G). Telson trapezoid, truncate on posterior margin, with median spine. [Cf. Ferrari, 1981, figs. 2-7, 16-18.]

Type locality. — Chiloé Is., Chile.

Distribution. — Only known from the type locality.

Notiax ceramica (Fulton & Grant, 1906)

Callianassa ceramica Fulton & Grant, 1906: 12, pl. 5; Hale, 1927a: 86; Poore, 1975: 205; Poore & Griffin, 1979: 257, figs. 22, 23; Sakai, 1988: 57; Sakai, 1999c: 41.
Callianassa (*Trypaea*) *ceramica* — De Man, 1928b: 27, 93, 104.
Biffarius ceramica — Tudge et al., 2000: 143.
Biffarius ceramicus — Davie, 2002: 457; Poore, 2004: 181, fig. 49d, e.

Diagnosis. — Mxp3 ischium-merus suboperculiform; merus rounded on mesiodistal margin. Male Plp1 uniramous and bisegmented; male Plp2 uniramous and unsegmented. Telson subquadrate, slightly convex on posterior margin, with distinct median spine.

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

Distribution. — Victoria to the south of Western Australia, intertidal to shallow subtidal (Poore & Griffin, 1979); Plimmerton, North Island, New Zealand.

Notiax delicatula Rodrigues & Manning, 1992

Biffarius delicatulus Rodrigues & Manning, 1992a: 324, fig. 1; Rodrigues et al., 1998: 380; Melo, 1999: 352, figs. 233-234; Tudge et al., 2000: 143; Robles et al., 2009: 316.
Callianassa delicatula — Sakai, 1999c: 27.

Diagnosis. — Mxp3 ischium-merus operculiform; merus rounded on distomesial margin. Male Plp1 uniramous and bisegmented; male Plp2 uniramous and bisegmented. Telson subquadrate, truncate on posterior margin, without median spine. [Cf. Rodrigues & Manning, 1992a, fig. 1j, r, s, w.]

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

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

Notiax limosa (Poore, 1975)

Callianassa limosa Poore, 1975: 201-205, figs. 4, 5; Poore & Griffin, 1979: 270, figs. 32, 33.
Neocallichirus limnosa — Sakai, 1988: 61.
Neocallichirus limosus — Sakai, 1999c: 103; Sakai, 2005b: 90.
Biffarius limosa — Tudge et al., 2000: 143.
Biffarius limosus — Davie, 2002: 457; Poore, 2004: 181, fig. 49f, g pl. 12b.

Diagnosis. — Mxp3 ischium-merus subsquare; merus rounded on mesiodistal margin; propodus subovate; dactylus digitiform. Male Plp1 uniramous and bisegmented; male Plp2 uniramous, minute, and lobed medially. Telson trapezoid, convex on posterior margin, without median spine. [Cf. Poore, 1975: 201-204, figs. 4b, 5g, i, j.]

Remarks. — Poore (1975) described the present species as *Callianassa limosa*, stating that "Pleopod 1 (male) uniramous, 2-articles, distal article tapering. Pleopod 2 (male) a minute medially lobed tapered papilla." However, the species was later included in the genus *Biffarius* by Tudge et al. (2000), and Davie (2002).

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

Distribution. — Australia — central New South Wales to Tasmania; shallow water to 100 m.

Notiax ngochoae (Sakai, 1999)

Callianassa amboinensis — Poore & Griffin, 1979: 248, fig. 14; Sakai, 1984: 96, figs. 1, 2; Sakai, 1988: 53, 57, fig. 1; Ngoc-Ho, 1991: 283, fig. 1; Sakai, 1999c: 38; Tudge et al., 2000: 143; Davie, 2002: 458; Sakai, 2005b: 71; Poore, 2008: 172.
Callianassa (*Trypaea*) *amboinensis* — De Man, 1928b: 27, 93, 107, 165, pl. 18 fig. 28-28c.
Callianassa ngochoae Sakai, 1999c: 49 (partim).
Rayllianassa amboinensis — Komai & Tachikawa, 2008: 43, figs. 13-15.

Diagnosis. — Cornea located distolaterally on eyestalks. The distal segment of A1 peduncle 1.5-2 times as long as segment 2. Mxp3 ischium-merus rounded in shape; merus rounded on distomesial margin. Merus of larger cheliped rounded and serrated on ventral margin, lacking ventroproximal lobe. Male Plp1 uniramous and unsegmented; male Plp2 uniramous and bisegmented. Telson subquadrate, bearing median spinule on posterior margin.

Remarks. — The genus *Rayllianassa* Komai & Tachikawa, 2008 was established for *Callianassa amboinensis* De Man, 1888. However, the type species of *Rayllianassa*, *C. amboinensis* is now referred to as *Notiax amboinensis* and is distinguished from *C. ngochoae* (=*N. ngochoae*). In *Notiax amboinensis* (De Man, 1888), the terminal segment of the A1 peduncle is elongate, and three times as long as the penultimate segment, as shown in the figure of De

Man (1888, pl. 20 fig. 4), whereas in *N. ngochoae* the terminal segment of the A1 peduncle is 1.5-2 times as long as the penultimate segment, as described by Poore & Griffin (1979, 2007), Sakai (1984, 1988, 1999c, 2005b), Ngoc-Ho (1991), and Komai & Tachikawa (2008).

Komai & Tachikawa (2008) described the male Plps1-2 of *Callianassa amboinensis*, i.e., in their text but without figures, under their new genus *Rayllianassa* as follows: "Male Plp1 is greatly reduced to minute papilla; Plp2 very small, exopod greatly reduced to rudimentary bud, endopod slightly shorter than protopod." This description was based on their examination of the male specimen of *C. amboinensis* from New Caledonia with the same catalogue number (MNHN-Th 1071) as that of the male specimen which Ngoc-Ho (1991: 283, fig. 1) had examined and figured. However, Komai & Tachikawa's (2008) description of the male pleopod 2 is, in spite of examining the specimen with the same catalogue number, quite different from Ngoc-Ho's (1999) description, who had clearly described, with reference to her figures, as follows: "Premier pléopode du male (fig. 1kl) à un seul article arrondi, très petit. Deuxième pléopode du mâle (fig. 1k2) à deux articles courts et grêles. [Male Plp1 a single segment, rounded, very small. Plp2 with two short and slender segments]". It cannot be possible, however, that two different descriptions were made by examining the male specimen(s) with the same catalogue number (MNHN-Th 1071), which thus can only indicate that Komai & Tachikawa (2007) most probably made a misdescription. The characteristic form of Plp2 observed in the male specimen (MNHN-Th 1071), shown by Ngoc-Ho's (1999) description and figures, suggests that Ngoc-Ho's *C. amboinensis* is included in the genus *Notiax*, thus in the present classification to be referred to as *N. ngochoae* Sakai, 1999, and that the generic classification under *Rayllianassa* is not permissible. Therefore, the type species of *Rayllianassa*, *Callianassa amboinensis* is also included in the genus *Notiax*, as a synonym of *N. ngochoae* Sakai, 1999.

Type locality. — Ambon (= Amboina), Indonesia.

Distribution. — Chichi-Jima, Ogasawara Islands (Komai & Tachikawa, 2008: 47); Philippines, 91-183 m. Amboina, off Lirung, Salibabu Island; Java, reef to 18 m, Indonesia. Northern Territory, Table Head, Port Essington; Dampier Island, Dampier Archipelago, northern Western Australia, reef to 19 m (Poore, 2008); Heron Island, Queensland, Australia. New Caledonia, 18-80 m off Tombeau Bay, Mauritius. Elat, Israel, Gulf of Aqaba.

Genus **Trypaea** Dana, 1852 **(sensu nov.)**

Trypaea Dana, 1852a: 14.

Biffarius Manning & Felder, 1991: 769; Poore, 2004: 181. [Type species. — *Callianassa biformis* Biffar, 1971b.]

Neotrypaea Manning & Felder, 1991: 771. [Type species. — *Callianassa californiensis* Dana, 1854.]

Nihonotrypaea Manning & Tamaki, 1998: 89. [Type species. — *Callianassa japonica* Ortmann, 1891.]

Necallianassa Heard & Manning, 1998: 883. [Type species. — *Necallianassa berylae* Heard & Manning, 1998.]

Pseudobiffarius Heard & Manning, 2000: 70. [Type species. — *Pseudobiffarius caesari* Heard & Manning, 2000.]

Diagnosis. — Mxp3 propodus subovate or subquadrate, and dactylus digitiform. Male Plp1 uniramous, slender, and un-, bi- or trisegmented; male Plp2 absent; male Plps3-5 biramous, endopods with projecting, finger-like to stubby appendix interna. Uropodal exopod with dorsal plate.

Remarks. — Tudge et al. (2000: 142) and Davie (2002: 457) listed 10 species of *Biffarius*. However, the type species of *Biffarius*, *Callianassa biformis* Biffar, 1971b has the same features of Plps1-2 as the type species of *Trypaea*, *T. australiensis* Dana, 1852b, so that *Biffarius* is synonymized here with *Trypaea*. Those species included in *Biffarius* by those authors, are reclassified by the features of the male Plps1-2; five of these species (*B. arenosus* (Poore, 1975); *B. biformis* (Biffar, 1971b); *B. fragilis* (Biffar, 1970); *B. lewtonae* (Ngoc-Ho, 1994); *B. poorei* Sakai, 1999b) are transferred to *Trypaea*; three species (*B. ceramicus* (Fulton & Grant, 1906); *B. delicatulus* Rodrigues & Manning, 1992a; and *B. limosa* (Poore, 1975)) are transferred to *Notiax*; and one species (*B. diaphora* (Le Loeuff & Intès, 1974)) is transferred to *Gilvossius*.

Type species. — *Trypaea australiensis* Dana, 1852a, by present designation and original monotypy. Gender of generic name, *Trypaea*, feminine.

Species included. — *Trypaea acanthura* (Caroli, 1946); *T. amboinae* (Bate, 1888); *T. amplimaxilla* (Sakai, 2002); *T. arenosa* Poore, 1975; *T. australiensis* Dana, 1852a; *T. berylae* (Heard & Manning, 1998); *T. biffari* (Holthuis, 1991); *T. biformis* (Biffar, 1971b); *T. brevirostris* (Sakai, 2002); *T. caesari* (Heard & Manning, 2000); *T. caledonica* (Ngoc-Ho, 1991); *T. californiensis* (Dana, 1854); *T. costaricensis* (Sakai, 2005b); *T. debilis* (Hernández-Aguilera, 1998); *T. exilimaxilla* (Sakai, 2005b); *T. filholi* (A. Milne-Edwards, 1878); *T. fragilis* (Biffar, 1970); *T. gigas* (Dana, 1852b); *T. intermedia* (De Man, 1905); *T. japonica* (Ortmann, 1891); *T. joculatrix* (De Man, 1905); *T. matzi* (Sakai, 2002); *T. melissae* (Poore, 2008); *T. mocambiquensis* (Sakai, 2004b); *T. petalura* (Stimpson, 1860); *T. plantei* (Sakai, 2004b); *T. poorei* (Sakai, 1999b); *T. pugnatrix* (De Man, 1905); *T. pygmaea* (De Man, 1928b); *T.*

sahul (Poore, 2008); *T. santarita* (Thatje, 2000); *T. sibogae* (De Man, 1905); *T. tabogensis* (Sakai, 2005b); *T. tenuipes* (Sakai, 2002); *T. thailandica* (Sakai, 2005b); *T. thermophila* (Lin, Komai & Chan, 2007); *T. thorsoni* (Sakai, 2005b); *T. tonkinae* (Grebenjuk, 1975); *T. truncata* (Giard & Bonnier, 1890); *T. uncinata* (H. Milne Edwards, 1837a).

Also the following 12 species, which were included in *Callianassa*, are tentatively reclassified under *Trypaea* in the present study, because they are different in morphological features, though the male Plps1-2 are unknown, from the type species of *Callianassa*, *Callianassa subterranea*, which is peculiar and, therefore, the only species now retained in the genus *Callianassa*:

T. acutirostella (Sakai, 1988); *T. bangensis* (Sakai, 2005b); *T. chakratongae* (Sakai, 2002); *T. gruneri* (Sakai, 1999c); *T. lewtonae* (Ngoc-Ho, 1994); *T. lignicola* (Alcock & Anderson, 1899); *T. nieli* (Sakai, 2002); *T. parva* (Edmondson, 1944); *T. propriopedis* (Sakai, 2002); *T. rochei* (Bouvier, 1895); *T. spinoculata* (Sakai, 2005b); *T. stenomastaxa* (Sakai, 2002).

The following key to the species of the genus *Trypaea* has been split-up into three sections, according to the species' currently known geographical distributions.

KEY TO THE SPECIES OF THE GENUS *TRYPAEA* IN THE EASTERN PACIFIC OCEAN

1 – Rostrum triangular 2
– Rostrum indistinctly developed 5

2 – A1 peduncle longer than A2 peduncle 3
– A1 peduncle shorter than A2 peduncle 4

3 – Telson with posteromedian spine and two pairs of subdistal spines on each lateral margin . . . . . *T. tabogensis*
– Telson unarmed on lateral and posterior margins . . . . . *T. debilis*

4 – P3 propodus square at proximoventral corner . . . . . *T. santarita*
– P3 propodus rounded at proximoventral corner . . . . . *T. uncinata*

5 – Eyestalk reaching distal fifth of A1 proximal segment . . . . . *T. rochei*
– Eyestalk overreaching distal margin of A1 proximal segment 6

6 – Telson without posteromedian spine . . . . . *T. biffari*
– Telson with posteromedian spine 7

7 – Male larger cheliped with subsquare carpus . . . . . *T. californiensis*
– Male larger cheliped with elongate carpus . . . . . *T. gigas*

KEY TO THE SPECIES OF THE GENUS *TRYPAEA* IN THE NORTH ATLANTIC AND IN THE WESTERN ATLANTIC OCEAN

1 – Rostrum sharply triangular and more than half as long as eyestalks; telson with two sharp spines on lateral margin . . . . . *T. berylae*

– Rostrum short and less than half as long as eyestalks; telson unarmed on lateral margin 2

2 – A1 peduncle longer than A2 peduncle 3
– A1 peduncle about as long as, or shorter than A2 peduncle 4

3 – Telson with median spine on posterior margin . . . . . *T. caesari*
– Telson without median spine on posterior margin . . . . . *T. costaricensis*

4 – A1 peduncle about as long as A2 peduncle . . . . . *T. fragilis*
– A1 peduncle shorter than A2 peduncle . . . . . *T. biformis*

Key to the Species of the Genus *Trypaea* with the exception of those occurring in the eastern Pacific Ocean and in the North Atlantic and western Atlantic Ocean

1 – Mxp3 ischium-merus broad, 1.3-1.8 times as long as wide 2
– Mxp3 ischium-merus slender, more than twice as long as wide 22

2 – Rostrum acutely triangular, and more than half as long as eyestalks 3
– Rostrum short and triangular, and less than half as long as eyestalks 7

3 – A1 peduncle as long as, or longer than A2 peduncle 4
– A1 peduncle shorter than A2 peduncle . . . . . *T. bangensis*

4 – A1 peduncle as long as A2 peduncle . . . . . *T. gruneri*
– A1 peduncle longer than A2 peduncle 5

5 – Telson with posteromedian spine, from North West Shelf, Western Australia, 82 m . . . . . *T. acutirostella*
– Telson without posteromedian spine 6

6 – Abdominal somite 6 wider than long, from Britomart Reef, Queensland, reef front, 15 m . . . . . *T. lewtonae*
– Abdominal somite 6 longer than wide, from Andaman Sea, 9°00′N 98°03′E, 40.0-58.0 m . . . . . *T. amplimaxilla*

7 – A1 peduncle longer than A2 peduncle 8
– A1 peduncle about as long as, or shorter than A2 peduncle 14

8 – Eyestalks armed with distal spine 9
– Eyestalks unarmed distally 10

9 – Distal spine of eyestalk distinct; Mxp3 ischium-merus subquadrate . . . . . *T. thorsoni*
– Distal spine of eyestalk short; Mxp3 ischium-merus oval . . . . . *T. filholi*

10 – Eyestalks overreaching distal margin of A1 proximal segment 11
– Eyestalks not reaching distal margin of A1 proximal segment 12

11 – Telson oval in dorsal view, and Mxp3 also oval . . . . . *T. sahul*
– Telson subquadrate in dorsal view, and Mxp3 also subquadrate . . . . . *T. poorei*

12 – A1 peduncle extremely elongate . . . . . *T. australiensis*
– A1 peduncle slightly longer than A2 peduncle 13

13 – P3 propodus rounded on ventral margin . . . . . *T. arenosa*
– P3 propodus convex on ventral margin . . . . . *T. melissae*

14 – A1 peduncle about as long as A2 peduncle 15
– A1 peduncle shorter than A2 peduncle 18

15 – Uropodal exopod with subdistal spine on lateral margin . . . . . *T. truncata*
– Uropodal exopod unarmed on lateral margin 16

16 – Rostrum triangular . . . . . *T. brevirostris*
– Rostrum indistinctly developed 17

17 – Carpus of male larger cheliped incurvate on dorsal margin, from Bay of Tokyo . . . . . *T. japonica*
– Carpus of male larger cheliped straight on dorsal margin . . . . . *T. petalura*

18 – Eyestalks armed with distal spine, from W. Malay Peninsula . . . . . *T. spinoculata*
– Eyestalks unarmed distally 19

19 – Uropodal endopod and telson each with distinct distolateral spine, from Bay of Naples . . . . . *T. acanthura*
– Uropodal endopod and telson each unarmed distolaterally 20

20 – Meral hook of male larger cheliped absent, from Hanauma Bay, Oahu . . . . . *T. parva*
– Meral hook of male larger cheliped present 21

21 – Mxp3 ischium divergent distally . . . . . *T. thermophila*
– Mxp3 ischium subsquare, from Andaman Sea, 185-244 m . . . . . *T. lignicola*

22 – Rostrum short and obtusely triangular . . . . . *T. thailandica*
– Rostrum sharply triangular 23

23 – Rostrum less than half as long as eyestalk 24
– Rostrum elongate, reaching almost tip of eyestalk, or overreaching proximal half of eyestalk 26

24 – Telson armed with median spine on posterior margin . . . . . *T. nieli*
– Telson unarmed on posterior margin 25

25 – P3 propodus convex on distal margin . . . . . *T. mocambiquensis*
– P3 propodus distinctly concave on distal margin . . . . . *T. joculatrix*

26 – Rostrum almost reaching tip of eyestalk 27
– Rostrum overreaching proximal half of eyestalk 35

27 – P3 propodus subsquare 28
– P3 propodus elongate and oval 30

28 – Telson medially concave on posterior margin . . . . . *T. stenomastaxa*
– Telson straight on posterior margin, bearing median spine . . . . . *T. propriopedis*

29 – Mxp3 ischium-merus narrowing distally . . . . . *T. exilimaxilla*
– Mxp3 ischium-merus obliquely truncate at distal end 30

30 – A1 peduncle shorter than A2 peduncle 31
– A1 peduncle subequal to A2 peduncle 32

31 – Uropodal endopod armed with subdistal spine on lateral margin . . . . . *T. amboinae*
– Uropodal endopod unarmed on anterior margin . . . . . *T. sibogae*

32 – A1 peduncle shorter than A2 peduncle . . . . . *T. intermedia**)
– A1 peduncle reaching distal end of A2 peduncle 33

33 – Uropodal endopod bearing subdistal spine on lateral margin . . . . . *T. pygmaea*
– Uropodal endopod smooth on lateral margin . . . . . *T. pugnatrix*

34 – A1 peduncle longer than A2 peduncle 35
– A1 peduncle about as long as A2 peduncle 36

35 – Mxp3 ischium-merus narrowing distally ..... *T. tenuipes*
– Mxp3 ischium-merus obliquely truncate at distal end ..... *T. caledonica*

36 – Mxp3 ischium-merus obliquely truncate at distal end 37
– Mxp3 ischium-merus narrowing distally 38

37 – Telson subsquare ..... *T.* sp. (Rabalais et al., 1981)
– Telson trapezoid ..... *T. tonkinae*

38 – Uropodal exopod concave on lateral margin ..... *T. matzi*
– Uropodal exopod straight on lateral margin 39

39 – Carpus of male larger cheliped 0.8-1.0 times as broad as long ..... *T. chakratongae*
– Carpus of male larger cheliped 1.4-1.8 times as broad as long ..... *T. plantei*

*) In *T. intermedia* (De Man, 1905) the description of the Mxp3 is missing, as shown in the original descriptions by De Man (1905, 1928b), which causes great difficulty in composing the key to the species. However, the key can still be made by adopting, as a clue, the similarity of *T. intermedia* to *T. pugnatrix* (De Man, 1905) and to *T. pygmaea* (De Man, 1928).

Trypaea acanthura (Caroli, 1946)

Callianassa acanthura Caroli, 1946: 66, figs. 1a, 2; Holthuis, 1953a, fig. 3; De Saint Laurent & Božić, 1976: 21, figs. 3, 11, 19, 25, 30; Türkay, 1982: 225; d'Udekem d'Acoz, 1996: 54; Abed-Navandi & Dworschak, 1998: 605; Sakai, 1999c: 14; Costello et al., 2001: 289; Ngoc-Ho, 2003: 466, fig. 8.

Callianassa (*Trypaea*) *acanthura* — Zariquiey Alvarez, 1968: 229.

Neocallianassa acanthura — Heard & Manning, 1998: 884; d'Udekem d'Acoz, 1999: 155; Tudge et al., 2000: 143.

Type locality. — Bay of Naples.

Distribution. — Bay of Naples; Adriatic Sea: Kornati Archipelago and Vestar Bay, near Rovinj, Croatia; 3-6 m; Ionian Sea; Aegean Sea.

Trypaea acutirostella (Sakai, 1988)

Callianassa acutirostella Sakai, 1988: 57, fig. 2; Sakai, 1999c: 37; Tudge et al., 2000: 143; Davie, 2002: 458; Sakai, 2005b: 64, figs. 13, 14.

Diagnosis. — Rostrum acutely pointed, almost reaching distal end of eyestalks. Mxp3 ischium-merus suboperculiform, merus rounded on distomesial margin. Male Plps1-2 unknown. Uropodal endopod without distolateral spine. Telson almost straight on posterior margin, with median spine.

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

Distribution. — North West Shelf of Western Australia, and Arafura Sea.

Trypaea amboinae (Bate, 1888)

Scallasis amboinae Bate, 1888: 34, pl. 2 figs. 3, 4; Manning & Felder, 1991: 780 (list); Tudge et al., 2000: 145.
Callianassa (*Scallasis*) *amboinae* — Borradaile, 1903: 547; De Man, 1928a: 93.
Callianassa (*Scallasis*) *Amboinae* — De Man, 1928b: 30.
Callianassa amboinae — Sakai, 1999c: 37, fig. 5d-f; Sakai, 2005b: 68, figs. 15, 16.

Diagnosis. — Mxp3 ischium-merus subpediform; merus obliquely truncate with rounded mesiodistal corner. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson concave on posterior margin, without median spine.

Remarks. — *Scallasis amboinae* was reclassified under the genus *Callianassa* by Sakai (1999c: 37; 2005b: 68), because it was found by examining the type specimen (MNH 1888.22) of *Scallasis amboinae* that it is different from Bate's (1888) figure as follows: the eyestalks are not globose but triangular, the Mxp3 ischium-merus is not slender but rectangular, and lacking an exopod (Sakai, 1999c, fig. 5f). However, the species is reclassified now under *Trypaea*, because the male Plp2 is absent.

Type locality. — Ambon (= Amboina), Indonesia.

Distribution. — Bay of Nhatrang, Vietnam (Sakai, 1997); Ambon, Indonesia (Bate, 1888; De Man, 1928); East Lagoon, New Caledonia (Ngoc-Ho, 1991).

Trypaea amplimaxilla (Sakai, 2002)

Callianassa amplimaxilla Sakai, 2002: 501, figs. 22A-D, 23A-D; Sakai, 2005b: 72.

Type locality. — Andaman Sea, 9°00′N 98°03′E, 40.0 m.

Distribution. — Andaman Sea, 7°35.995′N 98°25.119′E; 7°59.839′N 98°13.625′E; 9°00.009′N 98°02.962′E; 9°14.939′N 97°54.212′E; 40.0-58.0 m; muddy sand, sandy mud.

Trypaea arenosa Poore, 1975

Callianassa arenosa Poore, 1975: 197-201, figs. 1, 2; Poore & Griffin, 1979: 250, figs. 15-17; Sakai, 1988: 57; Sakai, 1999c: 39; Sakai, 2005b: 73.
Biffarius arenosa — Tudge et al., 2000: 142; Davie, 2002: 457; Poore, 2004: 181, fig. 49b, d pl. 12a.

Diagnosis. — Mxp3 ischium-merus suboperculiform; merus rounded mesiodistally. P3 propodus largely convex on ventral margin. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson almost straight on posterior margin, without median spine. [Cf. Poore & Griffin, 1979, fig. 15b.]

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

Distribution. — Moreton Bay, Queensland; New South Wales; Victoria; Tasmania; intertidal to shallow water.

Trypaea australiensis Dana, 1852

Trypaea australiensis Dana, 1852a: 19; Dana, 1852b: 513; Dana, 1855, pl. 32 fig. 4; Fulton & Grant, 1906: 14; Manning & Felder, 1991: 774, figs. 1, 3, 12; Tudge et al., 2000: 143; Davie, 2002: 461.

Trypaea porcellana Kinahan, 1856: 130, pl. 4 fig. 2. [Type locality. — Port Phillip, 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: 83, 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; Debelius, 1999: 227, figs.; Sakai, 1999c: 39.

Diagnosis. — A1 distal segment distinctly long, overreaching A2 peduncle at proximal fifth. Mxp3 ischium-merus suboperculiform; merus distinctly protruded at mesiodistal angle. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson almost straight on posterior margin, without median spine.

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

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

Trypaea bangensis (Sakai, 2005)

Callianassa bangensis Sakai, 2005b: 74, figs. 17, 18.

Diagnosis. — Rostrum triangular and pointed apically in dorsal view; frontal margin of carapace smooth. Eyestalks rounded distally, shorter than rostrum, and directed downward distally, overreaching basal segment of A1 peduncle. A1 peduncle shorter than A2 peduncle. Mxp3 merus-ischium broad and oval; merus rounded on distomesial margin; propodus subovate and dactylus digitiform. Male larger cheliped massive; ischium denticulate on ventral margin, but unarmed on dorsal margin; merus oval, dorsal margin arched and smooth, ventral margin arched and denticulate; carpus short, broad, and rounded on proximoventral margin; chela stout. P3 propodus ovate and rounded at ventroproximal corner. Plps1-2 unknown. Telson slightly longer than broad and shield-like, unarmed on convergent lateral margins, and lacking median spine on straight posterior margin. Uropodal endopod subquadrate,

longer than telson, and rounded distally; uropodal exopod broad, longer than endopod, and obliquely truncate distally. [Adapted from Sakai, 2005b.]

Type locality. — Six miles of Port Banga, Mindanao, Philippines, 50 m.

Distribution. — Known only from the type locality.

Trypaea berylae (Heard & Manning, 1998)

Neocallianassa berylae Heard & Manning, 1998: 884, figs. 1-3; Tudge et al., 2000: 143; Heard et al., 2007: 22, fig. 20.
Callianassa berylae — Sakai, 1999c: 129; Sakai, 2005b: 44.

Material examined. — USNM 260881, holotype, male (TL/CL, 18.0/4.5 mm), South Carolina, U.S.[A.], 43 m, viii.1977, leg. G.W. Pierce.

Diagnosis. — Rostrum sharply triangular, not reaching distal margin of eyestalks. Mxp3 ischium-merus operculiform; merus broadly rounded at mesiodistal angle (Heard & Manning, 1998, fig. 2f). Male Plp1 uniramous and bisegmented; male Plp2 uncertain, but probably absent. Telson almost straight on posterior margin, with median spine, bearing two distinct, posteriorly-directed subdistal spines on lateral margin. [Adapted from Heard & Manning, 1998: 888.]

Type locality. — South Carolina, 32°00′57″N 79°31′03″W, 43 m, sand.

Distribution. — Only known from the type locality.

Trypaea biffari Holthuis, 1991

Callianassa affinis Holmes, 1900: 162, pl. 2 figs. 29-30; Rathbun, 1904: 154; Schmitt, 1921: 119, fig. 81; Stevens, 1928: 341, fig. 18; Haig & Abbott, 1980: 580, pl. 166, fig. 24.3. [A junior primary homonym of *Callianassa affinis* A. Milne-Edwards, 1861, a fossil species.]
Callianassa (*Callichirus*) *affinis* — Borradaile, 1903: 547.
Callianassa (*Trypaea*) *affinis* — De Man, 1928b: 27, 101.
Neotrypaea affinis — Manning & Felder, 1991: 771.
Callianassa biffari Holthuis, 1991: 242, fig. 243 (partim, *C. tabogensis* sp. nov.). [New name for *Callianassa affinis* Holmes, 1900.]
Neotrypaea biffari — Tudge et al., 2000: 143.

Type locality. — Point Loma, California, U.S.A.

Distribution. — Santa Monica Bay, Los Angeles, San Diego and San Clemente Is., U.S.A.; Ensenada and San Quantin Bay, Baja California, Mexico; Panama; on beaches.

Trypaea biformis (Biffar, 1971)

Callianassa biformis Biffar, 1971b: 225, fig. 1; Rabalais et al., 1981: 101; Manning, 1987: 397; Squires, 1990: 349, figs. 184-186; Sakai, 1999c: 26; Sakai, 2005b: 44.

Biffarius biformis — Coelho, 1997: 147; Melo, 1999: 348, figs. 230-231; Tudge et al., 2000: 143; Coelho et al., 2007: 5 (table); Heard et al., 2007: 20, fig. 26.

Material examined. — USNM 135053, paratype, male (TL/CL, 20.0/4.5 mm), south end, mouth of Doboy Sound, Sapelo Island, Georgia, U.S.[A.], 01.i.1969, leg. H. Heard, det. T. Biffar.

Diagnosis. — Mxp3 ischium-merus operculiform; merus rounded at mesiodistal angle. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson slightly rounded on posterior margin, without median spine.

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; Itamaracá and Casa Caiada, Brazil (Coelho, 1997).

Trypaea brevirostris (Sakai, 2002)

Callianassa brevirostris Sakai, 2002: 514, figs. 30A-E, 31A-I.

Diagnosis. — Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson longer than wide, bearing median concavity, with spine on posterior margin.

Type locality. — Andaman Sea, 7°52′N 98°42′E, 21 m, sand with shell fragments.

Distribution. — Andaman Sea, 6°59.913′N 99°23.822′E; 9°30.351′N 97°57.168′E; 17.0-60.7 m, mud, fine sand, sand with shell fragments.

Trypaea caesari (Heard & Manning, 2000)

Pseudobiffarius caesari Heard & Manning, 2000: 71, figs. 1, 2, 3a-k, n-o, 4, 5a.
Callianassa caesari — Sakai, 2005b: 44.

Diagnosis. — Rostrum small and triangular. Eyestalks flattened and contiguous along median line, slightly overreaching A1 proximal segment. A1 peduncle slightly longer than A2 peduncle. Mxp3 ischium-merus operculiform and 1.3-1.8 times as long as wide; merus rounded at distomesial angle. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson subquadrate, bearing shallow median concavity, with spine on posterior margin. [From Heard & Manning, 2000, figs. 3i, k, 4g.]

Type locality. — Buccoo Reef, 11°11′N 60°49′W, Tobago.

Distribution. — Northwest corner of Man O'War Bay (11°19′N 60°34′W), Lover's Beach, Tobago, ca. 2 m; Pirate's Cove, east side of Man O'War

Bay; Buccoo Reef (11°11′N 60°49′W); Coral Gardens, Buccoo Reef; Pigeon Point (11°10′N 60°51′W); Lowlands Lagoon (= Petit Trou; 13°50′N 61°05′W, 1-3 m).

Trypaea caledonica (Ngoc-Ho, 1991)

Callianassa caledonica Ngoc-Ho, 1991: 285, fig. 2.

Diagnosis. — Mxp3 ischium-merus rectangular; merus slightly concave on distal margin, with rounded mesiodistal angle. P3 propodus oval, with protruded ventroproximal angle. Male Plp1 uniramous and small; male Plp2 absent. Telson wider than long, bearing median concavity with small spine on posterior margin.

Remarks. — *Callianassa caledonica* Ngoc-Ho, 1991 is characterized as follows. The A1 peduncle is longer than the A2 peduncle, the Mxp3 ischium-merus is subpediform, abdominal somite 6 is elongate, the uropodal endopod bears a spine on the lateral margin, and the uropodal exopod is broadened and longer than the endopod, bearing a spine on the lateral margin. However, those morphological features mentioned above are not decisive in determining the genus to which *C. caledonica* should belong. What is more important is that in *C. caledonica* the male Plp1 is present, and uniramous and small, and the male Plp2 is absent, as in the type species of *Trypaea*, *T. australiensis*, which suggests that *C. caledonica* may safely be included in *Trypaea*.

Type locality. — East Lagoon, New Caledonia, 21 m.

Distribution. — Only known from the type locality.

Trypaea californiensis (Dana, 1854)

Callianassa californiensis Dana, 1854: 175; Stimpson, 1857: 4, 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; Sakai, 1999c: 32.

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; Feldman et al., 2000: 141; Tudge et al., 2000: 143; Atkinson & Taylor, 2004: 45, tab. 2.

Not: *Callianassa* (*Trypaea*) *californiensis* — Parisi, 1917: 23 (= *Trypaea japonica*).

Diagnosis. — Rostrum inconspicuous. Eyestalks elongate and triangular, overreaching A1 proximal segment. Mxp3 ischium-merus operculiform;

merus rounded at mesiodistal corner. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson almost straight on posterior margin, with or without median spine.

Type locality. — California.

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

Trypaea chakratongae (Sakai, 2002)

Callianassa chakratongae Sakai, 2002: 513, figs. 28A-D, 29A-G; Sakai, 2004b: 574-581, figs. 9-12; Sakai, 2005b: 80.

Diagnosis. — Rostrum pointed apically. Eyestalks rounded distally, and directed downward distally, corneae dispersed on eyestalks. A2 peduncle about as long as A1 peduncle. Anterolateral margin of carapace without spines. Mxp3 ischium-merus elongate and pediform, more than twice as long as wide. P3 propodus straight on ventral margin, and convex at posteroventral angle. Male Plps1-2 unknown. Telson convergent posteriorly.

Type locality. — Andaman Sea, 9°00.062′N 97°53.366′E, 65.4 m, muddy sand.

Distribution. — Only known from the type locality.

Trypaea costaricensis (Sakai, 2005)

Callianassa costaricensis Sakai, 2005b: 51, figs. 5-10.

Diagnosis. — P3 propodus protruded proximoventrally and rectangular. Male Plp1 uniramous and bisegmented; male Plp2 absent.

Type locality. — Golfo de Nicoya, Bahia Herradura, Costa Rica, GN-50KG (09°32.38′N 84°32.41′W), 45 m.

Distribution. — Only known from the type locality.

Trypaea debilis (Hernández-Aguilera, 1998)

Biffarius debilis Hernández-Aguilera, 1998: 303, fig. 1; Tudge et al., 2000: 143; Hendrickx et al., 2005: 170.
Callianassa debilis — Sakai, 2005b: 57.

Diagnosis. — Mxp3 ischium-merus subsquare; merus rounded at mesiodistal angle. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson

concave on posterior margin, without median spine. [Cf. Hernández-Aguilera, 1998, fig. 1h, i, l.]

Type locality. — Revillagigedo Archipelago, 18°20′52″N 114°43′43″W, Azufre Bay, Clarión Island.

Distribution. — Revillagigedo Archipelago, Pacific side of Mexico.

Trypaea exilimaxilla (Sakai, 2005)

Callianassa exilimaxilla Sakai, 2005b: 80, figs. 19, 20, tab. IV.

Diagnosis. — Mxp3 ischium-merus narrow and pediform. Male Plp1 uniramous and bisegmented; male Plp2 absent; male Plp3 endopod with projecting, finger-like appendix interna. Telson convergent distally, and almost straight on posterior margin, with median spine.

Type locality. — South China Sea, 05°09′N 106°47′E.

Distribution. — Only known from the type locality.

Trypaea filholi (A. Milne-Edwards, 1878)

Callianassa Filholi A. Milne-Edwards, 1878: 112; Filhol, 1886: 491, pl. 53 figs. 10-12; Borradaile, 1903: 548; Robles et al., 2009: 316.

Callianassa filholi — Chilton, 1907: 461-464, pl. 16 figs. 1-5; Miller & Batt, 1973: 110; Berkenbusch et al., 1998: 55; Sakai, 1999c: 43, fig. 7a-c; Berkenbusch et al., 2000: 397; Tudge et al., 2000: 143; Sakai, 2005b: 85.

Callianassa (*Trypaea*) *Filholi* — De Man, 1928b: 27, 101, 104.

Type locality. — Stewart Is.

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

Trypaea fragilis (Biffar, 1970)

Callianassa fragilis Biffar, 1970: 45, fig. 3; Biffar, 1971a: 667, figs. 7, 8; Manning, 1987: 397; Sakai, 1999c: 27; Sakai, 2005b: 45.

Biffarius fragilis — Manning & Felder, 1991: 769; Coelho, 1997: 147; Melo, 1999: 352, figs. 233-234; Tudge et al., 2000: 143; Coelho et al., 2007: 5 (table).

Biffarius cf. *fragilis* — Heard et al., 2007: 21, fig. 27.

Diagnosis. — Mxp3 ischium-merus subsquare; merus straight distally and rounded at mesiodistal angle. P3 propodus protruded proximoventrally and rectangular. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson almost straight but slightly concave medially on posterior margin, without median spine. [Cf. Biffar, 1971a: 667, figs. 7, 8.]

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

Distribution. — Miami, southeastern Florida; Puerto Rico; Antigua; Venezuela, sandy flat; Itamaracá, Brazil (Coelho, 1997).

Trypaea 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; Sakai, 1999c: 32; Sakai, 2005b: 57.

Callianassa longimana Stimpson, 1857a: 86; Stimpson, 1857b: 490, pl. 21 fig. 5; A. Milne-Edwards, 1870: 83, 101; Lockington, 1878: 302; Neumann, 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.

Neotrypaea gigas — Tudge et al., 2000: 143.

Diagnosis. — Rostrum reduced. Eyestalks shaped in elongate triangle. A1 peduncle about as long as A2 peduncle. Mxp3 ischium-merus subsquare, and 1.3-1.8 times as long as wide; merus rounded on distomesial angle. Meral hook of male larger cheliped convex on ventral margin. Carpus of male larger cheliped straight on dorsal margin. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson square, bearing small median spine on posterior margin.

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 sediments.

Trypaea gruneri (Sakai, 1999)

Callianassa mucronata — Tirmizi, 1977 (part.): 21, fig. 1b. [Not: *Callianassa mucronata* Strahl, 1862.]

Callianassa gruneri — Sakai, 1999c: 44, fig. 8a-g; Sakai, 2005b: 86.

Diagnosis. — Mxp3 ischium-merus subsquare; merus straight, and slanting mesially on distal margin. P3 propodus convex proximoventrally. Male Plps1-2 uncertain. Telson straight on posterior margin, without median spine.

Type locality. — Philippines, Luzon.

Distribution. — Only known from the type locality.

Trypaea intermedia De Man, 1905

Callianassa intermedia De Man, 1905: 609; Sakai, 1999c: 46; Tudge et al., 2000: 143; Sakai, 2005b: 86.

Callianassa (*Cheramus*) *intermedia* — De Man, 1928b: 26, 98, 143, pl. 14 figs. 21-21d.
Not: *Callianassa subterranea intermedia* forma; Czerniavsky, 1884: 80 [nomen dubium].

Diagnosis. — Rostrum sharply pointed, slightly overreaching eyestalks. A1 peduncle much shorter than A2 peduncle. Mxp3 ischium-merus narrow and more than twice as long as wide. P3 propodus subquadrate, swelling at proximoventral angle. Male Plp1 uniramous and bisegmented; Plp2 absent. Telson bearing median concavity with spine on posterior margin.

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

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

Trypaea japonica (Ortmann, 1891)

Callianassa subterranea var. *japonica* Ortmann, 1891: 56, pl. 1 fig. 10a; Bouvier, 1901: 332-334; Doflein, 1902: 644; Balss, 1914: 91; Nakazawa, 1927: 1039, fig. 1999; Yokoya, 1930: 543; Kikuchi, 1932: 7; Yokoya, 1933: 52; Miyazaki, 1936: 317-320, figs. 1-3; Kamita, 1957: 107-109, 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; Vinogradov, 1950: 224; Shiino, 1951: 87; Miyake, 1965: 633, fig. 1037 (illustrated by K. Sakai); Sakai, 1968: 2-3, fig. 8; Sakai, 1969: 232, pls. 9-12; Miyake, 1982: 92, pl. 31 fig. 4; Sakai, 1987a: 303; Holthuis, 1991: 246, figs. 449, 450; Dworschak, 1992: 198; Liu & Zhong, 1994: 562 (list); Tamaki et al., 1996: 675, tabs.; Tamaki et al., 1997: 223; Miyabi et al., 1998: 101; Sakai, 1999c: 46; Sakai, 2001: 937-948, figs. 1-4, table 1; Sakai, 2002, fig. 15D-F; Sakai, 2004: 113, fig. 4; Sakai, 2005b: 87; Sakai & Sawada, 2006: 1357.

Callianassa harmandi — Nakazawa & Kubo, 1947: 754, fig. 2173; Vinogradov, 1950: 224; Shiino, 1951: 87; Liu, 1955: 63, pl. 23 figs. 1-5; Utinomi, 1956: 63, pl. 32 fig. 2; Miyake et al., 1962: 124.

Callianassa petalura — Liu, 1955, pl. 23 fig. 6-9; Holthuis, 1991, fig. 453 (larger cheliped of male and female); Debelius, 1999: 277, fig. [Not: *Callianassa petalura* Stimpson, 1860.]

Nihonotrypaea japonica — Manning & Tamaki, 1998: 889, fig. 1; Tamaki et al., 1999: 37; Tamaki & Miyabe, 2000: 182; Tudge et al., 2000: 133, 143; Sakai, 2001: 946; Tamaki, 2003: 116; Atkinson & Taylor, 2004: 45, tab. 2; Itani, 2004, fig. 3; Tamaki, 2004a: 87; Tamaki & Harada, 2006: 65; Itani, 2007: 202; Lin et al., 2007: 153.

Callianassa ?*japonica* — Yamaguchi & Holthuis, 2001: 112-113, referring to Suiken-figs. 2, 3.
Nihonotrypaea harmandi — Tudge et al., 2000: 143; Tamaki, 2003: 116; Fuji-ie, W. et al., 2004: 77; Itani, 2004, fig. 3; Tamaki, 2004a: 87; Tamaki & Harada, 2006: 65; Itani, 2007: 202.

Material examined. — SMF 32732 (7 males with the larger cheliped of *harmandi*-form, 29.0/6.3-34.0/7.7 mm; 11 males with the larger cheliped of *japonica*- and *C. californiensis* var. *japonica*-types, 19.0/4.5-34.0/8.0 mm; 2 ovig. females, 22.0/5.1 mm; 20 females, 21.0/4.8-37.0/7.7 mm; 9 damaged males and females), Warabi-I, Izumi-city, Kagoshima Pref., Japan, 2.vi.1989, leg. H. Mukai; SMF 32733, 2 males (35.0/7.7-35.0/4.4 mm with larger chelipeds of *harmandi*-form), Okinosu beach, Tokushima, Japan, 30.x.2005, leg. H. Sora.

Diagnosis. — Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson straight on posterior margin with median spine.

Remarks. — Specimens of the present species were found abundantly in the sandy-mud tidal zone, and their larger chelipeds are variable in shape, which has caused numerous synonymous species as shown in the list of synonyms. It was found through the examination of the specimens that each collection includes individuals with dactyli in varied forms and also with different proportions in length of the carpus to the palm, and they are almost the same morphologically with one another, except for those differences found in the male larger cheliped. Those specimens were grouped into three types by the morphological features of their male larger chelipeds (Sakai, 1969, table 9): an A-group represented by *C. japonica*; a B-group by Bouvier's *C. californiensis* var. *japonica*; and a C-group by Bouvier's *C. harmandi*, and they were safely considered to belong to one species, *C. japonica*, with morphological variations in the features of the male larger cheliped, because it seems improbable that each group of those individuals collected together at each locality and grouped into three types has its own habitat. This fact was proven morphologically by re-examining the syntypes (MNHN Th 70, registered as *C. californiensis* var. *japonica* Bouvier, 1901, from the surroundings of Tokyo Bay, Japan; MNHN Th 80, registered as *C. Harmandi* Bouvier, 1901, from Tokyo Bay, Japan; MNHN Th 496, registered as *C. japonica* Ortmann, 1891, leg. Franck, 1895, from Japan; MNHN Th 507, registered as *C. japonica* Ortmann, 1891, leg. Franck, from Japan) (Sakai, 2001: 938). Though Wardiatino & Tamaki (2001) described *C. japonica* and *C. harmandi* as two valid species by the difference in size of their cornea alone (Wardiatino & Tamaki, 2001, fig. 1), this has turned out to be incorrect, because it is confirmed by the present examination of the material (SMF32732, from Warabi I. Izumi-city, Kagoshima) that the cornea of *C. japonica* is the same as that of *C. harmandi*, namely the cornea is round

in both these species. Itani (2007: 202, in Japanese) is skeptical about the statistical results of measurement of morphological features by Wardiatono & Tamaki (2001), mentioning that it is not always easy to make a clear distinction in morphology between *Nihonotrypaea* (= *Callianassa*) *japonica* and *Nihonotrypaea* (= *Callianassa*) *harmandi*, which are found distributed all over Japan, though each of them has its own locality, because their eyes and rostrums change in width (the former) and in shape (the latter) according to their growth, and the lively dispute over *Nihonotrypaea* (= *Calianassa*) *harmandi*, that is, whether it is a valid species or not, will be settled if genetic exchanges (hybrids) will be confirmed between those two species collected in the same locality.

After my rebuttal (Sakai, 2001, 2004) against Manning & Tamaki (1998), Tamaki & Miyabe (2000), and Wardiatino & Tamaki (2001), yet Tamaki (2004), and Tamaki et al. (2006) reported two species, *C. japonica* and *C. harmandi* with their data, without paying attention to my earlier paper (Sakai, 1969). They classified in vain the specimens collected together at each locality into two species, because each collection includes individuals whose male larger chelipeds are morphologically intermediate, just as Bouvier' collection from Tokyo Bay (Bouvier, 1901: 332) preserved in one bottle, whose specimens were confirmed to belong to one species, *C. japonica* (cf. Sakai, 2001: 938), though they had once been classified into three species, *Callianassa subterranea* var. *japonica* Ortmann, 1891; *Callianassa californiensis* var. *japonica* Bouvier, 1901; and *Callianassa Harmandi* Bouvier, 1901 (cf. Sakai, 2001: 938).

Type locality. — Bay of Tokyo, Japan.

Distribution. — Peter the Great Bay, intertidal mud flats in bays and estuaries to 192 m. Nemuro, Funka Bay, Hokkaido to Kagoshima, Kyushu Is., on both Pacific side and Japan Sea. Hou Hai, Yellow Sea (Shantung Peninsula to southwestern coast of Korean peninsula).

Trypaea 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; Liu & Zhong, 1994: 562; Ngoc-Ho, 1994: 51; Sakai, 1999c: 47; Komai, 2000b: 345 (list); Tudge et al., 2000: 143; Davie, 2002: 458; Sakai, 2005b: 88; Komai & Tachikawa, 2008: 30, figs. 7-9.

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.

Diagnosis. — Rostrum acutely triangular. Eyestalks protruded mesiodistally; corneae dispersed on eyestalks. A2 peduncle about as long as A1 peduncle. Mxp3 ischium-merus narrow and more than twice as long as wide;

merus not protruded at distomesial angle. Merus of larger cheliped with proximal spine on dorsal margin. P3 propodus concave on ventral margin. Male Plp1 uniramous and bisegmented; Plp2 absent. Telson trapezoid and straight on posterior margin, without median spine.

Type locality. — Bay of Labuan Tring (8°44.5′S 116°02.5′E), west coast of Lombok, Indonesia, 18-27 m.

Distribution. — N. South China Sea; Taiwan; Philippines; Bonin Islands, Chichi-jima (Komai & Tachikawa, 2008); Indonesia (Lombok, Java Sea); Arafura Sea, northern Queensland; north-west and north-east Australia; New Caledonia; South Vietnam; Mombasa; 15-300 m.

Trypaea lewtonae (Ngoc-Ho, 1994)

Callianassa lewtonae Ngoc-Ho, 1994: 52, fig. 1; Sakai, 1999c: 47; Sakai, 2005b: 90.
Biffarius lewtonae — Tudge et al., 2000: 143; Davie, 2002: 457.

Diagnosis. — Rostrum pointed apically, overreaching proximal half of eyestalks. A1 peduncle slightly longer than A2 peduncle. Mxp3 ischium-merus subsquare; merus rounded on distomesial margin. Male Plps1-2 unknown. Abdominal somite 6 wider than long. Telson almost straight on posterior margin, without median spine.

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

Distribution. — Only known from the type locality.

Trypaea lignicola (Alcock & Anderson, 1899)

Callianassa lignicola Alcock & Anderson, 1899: 288; Alcock, 1900, pl. 42 fig. 2, 2a, 2b; Alcock, 1901: 200; Borradaile, 1903: 545; Balss, 1925: 212; Sakai, 1999c: 48; Tudge et al., 2000: 143; Sakai, 2005b: 90.
Callianassa (*Calliactites*) *lignicola* — De Man, 1928b: 25, 97.

Diagnosis. — Rostrum small and triangular, less than half as long as eyestalks. A1 peduncle shorter than A2 peduncle. Mxp3 ischium-merus suboperculiform; merus rounded at distomesial angle. Mxp3 ischium-merus subsquare and 1.3-1.8 times as long as wide. Meral hook of male larger cheliped small. Male Plps1-2 unknown. Telson straight on posterior margin, without median spine. Uropodal endopod and telson without distinct distolateral spine, respectively. [Adapted from Alcock & Anderson, 1899: 289; Alcock, 1900, pl. 42 fig. 2, 2b.]

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

Distribution. — Only known from the type locality.

Trypaea matzi (Sakai, 2002)

Callianassa matzi Sakai, 2002: 506, figs. 26A-C, 27A-I; Sakai, 2005b: 92.

Diagnosis. — Rostrum triangular and pointed apically. Eyestalks rounded distally and directed downward distally; corneae dispersed on eyestalks. A2 peduncle about as long as A1 peduncle. Mxp3 ischium-merus slender. Merus of larger cheliped unarmed on dorsal margin. P3 propodus concave on ventral margin. Male Plp1 uniramous and bisegmented; Plp2 absent. Telson trapezoid and almost straight on posterior margin, with minute median spine.

Type locality. — Andaman Sea, 7°59.839′N 98°13.625′E, 41.8 m, sandy mud.

Distribution. — Andaman Sea, 6°43.303′N 99°03.304′E; 6°45.961′N 99°20.968′E; 9°14.939′N 97°54.212′E; 9°00.091′N 97°43.147′E; 20.5-83.3 m, mud, fine sand, muddy sand, with shell fragments.

Trypaea melissae (Poore, 2008)

Biffarius melissae Poore, 2008: 170, fig. 4.

Diagnosis. — Rostrum triangular. Eyestalks with broadly triangular apical lobes; cornea pigmented and domed. A1 peduncle slightly longer than A2 peduncle. Mxp3 ischium-merus operculiform and two times as long as greatest width, crista dentata with 18 teeth; carpus, propodus subovate, and dactylus digitiform. P1 (female) unequal and dissimilar. In larger cheliped, ischium finely denticulate on ventral margin; merus with denticulate distally-directed proximal tooth on ventral margin; carpus, propodus, and dactylus unarmed. In smaller cheliped, merus with small tooth on ventral margin. Male Plp1 simple and bisegmented. Female Plp1 trisegmented, segment 1 curved, segment 2 one-third as long as segment 1, segment 3 tapering, shorter than segment 2; female Plp2 biramous with curved basis, endopod bisegmented, as long as exopod. Telson subquadrate. Uropodal endopod oval, with straight lateral margin; uropodal exopod almost semicircular, with rounded distal and mesial margins, and barely concave on lateral margin, bearing dorsal plate.

Remarks. — Poore (2008) selected a female as the type specimen and described the female Plps1-2. However, he did not describe the Plp2 of the male paratype, which is an important element in the present classification. It is thus supposed that the male Plp2 is absent in Poore's *Biffarius melissae*. Therefore, his species is safely reclassified under the genus *Trypaea* (in the present classification), in which the male Plp2 is absent.

Type locality. — Western Australia, Dampier Archipelago; N.W. of Cohen Is. (20°22.14′S 116°46.13′E), 32-35 m.

Distribution. — Only known from the type locality.

Trypaea mocambiquensis (Sakai, 2004)

Callianassa mocambiquensis Sakai, 2004b: 585-592; Sakai, 2005b: 93.

Diagnosis. — Rostrum short and obtusely triangular in dorsal view. Eyestalks with small cornea. A1 peduncle about as long as A2 peduncle. Mxp3 ischium-merus slender and more than twice as long as wide. P1 unequal; larger cheliped unarmed, fingers slightly longer than palm and crossed with each other distally; smaller cheliped also unarmed, fingers longer than palm and crossed with each other distally. P3 propodus oval, swollen at posteroventral angle, and straight on ventral margin. Male Plp1 uniramous and bisegmented; Plp2 absent. Telson subtrapezoid.

Type locality. — Mocambique Channel, 26.0 m.

Distribution. — Only known from the type locality.

Trypaea nieli (Sakai, 2002)

Callianassa nieli Sakai, 2002: 518, fig. 32A-E; Sakai, 2005b: 94.

Diagnosis. — Rostrum obtusely triangular and less than half as long as eyestalks. Eyestalks rounded distally. A1 peduncle about as long as A2 peduncle. Mxp3 ischium-merus more than twice as long as wide; merus rounded on mesiodistal margin. Male Plps1-2 undescribed. Telson almost straight on posterior margin, with median spine. [Cf. Sakai, 2002: 518, fig. 32C, D.]

Type locality. — Andaman Sea, 7°36.100′N 98°19.257′E, 55.4 m.

Distribrution. — Andaman Sea, 7°34.598′N 98°16.250′E; 7°36.100′N 98°19.257′E; 7°35.995′N 98°25.119′E; muddy sand, 48.9-68.8 m.

Trypaea parva (Edmondson, 1944)

Callianassa (*Calliactites*) *parva* Edmondson, 1944: 45, fig. 5a-j; Edmondson, 1946: 261.
Callianassa parva — Sakai, 1999c: 50; Tudge et al., 2000: 143; Sakai, 2005: 95.

Diagnosis. — Male Plp1 uniramous and bisegmented, Plp2 undescribed. [Cf. Edmondson, 1944: 45, fig. 5b, g, i.]

Remarks. — Edmondson (1944) described the male Plp1 as uniramous and bisegmented, but the Plp2 is undescribed, probably absent, so that this species is included in *Trypaea*.

Type locality. — Hanauma Bay, Oahu.

Distribution. — Hanauma Bay and Palos Bay, Hawaii; Celebes (= Sulawesi), Indonesia.

Trypaea petalura (Stimpson, 1860)

Callianassa petalura Stimpson, 1860: 23; A. Milne-Edwards, 1870: 88, 101; Bouvier, 1901: 332-334; De Man, 1928b: 115; Yokoya, 1939: 277-278; Liu, 1955: 65, pl. 23 figs. 6-9 (= *Callianassa japonica*); Miyake et al., 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*); Liu & Zhong, 1994: 562 (list); Sakai, 1999c: 50.

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, Peter the Great Bay.]

Callianassa (*Trypaea*) *gigas* var. *eoa* Makarov, 1938: 67-69, fig. 24; Vinogradov, 1950: 223. [New name for *Callianassa* (*Trypaea*) *gigas* var. *japonica* Makarov, 1938.]

Nihonotrypaea petalura — Tudge et al., 2000: 143; Itani, 2004, fig. 3; Shimoda & Tamaki, 2004: 23, figs. 1-6, tabs. 1, 2.

Not: *Callianassa petalura* — Debelius, 1999: 227, fig. (= *Trypaea japonica*).

Diagnosis. — Male Plp1 uniramous and bisegmented; Plp2 absent.

Type locality. — Japan, Shimoda.

Distribution. — Japan, from Hokkaido to Kyushu Is. on both Pacific side and Japan Sea, on sandy mud flats, facing open sea; Ho Hai, Yellow Sea, shallow water (Liu & Zhong, 1994).

Trypaea plantei (Sakai, 2004)

Callianassa plantei Sakai, 2004b: 592-599, figs. 18-23; Sakai, 2005b: 99.

Diagnosis. — Male Plp1 uniramous and bisegmented; Plp2 absent; Plps3-5 endopods with projecting, finger-like appendix interna.

Type locality. — Mozambique Channel, 30 m.

Distribution. — Mozambique Channel; 16-64 m.

Trypaea poorei (Sakai, 1999)

Callianassa poorei Sakai, 1999b: 373, figs. 1, 2; Sakai, 2005b: 100.

Biffarius poorei — Davie, 2002: 457.

Diagnosis. — Rostrum obtusely triangular and less than half as long as eyestalks. A1 peduncle longer than A2 peduncle. Eyestalks flattened and contiguous along median line; cornea distinct. Mxp3 ischium-merus

suboperculiform and 1.6 times as long as wide; merus rounded on mesiodistal margin. In male larger cheliped, ischium denticulate on ventral margin; meral hook acutely triangular. P3 propodus convex on ventral margin. Male Plp1 uniramous and bisegmented; Plp2 absent. Telson subquadrate, and truncate on posterior margin, without a median spine. [Cf. Sakai, 1999b: 373, figs. 1C, 2A.]

Type locality. — East coast of Tasmania (42°09′S 148°10′E), Great Oyster Bay, Tasmania, Australia.

Distribution. — Only known from the type locality.

Trypaea propriopedis (Sakai, 2002)

Callianassa propriopedis Sakai, 2002: 522, fig. 34A-F; Sakai, 2005b: 101.

Diagnosis. — Rostrum acutely triangular and as long as eyestalks. Eyestalks obtusely angulate distally, bearing rounded cornea in centre. A1 peduncle about as long as A2 peduncle. Mxp3 ischium-merus slender and more than twice as long as wide; merus rounded on distomesial margin. P3 propodus short, subsquare, or subtriangular. Male Plps1-2 undescribed. Telson subsquare and straight on posterior margin, with median spine. [Cf. Sakai, 2002: 522, fig. 34C, D.]

Type locality. — Andaman Sea, 7°59.956′N 98°38.587′E, 17.0 m, sand with shell fragments.

Distribution. — Only known from the type locality.

Trypaea pugnatrix (De Man, 1905)

Callianassa pugnatrix De Man, 1905: 611; Sakai, 1999c: 51; Tudge et al., 2000: 143; Sakai, 2005b: 101.

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

Diagnosis. — Rostrum narrow and protruded, not reaching distal end of eyestalks. Eyestalks obtuse distally; cornea small and located medially. A1 peduncle about as long as A2 peduncle. Mxp3 ischium-merus subpediform and more than twice as long as wide; merus slightly concave on distal margin and rounded on mesial margin. Merus of larger cheliped with sharp spine proximoventrally. P3 propodus oval. Male Plp1 uniramous and bisegmented; Plp2 absent. Telson bearing median concavity with acute spine on posterior margin.

Type locality. — Anchorage off Djangkar, Java, Indonesia, 7°46′S 114°30.5′E, “Siboga” Sta. 5, 330 m.

Distribution. — Indonesia — off Djangkar, Java (De Man, 1928b); 330 m; off Tranquebar, India; 75 m.

Trypaea pygmaea (De Man, 1928)

Callianassa (*Cheramus*) *pygmaea* De Man, 1928b: 1, 18, 27, 93, 99, 155, pl. 16 fig. 24-24g. [Type locality. — Ambon Anchorage, 54 m.]
Callianassa amboinae — Sakai, 1999c: 37 [not *C. pygmaea*, misidentified].
Callianassa pygmaea — Tudge et al., 2000: 143; Sakai, 2005b: 102.

Diagnosis. — Rostrum acutely triangular, not reaching distal end of eyestalks. Eyestalks pointed distally; cornea distinct and located distolaterally. A1 peduncle about as long as A2 peduncle. Mxp3 ischium-merus narrow and more than twice as long as wide; merus concave on distal margin and convex on lateral margin. P3 propodus shaped as elongate oval. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson subsquare, posterior margin bearing median concavity, with minute spine. Uropodal exopod and endopod with a spine on each lateral margin. [Cf. De Man, 1928b, pl. 16 fig. 24-24b, c, g.]

Type locality. — Ambon anchorage, 54 m.

Distribution. — Only known from the type locality.

Trypaea rochei (Bouvier, 1895)

Callianassa Rochei Bouvier, 1895: 7.
Callianassa (*Trypaea*) *Rochei* — De Man, 1928a: 17, fig. 8-8d; De Man, 1928b: 28, 104.
Callianassa rochei — Sakai, 1999c: 33.
Neotrypaea rochei — Tudge et al., 2000: 143.

Diagnosis. — A1 peduncle slightly longer than A2 peduncle. Mxp3 ischium-merus suboperculiform; merus rounded at distomesial angle. Male Plps1-2 undescribed. Telson undescribed.

Type locality. — Baja California.

Distribution. — Only known from the type locality.

Trypaea sahul (Poore, 2008)

Callianassa sahul Poore, 2008: 172, fig. 5.

Diagnosis. — Rostrum broadly triangular. Eyestalks with triangular apical lobes; cornea pigmented and domed. A1 peduncle longer than A2 peduncle. Mxp3 ischium-merus operculiform, and 1.5 times as long as greatest width; ischium with crista dentata with 25 teeth; carpus and propodus subovate (not expanded); dactylus short and digitiform; exopod absent. P1 (female) equal and similar; ischium finely denticulate on ventral margin; merus straight and

unarmed on ventral margin; carpus, propodus, and dactylus unarmed; fixed finger with proximal blade ending in distally-directed tooth, separated from apex of finger by notch. P3 propodus with posteriorly-produced rounded lobe. Abdominal somite 1, 1.5 times length of abdominal somite 2; somites 3-5 with small, inconspicuous lateral tufts of setae. Female Plp1 uniramous and bisegmented; female Plp2 biramous, endopod bisegmented; Plps3-5 with appendix interna. Telson as long as wide, and rounded on posterolateral angles. Uropodal endopod oval with convex lateral margin. Uropodal exopod subcircular with rounded distomesial margin, bearing dorsal plate. [Adapted from Poore, 2008.]

Remarks. — Unfortunately, male specimens of the present species are not reported, which makes it difficult to classify this species exactly. However, the present species is safely reclassified under the genus *Trypaea*, as most of the species in *Callianassa* are transferred into *Trypaea* in the present classification, because the present species with its equal and similar chelipeds is different from *C. subterranea*, the type species of the genus *Callianassa*, in which the chelipeds are unequal and dissimilar.

Type locality. — Timor Sea, Sahul Bank (10°40.26′S, 125°04.84′E), 18 m.

Distribution. — Only known from the type locality.

Trypaea santarita (Thatje, 2000)

Notiax santarita Thatje, 2000: 289, figs. 1-6, table 1.
Callianassa santarita — Sakai, 2005b: 58.

Diagnosis. — Rostrum triangular and less than half as long as eyestalks. Eyestalks almost contiguous along median line; cornea distinct. A1 peduncle shorter than A2 peduncle. Mxp3 ischium-merus oval and 1.8 times as long as wide. P3 propodus protruded at ventroproximal corner. Male Plp1 uniramous and bisegmented; Plp2 absent. Telson square and straight on posterior margin, with median spine. [Cf. Thatje, 2000: 295, 297, figs. 3B, 6C.]

Type locality. — Seno Ponsonby, 55°12.0′S 68°87.03′W, Chile, sublittoral, 65 m, mud to sandy-mud.

Distribution. — Seno Ponsonby, Chile.

Trypaea 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 fig. 17-17e.
Callianassa sibogae — Ngoc-Ho, 1994: 54, fig. 3; Sakai, 1999c: 52; Sakai, 2005b: 102.

Cheramus sibogae — Tudge et al., 2000: 145; Davie, 2002: 460.

Diagnosis. — Male Plp1 uniramous and bisegmented; male Plp2 absent. [Cf. Ngoc-Ho, 1994: 56, fig. 3c, h.]

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

Distribution. — Indonesia (7°46′S 114°30.5′E), 330 m; North-West Shelf, Australia; benthic, continental shelf, continental slope, 134-330 m.

Trypaea spinoculata Sakai, 2005

Callianassa spinoculata Sakai, 2005b: 103, figs. 22, 23.

Type locality. — W. Malay Peninsula, 07°00′N 99°22′E, 27 m.

Distribution. — Only known from the type locality.

Trypaea stenomastaxa (Sakai, 2002)

Callianassa stenomastaxa Sakai, 2002: 496, fig. 20A-G; Sakai, 2005b: 108.

Remarks. — Mxp3 and P3 propodus are similar to those of *Trypaea thailandica* Sakai, 2005b. Males unknown.

Type locality. — Andaman Sea, 8°00.046′N 98°29.383′E, 19.0 m, sand with shell fragments.

Distribution. — Only known from the type locality.

Trypaea tabogensis (Sakai, 2005)

Trypaea tabogensis Sakai, 2005b: 58, figs. 11, 12, tab. III.

Diagnosis. — Male Plp1 uniramous and bisegmented; male Plp2 absent; male Plps3-5 endopods with projecting, finger-like appendix interna.

Type locality. — Tobaga, Bahia de Panama, Panama.

Distribution. — Only known from the type locality.

Trypaea tenuipes Sakai, 2002

Callianassa tenuipes Sakai, 2002: 528, fig. 38A-D; Sakai, 2005b: 108.

Diagnosis. — Mxp3 ischium-merus narrow and pediform. Male Plp1 uniramous, as thick protrusion; male Plp2 absent. Telson convergent posteriorly, bearing median spine on straight posterior margin. [Cf. Sakai, 2002: 528, fig. 38C, D.]

Type locality. — Andaman Sea, 41-61 m.

Distribution. — Only known from the type locality.

Trypaea thailandica (Sakai, 2005)

Callianassa thailandica Sakai, 2005b: 108, figs. 24, 25.

Diagnosis. — Male Plp1 uniramous and trisegmented; male Plp2 absent; Plps3-5 endopods with projecting, finger-like appendix interna.

Remarks. — In the original description by Sakai (2005b), male Plps3-5 endopods would bear a stubby appendix interna, but as shown in fig. 25G of Sakai (2005b), they actually bear a projecting, finger-like appendix interna.

Type locality. — Gulf of Thailand, 13°13′N 100°34′E.

Distribution. — Only known from the type locality.

Trypaea thermophila (Lin, Komai & Chan, 2007)

Nihonotrypaea thermophila Lin et al., 2007a: 143, figs. 1-5A, B.

Remarks. — Lin et al. (2007a) described *Nihonotrypaea thermophila* as a new species under the genus *Nihonotrypaea* Manning & Tamaki, 1998, though *Nihonotrypaea* was already synonymized with *Callianassa* (cf. Sakai, 1999c, 2004, 2005) because of its variety of intermediate forms of the Mxp3 ischium and merus. In the present revision, however, their *N. thermophila* is reclassified under *Trypaea* by the features of the male Plps1-2, as *T. thermophila*.

Trypaea thermophila is very similar to *Trypaea japonica* (Ortmann, 1891), but different geographically and morphologically, because *T. thermophila* was collected around the hydrothermal vents off northeastern Taiwan at depths of 128-320 m; the A1 peduncle is distinctly shorter than the A2 peduncle, and the Mxp3 merus and ischium are the same in length; while *T. japonica* is distributed in the shallow waters around Japan and the East China Sea, its A1 peduncle is as long as the A2 peduncle, and the Mxp3 merus is shorter than the Mxp3 ischium.

Type locality. — Dasi fishing ground, off Kueishan Island, northeastern Taiwan, 24°52.33′N 121°59.52′E, 320 m.

Distribution. — Only known from the type locality.

Trypaea thorsoni (Sakai, 2005)

Callianassa thorsoni Sakai, 2005b: 114, figs. 26, 27.

Diagnosis. — Male Plp1 uniramous and bisegmented; male Plp2 absent.

Type locality. — Bahrein Lightship, Persian Gulf, 27°03′N 51°02′E, 71 m.

Distribution. — Only known from the type locality.

Trypaea tonkinae (Grebenjuk, 1975)

Callianassa (*Scallasis*) *tonkinae* Grebenjuk, 1975: 302, fig. 3.
Callianassa tonkinae — Sakai, 1999c: 52; Tudge et al., 2000: 143; Sakai, 2002: 503, fig. 24A-C, 25A-G; Sakai, 2005b: 118.

Diagnosis. — Rostrum acutely triangular, slightly overreaching proximal half of eyestalks. Eyestalks obtuse on distal margin and directed downward distally. A1 peduncle about as long as A2 peduncle. Mxp3 ischium-merus subpediform and more than twice as long as wide; merus straight on distal margin and slightly convex on mesial margin. Merus of larger cheliped with proximoventral tooth followed distally by denticles. Male Plp1 uniramous and bisegmented; Plp2 absent. Telson trapezoid, bearing median concavity with spine on posterior margin.

Type locality. — Tonkin Bay.

Distribution. — Tonkin Bay, South China Sea; Andaman Sea, 7°45.452′N 97°57.951′E; 9°00.062′N 97°53.366′E; 65.4-70.0 m, muddy sand, coarse and fine sand; East Lagoon, New Caledonia, 21 m.

Trypaea truncata Giard & Bonnier, 1890

Callianassa truncata Giard & Bonnier, 1890: 362, figs. 2, 4; Caroli, 1939: 73; Caroli, 1940: 73; Lutze, 1941: 34; Reverberi, 1942a: 89; Reverberi, 1942b: 225; Caroli, 1946: 66, fig. 1b, 3; Holthuis, 1953a: 91, fig. 4; Lagardère, 1966: 195, pls. 2-5; Doldopolski, 1969: 286; Faure, 1970: 751; Lagardère, 1973: 94; De Saint Laurent & Božić, 1976: 19, figs. 2, 10, 18, 29; Beaubrun, 1979: 84, figs. 56, 57, 62-64; Zavodnik, 1979: 313; Kocatas, 1981: 161-162; Mikashavidze, 1981: 1415; Thessalou-Legaki & Zenetos, 1985: 309; Thessalou-Legaki, 1986: 183; Petrescu & Balasescu, 1995: 99; d'Udekem d'Acoz, 1996: 54; Ziebis et al., 1996a: 619; Ziebis et al., 1996b: 227; Abed-Navandi & Dworschak, 1997: 565, figs. 1-9; Sakai, 1999c: 20; Costello et al., 2001: 289; Ngoc-Ho, 2003: 473, fig. 11; d'Udekem d'Acoz, 2003, fig. website; Makarov, 2004: 294, fig. 137, table 18; Sakai, 2005b: 39.
Callianassa (*Trypaea*) *truncata* — Borradaile, 1903: 546; Bouvier, 1940: 102, fig. 68; Gurney, 1942: 244; Zariquiey Alvarez, 1950: 81, fig. 1, pl. 2 figs. 1-6, pl. 3 fig. 2; Dolgopol'skaia, 1954: 186, figs. 5-9; 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* — Dolgopol'skaia, 1954: 186, figs. 5, 6; Dolgopol'skaia, 1969: 316, pls. 35-38; Kobyakova & Dolgopol'skaia, 1969: 286.
Callianassa (*Trypaeta*) *truncata* — Băcescu, 1967: 229, fig. 104A, D, d, E (B, C after Giard & Bonnier, 1890) [misspelling].
Necallianassa truncata — d'Udekem d'Acoz, 1999: 156; Tudge et al., 2000: 143.

Diagnosis. — Rostrum triangular and less than half as long as eyestalks. Eyestalks reaching distal end of A1 proximal segment; cornea distinct. A1 peduncle about as long as A2 peduncle. Mxp3 ischium-merus oval; merus

rounded on distal margin. Male Plp1 uniramous and bisegmented; Plp2 absent. Telson trapezoid, bearing small median spine on posterior margin. Uropodal endopod with distolateral spine. [Cf. Ngoc-Ho, 2003, fig. 11D, J, L.]

Type locality. — Gulf of Naples, Italy.

Distribution. — From Atlantic Ocean: Bay of Biscay, France, 44-57 m depth, to Romanian coast, south-eastern Black Sea, 15-40 m depth.

Trypaea uncinata (H. Milne Edwards, 1837)

Callianassa uncinata H. Milne Edwards, 1837a: 310, pl. 25 fig. 1; Nicolet, 1849: 208; Guérin-Méneville, 1857: 43; A. Milne-Edwards, 1870: 83, 101; Czerniavsky, 1884: 76; Solar et al., 1970: 20; Sakai, 1999c: 33, fig. 3f.

Callianassa chilensis A. Milne-Edwards, 1860: 302, pl. 16 fig. 2a, 2A; A. Milne-Edwards, 1870: 84, 101; Tudge et al., 2000: 143. [Type locality. — Chile.]

Callianassa (*Trypaea*) *uncinata* — Borradaile, 1903: 546.

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; Tudge et al., 2000: 143.

Diagnosis. — A1 peduncle longer than A2 peduncle. Mxp3 ischium-merus suboperculiform; merus rounded on mesiodistal angle. Male Plp1 uniramous and bisegmented; male Plp2 absent. Telson concave on posterior margin, with median spine.

Type locality. — Coast of Chile.

Distribution. — Only known from the type locality.

Trypaea sp. (Rabalais, Holt & Flint, 1981)

Callianassa sp., Rabalais et al., 1981: 106, fig. 4; Manning, 1987: 397; Sakai, 1999c: 30.

Diagnosis. — Rostrum triangular. Mxp3 ischium-merus subpediform. Male Plps1-2 unknown. Telson convex proximally and rounded on posterior margin, bearing broad median concavity with spine. [Cf. Rabalais et al., 1981, fig. 4E, B.]

Distribution. — N.W. Gulf of Mexico.

Subfamily CALLICHIRINAE Manning & Felder, 1991 **(sensu nov.)**

Callichirinae Manning & Felder, 1991: 775; Tudge et al., 2000: 136; Ngoc-Ho, 2002a: 540; Ngoc-Ho, 2003: 486 (partim); Sakai, 2005b: 120.

Diagnosis. — Rostrum developed or reduced, lacking rostral carina. Carapace with dorsal oval; cardiac prominence present or not; cardiac sulcus(i) present or not. Eyestalks flattened and contiguous. A2 scaphocerite developed

as a small process. Mxp3 ischium-merus operculiform, rectangular, or pediform; propodus broadened; dactylus subovate or digitiform; exopod present or not. P1 chelate, unequal or subequal in size, and similar or dissimilar in shape, lacking meral hook in both chelipeds. P2 chelate. P3 propodus broadened. P4 simple. P5 chelate. Abdominal somite 6 lacking lateral projections. Male Plp1 present or not; male Plp2 uniramous or biramous, endopod with appendices interna and masculina, with either appendix interna or appendix masculina, or without appendices interna and masculina; male Plps3-5 biramous and foliaceous, and endopods with appendix interna in both sexes. Uropodal exopod with dorsal plate. [Adapted from Sakai, 2005b.]

Type genus. — *Callichirus* Stimpson, 1866.

Genera included. — *Balsscallichirus* gen. nov., *Barnardcallichirus* gen. nov., *Callichirus* Stimpson, 1866; *Corallichirus* sensu nov.; *Forestcallichirus* gen. nov.; *Glypturoides* gen. nov.; *Glypturus* Stimpson, 1866; *Grynaminna* Poore, 2000; *Lepidophthalmoides* gen. nov.; *Lepidophthalmus* Holmes, 1904; *Michaelcallianassa* Sakai, 2002; *Neocallichirus* Sakai, 1988; *Podocallichirus* Sakai, 1999c; *Sergio* sensu nov.; *Thailandcallichirus* gen. nov.; and *Tirmizicallichirus* gen. nov.

KEY TO THE GENERA OF THE SUBFAMILY CALLICHIRINAE

1 – Abdominal somites 3-5 ornamented dorsally 2
– Abdominal somites 3-5 not ornamented dorsally 3

2 – Male and female Plp2 biramous . . . . . *Callichirus*
– Male and female Plp2 uniramous . . . . . *Michaelcallianassa*

3 – Male Plp2 uniramous 4
– Male Plp2 biramous 6

4 – Mxp3 propodus straight on ventral margin . . . . . *Forestcallichirus* gen. nov.
– Mxp3 propodus rounded on ventral margin 5

5 – Male Plp1 uniramous and un- or bisegmented, distal segment simple . . . . . *Balsscallichirus* gen. nov.
– Male Plp1 uniramous and bisegmented, distal segment subchelate distally . . . . . *Barnardcallichirus* gen. nov.

6 – A1 peduncle equal to, or shorter than, A2 peduncle 7
– A1 peduncle distinctly longer and stouter than A2 peduncle 12

7 – Male Plp1 uniramous and bisegmented, distal segment bilobed by median longitudinal furrow, and subchelate distally . . . . . *Sergio*
– Male Plp1 uniramous and bisegmented, distal segment simple, subchelate, or w-shaped distally 8

8 – Male Plp2 endopod with appendices interna and masculina 9
– Male Plp2 endopod with either appendix interna or appendix masculina 11

9 – Mxp3 dactylus rounded distally . . . . . *Thailandcallichirus* gen. nov.

– Mxp3 dactylus pointed distally 10

10 – Plp2 biramous, endopod bearing distally triangular appendix masculina with marginal setae, and mesiodistally small appendix interna . . . . . *Glypturoides* gen. nov.
– Male Plp2 biramous, endopod bearing embedded appendix masculina distally and embedded appendix interna distolaterally . . . . . *Neocallichirus*

11 – Male Plp2 endopod with appendix interna distally, but without appendix masculina . . . . . *Corallichirus* sensu nov.
– Male Plp2 endopod with appendix masculina mesiodistally, but with or without appendix interna . . . . . *Glypturus*

12 – Male Plp2 endopod without appendices interna and masculina . . . . . *Tirmizicallichirus* gen. nov.
– Male Plp2 endopod with appendix masculina, but with or without appendix interna 13

13 – P1 unequal, smaller cheliped with spoon-shaped chela, dactylus shaped as elongate-oval, dorsal and ventral margins spinous, fixed finger concave on cutting surface, with spinous lateral and mesial margins . . . . . *Podocallichirus*
– P1 unequal, smaller cheliped usually compressed 14

14 – Male Plp2 endopod distally bearing proximally-fused broad appendix masculina with marginal setae, and mesiomedially small appendix interna with hooklets . . . . . *Grynaminna*
– Male Plp2 endopod bearing mesiodistally appendix masculina with marginal setae, and with or without appendix interna with hooklets mesiomedially 15

15 – Male Plp1 uniramous and bisegmented, distal segment simple . . . . . *Lepidophthalmus*
– Male Plp1 uniramous and bisegmented, distal segment chelate distally . . . . . *Lepidophthalmoides* gen. nov.

Genus **Balsscallichirus** gen. nov.

Diagnosis. — Carapace with dorsal oval, rostrum short or reduced, and triangular. A1 peduncle longer than A2 peduncle. Mxp3 ischium-merus elongate and pediform; carpus longer than wide and longer than merus; propodus broadened, shorter than carpus, and largely convex on ventral margin; and dactylus digitiform; exopod absent. P1 chelate and unequal; in larger cheliped ischium denticulate distally on ventral margin; merus with lower triangular lobe on ventral margin. In smaller cheliped ischium and merus unarmed. P2 chelate. P3 simple. P4 subchelate. P5 chelate. Male Plp1 uniramous and un- or bisegmented; male Plp2 uniramous and unsegmented, lacking appendices interna and masculina. Telson wider than long, and slightly convex on posterior margin. Uropodal endopod oval in shape; uropodal exopod broadly convex on lateral margin, with marginal setae, bearing dorsal plate.

Remarks. — The present genus, *Balsscallichirus* gen. nov. is erected based on *Callianassa balssi*, which was included in the genus *Podocallichirus* Sakai, 1999c, but is distinguished from *Podocallichirus* by the forms of male Plps1-2.

Podocallichirus guineensis (De Man, 1928a) is included in the present genus, because Plps1-2 are uniramous, as in *B. balssi*, although they are small simple protrusions only in *B. guineensis* (cf. De Saint Laurent & Le Loeuff, 1979, fig. 15m-n), and the Plp1 is unsegmented.

Type species. — *Callianassa* (*Callichirus*) *balssi* Monod, 1933, by present designation. The gender of the new generic name, *Balsscallichirus*, is masculine.

Species included. — *Balsscallichirus balssi* (Monod, 1933); *B. guineensis* (De Man, 1928a).

Etymology. — The new generic name is dedicated to Dr. H. Balss, by adding his name as a prefix to *Callichirus*.

KEY TO THE SPECIES OF THE GENUS *BALSSCALLICHIRUS*

1 – P3 propodus distinctly protruded posteriorly at ventroproximal corner . . . . . *B. balssi*
– P3 propodus not protruded posteriorly at ventroproximal corner . . . . . *B. guineensis*

Balsscallichirus balssi (Monod, 1933)

[Abbreviated list of synonymy.]
Callianassa (*Callichirus*) *balssi* Monod, 1933: 13, fig. 2A-F.
Callianassa balssi — Longhurst, 1958: 45 (partim); Sakai, 1999c: 54; Sakai, 2005b: 189.
Callichirus balssi — Le Loeuff & Intès, 1974: 46, fig. 13a-o; De Saint Laurent & Le Loeuff, 1979: 58, figs. 11c-e, 12d, 13a-b, 14a, 15a-d, 19a.
Podocallichirus balssi — Sakai, 1999c: 54; Sakai, 2005b: 189.

Diagnosis. — Mxp3 ischium-merus pediform; merus convex at mesiodistal corner; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous and bisegmented; male Plp2 uniramous and unsegmented, lacking appendices interna and masculina. Telson subquadrate, wider than long, and convex on lateral margins, but slightly concave medially on posterior margin, without median spine. [Cf. Le Loeuff & Intès, 1974: 46, fig. 13g, m; De Saint Laurent & Le Loeuff, 1979: 58, figs. 12d, 15a-d, 19a.]

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

Distribution. — Bay of Repos, Nouadhibou, Mauritania; Dakar, Senegal; Gambia; Pointe-Noire, Congo; 6-10 m.

Balsscallichirus guineensis (De Man, 1928)

[Abbreviated list of synonymy.]
Callianassa (*Callichirus*) *guineensis* De Man, 1928a: 45, pl. 10 fig. 19-l9e, pl. 11 fig. 19f-19r.
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.

Podocallichirus guineensis — Sakai, 1999c: 55; Sakai, 2005b: 190.

Diagnosis. — Mxp3 ischium-merus pediform; merus angulated at mesiodistal corner; propodus subovate, and dactylus digitiform. Male Plp1 uniramous and unsegmented; male Plp2 uniramous and unsegmented. [Cf. De Man, 1928a: 45, pl. 10 fig. 19a, b; De Saint Laurent & Le Loeuff, 1979: 64, figs. 15m, n, 19d).

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

Distribution. — Ghana; Nigeria; 9-15 m.

Genus **Barnardcallichirus** gen. nov.

Diagnosis. — Carapace with dorsal oval. Rostrum short and acutely triangular. A1 peduncle longer than A2 peduncle. Mxp3 ischium-merus pediform; carpus longer than wide; propodus broadened, shorter than carpus, and largely convex on ventral margin; and dactylus digitiform; exopod absent. P1 chelate and unequal; in larger cheliped, merus with lower triangular lobe on ventral margin; in smaller cheliped, ischium and merus unarmed. P2 chelate. P3 simple. P4 subchelate. P5 chelate. Male Plp1 uniramous and bisegmented, distal segment longitudinally furrowed, mesial part rounded distally and lateral part sharply protruded distally over mesial part; male Plp2 uniramous and unsegmented, lacking appendices interna and masculina; Plps3-5 with appendix interna. Telson wider than long, almost straight on posterior margin, without median spine. Uropodal endopod oval; uropodal exopod broadly convex on distal margin, bearing dorsal plate.

Remarks. — The present genus, *Barnardcallichirus* gen. nov. is established on the basis of *Callichirus tenuimanus* De Saint Laurent & Le Loeuff, 1979, which was included in the genus *Podocallichirus* Sakai, 1999c, and is distinguished from *Podocallichirus* by the form of the male Plp2. In *Barnardcallichirus*, the male Plp2 is uniramous and unsegmented, lacking appendices interna and masculina, whereas in *Podocallichirus*, the male Plp2 is biramous, and the endopod bears mesiodistally a fusiform appendix masculina provided mesiomedially with a proximally-fused appendix interna with a patch of hooklets.

Type species. — *Callichirus tenuimanus* De Saint Laurent & Le Loeuff, 1979, by present designation. The gender of the new generic name, *Barnardcallichirus*, is masculine.

Species included. — *Barnardcallichirus gilchristi* (Barnard, 1946); *B. tenuimanus* (De Saint Laurent & Le Loeuff, 1979).

Etymology. — The new generic name is dedicated to Dr. K.H. Barnard by adding his name as a prefix to the existing name *Callichirus*; Dr. Barnard devoted his life to extensive carcinological studies in South Africa by describing many species, including *Callianassa gilchristi*.

KEY TO THE SPECIES OF THE GENUS *BARNARDCALLICHIRUS*

1 – Mxp3 propodus subovate, distinctly expanded ventrally . . . . . *B. gilchristi*
– Mxp3 propodus subovate, slightly rounded ventrally . . . . . *B. tenuimanus*

Barnardcallichirus gilchristi (Barnard, 1946)

Callianassa gilchristi Barnard, 1946: 379; Barnard, 1950: 509, fig. 95a-e; Kensley, 1974: 277; Tudge et al., 2000: 143.
Podocallichirus gilchristi — Sakai, 1999c: 56, fig. 9a-d; Sakai, 2005b: 191.

Diagnosis. — Mxp3 ischium-merus pediform; merus angulated at distomesial corner; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous and bisegmented, distal segment longitudinally furrowed, mesial part rounded distally and lateral part sharply protruded distally over mesial part; male Plp2 undescribed; Plps3-5 with appendix interna. Telson subquadrate, wider than long, and almost straight on posterior margin, without median spine. [Cf. Barnard, 1950, fig. 95; Sakai, 1999c, fig. 9b.]

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

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

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

[Abbreviated list of synonymy.]
Callianassa balssi — Longhurst, 1958: 31 (partim). [Not: *Callianassa balssi* Monod, 1933.]
Callichirus tenuimanus De Saint Laurent & Le Loeuff, 1979: 61, figs. 11a-b, 12a-b, 13e-f, 14c, 15e-h, 19c.
Podocallichirus tenuimanus — Sakai, 1999c: 55; Sakai, 2005b: 190.

Diagnosis. — Mxp3 ischium-merus pediform; merus angulated at mesiodistal corner; propodus subovate, and dactylus digitiform. Male Plp1 uniramous and bisegmented, distal segment longitudinally furrowed, mesial part rounded distally and lateral part sharply protruded distally over mesial part; male Plp2 uniramous and unsegmented. Telson subquadrate, wider than long, and slightly convex on posterior margin, without median spine. [Cf. De Saint Laurent & Le Loeuff, 1979: 61, figs. 12b, 15e-f, 19c.]

Type locality. — Sierra Leone, 7 m.

Distribution. — Only known from the type locality.

Genus **Callichirus** Stimpson, 1866

[Abbreviated list of synonymy.]

Callichirus Stimpson, 1866: 61, figs. 11a-b, 12a-b, 13e-f, 14c, 15e-h, 19c; Manning & Felder, 1991: 775; Sakai, 1999c: 59; Sakai, 2005b: 126.

Diagnosis. — Carapace with dorsal oval. Rostrum reduced to a small triangle; rostral carina, hepatic sulcus, and hepatic prominence undeveloped. A1 peduncle longer and more robust than A2 peduncle; distal segment elongate. Mxp3 ischium-merus broadened and operculiform; propodus broadened and rounded on ventral margin; and dactylus digitiform; exopod usually absent. P1 chelate, equal or unequal; in male larger cheliped ischium very elongate, merus normal in length or elongate, bearing meral hook or not, and carpus much longer than chela. P2 chelate. P3 propodus broadened. P4 subchelate. P5 subchelate or chelate. Abdominal somites 3-5 ornamented dorsally. Male Plp1 uniramous, blade-like, and un-, bi- or trisegmented, distal segment simple distally; male Plp2 biramous and blade-like, endopod without appendices interna and masculina, or with appendix interna but without appendix masculina; Plps3-5 with appendix interna. Telson wider than long, and almost straight on posterior margin. Uropodal endopod strap-shaped; uropodal exopod convex on distal margin, bearing dorsal plate. [Adapted from Sakai, 1999c: 59.]

Remarks. — *Callichirus major* Say, 1818, the type species of *Callichirus*, belonging to the family Callichiridae, is similar to *Callianassa subterranea*, the type species of *Callianassa*, in that the uropodal exopod bears a dorsal plate, but *Callichirus* is different from *Callianassa* in the proportion in length of A1 peduncle to A2 peduncle, in the forms of Mxp3 propodus and dactylus, in telson and uropodal endopod, and also in the presence or absence of a transverse row of setae on the dorsal surface of abdominal somites 3-5.

Type species. — *Callianassa major* Say, 1818, by original designation. The gender of the generic name, *Callichirus*, is masculine.

Species included. — *Callichirus adamas* (Kensley, 1974); *C. islagrande* (Schmitt, 1935b); *C. kraussi* (Stebbing, 1900); *C. major* (Say, 1818); *C. seilacheri* (Bott, 1955).

Key to the Species of the Genus *Callichirus*

1 – Eyestalks obtuse or rounded distally 2
– Eyestalks narrowly protruded distally 3

2 – Telson subsquare, and largely concave on posterior margin . . . . . *C. kraussi*
– Telson wider than long, bearing concavity between proximal and median lobes on lateral margin, converging toward rounded posterior margin, with median notch without spine . . . . . *C. major*

3 – Telson subcircular, with broad median concavity, without spine on posterior margin . . . . . *C. seilacheri*
– Telson trapezoid or subsquare, broader than long 4
4 – Telson trapezoid . . . . . *C. islagrande*
– Telson subsquare . . . . . *C. adamas*

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; Sakai, 1999c: 63; Tudge et al., 2000: 144; Sakai, 2005b: 127.

Diagnosis. — Rostrum inconspicuous. Eyestalks narrowly protruded distally, reaching middle of A1 penultimate segment. Mxp3 ischium-merus oval; propodus subtriangular, and dactylus digitiform. Ischium of male larger cheliped elongate, bearing median protrusion on mesial margin. Male Plp1 uniramous and bisegmented; male Plp2 biramous, exopod small, endopod without appendices interna or masculina; Plp3 with pad of rounded hooks. Telson subquadrate, slightly broader than long, and lobulated at posterolateral corners; posterior margin short. [Adapted from Kensley, 1974; and from De Saint Laurent & Le Loeuff, 1979.]

Type locality. — Orange River mouth, South Africa.

Distribution. — Orange River mouth and Lambert's Bay, South Africa; Senegal; Cape Verde Islands.

Callichirus islagrande (Schmitt, 1935)

[Abbreviated list of synonymy.]
Callianassa (*Callichirus*) *islagrande* Schmitt, 1935b: 5, pl. 1 fig. 3, pl. 2 fig. 1, pl. 3 fig. 2, pl. 4 fig. 5.
Callianassa (*Calichirus*) *islagtande* [sic!] — Solar et al., 1970: 20.
Callianassa islagrande — Biffar, 1971a: 654; Manning & Felder, 1986: 438, fig. 2.
Callichirus islagrande — De Saint Laurent & Le Loeuff, 1979: 79; Manning & Felder, 1991: 775; Sakai, 1999c: 60, fig. 11b-f; Sakai, 2005b: 128.

Material examined. — USNM 70792, paratype, male (TL/CL, 67.0/10.5 mm), Grand Isle, Louisiana, 1930, leg. N.N. Anderson.

Diagnosis. — Mxp3 ischium-merus subsquare; merus obliquely straight on distal margin. Male Plp1 uniramous and trisegmented, and rounded distally; male Plp2 biramous, endopod bearing neither appendix interna nor appendix masculina, and exopod shorter than endopod (Sakai, 1999c: 60, fig. 11e-f). Telson trapezoid, wider than long and trapezoid, with convex posterolateral

corners, and slightly concave medially on posterior margin, without median spine.

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

Distribution. — Northern and western Gulf of Mexico (Manning & Felder, 1986); common in the shallow subtidal of sandy beaches.

Callichirus kraussi (Stebbing, 1900)
(fig. 64A-C)

[Abbreviated list of synonymy.]

Callianassa kraussi Stebbing, 1900: 39, pls. 2, 3; Kensley, 1974: 277 (key); Kensley, 1975: 57; Ngoc-Ho, 2002b: 224.

Callianassa (*Callichirus*) *kraussi* — De Man, 1928b: 28, 94, 95, 113, 179, 182, 183; Barnard, 1950: 506, fig. 94; Holthuis, 1991: 248, figs. 451, 452, 264.

Callichirus kraussi — Sakai, 1999c: 64, fig. 13a-e; Sakai, 2005b: 130.

Callianassa (*Callianassa*) *kraussi* — Felder, 2001: 441.

Material examined. — USNM 105736, 1 male (TL/CL, 83.0/19.0 mm), Langebaan, South Africa, 5.vi.1957, det. L.B. Holthuis.

Diagnosis. — Mxp3 ischium-merus operculiform; merus straight on distal margin; propodus subquadrate, and dactylus digitiform. Abdominal somites 3-5 distinctively ornamented. Male Plp1 (fig. 64A) uniramous and trisegmented; male Plp2 (fig. 64B, C) biramous, endopod distinct, bearing mesiodistally embedded appendix interna with patch of hooklets. Telson subquadrate, wider than long, and protruded at posterolateral angles to form median concavity with tubercle on posterior margin.

Remarks. — In the male specimen examined (USNM 105736) the Plp2 exopod is rather longer than the endopod, though in the male specimen (RMNH D 12002) the Plp2 exopod is much smaller and shorter than the endopod (Sakai, 1999c: 64, fig. 13d).

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

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

Callichirus major (Say, 1818)
(fig. 64D-E)

Callianassa major Say, 1818: 238; White, 1847: 70; Gibbes, 1850: 194; A. Milne-Edwards, 1870: 86, 101; Stimpson, 1871: 122; Yong, 1900: 425; Schmitt, 1935b: 3; Lutze, 1937: 1-15, figs. 1-3; Pearse et al., 1942: 153, 155, 156, 185, figs. 10, 14; Willis, 1942: 2; Gurney, 1944: 83; Pohl, 1946: 71-80, figs. 7-28; Hoyt & Weimer, 1963: 10; Frankenberg et al., 1967: 113-120; Holthuis, 1969: 12; Biffar, 1971a: 651-653; Coelho & Ramos, 1973: 161; Rabalais et al., 1981: 105; Williams, 1984: 183, fig. 127.

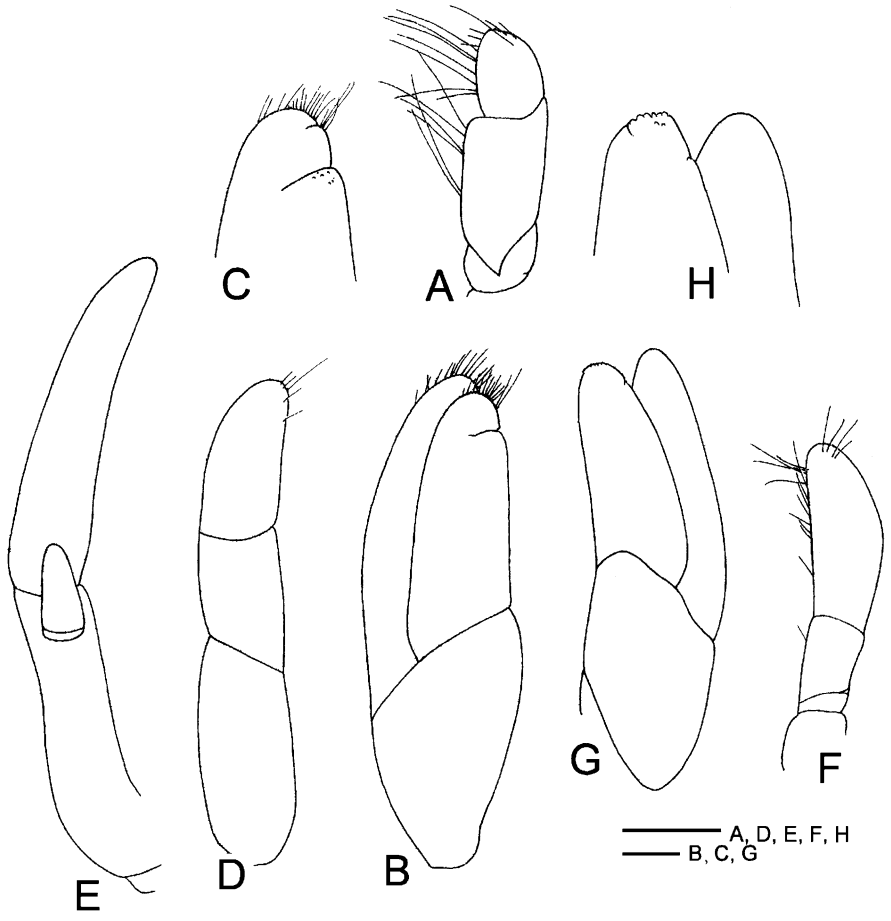

Fig. 64. *Callichirus kraussi* (Stebbing, 1900), *Callichirus major* (Say, 1818), and *Callichirus seilacheri* (Bott, 1955). A, D, F, male Plp1; B, C, E, G, H, male Plp2. A, B, C, *Callichirus kraussi*, USNM 105736, male (TL/CL, 83.0/19.0 mm), Langebaan, South Africa; D, E, *Callichirus major*, USNM, male (TL/CL, 100.0/19.0 mm); F, G, H, *Callichirus seilacheri*, USNM 142540, male. Scales, 1 mm.

Callichirus major — Stimpson, 1866: 47; Stimpson, 1871: 122; Kingsley, 1878: 327; Fowler, 1911: 571; 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; Blanco-Rambla, 1997: 7-12, figs. 1-3; Coelho, 1997: 147; Rodrigues et al., 1998: 380; Melo, 1999: 354, figs. 235-236; Sakai, 1999c: 61, fig. 11a; Strasser et al., 1999a: 211; Strasser et al., 1999b: 844; Tudge et al., 2000: 144; Coelho et al., 2007: 5; Robles et al., 2009: 317.

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

Material examined. — USNM, male (TL/CL, 100.0/19.0 mm).

Diagnosis. — Mxp3 ischium-merus rhombic; merus obliquely concave on distal margin; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous and trisegmented (fig. 64D), distal segment obtuse distally; male Plp2 (fig. 64E) biramous, endopod without appendices interna and masculina. Telson subovate, wider than long, and convergent toward rounded posterior margin with median notch without spine, bearing concavity between proximal and median lobes on lateral margin.

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

Distribution. — North Carolina — Cape Lookout, Barden Inlet, Ferry Landing; Gulf of Mexico; Venezuela — Guaracayal, Tunantal, and Carenero; Brazil — Rio Grande do Norte; Pernambuco, São Paulo, Santos; intertidal.

Callichirus seilacheri (Bott, 1955)
(fig. 64F-H)

Callianassa seilacheri Bott, 1955: 47, fig. 7a-g.
Callichirus seilacheri — Manning & Felder, 1986: 439, fig. 3; Manning & Felder, 1991: 775; Hendrickx, 1995: 390; Sakai, 1999c: 62, fig. 12a-f; Tudge et al., 2000: 144; Sakai, 2005b: 129; Hernáez et al., 2008: 351.
Callianassa garthi Retamal, 1975: 178, figs. 1-8. [Type locality. — Playa Negra, Chile, 36°45′S 73°10′W.]
Callichirus garthi — Tudge et al., 2000: 144.

Material examined. — USNM 142540, male.

Diagnosis. — Mxp3 ischium-merus rhombic; merus obliquely concave on distal margin; propodus subtriangular, and dactylus digitiform. Male Plp1 uniramous and trisegmented (fig. 64F); male Plp2 (fig. 64G, H) biramous, endopod bearing distally embedded appendix interna, but no appendix masculina. Abdominal somites 3-5 with transverse row of setae. Telson subovate, wider than long, convex medially on lateral margin, and bearing broad median concavity without spine on rounded posterior margin.

Type locality. — El Salvador.

Distribution. — El Salvador; Chile, Tubul, south of Talcahuano to Playa Negra near Viña del Mar.

Genus **Corallichirus** Manning, 1992 **(sensu nov.)**

Corallichirus Manning, 1992: 571, figs. 1b, 2.

Diagnosis. — Rostrum acutely triangular. Carapace with dorsal oval, and proximally non-calcified anterolateral projections. A1 peduncle shorter than

A2 peduncle. Mxp3 ischium-merus subpediform; propodus broadened and ovate on ventral margin; dactylus digitiform; exopod absent. P1 chelate, unequal, and dissimilar; male larger cheliped with or without meral hook. P2 chelate. P3 propodus broadened. P4 subchelate. P5 chelate. Abdominal somites 3-5 not ornamented dorsally. Male Plp1 uniramous and bisegmented, distal segment chelate distally; male Plp2 biramous, endopod bearing small appendix interna distally, but no appendix masculina; male Plps3-5 biramous and foliaceous, endopods with stubby, embedded appendix interna. Telson wider than long, and varied in shape. Uropodal endopod wider than long and rhombic, overreaching telson. Uropodal exopod convex on lateral margin, bearing dorsal plate.

Remarks. — Manning (1987: 392) established a new genus, *Corallianassa* including two species, *C. longiventris* (A. Milne-Edwards, 1870) and *C. borradailei* (De Man, 1928), and Manning & Felder (1991: 776) showed that the genus *Corallianassa* includes *C. longiventris* (A. Milne-Edwards, 1870), *C. hartmeyeri* (Schmitt, 1935b), and *C. xutha* Manning, 1988. However, later, in 1992, Manning erected a new genus *Corallichirus* based on *Corallianassa xutha* as the type species, excluded from the genus *Corallianassa*, because the relative length of abdominal somites 2 to 6 is different between the two genera. In the type species of *Corallichirus*, *C. xuthus*, abdominal somite 2 is subequal in length to abdominal somite 6, whereas in the type species of *Corallianassa*, *C. longiventris*, abdominal somite 2 is much longer than abdominal somite 6. However, such a difference is not to be regarded as a vital feature that determines their generic status, because it is a difference at the species level rather than on the generic level. Sakai (2005b: 134) reclassified *Corallianassa hartmeyeri*, *Corallianassa longiventris*, and *Corallichirus xuthus* under the genus *Glypturus* (cf. Sakai, 2005b: 134). However, in the present revision *G. hartmeyeri* is synonymized with *G. longiventris*, and *G. xuthus* is reclassified under *Corallichirus* sensu nov., because *G. xuthus* is different from the type species of *Glypturus*, *G. acanthochirus* Stimpson, 1866, in the features of male Plps1-2.

Type species. — *Corallianassa xutha* Manning, 1988, by original designation. The gender of the generic name, *Corallichirus*, is masculine.

Species included. — *Corallichirus bayeri* Kensley, 2001b; *C. intesi* (De Saint Laurent & Le Loeuff, 1979); *C. xuthus* (Manning, 1988).

KEY TO THE SPECIES OF THE GENUS *CORALLICHIRUS*

1 – Uropodal endopod narrow and fusiform ..... *C. bayeri*

– Uropodal endopod broad and fusiform 2

2 – Carpus of larger cheliped serrated on ventral margin; eyestalks narrowly protruded anteriorly . . . . . *C. intesi*

– Carpus of larger cheliped slightly cristate ventrally; eyestalks rounded anteriorly . . . . . *C. xuthus*

Corallichirus bayeri Kensley, 2001

Corallichirus bayeri Kensley, 2001b: 328, figs. 1, 2.

Remarks. — The male and female are similar in the structures of their pereiopods, pleopods, and uropods (Kensley, 2001: 231); however it is necessary to examine the structures of their male Plps1-2, and to report and interpret those observations.

Type locality. — Agat Bay, north of Alutom Island, Guam.

Distribution. — Known only from the type locality.

Corallichirus intesi (De Saint Laurent & Le Loeuff, 1979) (fig. 65C-D)

Callichirus intesi De Saint Laurent & Le Loeuff, 1979: 69, figs. 14g, 16c, 17b, 18b, 19b, 21a-c, 23 j-m; Tudge et al., 2000: 144.
Glypturus intesi — Manning, 1987: 392; Sakai, 1999c: 73; Sakai, 2005b: 133.
Corallianassa intesi — Abed-Navandi, 2000: 294-295.

Material examined. — MNHN Th 371, Goree Island, Republic of Senegal, 5 m. MNHN Th 371, type specimens of *Callichirus intesi* De Saint Laurent & Le Loeuff, 1979, 4 males (TL, 68-97 mm), 5 females (TL, 71-98 mm), Goree Island, Republic of Senegal, 5 m, in front of Port of Dakar.

Diagnosis. — Mxp3 ischium-merus operculiform; merus curved on distomesial margin; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous and bisegmented, and distal segment chelate distally (fig. 65C); male Plp2 endopod bearing small appendix interna distally, but no appendix masculina (fig. 65D; De Saint Laurent & Le Loeuff, 1979, fig. 23J, k). Telson slightly concave on posterior margin, with low median convexity.

Type locality. — Senegal, Port Dakar.

Distribution. — Goree and Dakar, Senegal; Ilha da Boavista; Ilha do Maio and Ilha de Santiago, CapeVerde Is.

Corallichirus xuthus (Manning, 1988) (fig. 65G-H)

Callianassa hartmeyeri — Hult, 1938: 7, figs. 1-4, pl. 1; Schmitt, 1939: 15. [Not: *Callianassa hartmeyeri* Schmitt, 1935b.]

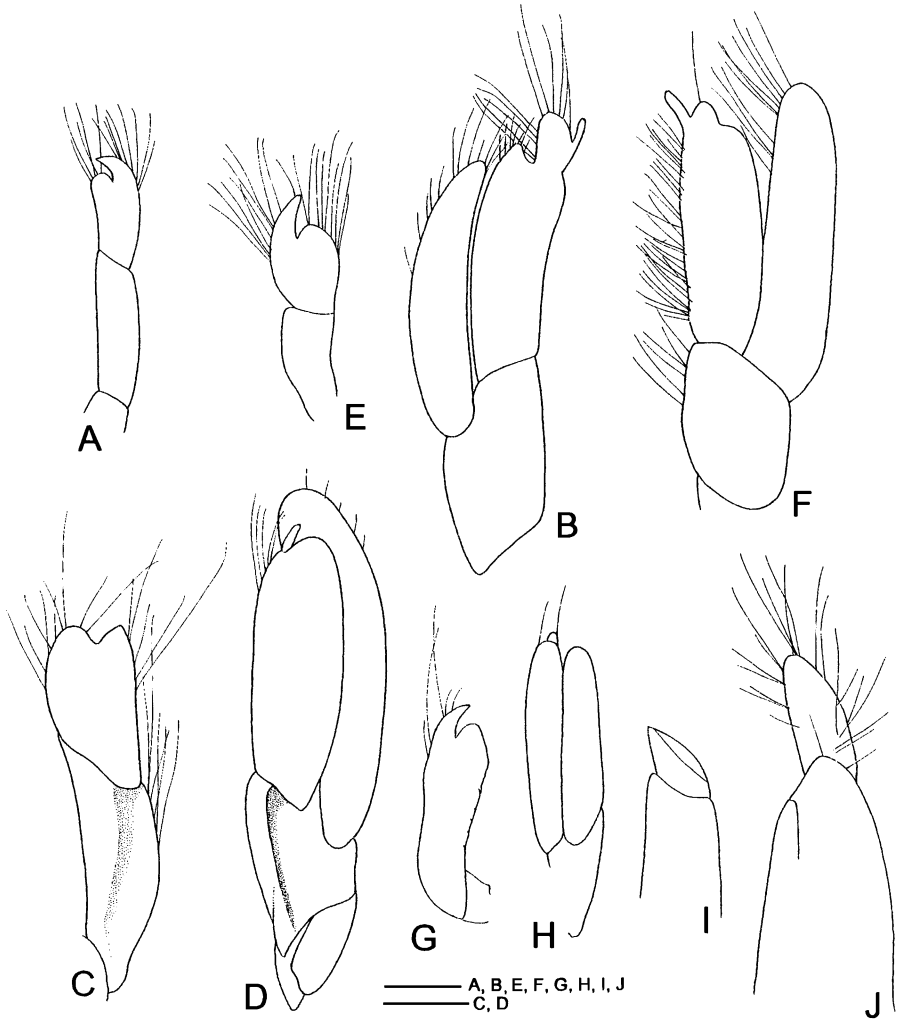

Fig. 65. *Glypturus acanthochirus* Stimpson, 1866, *Corallichirus intesi* (De Saint Laurent & Le Loeuff, 1979), *Glypturus longiventris* (A. Milne-Edwards, 1870), *Corallichirus xuthus* (Manning, 1988), and *Glypturoides trilobata* (Biffar, 1970). A, C, E, G, I, male Plp1; B, D, F, H, J, male Plp2. A, B, *Glypturus acanthochirus*, USNM 266220, 1 male (TL/CL, 47.0/13.0 mm), Parguera Bay, Lajas, Puerto Rico, Caribbean Sea; C, D, *Corallichirus intesi*, MNHN Th 371, Goree Island, Republic of Senegal, 5 m; E, F, *Glypturus longiventris*, USNM 122449, 1 male, S.W. reef of Somerset, 25 fms (45.7 m); G, H, *Corallichirus xuthus*, USNM 99861, holotype male (TL/CL/ 43.0/10.0 mm), Clipperton Is. (10°18′N 106°33′W); I, J, *Glypturoides trilobata*, USNM 205642, 1 male (TL/CL, 48.0/10.0 mm), in front of FSU Marine Laboratory, Florida. Scales 1 mm.

Callianassa (*Callichirus*) *placida* — Chace, 1962: 617 (partim). [Not: *Callianassa placida* De Man, 1905.]
Callianassa placida — Hernández 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; Hernández-Aguilera, 1998: 304; Tudge et al., 2000: 144; Hendrickx et al., 2005: 170.
Glypturus xuthus — Sakai, 1999c: 75; Sakai, 2005b: 135.

Material examined. — USNM 99861, holotype, male (TL/CL/43.0/10.0 mm), Clipperton Is. (10°18′N 106°33′W).

Diagnosis. — Mxp3 ischium-merus subsquare; merus subtriangular; propodus subsquare; and dactylus digitiform. Male Plp1 uniramous and bisegmented, and chelate distally (fig. 65G); male Plp2 biramous, endopod bearing appendix interna distally, but without appendix masculina (fig. 65H). Telson wider than long and trapezoid, and almost straight on posterior margin, with low median convexity. [Cf. Manning, 1988, fig. 3J.]

Remarks. — The present species, *Corallichirus xuthus* (Manning, 1988) is similar to the type species of *Glypturus*, *G. acanthochirus* in the shape of its male Plp1 and other characteristics. However, the male Plp2 is different in structure between the two species: in *Corallichirus xuthus* the male Plp2 endopod bears a small appendix interna distally, but not an appendix masculina (fig. 65H), whereas in *Glypturus acanthochirus* it bears distally an appendix masculina with a small appendix interna mesiomedially (fig. 65B).

Type locality. — Clipperton Is. (10°18′N 106°33′W), eastern Pacific Ocean, southwest of Mexico.

Distribution. — Eastern Pacific: María Madre Island, Mexico; Bahía Azufre, Isla Clarión, Mexico, Tres Marias Islands, Baja California; 7-18 m; Clipperton Island; Port Utria, Colombia; Socorro island, Gorgona Island, and Indefatigable Island, Galapagos Islands; Ecuador, lagoon.

Genus **Forestcallichirus** gen. nov.

Diagnosis. — Carapace with dorsal oval. Rostrum small and obtusely triangular. A1 peduncle longer than A2 peduncle. Mxp3 ischium-merus pediform, keeping same width from proximal to distal; propodus broadened, convex on ventral margin; dactylus digitiform; exopod absent. P1 chelate; in larger cheliped, ischium and merus minutely denticulate on ventral margin; chela smooth on dorsal and ventral margins; in smaller cheliped, ischium, merus, and chela unarmed on dorsal and ventral margins. P2 chelate. P3 simple. P4 subchelate.

P5 chelate. Male Plp1 uniramous and bisegmented, distal segment longer than proximal one and w-shaped distally; male Plp2 uniramous and bisegmented, lacking appendices interna and masculina; Plps3-5 with appendix interna. Telson wider than long, slightly convergent in posterior two-thirds, and straight on posterior margin. Uropodal endopod oval in shape; uropodal exopod broadly convex on distal margin, with setae, bearing dorsal plate.

Remarks. — The present new genus *Forestcallichirus* gen. nov. is separated from the genus *Podocallichirus* Sakai, 1999c, because the male Plps1-2 are different in structure between the two genera. In *Forestcallichirus* the male Plp1 is uniramous and bisegmented, the distal segment is w-shaped distally, and the male Plp2 is uniramous; whereas in *Podocallichirus* the male Plp1 is uniramous and bisegmented, but the distal segment is chelate, and Plp2 is biramous, and the endopod bears mesiodistally a fusiform appendix masculina with marginal setae and a small, proximally-fused appendix interna with hooklets mesiomedially.

Type species. — *Callichirus foresti* Le Loeuff & Intès, 1974, by present designation and monotypy. The gender of the new generic name, *Forestcallichirus*, is masculine.

Species included. — *Forestcallichirus foresti* (Le Loeuff & Intès, 1974).

Etymology. — The new generic name *Forestcallichirus* is dedicated to Prof. J. Forest, who has played a leading role in the carcinological world as one of the great carcinologists of the National Museum of Natural History, Paris, by adding his name as a prefix to the generic name *Callichirus*.

Forestcallichirus foresti (Le Loeuff & Intès, 1974)

[Abbreviated list of synonymy.]

Callianassa guineensis — Longhurst, 1958: 31 (partim). [Not: *Callianassa* (*Callichirus*) *guineensis* De Man, 1928a.]

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.

Podocallichirus foresti — Sakai, 1999c: 55; Sakai, 2000: 189; Sakai, 2005b: 189.

Material examined. — Males, Côte d'Ivoire, leg. R/V "Reine Pokou", det. Le Loeuff & Intès, 1974.

Diagnosis. — Mxp3 ischium-merus pediform; merus angulated on distomesial corner; propodus subovate, and dactylus digitiform. Male Plp1 uniramous and bisegmented, distal segment w-shaped distally; male Plp2 uniramous and bisegmented, lacking appendices interna and masculina; Plps3-5 with appendix interna. Telson subquadrate, wider than long, slightly convergent in posterior two-thirds, and straight on posterior margin. [Cf. Le Loeuff & Intès, 1974:

46, fig. 14m, s, t, u; De Saint Laurent & Le Loeuff, 1979: 58, figs. 12c, 15i-l, 19b.]

Type locality. — Grand Lahou (5°11′N 3°49.05′W), Ivory Coast, 25 m.

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

Genus **Glypturoides** gen. nov.

Diagnosis. — Carapace with dorsal oval, but without rostral carina, cardiac prominence, and transverse cardiac sulci. A1 peduncle shorter than A2 peduncle. Mxp3 ischium-merus ovate; propodus broadened and truncate on ventral margin; dactylus digitiform; exopod absent. P1 chelate, unequal, and dissimilar; in male larger cheliped meral hook triangular. P2 chelate. P3 propodus broadened. P4 subchelate. P5 chelate. Abdominal somites 3-5 not ornamented dorsally. Male Plp1 uniramous and bisegmented, distal segment subchelate with acute tip mesiodistally and rounded prominence distolaterally (fig. 65I; Biffar, 1970, fig. 1m); male Plp2 biramous, endopod bearing distally triangular appendix masculina with marginal setae, and mesiodistally small appendix interna (fig. 65J); male Plps3-5 endopods foliaceous, bearing appendix interna. Telson wider than long. Uropodal endopod longer than wide, and rhombic in shape, overreaching telson; uropodal exopod convex on lateral margin, bearing distal flap. [Adapted from Sakai, 1999c: 72.]

Remarks. — *Callianassa trilobata* Biffar, 1970, was classified by Manning & Lemaitre (1994) as *Sergio trilobatus*, and later reclassified by Sakai (1999, 2005b) under *Neocallichirus* Sakai, 1988 as *N. trilobatus*. However, this species does not belong in *Neocallichirus* either, because it is also different from the type species of the genus *Neocallichirus*, *Neocallichirus horneri* Sakai, 1988, in the form of the male Plp2. In *N. trilobatus* the Plp2 endopod bears an appendix masculina distally and a small appendix interna mesiodistally (Biffar, 1973, fig. 1m, o); whereas in *N. horneri* the male Plp2 endopod bears an embedded appendix masculina distally and an embedded appendix interna distolaterally (Sakai, 1988, fig. 8I). Thus, a new genus, *Glypturoides* gen. nov. is established for *N. trilobatus*, which is reclassified under the new genus as *Glypturoides trilobata*.

Type species. — *Callianassa trilobata* Biffar, 1970, by present designation and monotypy. The gender of the new generic name, *Glypturoides*, is feminine.

Species included. — *Glypturoides trilobata* (Biffar, 1970).

Etymology. — The new generic name, *Glypturoides* is composed of a generic name, *Glypturus* and a Latin suffix, -oides, meaning “like” or “similar to”.

Glypturoides trilobata (Biffar, 1970)
(fig. 65I-J)

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; Tudge et al., 2000: 145; Robles et al., 2009: 317.
Neocallichirus trilobatus — Sakai, 1999c: 93, fig. 20e-f; Sakai, 2005b: 169.

Material examined. — USNM 205642, 1 male (TL/CL, 48.0/10.0 mm), in front of FSU Marine Laboratory, Florida, 06.iv.1985, leg. D.L. Felder & R.B. Manning.

Type locality. — Off Pinellas Point, Tampa Bay, Florida, 2-3 m.
Distribution. — Tampa Bay, Miami, Lemon Bay, Florida, U.S.A.

Genus **Glypturus** Stimpson, 1866

Glypturus Stimpson, 1866: 46; Manning, 1987: 390, 398; Manning & Felder, 1991: 778; Sakai, 1999c: 72; Sakai, 2005b: 130.
Corallianassa Manning, 1987: 392, 397; Manning & Felder, 1991 (partim): 776, figs. 1, 2, 5. [Type species. — *Callianassa longiventris* A. Milne-Edwards, 1870.]
Corallianassa s. str., Felder, 2001: 440
Glypturus s. str., Felder, 2001: 440.

Diagnosis. — Rostrum acutely or obtusely triangular. Anterolateral projections on carapace calcified or non-calcified proximally. Carapace with dorsal oval, but without rostral carina, cardiac prominence, and transverse cardiac sulcus(i). A1 peduncle shorter than A2 peduncle. Mxp3 ischium-merus subpediform; propodus broadened and rounded on ventral margin; dactylus digitiform; exopod absent. P1 chelate, unequal, and dissimilar; male larger cheliped with or without meral hook. P2 chelate. P3 propodus broadened. P4 subchelate. P5 chelate. Abdominal somites 3-5 not ornamented dorsally. Male Plp1 uniramous and bisegmented, distal segment subchelate or w-shaped distally; male Plp2 biramous, endopod bearing mesiodistally a proximally-fused appendix masculina with slender, proximally-fused appendix interna mesiomedially, or lacking appendices interna and masculina; male Plps3-5 biramous and foliaceous, endopods with stubby, embedded appendix interna. Telson wider than long, and varied in shape. Uropodal endopod wider than long, and rhombic or subquadrate, overreaching telson; uropodal exopod convex on lateral margin, bearing dorsal plate. [Adapted from Sakai, 1999c: 72.]

Remarks. — Manning (1987) established a new genus, *Corallianassa* for *Callianassa longiventris* A. Milne-Edwards, 1870, including *Callianassa longiventris* var. *borradailei* De Man, 1928, and later in 1988 added *Corallianassa*

hartmeyeri (Schmitt, 1935b) and *Corallianassa xutha* Manning, 1988. In 1992, however, he (Manning, 1992) erected a new genus, *Corallichirus* for *Corallianassa xutha*, because *Corallianassa xutha* is different from *Corallianassa longiventris*. In *Corallianassa longiventris* abdominal somite 2 is longer than abdominal somite 6, while in *Corallianassa xutha* abdominal somite 2 is about as long as somite 6. The three species included in *Corallianassa* were later reclassified under *Glypturus* by Sakai (2005b: 134-135). However, in the present revision, *Glypturus hartmeyeri* (Schmidt, 1935b) is synonymized with *G. longiventris*, because in the type species of *Corallianassa*, *C. longiventris* (A. Milne-Edwards, 1870), the male Plps1-2 are the same in features as those of the type species of *Glypturus*, *G. acanthochirus* Stimpson, 1866, and *G. xuthus* is reclassified under *Corallichirus* sensu nov.

Type species. — *Glypturus acanthochirus* Stimpson, 1866: 46, by original designation. The gender of the generic name, *Glypturus*, is masculine.

Species included. — *G. acanthochirus* Stimpson, 1866; *G. armatus* (A. Milne-Edwards, 1870) (= *G. motupore* Poore & Suchanek, 1988); *G. articulatus* (Rathbun, 1906); *G. assimilis* (De Man, 1928b); *G. borradailei* (De Man, 1928a); *G. collaroy* (Poore & Griffin, 1979); *G. haswelli* (Poore & Griffin, 1979); *G. lanceolatus* (Edmondson, 1944) [= *G. nakasonei* (Sakai, 1967)]; *G. longiventris* (A. Milne-Edwards, 1870) [= *Callianassa placida* De Man, 1905; *G. hartmeyeri* (Schmitt, 1935b); *Callianassa* (*Callichirus*) *oahuensis* Edmondson, 1944]; *G. martensi* (Miers, 1884a); *G. rabalaisae* sp. nov.

KEY TO THE SPECIES OF THE GENUS *GLYPTURUS*

1 – Telson wider than long 2
– Telson trapezoid or pentagonal 3

2 – Eyestalks rounded distally; cornea distinct, occupying distal half of eyestalk . . . . . *G. articulatus*
– Eyestalks with tubercle mesiodistally; cornea located distolaterally . . . . . *G. collaroy*

3 – Uropodal exopod strongly curved mesially in its posterior half 4
– Uropodal exopod bilobate and broadened in its posterior half 7

4 – A1 peduncle reaching to distal end of A2 penultimate segment . . . . . *G. haswelli*
– A1 peduncle reaching to middle of A2 distal segment 5

5 – Telson rounded on posterior margin . . . . . *G. assimilis*
– Telson angulate at both posterolateral angles 6

6 – Eyestalks not reaching distal end of A1 proximal segment . . . . . *G. martensi*
– Eyestalks reaching distal end of A1 proximal segment . . . . . *G. lanceolatus* (= *G. nakasonei*)

7 – Telson pentagonal, widest at middle part . . . . . *G. armatus* (= *G. motupore*)
– Telson trapezoid, widest at proximal part 8

8 – Telson with median spine on posterior margin ..... *G. rabalaisae* sp. nov.
– Telson without median spine on posterior margin 9

9 – Abdominal somite 2 elongate ..... *G. borradailei*
– Abdominal somite 2 not elongate 10

10 – Cornea distinct and located apically ..... *G. longiventris*
– Cornea distinct and located distolaterally ..... *G. acanthochirus*

Glypturus acanthochirus Stimpson, 1866
(fig. 65A-B)

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*); Poore & Suchanek, 1988: 201, fig. 4d; Manning & Felder, 1991: 778, figs. 2, 4; Dworschak, 1992: 209; Dworschak & Ott, 1993: 282; Blanco Rambla, 1995: 61, figs. 7, 8; Sakai, 1999c: 73, fig. 14i; Tudge et al., 2000: 144; Sakai, 2005b: 133.

? *Glypturus acanthochirus* — Schmitt, 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 & Reames, 1979: 52.

Callianassa acanthochirus — Gurney, 1944: 84; Biffar, 1971a: 655, figs. 3, 4; Heard & Reames, 1979: 52, fig. 1.

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

Not: *Callianassa acanthochirus* — Rabalais et al., 1981: 103, fig. 3 [= *Glypturus rabalaisae* Sakai, 2005b].

Material examined. — SMF 23508, 1 female (TL/CL 89.0/21.5), Key Largo, Florida Bay, Florida, U.S.A., 16.v.1971, leg. J. Doerjes; USNM 266220, 1 male (TL/CL, 47.0/13.0 mm), Parguera Bay, Lajas, Puerto Rico, Caribbean Sea, 06.i.1955, leg. B. Padilla, det. R.B. Manning.

Diagnosis. — Carapace with distinct anterolateral spines. Rostrum sharply triangular. Anterolateral spines on carapace non-calcified proximally. A1 peduncle reaching to distal margin of A2 penultimate segment. Mxp3 ischium-merus operculiform; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous, bisegmented, and subchelate distally (fig. 65A); male Plp2 biramous, endopod bearing mesiodistally a proximally-fused appendix masculina provided mesiomedially with slender, proximally-fused appendix interna (fig. 65B); male Plps3-5 endopods with narrow, triangular appendix interna. Telson wider than long, parallel-sided in proximal half, and curving toward rounded posterior margin. Uropodal endopod oval.

Remarks. — Biffar (1971) showed by his figure that the male Plp2 endopod bears mesiodistally an articulate appendix masculina provided mesiomediallly with an articulate appendix interna (Biffar, 1971a: 655, fig. 3h, i). However, it has turned out through the present examination of the holotype (USNM 266220) that the male Plp2 endopod bears mesiodistally a proximally-fused appendix masculina provided mesiomedially with a proximally-fused appendix interna (fig. 65B).

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 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 (partim).
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; Abu-Hilal et al., 1988: 233, 4 figs. [Type locality. — Gulf of Aqaba, Red Sea.]
Glypturus accanthochirus — Manning, 1987: 390 (partim), figs. 4, 5 (= *G. armata*, fig. 4 from A. Milne-Edwards, 1870; fig. 5 from Kensley, 1975).
Glypturus motupore Poore & Suchanek, 1988: 198, figs. 1-3, 4a, table 1; Tudge et al., 2000: 144. [Type locality. — Bootless Inlet, Motupore Is., Papua New Guinea.]
Glypturus laurae — Poore & Suchanek, 1988: 201, fig. 4c; Dworschak, 1992: 209; Tudge et al., 2000: 144; Robles et al., 2009: 317.
Glypturus armatus — Poore & Suchanek, 1988: 201; Sakai, 1999c: 76; Tudge et al., 2000: 144; Sakai, 2005b: 137, table VIII.
Neocallichirus motupore — Sakai, 1999c: 105; Sakai, 2005b: 182.
Callianassa (*Callianassa*) *laurae* — Felder, 2001: 441.

Remarks. — The present species, *Glypturus armatus*, which was included in *Callianassa*, and later in *Glypturus* by Manning (1987) as a synonym of *G. acanthochirus* Stimpson, 1866, is different, however, from *G. acanthochirus*, because in *G. armatus* the telson is pentagonal with convex lateral margins (Kensley, 1975, fig. 1f), while in *G. acanthochirus* the telson is wider than long, and the lateral margins are parallel-sided in the proximal half, curving toward the rounded posterior margin. Poore & Suchanek (1988) mentioned that "*Glypturus motupore* shares with *G. laurae* a broadly-based upturned rostrum, tapering eyestalks with a small cornea but differs most importantly in the shape of the telson (narrower proximally in *G. motupore*) in the uropodal endopod (broader and more truncate in *G. laurae*). The larger chelipeds of the two species differ in the shape of the cutting edge of the dactylus (without a notch in *G. laurae*), and in that lateral granules at the base of the fixed finger are absent in *G. motupore* except in one individual, but are a constant prominent feature of *G. laurae*". However, those differences pointed out by Poore & Suchanek (1988) are not decisive to separate those two species, so in the present paper *G. laurae* as well as *G. motupore* are synonymized with *G. armatus*. This is because, those three species are almost the same in the following morphological features: larger cheliped, tail fan, spination on carapace, P3 propodus, relative length of A1 to A2, and Mxp3, i.e., features that

are considered taxonomically important in the classification as proposed in the present revision.

Type locality. — Fiji.

Distribution. — Mataiva, Tuamotu Arch.; Mauritius; Ternate, Indonesia; Bootless Inlet, Motupore Is., Papua New Guinea; Fiji; Djibouti; Gulf of Aden; Aqaba; Red Sea; intertidal, 5 to 45 m.

Glypturus articulatus (Rathbun, 1906)

Callianassa articulata Rathbun, 1906: 892, fig. 47; Chilton, 1911: 511.
Callianassa (*Callichirus*) *articulata* — De Man, 1928b: 28, 94, 108; Edmondson, 1944: 54, fig. 9a-j.
Corallianassa articulata — Dworschak, 1992: 210, fig. 14a-e; Tudge et al., 2000: 144.
Glypturus articulatus — Sakai, 1999c: 76, fig. 15a-f; Sakai, 2005b: 138.

Diagnosis. — Mxp3 ischium-merus subsquare, merus rounded on distomesial margin; propodus subquadrate, and dactylus subovate. Male Plp1 blade-shaped, uniramous, and bisegmented; male Plp2 unknown. Telson wider than long and subsquare, convex on lateral margins, and almost straight on posterior margin.

Type locality. — Vicinity of Modu Manu, Hawaii, 23-33 fathoms [ca. 42-60 m].

Distribution. — Honolulu, Oahu, Hawaii; Kermadec Islands; Gilbert Island.

Glypturus assimilis (De Man, 1928b)

Callianassa Martensi — De Man, 1888: 482-483, pl. 21 fig. 1 (Not: *Callianassa Martensi* Miers, 1884).
Callianassa (*Callichirus*) *assimilis* De Man, 1928b: 28, 109.
Glypturus assimilis — Sakai, 1999c: 78, fig. 16a-f; Sakai, 2005b: 138.
Corallichirus bayeri Kensley, 2001: 328, figs. 1, 2. [Type locality. — Agat Bay, north of Alutom Island, Guam, among rocks, 2.5-6 m.]
Callianassa assimilis — Tudge et al., 2000: 143.

Diagnosis. — Rostrum sharply triangular. Anterolateral spines of carapace non-calcified proximally. A1 peduncle shorter than A2 peduncle. Mxp3 ischium-merus rectangular; merus obliquely curved distally, and rounded on mesial margin; propodus subquadrate, and dactylus digitiform. Male Plps1-2 unknown. Telson semicircular; uropodal endopod fusiform.

Type locality. — Indonesia, Ambon.

Distribution. — Ambon, Indonesia; Gilbert Is.; Agat Bay, north of Alutom Island, Guam.

Glypturus borradailei (De Man, 1928a)

Callianassa (*Callichirus*) *longiventris* var. *borradailei* De Man, 1928a: 27; De Man, 1928b: 29, 108.
Callianassa (*Callichirus*) *borradailei* — Ward, 1942: 62.
Corallianassa borradailei — Manning, 1987: 394, figs. 7 (from Borradaile, 1902), 8; Manning, 1992, fig. 1a; Tudge et al., 2000: 144; Ngoc-Ho, 2002b: 224.

Diagnosis. — Rostrum sharply pointed apically, overreaching middle of eyestalks. Anterolateral margins of carapace with sharp teeth bearing non-calcified proximal area. Eyestalks oval; cornea distinct and located apically. A1 peduncle reaching middle of A2 distal segment. Mxp3 propodus subquadrate, and dactylus digitiform. P1 ischium and merus armed with sharp teeth on ventral margin. Abdominal somite 2 longer than somite 6. Telson shaped as inverted trapezoid. Uropodal exopod bilobate and broadened in distal half.

Type locality. — Goidu, Goifurfehendu Atoll, Maldive Archipelago.

Distribution. — Only known from the type locality.

Glypturus collaroy (Poore & Griffin, 1979)

Callianassa collaroy Poore & Griffin, 1979: 260, figs. 24, 25.
Glypturus collaroy — Sakai, 1988: 61; Sakai, 2005b: 139, fig. 29.
Corallianassa collaroy — Sakai, 1992b: 212, fig. 1; Tudge et al., 2000: 144; Davie, 2002: 460.
Neocallichirus collaroy — Sakai, 1999c: 94 (key), 98.

Diagnosis. — Mxp3 ischium-merus oval; merus rounded, with spine on distomesial margin; propodus subquadrate, and dactylus subovate. Male Plp1 uniramous, bisegmented, and w-shaped distally; male Plp2 biramous, endopod with appendices interna and masculina. Telson wider than long and subsquare, convex on lateral margins, and concave medially on posterior margin.

Type locality. — Collaroy, Long Reef, New South Wales, Australia.

Distribution. — Collaroy, New South Wales; Society Islands — Maharepa, Moorea, French-Polynesia; coral reef, sand bottom, low intertidal among boulders.

Glypturus haswelli (Poore & Griffin, 1979)

Callianassa haswelli Poore & Griffin, 1979: 263, figs. 26, 27.
Callianassa nakasonei — Sakai, 1987a: 306; Tudge et al., 2000: 143.
Glypturus haswelli — Sakai, 1999c: 82; Davie, 2002: 460.

Diagnosis. — Mxp3 ischium-merus subsquare; merus rounded on mesiodistal margin; propodus subquadrate, and dactylus digitiform. Male Plp1 blade-shaped, uniramous, bisegmented, and subchelate; male Plp2 biramous, endopod without appendices interna and masculina (Poore & Griffin, 1979,

fig. 27m, n). Telson shaped in inverted trapezoid, bearing low median convexity on posterior margin.

Remarks. — *Callianassa* (*Callichirus*) *nakasonei* Sakai, 1967 was synonymized with *Callianassa haswelli* Poore & Griffin, 1979, by Manning (1987: 392), and later with *Glypturus martensi* from Mauritius by Sakai (2005b: 18). However, *C. nakasonei* is different from *G. martensi*, because in *G. martensi* the palm of the larger cheliped is denticulate on the distal margin, and the telson is trapezoid, bearing no median convexity on the posterior margin; whereas in *C. nakasonei* the palm of the larger cheliped is not denticulate on the distal margin and the telson is trapezoid, bearing a median convexity on the posterior margin.

Type locality. — Queensland, Whitsunday Group, Australia.

Distribution. — Torres Strait; Queensland, Islands off northern and central Queensland coast.

Glypturus lanceolatus (Edmondson, 1944)

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

Callianassa (*Callichirus*) *nakasonei* Sakai, 1967: 46, fig. 3. [Type locality. — East coast of Tonaki Island, Okinawa-Island, Ryukyu Archipelago.]

Glypturus lanceolatus — Sakai, 1999c: 83; Sakai, 2005b: 142.

Diagnosis. — Mxp3 ischium-merus subsquare; merus rounded on distomesial margin; propodus subtriangular, and dactylus digitiform. Male Plps1-2 unknown. Telson wider than long and trapezoid, bearing low median convexity on posterior margin.

Type locality. — Hanauma Bay, Oahu, in shallow water on the reef.

Distribution. — Oahu, Hawaii; Queensland, Whitsunday Group, Australia (Poore & Griffin, 1979); and Okinawa, Japan (Sakai, 1967).

Glypturus longiventris (A. Milne-Edwards, 1870) (fig. 65E-F)

Callianassa longiventris A. Milne-Edwards, 1870: 92, 101; Biffar, 1971a: 651, 653, 685, figs. 13, 14.

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

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

?*Callianassa* (*Callichirus*) *longiventris* — Borradaile, 1904: 752, pl. 58 fig. 2. [Type locality. — Hulue, Male Atoll, Maldives.]

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

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

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*) *hartmeyeri* Schmitt, 1935b: 3, 4. [Replacement name for *Glypturus grandimanus* sensu Balss, 1924.] [Type locality. — Jamaica Is.: Kingston (Kingston Harbor, 17°57′N 76°47′W).]

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

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

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

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

Corallianassa longiventris — Manning, 1987: 392, fig. 6; Manning & Felder, 1991: 777; Coelho, 1997: 148; Melo, 1999: 366, figs. 243-244; Dworschak et al., 2006: 1369, figs. 2, 5, 6, tab. 2; Coelho et al., 2007: 5 (table).

Corallianassa hartmeyeri — Manning, 1988: 884, figs. 1, 2; Manning & Chace, 1990: 34, figs. 18, 19; Manning & Felder, 1991: 777; Manning, 1992: 571; Coelho, 1997: 148; Melo, 1999: 364, figs. 241-242; Tudge et al., 2000: 144; Coelho et al., 2007: 5.

Corallichirus placidus — Manning, 1992: 571; Tudge et al., 2000: 144.

Glypturus coutierei — Sakai, 1999c: 78, figs. 17a-f, 18a-d.

Glypturus longiventris — Sakai, 1999c: 74; Sakai, 2005b: 134.

Glypturus hartmeyeri — Sakai, 1999c: 74; Sakai, 2005b: 134.

Callianassa coutierei — Tudge et al., 2000: 143.

Material examined. — SMF 23509, 1 ovig. female (TL/CL, 11.0/2.4 mm), Bahia Gairaca, ca. 20 km N.E. of Santa Marta, Magdalena, Colombia, 16.iv.1980; USNM 122449, 1 male, S.W. reef of Somerset, Bermuda, 25 fm (45.7 m), 15.vi.1964, leg. T. Tucker, det. T.A. Biffar; SMNH 16239 1 female (lacking posterior to abdominal somite 2), Viti Levu, Namuka, Fiji Is., barrier reef, 18.vi.1917, leg. S. Bock.

Diagnosis. — Mxp3 ischium-merus operculiform; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous, bisegmented, and w-shaped distally (fig. 65E); male Plp2 biramous, endopod bearing distally proximally-fused appendix masculina, and mesiodistally slender, proximally-fused appendix interna (fig. 65F). Telson wider than long and trapezoid, bearing median convexity on posterior margin. [Cf. Biffar, 1971a: 686, 688, figs. 13e, g; 14a, e.]

Remarks. — The present species, *Glypturus longiventris* (A. Milne-Edwards, 1870) is similar to *G. acanthochirus* Stimpson, 1866 in that the male Plp1 is uniramous and bisegmented, and the distal segment is chelate distally; the male Plp2 is biramous, and the endopod bears a proximally-fused appendix masculina and a small, proximally-fused appendix interna. However, they are different from each other in the features of the telson and anterolateral spines on the carapace. In *G. longiventris* the telson is wider than long and trapezoid, and the anterolateral spines on the carapace are calcified proximally; whereas in *G. acanthochirus* the telson is wider than long, and parallel-sided in the

proximal half, curving toward the rounded posterior margin, and the anterolateral spines on the carapace are not calcified proximally.

Four species in *Glypturus*, *G. coutierei* (Nobili, 1904) from Djibouti; Mindanao, Philippines; Tahiti; Fiji; Goidu, Goifurfehendu Atoll, Maldive Archipelago; Indonesia; Tuléar, S.W. Madagascar; *G. placida* (De Man, 1905) from Indonesia; *G. hartmeyeri* (Schmitt, 1935b) from Jamaica Is.: Kingston; and *G. oahuensis* (Edmondson, 1944) from Hanauma Bay, Oahu, Hawaii, show almost the same features as those of *G. longiventris* (A. Milne-Edwards, 1870) in the eyestalks, the anterolateral spines of the carapace, the denticulation on the ventral margins of P1 ischium and merus, and also in the telson and uropodal endopod, so that those four species are here synonymized with *G. longiventris* (A. Milne-Edwards, 1870) from Martinique, though in *G. hartmeyeri* and *G. oahuensis* no males are known. Therefore, it is safely concluded that *G. longiventris* is distributed in the Atlantic and Indo-Pacific oceans.

Type locality. — Martinique.

Distribution. — Bermuda; Carrie Bow Cay; southeastern Florida; Belize; Caribbean Sea (Jamaica; Martinique; Virgin Is.), Pará and Pernambuco, Brazil (as *G. longiventris*). — Jamaica, Caribbean Sea, and Ascension, Alagoas, Brazil, South Atlantic (as *G. hartmeyeri*). — Hawaii (Hanauma Bay, Oahu) (as *G. oahuensis*). — Mindanao, Philippines; Tahiti; Fiji; Goidu, Goifurfehendu Atoll, Maldive Archipelago; Indonesia (off Seba, Savu; off Laiwui, coast of Obi Major); Gulf of Aden (Perim; Djibouti; Aden); Tuléar, S.W. Madagascar (as *G. coutierei*). — East coast of Tonaki Island, Okinawa-Island, Ryukyu Archipelago; Mauritius; Ambon, Indonesia; north and central Queensland, Australia; Sri Lanka; Belligom, West Pakistan (as *G. martensi*).

Glypturus martensi (Miers, 1884)

Callianassa Martensi Miers, 1884a: 13-15, pl. 1 fig. 1; Lanchester, 1900: 261, pl. 12 fig. 4, 4a; Nobili, 1906b: 111, fig. 7.
Callianassa (*Callichirus*) *Martensi* — Borradaile, 1903: 547; De Man, 1928b: 29, 109, 171.
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; Tudge et al., 2000: 144; Davie, 2002: 460; Sakai, 2005b: 142.

Diagnosis. — Mxp3 ischium-merus subsquare; propodus subtriangular, and dactylus digitiform. In larger cheliped palm denticulate on distal margin (Sakai, 1984, fig. 3B). Male Plp1 uniramous, bisegmented, and subchelate distally; male Plp2 biramous, endopod bearing distally proximally-fused appendix masculina with appendix interna mesioproximally. Telson wider than long

and trapezoid, and almost straight on posterior margin, with median convexity. [Cf. Tirmizi, 1974, figs. 1, 4C, D.]

Type locality. — Mauritius.

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

Glypturus rabalaisae sp. nov.

Callianassa acanthochirus — Rabalais et al., 1981: 103, fig. 3.
Glypturus rabalaisae Sakai, 2005b: 135 [invalid, as no type specimen was designated].

Material. — Holotype, male (collected on 21.i.1976); paratypes, females (17.ix.1975), (11.x.1976), South Texas outer continental shelf, northwestern Gulf of Mexico (Rabalais et al., 1981).

Remarks. — The present species was described without designating any types by Sakai (2005b), so the species name is invalid according to Art. 72.3 of the ICZN. In the present revision this species is redescribed by designating the type.

The present species is different from *G. acanthochirus* Stimpson, 1866, because in *G. acanthochirus* the A1 peduncle reaches to the distal margin of the A2 penultimate segment, and the telson bears no median spine on the posterior margin; whereas in *G. rabalaisae* sp. nov. the A1 peduncle reaches to the middle of the A2 distal segment, and the telson bears a median spine on the posterior margin.

Type locality. — Off Galveston, Texas, 15-65 to 90 m.

Distribution. — Only known from the type locality.

Genus **Grynaminna** Poore, 2000

Grynaminna Poore, 2000: 150.

Diagnosis. — Rostrum low and obtusely triangular. Carapace with dorsal oval, but without rostral carina, hepatic sulcus, or cardiac prominence. A1 peduncle longer and stouter than A2 peduncle; distal segment elongate. Mxp3 ischium-merus broadly subpediform; propodus broadened and truncate on ventral margin; dactylus slender and digitiform; exopod rudimentary. P1 unequal, in larger cheliped merus convex and denticulate on ventral margin. P2 chelate. P3 propodus broad and pediform. P4 subchelate. P5 chelate. Abdominal somites 3-5 without dorsal ornament. Male Plp1 uniramous and bisegmented, and distal segment subchelate distally; male Plp2 biramous,

endopod bearing distally subsquare appendix masculina with distal setae and small appendix interna mesiomedially (fig. 66A, B); male Plps3-5 biramous and foliaceous, endopods with appendix interna. Telson wider than long and hexagonal. Uropodal endopod elongate and ovate; uropodal exopod broadly triangular, bearing dorsal plate.

Remarks. — Poore (2000: 150) established *Grynaminna* Poore, 2000 and mentioned in the remarks that his genus resembles *Callichirus*, but differs from all the callichirine genera in the digitiform appendix interna of male Plp2. Poore's (2000) original designation of the present genus made at that time, about ten years ago, should not have been rejected (cf. Sakai, 2005b: 126, 187-188), because he also indicated the importance of the features of male Plps1-2, though his designation was made without examining all the genera included in the present Callichirinae. The present classification was made systematically by applying the different features in the structures of male Plps1-2.

Type species. — *Grynaminna tamakii* Poore, 2000, by original designation and monotypy. The gender of the generic name, *Grynaminna*, is feminine.

Species included. — Only the type species, *Grynaminna tamakii* Poore, 2000.

Grynaminna tamakii Poore, 2000
(fig. 66A-B)

Grynaminna tamakii Poore, 2000: 150, figs. 1-4.
Podocallichirus tamakii — Sakai, 2005b: 193, figs. 39, 40.

Material examined. — NSMT-Cr. 12532, paratype, 1 male (TL/CL, 66.0/13.5 mm, chelipeds missing); NSMT-Cr. 12533, paratype, 1 male (TL/CL, 65.0/13.0 mm, chelipeds missing); NSMT-Cr. 12534, paratype, 1 male (TL/CL, 68.0/15.3 mm, chelipeds missing); S. end of Shimabara Peninsula, Nagasaki Pref., Kyushu, Japan, leg. A. Tamaki, 8.vii.1998.

Remarks. — The present species was included in *Podocallichirus* Sakai, 1999c, but it has turned out to be different from the type species of *Podocallichirus*, *P. madagassa* Lenz & Richters, 1881, in the form of the male Plps1-2. In *P. madagassa*, the male Plp1 is uniramous and bisegmented, and the distal segment is bilobed distally and curved inward distally (fig. 66C); the male Plp2 is biramous, and the endopod bears mesiodistally an oval appendix masculina with a proximally-fused appendix interna (fig. 66D). In *P. tamakii*, in contrast, the male Plp1 is uniramous, bisegmented, and its distal segment is subchelate distally; the male Plp2 is biramous, and the endopod bears distally a subsquare appendix masculina with distal setae and a small appendix interna mesiomedially (fig. 66A, B).

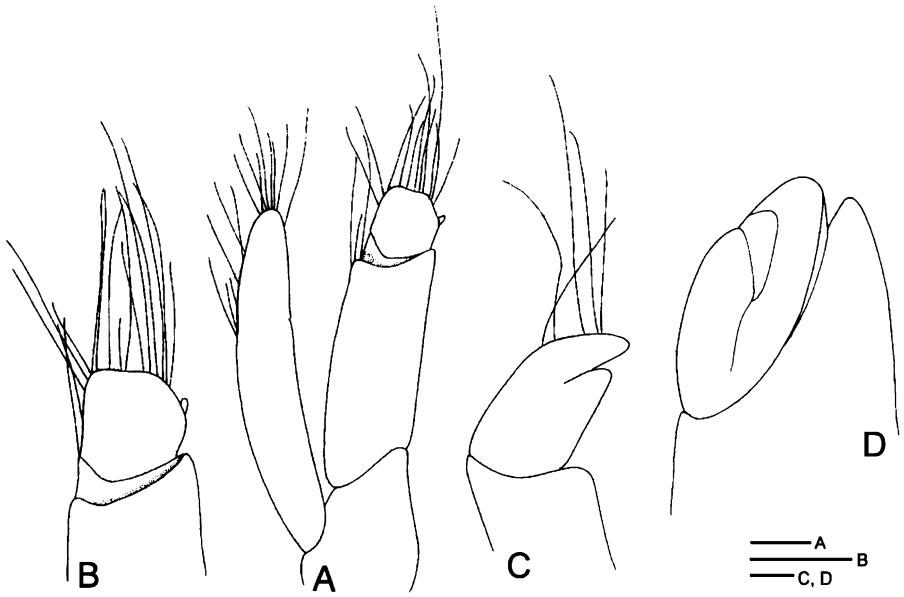

Fig. 66. *Grynaminna tamakii* Poore, 2000 and *Podocallichirus madagassus* (Lenz & Richters, 1881). A, B, D, male Plp2, C, male Plp1. A, B, *Grynaminna tamakii*, NSMT-Cr. 12532, paratype, male (TL/CL, 66.0/13.5 mm, chelipeds missing), south end of Shimabara peninsula, Nagasaki Pref., Kyusyu, Japan; C, D, *Podocallichirus madagassus*, SMF 4953, paratype, 1 male (TL/CL, 49.0/10.7 mm), Madagascar. Scales 1 mm.

Therefore, based on the type species, *P. tamakii*, the original concept of the genus *Grynaminna* is reinstated in the present classification, in which the Callichirinae are classified mainly on the basis of the characters of the male pleopods.

Type locality. — Minami-Arima-cho, Shimabara Peninsula, Nagasaki Prefecture, Japan, 32°37′N 130°13′E.

Distribution. — Known only from the type locality.

Genus **Lepidophthalmoides** gen. nov.

Diagnosis. — Rostrum small and acutely triangular, lacking rostral carina. Carapace with dorsal oval, but without hepatic sulcus and prominence, and anterolateral margin of carapace with or without spine. A1 peduncle longer and stouter than A2 peduncle; distal segment elongate. Mxp3 ischium-merus broadly rectangular; propodus broadened and rounded on ventral margin; dactylus digitiform or subovate; exopod rudimentary or absent. P1 unequal; in larger cheliped merus with meral crest ventroproximally. P2 chelate. P3 propodus broadened. P4 subchelate. P5 chelate. Abdominal somites 3-5 without dor-

sal ornament. Male Plp1 uniramous and unsegmented or bisegmented, distal segment subchelate or chelate distally; male Plp2 biramous, endopod with appendix masculina, but without appendix interna; or endopod with appendices masculina and interna; male Plps3-5 biramous and foliaceous, endopods with appendix interna. Telson wider than long and varied in shape. Uropodal endopod oval or subrhombic, overreaching telson; uropodal exopod broadened on distolateral corner, bearing dorsal plate. [Adapted from Sakai, 1999c, 2002.]

Remarks. — Manning & Felder (1991: 778) showed that *Lepidophthalmus eiseni* Holmes, 1904 is a junior synonym of *L. bocourti* (A. Milne-Edwards, 1870), the type species of the genus *Lepidophthalmus*. However, Felder (2003: 436) subsequently distinguished *L. eiseni* from *L. bocourti*, because they are different from each other: in *L. eiseni* the male Plp1 is chelate distally (Felder, 2003, fig. 24), whereas in *L. bocourti* it is subchelate (Felder, 2003, figs. 7, 15). It has turned out, however, through the present examination of the male holotype of *L. bocourti*, that the male Plp1 distal segment is not subchelate, but simple (fig. 67A), so that *Lepidophthalmus eiseni* is to be excluded from *Lepidophthalmus* and is here reclassified under the new genus *Lepidophthalmoides* gen. nov. as the type species, *Lepidophthalmoides eiseni*.

In *Lepidophthalmoides*, the Plp2 endopod can have two types of shape. In *Lepidophthalmoides eiseni*, the male Plp2 endopod bears mesiodistally an appendix masculina with distal setae, but no appendix interna; in *Lepidophthalmoides jamaicense* (Schmitt, 1935b) it bears mesiodistally an appendix masculina provided mesiomedially with a proximally-fused appendix interna.

Type species. — *Lepidophthalmus eiseni* Holmes, 1904, by present designation. The gender of the new name, *Lepidophthalmoides*, is feminine.

Species included. — *Lepidophthalmoides eiseni* (Holmes, 1904); *L. jamaicense* (Schmitt, 1935b); *L. louisianensis* (Schmitt, 1935b); *L. richardi* (Felder & Manning, 1997); *L. rosae* (Nobili, 1904); *L. siriboia* (Felder & Rodrigues, 1993); *L. socotrensis* (Sakai & Apel, 2002); *L. tridentata* (Von Martens, 1869).

Etymology. — The generic name *Lepidophthalmoides* is composed of a generic name, *Lepidophthalmus*, with the Latin suffix -oides, meaning “alike”, or “similar to”.

KEY TO THE SPECIES OF THE GENUS *LEPIDOPHTHALMOIDES*

1 – Anterolateral spines on carapace absent 2
– Anterolateral spines on carapace present 5

2 – Dactylus of smaller cheliped denticulate on dorsal margin . . . . . *L. socotrensis*

– Dactylus of smaller cheliped smooth on dorsal margin 3

3 – Merus of larger cheliped not concave subproximally on dorsal margin . . . . . *L. louisianensis*

– Merus of larger cheliped distinctly concave subproximally on dorsal margin 4

4 – Uropodal endopod broadly rhombic . . . . . *L. jamaicense*

– Uropodal endopod narrowly rhombic . . . . . *L. eiseni*

5 – Merus of larger cheliped distinctly concave subproximally on dorsal margin 6

– Merus of larger cheliped not concave subproximally on dorsal margin 7

6 – Telson rounded on posterior margin . . . . . *L. tridentata*

– Telson straight on posterior margin, bearing median convexity . . . . . *L. richardi*

7 – Fixed finger of male larger cheliped unarmed on cutting edge . . . . . *L. rosae*

– Fixed finger of male larger cheliped armed with median tooth on cutting edge . . . . . *L. siriboia*

Lepidophthalmoides eiseni (Holmes, 1904)

Lepidophthalmus Eiseni Holmes, 1904: 311, pl. 35 figs. 6-13.
Callianassa (*Callichirus*) *Eiseni* — De Man, 1928b: 28.
Callianassa Eiseni — De Man, 1928b: 110.
Callianassa (*Callichirus*) *eiseni* — Schmitt, 1935b: 9.
Callianassa eiseni — Holthuis, 1954a: 12-15, fig. 3; Holthuis, 1954c: 160; Bott, 1955: 47, fig. 6a-g.
Lepidophthalmus eiseni — Felder & Rodrigues, 1993: 373; Tudge et al., 2000: 144; Felder, 2003: 429, figs. 20-29.

Diagnosis. — Male Plp1 uniramous and bisegmented, distal segment chelate distally; male Plp2 biramous, endopod bearing mesiodistally appendix masculina with distal setae, but without appendix interna (cf. Holthuis, 1954, fig. 3i); Plps3-5 endopods with small, triangular appendix interna.

Possible type locality. — San Jose del Cabo, Lower California (Felder, 2003).

Distribution. — Mexico, Guatemala, Nicaragua, Costa Rica (Felder, 2003).

Lepidophthalmoides jamaicense (Schmitt, 1935)

Callianassa jamaicense Schmitt, 1935b: 1, 9, pl. 1 fig. 1, pl. 2 figs. 6, 8, pl. 4 fig. 1; Biffar, 1971a: 650, 654; Coelho & Ramos, 1973: 162 (partim); Abel & Kim, 1986: 27, 295, 296, 302-303, figs. j, k, l (partim); Manning, 1987: 397; Dworschak, 1992: 196 (partim) (not fig. 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 is defined as *L. jamaicense* var. *louisianensis*); Felder & Rodrigues, 1993: 357, 358, 367, 373; Sakai, 1999c: 66; Tudge et al., 2000: 144; Sakai, 2005b: 145.

Diagnosis. — Mxp3 ischium-merus rectangular; propodus subtriangular, and dactylus digitiform; exopod rudimentary. Male Plp1 uniramous and bisegmented, distal segment chelate distally; male Plp2 biramous, endopod bearing mesiodistally oval appendix masculina with distal setae, provided mesiomedially with proximally-fused appendix interna with hooklets (cf. Felder & Manning, 1997, fig. 1h). Telson wider than long and subrectangular, and weakly trilobate on posterior margin (cf. Schmitt, 1935b: 9-12, pl. 4 fig. 1).

Type locality. — Jamaica, Montego Bay.

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

Lepidophthalmoides louisianensis (Schmitt, 1935)

[Abbreviated list of synonymy.]

Callianassa jamaicense var. *louisianensis* Schmitt, 1935b: 1, 12-15, pl. 1 fig. 2, pl. 2 figs. 2, 4, 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, tabs. 1-3, 5-7; Fotheringham, 1980: 63, fig.; Felder et al., 1986: 91; Manning & Felder, 1989: 9.

Lepidophthalmus louisianensis — Felder & Staton, 1990: 137A; Felder et al., 1991: 101A (partim); Lemaitre & Rodrigues, 1991: 629; Manning & Felder, 1991: 778 (partim); Manning & Felder, 1992: 560; Felder & Felgenhauer, 1993: 263-276, figs.; Felder & Manning, 1997: 309-331, figs. 1-7; Sakai, 1999c: 67, fig. 14a-b; Dworschak, 2000b: 99; Tudge et al., 2000: 144; Atkinson & Taylor, 2004: 45, tab. 2; Robles et al., 2009: 317.

Diagnosis. — Male Plp1 uniramous and bisegmented, and subchelate distally; male Plp2 biramous, endopod bearing distally appendix masculina with proximally-fused appendix interna mesiomedially (cf. Sakai, 1999c, fig. 14b). Telson wider than long and subrectangular, bearing weak median convexity on posterior margin (cf. Felder & Rodrigues, 1993, fig. 1i).

Type locality. — Grand Isle, Louisiana.

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

Lepidophthalmoides 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; Sakai, 1999c: 68; Tudge et al., 2000: 144.

Lepidophthalmus sp. "a" — Staton et al., 2000: 161, figs. 1-3, tabs. 3-5.
Lepidophthalmus manningi Felder & Staton, 2000: 170, figs. 1, 2. [Type locality. — Laguna San Augustin, near village of Palma Sola, 19°55.23′N 96°31.85W, Veracruz, Mexico.]

Diagnosis. — Male Plp1 uniramous, bisegmented, and chelate distally; male Plp2 biramous, endopod bearing distolaterally a proximally-fused appendix masculina with marginal setae, and a small appendix interna mesiodistally. [Cf. Felder & Manning, 1997, figs. 6e-f, i.]

Remarks. — Felder & Staton (2000) described the new species *Lepidophthalmus manningi*, and differentiated it from *L. richardi* Felder & Manning, 1997, mentioning the reason that "*L. manningi* typically has a deeper proximal meral notch on the superior margin of the major cheliped, a larger lobe on the proximal article of the female first pleopod, a larger appendix interna on the male second pleopodal endopod, a narrower distal lobe on the female second pleopodal endopod, and a less strongly developed carination on mesial margins of the lateral ventral plates on the second abdominal somite of mature male". It seems difficult, however, to distinguish *L. manningi* from *L. richardi* by those minor features, so that *L. manningi* is here synonymized with *L. richardi*. In the present revision, *Lepidophthalmus richardi* is reclassified under the new genus *Lepidophthalmoides*, because the male Plp1 distal segment is chelate distally as in *Lepidophthalmoides eiseni*, the type species of the genus *Lepidophthalmoides*.

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

Distribution. — Belize; Veracruz, Tabasco, and western Campeche, Mexico.

Lepidophthalmoides rosae (Nobili, 1904)

Callianassa (*Callichirus*) *Rosae* Nobili, 1904: 237; Nobili, 1906b: 108, pl. 7 fig. 2; De Man, 1928b: 29, 110; Balss, 1933: 88.
Lepidophthalmus rosae — Sakai, 1999c: 71, fig. 14g-h; Sakai, 2005b: 151, figs. 30-32.
Callianassa rosae — Tudge et al., 2000: 143.

Diagnosis. — Male Plpl unsegmented and chelate distally; Plp2 biramous, endopod bearing mesiodistally appendix masculina with a few long distal setae, provided mesiomedially with proximally-fused appendix interna with distal hooklets. [Cf. Sakai, 1999c, fig. 14g.]

Type locality. — Red Sea.

Distribution. — Madagascar; Red Sea; Lombok, Indonesia; Mindanao, Philippines.

Lepidophthalmoides siriboia (Felder & Rodrigues, 1993)

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

Callianassa (*Callichirus*) *jamaicensis* — Rodrigues, 1971: 198 (partim).

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

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

Lepidophthalmus siriboia Felder & Rodrigues, 1993: 367, figs. 2e-h, 4a-f, 6a-l; Coelho, 1997: 148; Rodrigues et al., 1998: 380; Melo, 1999: 370, figs. 247-248; Sakai, 1999c: 69; Coelho et al., 2007: 5 (tab.).

Lepidophthalmus siriboius — Tudge et al., 2000: 144.

Diagnosis. — Male Plp1 uniramous and bisegmented, distal segment chelate; male Plp2 biramous, endopod bearing mesiodistally ovoid appendix masculina with distal setae, and proximally-fused appendix interna with hooklets mesiomedially. [Cf. Felder & Rodrigues, 1993, fig. 6c, d, e, f, g.]

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

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

Lepidophthalmoides socotrensis (Sakai & Apel, 2002)

Lepidophthalmus socotrensis Sakai & Apel, 2002: 278, figs. 3-7.

Diagnosis. — Mxp3 ischium-merus subsquare; merus rounded on distomesial angle; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous and bisegmented, distal segment subchelate distally; male Plp2 biramous, endopod bearing mesiodistally appendix masculina with distal setae and proximally-fused appendix interna. Telson wider than long and subrectangular, weakly trilobate on posterior margin.

Type locality. — Khawr Girmah, Socotra Island, Republic of Yemen, intertidal mudflat.

Distribution. — Khawr Girmah; Khawr Qariyah; Qalansiyah Lagoon; Ras Kharmah, Socotra Island, Socotra Archipelago, Yemen; intertidal mud, sand/mud in eulittoral, open lagoon, eulittoral.

Lepidophthalmoides tridentata (Von Martens, 1869)

Callianassa tridentata Von Martens, 1869: 614; A. Milne-Edwards, 1870: 94, 101.

Callianassa (*Callichirus*) *tridentate* — 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.
Lepidophthalmus tridentatus — Sakai, 1999c: 71, fig. 14e-f; Sakai, 2005b: 144; Dworschak, 2007: 122; Robles et al., 2009: 317.
Corallichirus tridentatus — Tudge et al., 2000: 144; Itani, 2007: 203.

Diagnosis. — Male Plp1 uniramous, bisegmented, and chelate distally. Male Plp2 unknown.

Type locality. — Java, Indonesia.

Distribution. — Java, Indonesia; Okusu-gawa, Okinawa Island; Miyara-Bay, Ishigaki Is., Ryukyu Archipelago (Itani, 2007: 203).

Genus **Lepidophthalmus** Holmes, 1904

Lepidophthalmus Holmes, 1904: 310; Manning & Felder, 1991: 778, figs. 5, 13; Poore, 1994: 102; Sakai, 1999c: 64; Sakai & Apel, 2002: 278; Sakai, 2005b: 143.
Lepidophthalmus s. str. — Felder, 2001: 440.

Diagnosis. — Rostrum spinous, single-pointed or trispinose apically, lacking rostral carina. Carapace with dorsal oval, but without hepatic sulcus and cardiac prominence; anterolateral margin of carapace with or without spine. A1 peduncle longer and stouter than A2 peduncle; distal segment elongate. Mxp3 ischium-merus broadly rectangular; propodus broadened and rounded on ventral margin; dactylus digitiform with obtuse tip; exopod rudimentary or absent. P1 unequal, larger cheliped with ventral meral hook. P2 chelate. P3 propodus broadened. P4 subchelate. P5 chelate. Abdominal somites 3-5 without dorsal ornament. Male Plp1 uniramous and bi- or tri-segmented, distal segment simple (fig. 67A); male Plp2 biramous, endopod bearing only appendix interna, or mesiodistally appendix masculina with marginal setae and proximally-fused appendix interna mesiomedially (fig. 67B); male Plps3-5 biramous and foliaceous, endopod with appendix interna. Telson wider than long, posterior margin usually trilobate. Uropodal endopod subrhombic or leaf-like, overreaching telson; uropodal exopod broadened on distolateral corner, bearing dorsal plate. [Adapted from Sakai, 1999c; Sakai & Apel, 2002.]

Remarks. — The genus *Lepidophthalmus* is distinguished from the genera *Glypturus* Stimpson, 1866 and *Neocallichirus* Sakai, 1988, because in *Lepidophthalmus* the A1 peduncle is distinctly longer than the A2 peduncle, and the male Plp1 distal segment is simple.

Type species. — *Callianassa bocourti* A. Milne-Edwards, 1870, by monotypy. Gender of generic name, *Lepidophthalmus*, masculine.

Species included. — *Lepidophthalmus bocourti* (A. Milne-Edwards, 1870); *L. grandidieri* (Coutière, 1899); *L. rafai* Felder & Manning, 1998; *L. sinuensis* Lemaitre & Rodrigues, 1991; *L. turneranus* (White, 1861).

KEY TO THE SPECIES OF THE GENUS *LEPIDOPHTHALMUS*

1 – Anterolateral projections on carapace indistinct 2
– Anterolateral projections on carapace distinct 4

2 – Male Plp1 distal segment simple . . . . . *L. bocourti*
– Male Plp1 distal segment simple, with subterminal tooth . . . . . *L. rafai*

4 – In larger cheliped dorsal margins of dactylus and palm, anteroventral margin of palm, and dorso- and ventrodistal angles of carpus, spinous . . . . . *L. grandidieri*
– In larger cheliped dactylus, palm, and carpus without spines 5

5 – Male Plp1 distal segment simple . . . . . *L. turneranus*
– Male Plp1 distal segment simple, with subterminal tooth . . . . . *L. sinuensis*

Lepidophthalmus bocourti (A. Milne-Edwards, 1870) (fig. 67A-B)

Callianassa bocourti A. Milne-Edwards, 1870: 95, 101. [Type locality. — San Jose del Cabo, Lower California.]

Callianassa (*Callichirus*) *Bocourti* — Borradaile, 1903: 547; De Man, 1928b: 28, 94, 115.

Callianassa bocourti — De Saint Laurent & Le Loeuff, 1979: 96 [in partim = *Lepidophthalmoides eiseni*].

Lepidophthalmus bocourti — Manning & Felder, 1991: 778 (partim); Felder & Rodrigues, 1993: 373; Hendrickx, 1995: 390; Felder & Manning, 1997: 319; Felder & Manning, 1998: 398, 406; Nates & Felder, 1998: 188, 190, 194-196, 204 (partim); Sakai, 1999c: 70, fig. 14c-d; Felder & Staton, 2000: 171, 179; Staton et al., 2000: 158, 167; Tudge et al., 2000: 144; Felder, 2001: 442; Felder et al., 2002, fig. 3C, D; Felder, 2003: 436, figs. 20-29.

Lepidophthalmus bocourti aff. — Staton et al., 2000: 158, 167, fig. 2 [designated as *Lepidophthalmoides* aff. *bocourti*].

Lepidophthalmus bocourti — Manning & Felder, 1991: 778 [in partim = *Lepidophthalmoides eiseni*]; Hendrickx, 1995: 390; Sakai, 1999c: 70 [partim], fig. 14c-d; Felder, 2001: 442; Felder, 2003: 431, figs. 1-19; Sakai, 2005b: 149.

Not: *Lepidophthalmus bocourti* — Biffar, 1972, excluded as published lit. by ICZN Article 8.4.

Not: *Lepidophthalmus bocourti* — Lemaitre & Ramos, 1992: 349, fig. 4; Lemaitre & León, 1992: 44. [Not assigned to *L. bocourti* by Felder, 2003: 431.]

Material examined. — SMF 2186, 1 male, 1 female, Estero near La Playa de las Flores near La Libhertad, El Salvador, 18.ix.1952, leg. O. Schuster; USNM 1002607, 1 male (TL/CL, 69.0/17.0 mm), Paso Caballo, Nicaragua, North Pacific Ocean, 11.iv.2000, leg. D.L. Felder and S. Nates.

Diagnosis. — Mxp3 ischium-merus subsquare; propodus subtriangular, and dactylus digitiform. Male Plp1 uniramous and bisegmented, distal segment simple distally (fig. 67A); male Plp2 biramous, endopod with appendix masculina with distal setae and proximally-fused appendix interna mesiomedially (fig. 67B) (cf. Sakai, 1999c: 70, fig. 14d); Plps3-5 endopods with small triangular appendix interna. Telson wider than long, subrectangular, and trilobate on posterior margin.

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

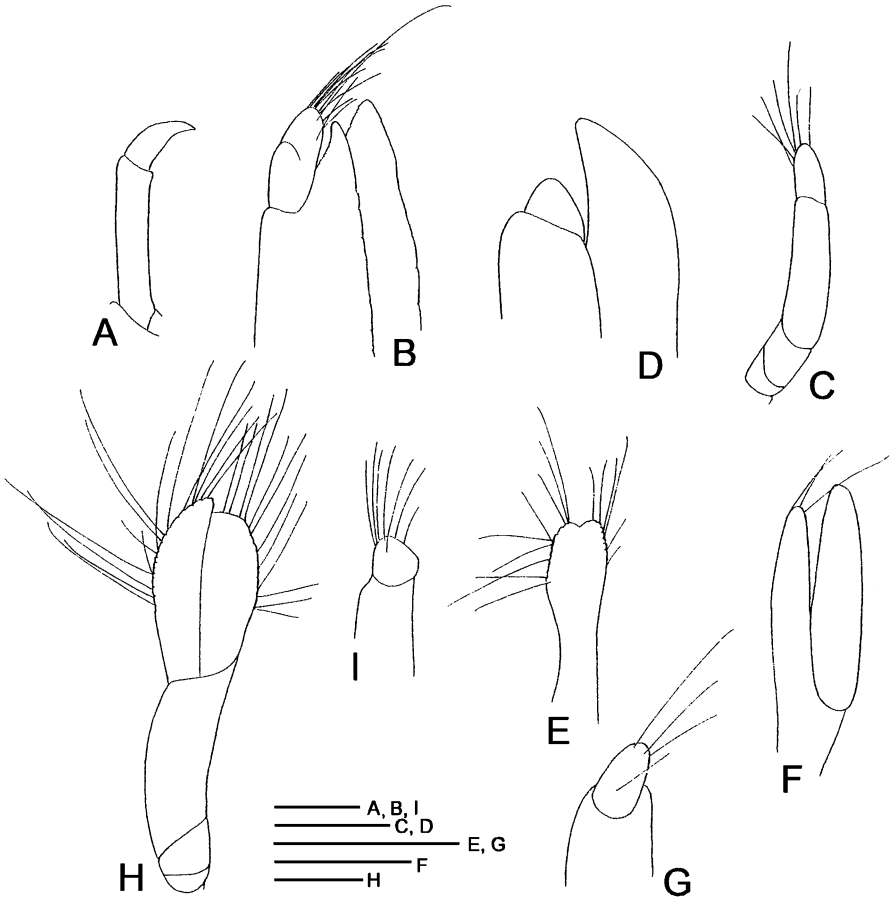

Fig. 67. *Lepidophthalmus bocourti* (A. Milne-Edwards, 1870), *Lepidophthalmus sinuensis* Lemaitre & Rodrigues, 1991, *Neocallichirus grandimanus* (Gibbes, 1850), and *Sergio guassutinga* (Rodrigues, 1971). A, C, E, H, male Plp1; B, D, F, G, I, male Plp2. A, B, *Lepidophthalmus bocourti*, USNM 1002607, 1 male (TL/CL, 69.0/17.0 mm), Paso Caballo, Nicaragua, North Pacific Ocean; C, D, *Lepidophthalmus sinuensis*, USNM 252403, paratype, male (TL/CL, 60.0/12.0 mm), on mouth of brackish creek draining to beach, bungalow beach near town of San Bernardo del Ciento, 09°17′N 76°99′W, Caribbean coast of Colombia; E, F, G, *Neocallichirus grandimanus*, USNM 205630, neotype, male (TL/CL, 67.0/18.5 mm), S. Roosevelt Blvd, Key West, Florida, 0.5 m; H, I, *Sergio guassutinga*, USNM 256886, paratype, male (TL/CL, 100.6/26.6 mm), Praia do Araç, São Sebastião, São Paulo, Brazil. Scales, 1 mm.

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

Lepidophthalmus grandidieri (Coutière, 1899)

Callianassa Grandidieri Coutière, 1899: 285, figs. 1-5; Tudge et al., 2000: 143.

Callianassa (*Callichirus*) *Grandidieri* — Borradaile, 1903: 547; De Man, 1928b: 28, 92, 110.
Lepidophthalmus grandidieri — Sakai, 1999c: 71; Sakai, 2005b: 151.

Diagnosis. — Mxp3 and male Plps1-2 unknown. Telson slightly wider than long, subrectangular, and rounded on posterior margin.

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

Distribution. — Only known from the type locality.

Lepidophthalmus rafai Felder & Manning, 1998

Lepidophthalmus rafai Felder & Manning, 1998: 398, figs. 1-3; Tudge et al., 2000: 144; Sakai, 2005b: 150.

Type locality. — Beach at Playa Basura, Bahia de Buenaventura, Pacific coast of Colombia.

Distribution. — Only known from the type locality.

Lepidophthalmus sinuensis Lemaitre & Rodrigues, 1991 (fig. 67C-D)

Lepidophthalmus sinuensis Lemaitre & Rodrigues, 1991: 623, figs. 1-4; Manning & Felder, 1991: 778; Nates et al., 1999: 526-541; Sakai, 1999c: 68; Tudge et al., 2000: 144; Sakai, 2005b: 148.

Material examined. — USNM 252403, paratype, male (TL/CL, 6.0/12.0 mm), on mouth of brackish creek draining to beach, Bungalow beach near town of San Bernardo del Ciento, 09°17′N 76°99′W, Caribbean coast of Colombia, leg. Departamento de Córdoba.

Diagnosis. — Frontal margin of carapace with rostrum, and truncate tooth on both sides of rostrum. Mxp3 ischium-merus rectangular; propodus subtriangular, and dactylus digitiform. Male Plp1 uniramous, trisegmented and simple, with subdistal tooth (fig. 67C) (cf. Lemaitre & Rodrigues, 1991, fig. 4c); male Plp2 biramous, endopod bearing distally appendix masculina with distal setae and proximally-fused appendix interna (fig. 67D) (cf. Lemaitre & Rodrigues, 1991, fig. 4d).

Type locality. — Colombia, mouth of Rio Sinú, 9°07′N 75°0′W.

Distribution. — Caribbean coast of Colombia; intertidal, 1.5 m.

Lepidophthalmus turneranus (White, 1861)

[Abbreviated list of synonymy.]

Callianassa turnerana White, 1861a: 42, pl. 6; White, 1861b: 479; A. Milne-Edwards, 1870: 89, 101; Nobili, 1900: 3; Rathbun, 1900a: 308; Lenz, 1911: 316, figs. 1-11; Vanhöffen, 1911: 105, fig. a, d; Balss, 1916: 33; Monod, 1927: 595; Holthuis, 1991: 250, 246, fig. 455; Clark & Presswell, 2001: 155.

Callichirus turneranus — Le Loeuff & Intès, 1974: 40, fig. 10a-s; De Saint Laurent & Le Loeuff, 1979: 64, figs. 14e, 19e, 20a-d, 23a-e.
Lepidophthalmus turneranus — Sakai, 1999c: 65; Sakai, 2005: 144.

Diagnosis. — Mxp3 ischium-merus rectangular; propodus subquadrate; dactylus digitiform with obtuse tip. Male Plp1 uniramous and bisegmented, and simple distally; male Plp2 biramous, endopod with fused appendix interna (Le Loeuff & Intès, 1974, fig. 10r). Telson ovate, and trilobate on posterior margin (Le Loeuff & Intès, 1974, fig. 10s).

Type locality. — Cameroon, fresh water.

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

Genus **Michaelcallianassa** Sakai, 2002

Michaelcallianassa Sakai, 2002: 480; Sakai, 2005b: 156.

Diagnosis. — Rostrum spinous. Carapace with dorsal oval, linea thalassinica entire. Eyestalks flattened, contiguous; cornea located dorsally. A1 peduncle slightly longer than A2 peduncle. Maxilla 2 scaphognathite without elongate posterior whip. Mxp3 ischium-merus subpediform; propodus broadened, and rounded on ventral margin; dactylus digitiform; no exopod. P1 unequal and chelate. P2 chelate. P3 propodus distinctly protruded on posterior side; dactylus trilobed on dorsal margin. P4 subchelate. P5 chelate. Abdominal somites 4-5 bearing transverse row of setae; pleura 3-5 with rounded integumental patches. Male Plp1 uniramous and bisegmented; male Plp2 uniramous and bisegmented, distal segment bilobed distally, lacking appendices interna and masculina; male Plps3-5 biramous and foliaceous, endopods with embedded appendix interna with hooklets on mesial margin. Telson subquadrate, wider than long and convergent in posterior two-thirds, and concave medially on posterior margin. Uropodal endopod broadly oval; uropodal exopod distinctly longer than endopod and rounded distally, bearing dorsal plate. [Adapted from Sakai, 2002: 480.]

Type species. — *Michaelcallianassa indica* Sakai, 2002, by original designation and monotypy. The gender of the generic name, *Michaelcallianassa*, is feminine.

Species included. — *Michaelcallianassa indica* Sakai, 2002.

Michaelcallianassa indica Sakai, 2002

Michaelcallianassa indica Sakai, 2002: 481, figs. 11A-C, 12A-D, 13A-G, 14A-J; Sakai, 2005b: 157, fig. 33.

Type locality. — Persian (Arabian) Gulf, 29°29.897′N 49°54.108′E, 32 m depth.

Distribution. — Persian (= Arabian) Gulf (29°29.897′N 49°54.108′E; 32 m); Andaman Sea (7°15.087′N 99°02.918′E; 7°00.082′N 99°15.660′E – 9°00.062′N 97°53.366′E; 9°30.991′N 97°57.706′E; 17.0-65.4 m); mud, muddy sand, and sand with shell fragments.

Genus **Neocallichirus** Sakai, 1988

Neocallichirus Sakai, 1988: 61; Manning & Felder, 1991: 779, figs. 1, 3, 4; Poore, 1994: 102; Sakai, 1999c: 84; Sakai, 2000: 92; Davie, 2002: 461; Sakai, 2005b: 160.
Neocallichirus s. str. — Felder, 2001: 440.

Diagnosis. — Front of carapace with low rostrum and paired lateral, subtriangular projections. Carapace with dorsal oval, lacking rostral carina, cardiac prominence, and transverse cardiac sulcus(i). A1 peduncle shorter than A2 peduncle. Mxp3 ischium-merus subpediform; propodus broadened, rounded, or truncate on ventral margin; dactylus digitiform and obtuse distally; exopod absent. P1 chelate, unequal, and dissimilar; in male larger cheliped merus with or without ventral convexity. P2 chelate. P3 propodus broadened. P4 subchelate. P5 chelate. Abdominal somites 3-5 not ornamented dorsally. Male Plp1 uniramous and bisegmented, distal segment subchelate or w-shaped distally; male Plp2 biramous, endopod bearing appendices interna and masculina, or only appendix masculina; male Plps3-5 biramous and foliaceous, endopods with appendix interna. Telson wider than long, and varied in shape. Uropodal endopod wider than long, and ovate or subquadrate, overreaching telson. Uropodal exopod convex on lateral margin, bearing dorsal plate.

Type species. — *Neocallichirus horneri* Sakai, 1988 by original designation. The gender of the generic name, *Neocallichirus*, is masculine.

Species included. — *N. angelikae* Sakai, 2000; *N. auchenorhynchus* Sakai, 2005b; *N. audax* (De Man, 1911); *N. branneri* (Rathbun, 1900b) [= *Glypturus siguanensis* Boone, 1927]; *N. caechabitator* Sakai, 1988; *N. calmani* (Nobili, 1904); *N. darwinensis* Sakai, 1988; *N. denticulatus* (Ngoc-Ho, 1994); *N. grandimanus* (Gibbes, 1850); *N. guaiqueri* (Blanco Rambla & Liñero Arana, 1994) [= *G.* sp., Blanco Rambla et al., 1995]; *N. guarus* (Rodrigues, 1971); *N. horneri* Sakai, 1988; *N. indicus* (De Man, 1905) [= *Neocallichirus taiaro* Ngoc-Ho, 1995; *Callianassa natalensis* Barnard, 1946; *Callianassa* (*Cheramus*) *variabilis* Edmondson, 1944]; *N. jousseaumei* (Nobili, 1904); *N. karumba* (Poore & Griffin, 1979); *N. kempi* (Sakai, 1999c) [= *C. maxima*

A. Milne-Edwards, 1870]; *N. manningi* Kazmi & Kazmi, 1992; *N. mauritianus* (Miers, 1882); *N. mirim* (Rodrigues, 1971); *N. moluccensis* (De Man, 1905); *N. mortenseni* (Sakai, 2005b); *N. mucronatus* (Strahl, 1862a); *N. nickellae* Manning, 1993; *N. pentagonocephalus* (Rossignol, 1962); *N. rathbunae* (Schmitt, 1935b); *N. sassandrensis* (Le Loeuff & Intès, 1974); *N. vigilax* (De Man, 1916); *N. winslowi* (Miers, 1884a); and *N.* sp. (Rathbun, 1906).

KEY TO THE SPECIES OF THE GENUS *NEOCALLICHIRUS**)

1 – Eyestalks located on necklike frontal margin of carapace ..... *N. auchenorhynchus*
– Eyestalks located on frontal margin of carapace 2
2 – Frontal margin of carapace with spinous anterolateral projections 3
– Frontal margin of carapace with low or inconspicuous convexities 8
3 – Telson trapezoid. A1 peduncle almost reaching distal end of A2 penultimate segment 4
– Telson broadened proximally 5
4 – A1 peduncle almost reaching middle of A2 distal segment ..... *N. denticulatus*
– A1 peduncle almost reaching distal end of A2 penultimate segment ..... *N. vigilax*
5 – Telson unarmed on posterior margin ..... *N. rathbunae*
– Telson with spine on posterior margin 6
6 – Uropodal endopod fusiform ..... *N. winslowi*
– Uropodal endopod trapezoid 7
7 – Mxp3 ischium 1.8 times as long as wide ..... *N. angelikae*
– Mxp3 ischium 1.2 times as long as wide ..... *N. mortenseni*
8 – Uropodal sympod and uropodal exopod, respectively, with sharp spine ..... *N. sassandrensis*
– Uropodal sympod and uropodal exopod, respectively, without spine 9
9 – Uropodal endopod slenderly or broadly fusiform 10
– Uropodal endopod broadened distally 17
10 – Telson rounded on posterior margin 11
– Telson concave or w-shaped medially on posterior margin 13
11 – Mxp3 without exopod ..... *N. mucronatus*
– Mxp3 with rudimentary exopod 12
12 – Telson rounded on lateral margins ..... *N. kempi* [= *C. maxima*]
– Telson parallel-sided proximally and tapering toward posterior margin ... *N. karumba*
13 – Telson w-shaped medially on posterior margin ..... *N. mirim*
– Telson straight or concave on posterior margin 14
14 – Uropodal endopod broadly lanceolate 15
– Uropodal endopod slenderly lanceolate 16
15 – Denticulate meral tooth of male larger cheliped squarish ..... *N. guarus*
– Denticulate meral tooth of male larger cheliped rounded ..... *N. audax*
16 – Male Plp1 w-shaped distally ..... *N. pentagonocephalus*
– Male Plp1 chelate distally ..... *N. guaiqueri*
17 – Uropodal endopod oval 18
– Uropodal endopod trapezoid 19
18 – Merus of larger cheliped with triangular meral hook ..... *N. mauritianus*
– Merus of larger cheliped denticulate proximally on ventral margin ..... *N. caechabitator*

19 – Eyestalks denticulate distally 20
– Eyestalks not denticulate distally 21
20 – Telson semicircular . . . . . *N. indicus* [= *Neocallichirus taiaro*; *Callianassa natalensis*; *Callianassa* (*Cheramus*) *variabilis*]
– Telson wider than long and trapezoid . . . . . *N. manningi*
21 – Eyestalks separated from each other and triangular 22
– Eyestalks contiguous and triangular 23
22 – Eyestalks long and pointed apically, with cornea centrally . . . . . *N. jousseaumei*
– Eyestalks short, with cornea mediolaterally . . . . . *N. moluccensis*
23 – Eyestalks deformed distally 24
– Eyestalks simple distally 25
24 – Eyestalks truncate distally, and cornea small . . . . . *N. darwinensis*
– Eyestalks hook-like distally, and cornea distinct . . . . . *N. grandimanus*
25 – Cutting edge of dactylus of larger cheliped with distinct proximal protrusion 26
– Cutting edge of dactylus of larger cheliped without distinct proximal protrusion . . . 27
26 – Ischium of larger cheliped with denticulate protrusion on ventral margin . . . . . *N. calmani*
– Ischium of larger cheliped without denticulate protrusion on ventral margin . . . . . *N. nickellae*
27 – In female larger cheliped dactylus with triangular median concavity on cutting edge . . . . . *N. horneri*
– In female larger cheliped dactylus smooth on cutting edge . . . . . *N. branneri* [= *G. siguanensis*]

*) *Callianassa* sp. (Rathbun, 1906) not listed in this key.

Neocallichirus angelikae Sakai, 2000

Neocallichirus angelikae Sakai, 2000: 91, figs. 1-3; Davie, 2002: 461; Sakai, 2005b: 176.

Diagnosis. — Rostrum inconspicuous. Frontal margin of carapace with spinous anterolateral projections. Mxp3 ischium-merus subrectangular; merus obliquely declined distally and rounded on distomesial margin; propodus subquadrate, and dactylus digitiform. Male Plp1 blade-shaped, uniramous, and bisegmented, distal segment slightly bilobed distally; Plp2 endopod bearing distally stout appendix masculina provided mesiomedially with minute appendix interna with hooklets. Telson subrectangular, posterior margin narrow and straight, with a median spine. Uropodal endopod trapezoid. [Cf. Sakai, 2000: 91, figs. 1E, 2A, 3G, H, I.]

Type locality. — Murat Bay, Great Australian Bight, South Australia, stony flat (32°07′S 133°40′E).

Distribution. — Only known from the type locality.

Neocallichirus auchenorhynchus Sakai, 2005

Neocallichirus auchenorhynchus Sakai, 2005b: 184, fig. 37.

Type locality. — Unknown.

Neocallichirus audax (De Man, 1911)

Callianassa audax De Man, 1911: 223; Dworschak, 1992: 190, fig. 1a-d; Tudge et al., 2000: 143.
Callianassa (*Callichirus*) *audax* — De Man, 1928b: 1, 18, 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.
Neocallichirus audax — Sakai, 1999c: 95, fig. 21d-f; Sakai, 2005b: 176.

Type locality. — Straits of Malacca.

Distribution. — Straits of Malacca, Malay Peninsula; West Pakistan; Ratnagiri, India; east coast of India.

Neocallichirus branneri (Rathbun, 1900)

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 fig. 1a-e; Schmitt, 1924: 93; Schmitt, 1935a: 194, fig. 55; Manning, 1987: 397.
Callianassa branneri — Schmitt, 1935b: 4; Gurney, 1944: 82, figs. 16, 17; Weimer & Hoyt, 1964: 764; Biffar, 1971a: 652, 654, 661, 661-667, figs. 5, 6; Coelho & Ramos, 1973: 161; Manning, 1987: 398.
Neocallichirus branneri — Rodrigues et al., 1998: 380; Melo, 1999: 374, figs. 249-250.

Remarks. — The present species, *Neocallichirus branneri* was synonymized with *Neocallichirus grandimana* (Gibbes, 1890) in previous papers (Sakai, 1999c, 2005b). However, it has turned out that *N. branneri* is not conspecific with *N. grandimana*, because in *N. branneri* the A1 peduncle barely reaches the middle of the A2 distal segment, in the male P1 the cutting edge of the dactylus is triangularly concave at its distal third, and the cutting edge of the fixed finger bears a low median tooth; whereas in *N. grandimana* the A1 peduncle reaches the distal third of the A2 distal segment, in the male P1 the cutting edge of the dactylus is distinctly concave submedially, and the cutting edge of the fixed finger is unarmed (cf. Manning & Felder, 1991, fig. 2), so that those two species are considered valid.

Type locality. — Mamanguape Stone Reef, Brazil.

Distribution. — Only known from the type locality.

Neocallichirus caechabitator Sakai, 1988

Neocallichirus caechabitator Sakai, 1988: 67, figs. 9, 10; Sakai, 1999c: 96; Tudge et al., 2000: 144; Davie, 2002: 461; Sakai, 2005b: 177.

Diagnosis. — Rostrum small. Eyestalks contiguous and triangular in distal third; cornea small. Frontal margin of carapace with low convexities anterolaterally. Mxp3 ischium-merus rectangular; merus obliquely declined distally

and rounded on mesiodistal margin; propodus subquadrate, and dactylus digitiform. Merus of larger cheliped denticulate proximally on ventral margin. Male Plps1-2 unknown. Telson suboval, bearing no median spine but median concavity on short and straight posterior margin. Uropodal endopod broadened distally. [Adapted from Sakai, 1988: 67, figs. 9E, 10A.]

Type locality. — Shoal Bay, False Creek Point, Darwin, Northern Territory, Australia, 1.0 m.

Distribution. — Only known from the type locality.

Neocallichirus calmani (Nobili, 1904)

Callianassa (*Cheramus*) *Calmani* Nobili, 1904: 236; Nobili, 1906b: 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; Tudge et al., 2000: 143.
Neocallichirus calmani — Sakai, 1999c: 96, fig. 22a-d; Sakai, 2005b: 177; Robles et al., 2009: 317.

Type locality. — Obock, Djibouti.

Distribution. — Obock, Djibouti, Bay of Aden; in sandy intertidal and shallow subtidal; Aqaba, Red Sea.

Neocallichirus darwinensis Sakai, 1988

Neocallichirus darwinensis Sakai, 1988: 62, figs. 5, 6; Sakai, 1999c: 98; Tudge et al., 2000: 144; Davie, 2002: 461; Sakai, 2005b: 177.

Diagnosis. — Rostrum small. Eyestalks contiguous and triangular with truncate apex; cornea small. Frontal margin of carapace with low convexities anterolaterally. Mxp3 ischium-merus rectangular; merus obliquely declined distally and convex on distomesial margin; propodus subquadrate, and dactylus digitiform. Male Plps1-2 unknown. Telson shaped as inverted trapezoid, bearing no median spine on posterior margin. Uropodal endopod trapezoid. [Adapted from Sakai, 1988, figs. 5G, 6G.]

Type locality. — Mindil Beach, Darwin, Northern Territory, Australia.

Distribution. — Only known from the type locality.

Neocallichirus denticulatus Ngoc-Ho, 1994

Neocallichirus denticulatus Ngoc-Ho, 1994: 56, fig. 4; Sakai, 1999c: 98; Tudge et al., 2000: 144; Davie, 2002: 461; Sakai, 2005b: 178; Robles et al., 2009: 317.

Diagnosis. — Rostrum triangular, with acute apex, reaching middle of eyestalks; cornea distinct. Frontal margin of carapace with anterolateral spinous

projections. A1 peduncle almost reaching middle of A2 distal segment. Mxp3 ischium-merus subrectangular; merus obliquely declined distally and convex on distomesial margin. Male Plps1-2 unknown. Telson shaped as inverted trapezoid with mediolateral convexity, lacking median spine on slightly convex posterior margin. [Adapted from Ngoc-Ho, 1994: 56, fig. 4h, m.]

Type locality. — Queensland, N.W. of Townsville (18°56′S 146°50′E), 24 m, muddy sand.

Distribution. — Only known from the type locality.

Neocallichirus grandimanus (Gibbes, 1850)
(fig. 67E-G)

Callianassa grandimana Gibbes, 1850: 194; Stimpson, 1866: 47; Stimpson, 1871: 122; Kingsley, 1899: 823; De Man, 1928b: 19; Schmitt, 1935b: 2; Biffar, 1971a: 649, 671-674; Manning, 1987: 388, 397, fig. 2; Dworschak, 1992: 196.

Glypturus grandimanus — Rathbun, 1900b: 151.

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

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

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; Felder & Manning, 1995: 478, figs. 1d-f, 3f, 4e, g-h; Coelho, 1997: 148; Melo, 1999: 376, figs. 251-252; Blanco-Rambla, 2000: 73, fig. 2; Dworschak, 2004: 15, fig. 4; Coelho et al., 2007: 5 (table).

Neocallichirus grandimanus — Manning, 1993: 113; Sakai, 1999c: 89; Tudge et al., 2000: 144; Sakai, 2005b: 164.

Not: *Glypturus grandimanus* — Balss, 1924: 179, figs. 3, 4; Manning, 1987: 399. [= *C. hartmeyeri* Schmitt.]

Material examined. — USNM 205630, neotype, male (TL/CL, 67.0/18.5 mm), S. Roosevelt Blvd, Key West, Florida, 0.5 m, 08.viii.1986, leg. et det. R. Manning.

Diagnosis. — Mxp3 propodus subquadrate, and dactylus digitiform. Male Plp1 (fig. 67E) uniramous and bisegmented, distal segment w-shaped distally (cf. Felder & Manning, 1995, fig. 1f); male Plp2 (fig. 67F, G) biramous, endopod bearing mesiodistally appendix masculina with distal setae and small conical appendix interna (cf. Felder & Manning, 1995, fig. 4e-f).

Type locality. — Florida, Key West.

Distribution. — Atlantic side: Bermuda; southeast of Florida; west coast of Florida, including Keys and Dry Tortugas; Tobago; Venezuela; Bimini, Little San Salvador, Bahamas; Cuba; Puerto Rico; Barbados; Curaçao; South Water Cay (lagoon side, intertidal to 0.5 m), and Belize; Mamanguape and Pernambuco, Brazil. Pacific side: Panama, Ecuador; Gorgona Island, Colombia.

Neocallichirus guaiqueri (Blanco Rambla & Liñero Arana, 1995)

Neocallichirus sp. Blanco Rambla & Liñero Arana, 1994: 20-22, figs. 4, 5.
Sergio guaiqueri — Blanco Rambla et al., 1995: 102, text-figs. 1-3.
Sergio guaiqueri — Lemaitre & Felder, 1996: 453; Tudge et al., 2000: 144.
Neocallichirus guaiqueri — Sakai, 1999c: 90; Sakai, 2005b: 165.

Diagnosis. — Mxp3 ischium-merus subrectangular; propodus subovate, and dactylus digitiform. Male Plp1 uniramous, bisegmented, and subchelate distally; male Plp2 biramous, and endopod bilobed distally, but uncertain about appendices interna and masculina. Telson wider than long and trapezoid, and concave medially on posterior margin, without median spine. Uropodal endopod longer than wide and slenderly lanceolate. [Cf. Blanco Rambla & Liñero Arana, 1994: 20-22, figs. 4, 5.]

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.
Neocallichirus guarua — Manning & Felder, 1991: 779.
Sergio guara — Manning & Lemaitre, 1994: 41; Lemaitre & Felder, 1996: 453; Coelho, 1997: 149; Rodrigues et al., 1998: 381; Melo, 1999: 386, figs. 259-260; Tudge et al., 2000: 144; Coelho et al., 2007: 5 (tab. 2).
Neocallichirus guarus — Sakai, 1999c: 90; Sakai, 2005b: 166.

Material examined. — USNM 256885, male (CL 23.0; abdomen + telson, 50.0 mm), Praia do Araça, São Sebastião, São Paulo, Brazil, vii.1966, leg. S.A. Rodrigues.

Diagnosis. — Mxp3 ischium-merus subrectangular; merus subtriangular; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous and bisegmented, distal segment subchelate distally; male Plp2 biramous, endopod bearing distally proximally-fused appendix masculina with proximally-fused appendix interna distolaterally. Telson wider than long and trapezoid, and concave medially on posterior margin, without median spine. Uropodal endopod broadly lanceolate. [Cf. Rodrigues, 1971: 210, figs. 67, 74-76.]

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

Distribution. — Tampa Bay, Miami; Lemon Bay, Florida; Pará, Maranháo, Ceará, and Pernambuco, Brazil.

Neocallichirus horneri Sakai, 1988

Neocallichirus horneri Sakai, 1988: 65, figs. 7, 8; Manning & Felder, 1991: 779; Sakai, 1999c: 99; Tudge et al., 2000: 144; Davie, 2002: 461; Sakai, 2005b: 178.

Diagnosis. — Mxp3 ischium-merus subrectangular; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous and bisegmented, distal segment w-shaped distally; male Plp2 biramous, endopod bearing distally proximally-fused appendix masculina with distal setae, and proximally-fused appendix interna distolaterally. Telson wider than long and trapezoid, and convex on posterior margin, without median spine. [Cf. Sakai, 1988: 65, figs. 7F, 8A, H, I.]

Type locality. — Australia, Northern Territory, Darwin, Nightcliff.

Distribution. — Only known from the type locality.

Neocallichirus indicus (De Man, 1905)

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, South Africa.]

Callianassa indica — Kensley, 1975: 50, fig. 2A-E; Sakai, 1987a: 302, 306.

Neocallichirus taiaro Ngoc-Ho, 1995: 212, figs. 1, 2; Tudge et al., 2000: 144. [Type locality. — Taiaro atoll, Tuamotu Isle, French Polynesia.]

Neocallichirus indicus — Sakai, 1999c: 99, fig. 23a-e; Tudge et al., 2000: 144; Sakai & Apel, 2002: 277, fig. 2; Sakai, 2005b: 178; Robles et al., 2009: 317.

Callianassa variabilis — Tudge et al., 2000: 143.

Neocallichirus natalensis — Tudge et al., 2000: 144.

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; Kangeang Reef, Bay of Kankamaran, East Indies; Sandspit, Karachi; Djibouti, Gulf of Aden; Red Sea; Zululand, South Africa.

Neocallichirus jousseaumei (Nobili, 1904)

Callianassa (*Cheramus*) *Jousseaumei* Nobili, 1904: 236; Nobili, 1906b: 101, pl. 6 fig. 2; De Man, 1928b: 26 (list), 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.

Neocallichirus jousseaumei — Sakai, 1999c: 100, fig. 22e-g; Tudge et al., 2000: 144; Sakai, 2005b: 179.

Diagnosis. — Rostrum inconspicuous. Eyestalks triangular and separated from each other; cornea located medially. Frontal margin of carapace with low convexities anterolaterally. Mxp3 ischium-merus rectangular, merus obliquely declined distally and convex on distomesial margin; propodus subovate, and dactylus digitiform. Male Plp1 uniramous, bisegmented, and subchelate distally; male Plp2 biramous, endopod simple, bearing appendix masculina distally, but no appendix interna. Telson shaped as inverted trapezoid, bearing no median spine on slightly convex posterior margin. Uropodal endopod trapezoid. [Adapted from De Man, 1928b, pl. 18 fig. 27a, c; Sakai, 1999c: 100, fig. 22f, g.]

Type locality. — Djibouti, Perim, Gulf of Tadjourah, Red Sea.

Distribution. — Djibouti and Perim, Gulf of Aden; Safaga, Tubaya Al-Kabir, Red Sea; Aqaba, Gulf of Aqaba, 9 m.

Neocallichirus karumba (Poore & Griffin, 1979)

Callianassa karumba Poore & Griffin, 1979: 266, figs. 30, 31.

Glypturus karumba — Sakai, 1988: 61; Tudge et al., 2000: 144; Davie, 2002: 460.

Neocallichirus karumba — Sakai, 1999c: 101; Sakai, 2005b: 180; Dworschak, 2008: 75 (partim), fig. 1 (not figs. 2-6 = *Neocallichirus kempi* Sakai, 1999c); Robles et al., 2009: 317.

Diagnosis. — Mxp3 ischium-merus subrectangular; propodus subtriangular, and dactylus digitiform; exopod small. Male Plp1 uniramous and bisegmented, and w-shaped distally; male Plp2 biramous, endopod bearing mesiodistally appendix masculina with small, proximally-fused appendix interna mesiodistally. Telson wider than long and trapezoid, and slightly rounded on posterior margin, without median spine. [Cf. Poore & Griffin, 1979: 266, figs. 30c, 31f, g, h; Dworschak, 2008, fig. 1i.]

Type locality. — Norman River, Karumba, Queensland, Australia.

Distribution. — Only known from the type locality.

Neocallichirus kempi Sakai, 1999

Callianassa (*Callichirus*) *maxima* — Kemp, 1915: 252, pl. 13 figs. 1-5; De Man, 1928b: 29, 92, 112. [= *Callianassa maxima* A. Milne-Edwards, 1870.]

Callianassa maxima — Pillai, 1954: 23-26; Daniel, 1981: 193, pl. 6 figs. 1, 2 (larvae); Tudge et al., 2000: 143.

Neocallichirus kempi Sakai, 1999c: 101, fig. 24a-e; Sakai, 2005b: 180.

Neocallichirus karumba — Dworschak, 2008: 75 (partim), figs. 2-6.

Diagnosis. — Mxp3 ischium-merus subrectangular; propodus subquadrate, and dactylus digitiform; exopod small. Male Plp1 uniramous and bisegmented, distal segment subchelate distally (cf. Dworschak, 2008, figs. 3h, 4d, 4k, 5h); male Plp2 biramous, endopod bearing mesiodistally appendix masculina with small, proximally-fused appendix interna with hooklets mesiomedially (cf. Dworschak, 2008, figs. 3i, 3p, 4e). Telson wider than long and suboval, rounded laterally, and convex medially on posterior margin, without median spine. [Cf. Kemp, 1915: 252, pl. 13 fig. 5; Sakai, 1999c: 101, fig. 24b, c; Dworschak, 2008, fig. 3a.]

Remarks. — Dworschak (2008) regarded the present species *Neocallichirus kempi* Sakai, 1999c as a junior synonym of *Neocallichirus karumba* (Poore & Griffin, 1979). However, those two species are different, because in *N. kempi* the male Plp1 distal segment is subchelate distally, and the male Plp2 endopod bears mesiodistally an appendix masculina with a small, proximally-fused appendix interna with hooklets mesiomedially, and the telson is suboval; whereas in *G. karumba* the male Plp1 distal segment is w-shaped distally (Poore & Griffin, 1979, fig. 31g), and the male Plp2 endopod bears mesiodistally an appendix masculina with a small appendix interna with hooklets mesiodistally (Poore & Griffin, 1979, fig. 31h; Dworschak, 2008, fig. 1j), and the telson is trapezoid (Poore & Griffin, 1979, fig. 28c; Dworschak, 2008, fig. 1a).

Type locality. — Bangka, Indonesia.

Distribution. — Papua New Guinea (Dworschak, 2008); Bangka, Indonesia; Nalbano Island and Barhampur Island, Chilka Lake near Madras, India; Kayamkulam Lake, central Travancore, India (Pillai, 1954); Singapore (Dworschak, 2008); Taiwan (Dworschak, 2008).

Neocallichirus manningi Kazmi & Kazmi, 1992

Neocallichirus manningi Kazmi & Kazmi, 1992: 296, fig. 1; Tudge et al., 2000: 144; Sakai, 2005b: 180-181.

Neocallichirus indicus — Sakai, 1999c: 99; Sakai, 2000: 277.

Diagnosis. — Mxp3 ischium-merus subrectangular; propodus subquadrate, and dactylus digitiform. Male Plps1-2 unknown. Telson trapezoid, and convex on posterior margin, without median spine. [Cf. Kazmi & Kazmi, 1992: 296, fig. 1D, C.]

Type locality. — Sandspit, Karachi, 24°48′N 66°58′E, lower tidal region.

Distribution. — Only known from the type locality.

Neocallichirus mauritianus (Miers, 1882)

Callianassa mauritiana Miers, 1882: 341; Miers, 1884a: 15, pl. 1 fig. 2; Nobili, 1906b: 106, figs. 5, 6; Michel, 1974: 256; Kensley, 1975: 51, fig. 3A-H; Tudge et al., 2000: 143.
Callianassa (*Trypaea*) *mauritiana* — Borradaile, 1903: 546.
Callianassa (*Cheramus*) *mauritiana* — De Man, 1928a: 10, pl. 2 fig. 4; De Man, 1928b: 26, 99, 160.
Neocallichirus mauritianus — Sakai, 1999c: 103, fig. 21a-c; Sakai, 2005b: 181.

Diagnosis. — Mxp3 ischium-merus subrectangular; propodus subovate, and dactylus digitiform. Male Plp1 uniramous, bisegmented, and subchelate distally; male Plp2 endopod biramous, endopod bearing mesiodistally embedded appendix masculina, and distolaterally an embedded appendix interna with hooklets. Telson subovate and convex on posterior margin, with median spine. [Cf. Kensley, 1975: 51, fig. 3B, C, H; Sakai, 1999c: 103, fig. 21b, c.]

Type locality. — Mauritius.

Distribution. — Mauritius; Red Sea.

Neocallichirus mirim (Rodrigues, 1971)

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; Rodrigues et al., 1998: 381; Melo, 1999: 388, figs. 261-262; Tudge et al., 2000: 144; Coelho et al., 2007: 5 (tab. 2).
Neocallichirus mirim — Sakai, 1999c: 91, fig. 20d; Sakai, 2005b: 167.

Diagnosis. — Mxp3 ischium-merus subrectangular; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous, bisegmented, and w-shaped distally; male Plp2 bearing distally proximally-fused appendix masculina with setae, and proximally-fused appendix interna mesioproximally. Telson wider than long, convex laterally, and curving toward rounded posterior margin with median concavity with sharp spine. [Cf. Rodrigues, 1971: 214, figs. 84, 94, 95, 98.]

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

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

Neocallichirus moluccensis (De Man, 1905)

Callianassa (*Cheramus*) *moluccensis* De Man, 1905: 606; De Man, 1928b: 26, 93, 99, 159, pl. 16 fig. 25-25a, pl. 17 fig. 25b-c.

Neocallichirus moluccensis — Sakai, 1999c: 104, fig. 25a-f; Tudge et al., 2000: 144; Sakai, 2005b: 181.

Diagnosis. — Rostrum inconspicuous. Eyestalks short, triangular, with truncate apex, and separated from each other; cornea distinct and located mediolaterally. Frontal margin of carapace with low convexities anterolaterally. Mxp3 ischium-merus rectangular; merus obliquely declined distally and convex on mesiodistal margin; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous, bisegmented, and subchelate distally; male Plp2 biramous, endopod bearing distally appendix masculina with small appendix interna with distal hooklets. Telson shaped as inverted trapezoid, bearing no median spine on posterior margin. [Cf. De Man, 1928b, pl. 17 fig. 25b-c; Sakai, 1999c: 104, fig. 25c, d, e.]

Type locality. — Amboina, reef.

Distribution. — Amboina [= Ambon], Indonesia.

Neocallichirus mortenseni Sakai, 2005

Neocallichirus mortenseni Sakai, 2005b: 170, figs. 34-36.

Diagnosis. — Rostrum triangular, with acute apex. Eyestalks triangular in distal third. Frontal margin of carapace with anterolateral spinous projections. A1 peduncle slightly shorter than A2 peduncle. Mxp3 ischium-merus rectangular; propodus subquadrate, and dactylus digitiform. Male Plps1-2 unknown. Telson shaped as inverted trapezoid, bearing median spine on posterior margin. Uropodal endopod trapezoid and armed with spinule on lateral margin.

Type locality. — Off N. coast of Taboga, Panama.

Distribution. — Only known from the type locality.

Neocallichirus mucronatus (Strahl, 1862)

[Abbreviated list of synonymy.]

Callianassa mucronata Strahl, 1862a: 1056; Strahl, 1862b: 383; Tirmizi, 1977: 21 (part.), figs. 1-3 (not fig. 1b = *Callianassa gruneri* Sakai, 1999c); 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; Tudge et al., 2000: 143. [Type locality. — Zanzibar.]

Callianassa (*Cheramus*) *novaeguineae* Thallwitz, 1891: 31, pl. 1 fig. 9. [Type locality. — Papua New Guinea.]

Callianassa (*Callichirus*) *mucronata* — Borradaile, 1903: 547; Nobili, 1906b: 108; De Man, 1928b: 112, 175, pl. 19 fig. 30-30e.
Glypturus mucronatus — Sakai, 1988: 61; Tudge et al., 2000: 144.
Neocallichirus mucronatus — Sakai, 1999c: 105, fig. 26a-I; Sakai & Apel, 2002: 278; Sakai, 2005b: 182; Robles et al., 2009: 317.
Glypturus novaeguineae — Davie, 2002: 461.

Diagnosis. — Rostrum sharply triangular, reaching middle of eyestalks. Eyestalks triangular in distal third. Frontal margin of carapace with low convexities anterolaterally. Mxp3 ischium-merus oblong, merus obliquely declined distally and convex on distomesial margin; propodus subovate, and dactylus digitiform. Male Plp1 uniramous, bisegmented, and subchelate distally; male Plp2 biramous, endopod bearing distally fused appendix masculina, but uncertain about appendix interna. Telson shaped as inverted trapezoid, bearing no median spine on slightly convex posterior margin. Uropodal endopod fusiform. [Adapted from Sakai, 1999c, 2005b.]

Type locality. — Luzon, Philippines.

Distribution. — Papua New Guinea; Queensland, Australia, central reef; 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 nickellae Manning, 1993

Neocallichirus nickellae Manning, 1993: 110-113, figs. 4-6; Sakai, 1999c: 92; Blanco Rambla, 2000: 75, fig. 4; Tudge et al., 2000: 144; Sakai, 2005b: 168.

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

Distribution. — Only known from the type locality.

Neocallichirus pentagonocephalus (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; Tudge et al., 2000: 144.
Neocallichirus pentagonocephala — Sakai, 1999c: 87.
Neocallichirus pentagonocephalus — Sakai, 2005b: 163.

Diagnosis. — Mxp3 ischium-merus subrectangular; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous, bisegmented, and shallowly w-shaped distally; male Plp2 biramous, endopod bearing distally proximally-fused appendices masculina and interna. Telson hexagonal with shallow

median concavity without spine on posterior margin. [Cf. De Saint Laurent & Le Loeuff, 1979: 78, figs. 18d, 19i, 23w-x.]

Type locality. — Congo, Bay of Pointe Noire.

Distribution. — Only known from the type locality.

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: 699-704, figs. 19, 20; Suchanek, 1983: 281; 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; Felder & Manning, 1995: 487; Coelho, 1997: 149; Melo, 1999: 378, figs. 253-254; Sakai, 1999c: 92; Abed-Navandi, 2000: 294; Tudge et al., 2000: 144; Sakai, 2005b: 168.

Neocallichirus raymanningi Blanco Rambla & Lemaitre, 1999: 768, 4 figs. [Type locality. — Playa Cristal, south coast of Gulf of Cariaco, Sucre State, Venezuela.]

Neocallichirus maryae Karasawa, 2004: 87; Coelho et al., 2007: 5 (table); Robles et al., 2009: 317. [Replacement name for *Neocallichirus rathbunae* (Schmitt, 1935b).]

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. of Santa Marta, Colombia; Venezuela; Pernambuco, Brazil.

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.

Neocallichirus sassandrensis — Sakai, 1999c: 87; Tudge et al., 2000: 144; Sakai, 2005b: 164.

Diagnosis. — Mxp3 ischium-merus subrectangular; propodus subquadrate, and dactylus digitiform. Male Plps1-2 unknown. Telson trapezoid with straight posterior margin, bearing median spine. Uropodal protopod and uropodal exopod, respectively, with spine. [Cf. Le Loeuff & Intès, 1974: 43, fig. 11k, q-t.]

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

Distribution. — Only known from the type locality.

Neocallichirus vigilax (De Man, 1916)

Callianassa (*Callichirus*) *vigilax* De Man, 1916: 57, pl. 1 figs. 1-6; De Man, 1928b: 30, 93, 109.

Neocallichirus vigilax — Sakai, 1999c: 108; Sakai, 2005b: 183.

Diagnosis. — Rostrum triangular, reaching middle of eyestalks. Eyestalks contiguous and obtuse apically. A1 peduncle almost reaching distal end of A2 penultimate segment. Frontal margin of carapace with anterolateral spinous projections. Mxp3 ischium-merus rectangular; merus obliquely declined distally and rounded on mesiodistal margin; propodus subquadrate, and dactylus digitiform. Male Plps1-2 unknown. Telson shaped as inverted trapezoid, bearing no median spine on slightly convex posterior margin. [Adapted from De Man, 1916: 57, pl. 1 figs. 1-4.]

Type locality. — Ambon, Maluku Is., Indonesia.

Distribution. — Only known from the type locality.

Neocallichirus winslowi (Edmondson, 1944)

Callianassa (*Callichirus*) *winslowi* Edmondson, 1944: 59, fig. 11a-g.
Glypturus winslowi — Sakai, 1999c: 84.
Callianassa winslowi — Tudge et al., 2000: 143.

Diagnosis. — Rostrum sharply triangular, not reaching distal margin of eyestalks. Frontal margin of carapace with anterolateral spinous projections. Mxp3 propodus subquadrate, and dactylus digitiform. Male Plp1 blade-shaped, uniramous, bisegmented, and subchelate distally; male Plp2 unknown. Telson shaped as inverted trapezoid, bearing small median spine on posterior margin. Uropodal endopod fusiform. [Adapted from Edmondson, 1944, fig. 11f.]

Type locality. — Maui, Hawaii.

Distribution. — Only known from the type locality.

Neocallichirus sp. (Rathbun, 1906)

Callianassa sp., Rathbun, 1906: 893, fig. 48.
Callianassa (*Trypaea*) sp. — De Man, 1928b: 28.
Neocallichirus sp. — Sakai, 1999c: 108.

Remarks. — Rathbun (1906) gave a figure of her uncertain species, showing that the Mxp3 ischium-merus is subrectangular, the merus is subtriangular, the propodus is broadened, and the dactylus is slender, but no figure of the tail-fan, which makes it very difficult to determine the genus to which her species belongs. So, it is tentatively classified under *Neocallichirus*. [Cf. Rathbun, 1906: 893, fig. 48.]

Distribution. — [Honolulu, Hawaii?]

Genus **Podocallichirus** Sakai, 1999

Podocallichirus Sakai, 1999c: 53; Sakai, 2005b: 187.

Diagnosis. — Carapace with dorsal oval. Rostrum shaped as elongate triangle, with acute apex. A1 peduncle longer and stouter than A2 peduncle. Mxp3 ischium-merus rectangular; merus about as long as wide, lateral margin convex; carpus longer than wide, and longer than merus; propodus broadened, shorter than carpus, and largely convex on ventral margin; dactylus digitiform and obtuse distally; exopod absent. P1 unequal and chelate; in male merus of larger cheliped proximally convex on ventral margin; dactylus spoon-like, and spinose on dorsal and ventral margins; fixed finger broadly concave on cutting surface, armed with spines on both mesial and lateral sides; in male merus of smaller cheliped unarmed on ventral margin; dactylus unarmed on both dorsal and ventral margins; in female meri of both larger and smaller chelipeds bearing proximal hook on ventral margin; chelae as in males. P2 chelate. P3 simple. P4 subchelate. P5 chelate. Male Plp1 uniramous and bisegmented, distal segment short and chelate distally; Plp2 biramous, endopod bearing mesiodistally fusiform appendix masculina with marginal setae and a small, proximally-fused appendix interna with hooklets mesiomedially. Telson wider than long, and slightly convex on posterior margin. Uropodal endopod rhombic in shape; uropodal exopod broadly convex on lateral margin, bearing dorsal plate.

Remarks. — Sakai (2005b: 187) included 8 species in the genus *Podocallichirus* Sakai, 1999c: *P. balssi* (Monod, 1933); *P. foresti* (Le Loeuff & Intès, 1974); *P. guineensis* (De Man, 1928a); *P. tenuimanus* (De Saint Laurent & Le Loeuff, 1979) from the eastern Atlantic-Mediterranean region; and *P. gilchristi* (Barnard, 1946); *P. madagassus* (Lenz & Richters, 1881); *P. masoomi* (Tirmizi, 1970); *P. tamakii* (Poore, 2000) from the Indo-West Pacific region.

In the present revision, however, only *P. madagassus* is retained in the genus *Podocallichirus* as the type species of the genus, while the other species are reclassified by the forms of the male Plps1-2; *P. balssi* and *P. guineensis* are reclassifed under the new genus *Balsscallichirus* gen. nov.; *P. foresti* is reclassified under the new genus *Forestcallichirus* gen. nov.; *P. gilchristi* (Barnard, 1946) and *P. tenuimanus* (De Saint Laurent & Le Loeuff, 1979) under the new genus *Barnardcallichirus* gen. nov.; *P. masoomi* under the new genus *Tirmizicallichirus* gen. nov., and *P. tamakii* under *Grynaminna* Poore, 2000.

Type species. — *Callianassa madagassa* Lenz & Richters, 1881. The gender of the generic name, *Podocallichirus*, is masculine.

Species included. — Only the type species, *Podocallichirus madagassus* (Lenz & Richters, 1881).

Podocallichirus madagassus (Lenz & Richters, 1881) (fig. 66C-D)

Callianassa madagassa Lenz & Richters, 1881: 427, figs. 20-23; Tudge et al., 2000: 143.
Callianassa (*Callichirus*) *madagassa* — Borradaile, 1903: 547; De Man, 1928a: 42, fig. 18-18e; De Man, 1928b: 29, 92, 113.
Podocallichirus madagassus — Sakai, 1999c: 56, fig. 10a-d; Sakai, 2005b: 191, fig. 38.

Material. — SMF 7938, lectotype, female (TL/CL, 52.0/11.2 mm), SMF 4953, paralectotype, 1 male (TL/CL, 49.0/10.7 mm), Nosi Bé, Madagascar, 1880, leg. Ebenau.

Diagnosis. — Mxp3 ischium-merus subpediform; merus convex on mesiodistal margin. Male Plp1 uniramous and bisegmented, distal segment short, chelate distally, with distal emargination (fig. 66C); male Plp2 biramous, endopod bearing mesiodistally fusiform appendix masculina with proximally-fused appendix interna mesiomedially (fig. 66D). Telson wider than long and subrectangular, and posterior margin slightly convex medially, without median spine.

Type locality. — Nosi Bé, N.W. Madagascar.

Distribution. — Only known from the type locality.

Genus **Sergio** Manning & Lemaitre, 1994 **(sensu nov.)**

Sergio Manning & Lemaitre, 1994 (not 1993): 39 (partim).
Sergio s. str. — Felder, 2001: 440.

Diagnosis. — Carapace with dorsal oval, but without rostral carina, cardiac prominence and transverse cardiac sulci. Rostrum small and spinous. Carapace with anterolateral projections calcified proximally. A1 peduncle shorter than A2 peduncle. Mxp3 ischium-merus subquadrate; merus triangular; propodus broadened and rounded on ventral margin; dactylus narrow and digitiform; exopod absent. P1 chelate, unequal, and dissimilar; in male larger cheliped merus with small meral hook. P2 chelate. P3 propodus broadened. P4 subchelate. P5 chelate. Abdominal somites 3-5 not ornamented dorsally. Male Plp1 uniramous and bisegmented, distal segment bilobed by median longitudinal furrow, and subchelate distally; male Plp2 biramous, endopod bearing a proximally-fused or not fused appendix masculina, with or without proximally-fused appendix interna. Male Plps3-5 biramous and foliaceous, endopods with appendix interna in both sexes. Telson wider than long and varied in shape. Uropodal endopod longer than wide and rhombic, overreaching telson; uropodal exopod

convex on lateral margin, bearing dorsal plate. [Adapted from Sakai, 1999c: 72.]

Remarks. — The genus *Sergio* Manning & Lemaitre, 1994 was established for *Callianassa guassutinga* Rodrigues, 1971, and included three other species, *S. guarus* (Rodrigues, 1971), *S. mirim* (Rodrigues, 1971), and *S. trilobatus* (Biffar, 1970). Though in the previous revisions (Sakai, 1999c, 2005b) *Sergio* was synonymized with *Neocallichirus* Sakai, 1988 (cf. Sakai, 1999c, 2005b), in the present revision it has turned out by comparing *Sergio* with *Neocallichirus* on the male Plp1, that *Sergio* is different from *Neocallichirus*. In *S. guassutinga*, the type species of *Sergio*, the male Plp1 distal segment is bilobed by a median, longitudinal furrow, and subchelate distally; whereas in *N. horneri* Sakai, 1988, the type species of *Neocallichirus*, the male Plp1 distal segment is w-shaped distally.

The three species (*S. guarus* (Rodrigues, 1971), *S. mirim* (Rodrigues, 1971), and *S. trilobata* (Biffar, 1970)), included in *Sergio* by Manning & Lemaitre (1994) are thus reclassified by the forms of the male Plps1-2. *S. trilobatus* (Biffar, 1970) is included in *Glypturoides* gen. nov., because the male Plp1 distal segment is subchelate distally, and the male Plp2 endopod bears distally a triangular appendix masculina with marginal setae, and mesiodistally a small appendix interna (fig. 65J). The other two species, *S. guarus* and *S. mirim* are reclassified under *Neocallichirus*.

Type species. — *Callianassa guassutinga* Rodrigues, 1966, by original designation. The gender of the generic name, *Sergio*, is masculine.

Species included. — *Sergio cacahuate* (Felder & Manning, 1995); *S. guassutinga* (Rodrigues, 1971); *S. lemaitrei* (Manning, 1993); *S. mericeae* Manning & Felder, 1995; *S. monodi* (De Saint Laurent & Le Loeuff, 1979); *S. pachydactylus* (A. Milne-Edwards, 1870); *S. sulfureus* Lemaitre & Felder, 1996.

KEY TO THE SPECIES OF THE GENUS *SERGIO*

1 – Telson convex on posterior margin 2
– Telson concave on posterior margin 4

2 – Eyestalks with truncate apex with denticles . . . . . *Sergio pachydactylus*
– Eyestalks with obtuse apex without denticles 3

3 – In male larger cheliped carpus and palm denticulate on ventral margin . . . . . *S. lemaitrei*
– In male larger cheliped carpus and palm smooth on ventral margin . . . . . *S. cacahuate*

4 – Posterior margin of telson bearing concavity with triangular median protrusion . . . . . *S. monodi*
– Posterior margin of telson concave and smooth 5

5 – Male Plp2 endopod bearing appendix masculina distally ..... *S. guassutinga*
– Male Plp2 endopod bearing appendix masculina mesiodistally 6

6 – In male larger cheliped, dactylus bearing two teeth on proximal half of cutting edge, and is distal to these tuberculate ..... *S. sulfureus*
– In male larger cheliped, dactylus bearing truncate tooth and sharp tooth on proximal half of cutting edge, and is distal to these serrated ..... *S. mericeae*

Sergio cacahuate (Felder & Manning, 1995)

Neocallichirus cacahuate Felder & Manning, 1995: 478, figs. 1a-c, 2, 3a-e, 4a-c, 5; Sakai, 1999c: 88; Blanco Rambla, 2000: 74-75, fig. 3; Tudge et al., 2000: 144; Sakai, 2005b: 164.

Diagnosis. — Mxp3 ischium-merus subrectangular; merus subtriangular. Male Plp1 uniramous and bisegmented, distal segment shorter than proximal, and divided into two lobes by weak longitudinal furrow, and subchelate distally (cf. Felder & Manning, 1995: 484, fig. 1c); male Plp2 biramous, endopod bearing mesiodistally a proximally-fused appendix masculina with long distal setae, provided mesiomedially with a proximally-fused small, grain-shaped appendix interna (cf. Felder & Manning, 1995, figs. 1c, 4a). Telson wider than long and trapezoid, and slightly sinuous on posterior margin (cf. Felder & Manning, 1995, fig. 4c).

Remarks. — Felder & Manning (1995) described the present species as *Neocallichirus cacahuate*, mentioning that "*N. cacahuate* can be distinguished from the members of the closely related genus *Sergio* on the basis of its relatively longer, posteriorly rounded to truncate telson, and its broader, more rectangular uropodal endopods." However, this species belongs to *Sergio* by the form of the male Plp1, which is the same as that of the type species of *Sergio*, *S. guassutinga*, as described in the diagnosis.

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. — Only known from the type locality.

Sergio guassutinga (Rodrigues, 1971)
(figs. 67H-I, 68)

[Abbreviated list of synonymy.]
Callianassa (*Callichirus*) *guassutinga* Rodrigues, 1971: 204, figs. 41-60.
Callianassa guassutinga — Biffar, 1971a: 651, 653, 674, figs. 9, 10.
Sergio guassutinga — Manning & Lemaitre, 1994: 40; Coelho, 1997: 149; Rodrigues et al., 1998: 381; Melo, 1999: 378, figs. 253-254; Coelho et al., 2007: 5 (tab. 2).
Neocallichirus guassutingus — Sakai, 1999c: 90.

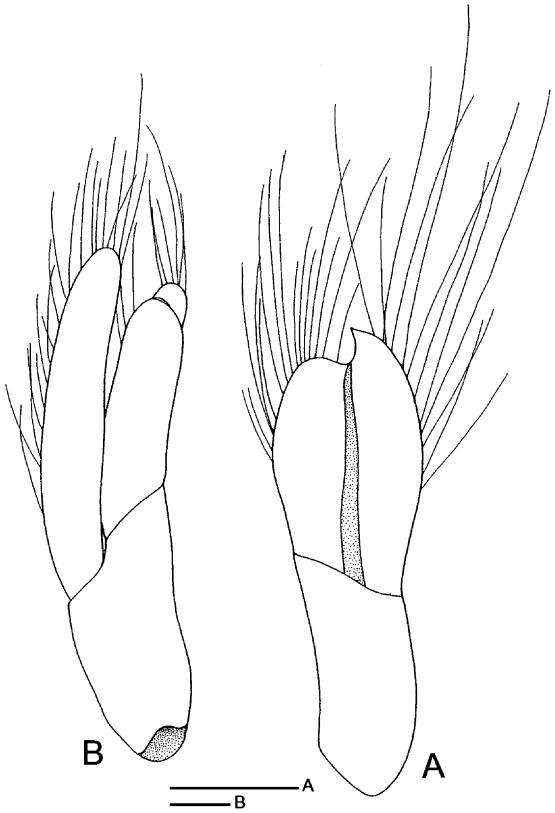

Fig. 68. *Sergio guassutinga* (Rodrigues, 1971). A, male Plp1; B, male Plp2. SMF 32727, 1 male (TL/CL, 90.0/22.3 mm), Cabo Branco, Paraíba, Brazil. Scales 1 mm.

Neocallichirus guassutinga — Sakai, 2005b: 166.

Material examined. — USNM 256886, paratype, male (TL/CL, 100.6/26.6 mm), Praia do Araç, São Sebastião, São Paulo, Brazil, 06.i.1966, leg. S.A. Rodrigues; SMF 32727, 1 male (TL/CL, 90.0/22.3 mm), Cabo Branco, Paraíba, Brazil, 16.ix.1982, leg. P.M. Dijck, det. S.A. Rodrigues, presented by R.M. Shimizu.

Diagnosis. — Mxp3 ischium-merus subrectangular; merus subtriangular. Male Plp1 uniramous, blade-shaped, and bisegmented, distal segment bilobed by median longitudinal furrow, and subchelate distally (figs. 67H, 68A); male Plp2 biramous, endopod bearing distally appendix masculina (figs. 67I, 68B). Telson trapezoid, concave on posterior margin, without median spine.

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; Gulf of Panama; Pernambuco and São Paulo, Brazil.

Sergio lemaitrei (Manning, 1993)

Neocallichirus lemaitrei Manning, 1993: 107, figs. 1-3; Felder & Manning, 1995: 488, fig. 6; Blanco-Rambla, 1998: 20, figs. 1-4; Sakai, 1999c: 91; Tudge et al., 2000: 144; Sakai, 2005b: 167.

Diagnosis. — Rostrum inconspicuous. Eyestalks contiguous and pointed apically. Frontal margin of carapace with inconspicuous anterolateral convexities. Mxp3 ischium-merus rectangular; merus obliquely declined on mesiodistal margin; propodus subquadrate, and dactylus digitiform. In male larger cheliped carpus and palm denticulate on ventral margin. Male Plp1 blade-shaped, uniramous, bisegmented, and subchelate distally; male Plp2 biramous, endopod bearing fused appendix masculina distally, and fused with appendix interna mesiodistally. Telson shaped as inverted trapezoid, lacking median spine on posterior margin. [Adapted from Manning, 1993: 107, figs. 1h, 3a, c; Felder & Manning, 1995, fig. 6b, c.]

Remarks. — The present species, which was described by Manning (1993) as *Neocallichirus lemaitrei*, is characterized as follows: the male Plp1 is uniramous and bisegmented, and the distal segment is bilobed by a weak longitudinal furrow, and subchelate distally; the male Plp2 endopod bears an appendix masculina provided mesiomedially with a proximally-fused appendix interna (cf. Felder & Manning, 1995, fig. 6b). The male Plp1 of *N. lemaitrei* shows the typical form of that of *S. guassutinga*, so that *Neocallichirus lemaitrei* is now reclassifed under *Sergio*, as *S. lemaitrei*.

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

Distribution. — Isla del Rosario, Colombia, Caribbean side.

Sergio mericeae Manning & Felder, 1995

Sergio mericeae Manning & Felder, 1995: 267, figs. 1a-f, 2a-f, 3a-f, 4a-f, 5a-g; Robles et al., 2009: 317.

Diagnosis. — Male Plp1 uniramous and bisegmented, distal segment divided into two lobes by weak longitudinal furrow, and subchelate distally; male Plp2 biramous, endopod bearing mesiodistally a proximally-fused appendix masculina with distal setae.

Type locality. — North side of Fort Pierce Inlet, Florida, Indian River Lagoon, intertidal sandflat, 27°28.2′N 80°18.8′W.

Distribution. — Florida, Louisiana, Texas; Mexico (Manning & Felder, 1995).

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

Callichirus monodi De Saint Laurent & Le Loeuff, 1979: 71, figs. 14h, 16f, 17c, 18a, 19h, 22a-b, 23n-r; Tudge et al., 2000: 144.
Neocallichirus monodi — Sakai, 1999c: 86; Sakai, 2005b: 162.

Diagnosis. — Mxp3 ischium-merus subsquare; merus obliquely curved distally and rounded on distomesial margin; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous, bisegmented, distal segment bilobed by weak longitudinal furrow, and subchelate distally; male Plp2 biramous, endopod bearing mesiodistally appendix masculina with proximally-fused appendix interna laterally (cf. De Saint Laurent & Le Loeuff, 1979, fig. 23o). Telson wider than long, bearing broad concavity with triangular median protrusion on posterior margin. [Cf. De Saint Laurent & Le Loeuff, 1979: 71, figs. 17c, 18a, 19h, 23n-r.]

Type locality. — Senegal.

Distribution. — Only known from the type locality.

Sergio pachydactylus (A. Milne-Edwards, 1870)

Callianassa pachydactyla A. Milne-Edwards, 1870: 86, 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.
Neocallichirus pachydactylus — Sakai, 1999c: 86, fig. 20a-c; Dworschak et al., 2000: 309; Tudge et al., 2000: 144; Sakai, 2005b: 163.
Not: *Callianassa pachydactyla* — Longhurst, 1958: 42 [= *Forestcallichirus foresti* (Le Loeuff & Intès, 1974)].

Diagnosis. — Rostrum triangular, reaching proximal third of eyestalks. Eyestalks with truncate apex with denticles. Male Plp1 uniramous and bisegmented, distal segment bilobed by short longitudinal furrow and subchelate distally; male Plp2 biramous, endopod bearing appendix masculina distally, but no appendix interna. Telson shaped as inverted trapezoid, lacking median spine on posterior margin. [Adapted from De Saint Laurent & Le Loeuff, 1979, 23s-t.]

Remarks. — Dworschak et al. (2000) stated that this species was collected by yabby pump together with *Salmoneus caboverdensis* Dworschak, Anker & Abed-Navandi 2000 (Alpheidae) in the Cape Verde Islands.

Type locality. — Cape Verde Islands.

Distribution. — Cape Verde Is.; Senegal; Ghana; Île Príncipe; intertidal.

Sergio sulfureus Lemaitre & Felder, 1996

Sergio sulfureus Lemaitre & Felder, 1996: 453-463, text-figs. 1-6; Tudge et al., 2000: 145.
Neocallichirus sulfureus — Sakai, 1999c: 92; Sakai, 2005b: 169.

Diagnosis. — Mxp3 ischium-merus subrectangular; merus subtriangular; propodus subquadrate, and dactylus digitiform. Male Plp1 uniramous, blade-shaped, and bisegmented, distal segment bilobed by weak longitudinal furrow, and subchelate distally; male Plp2 biramous, endopod bearing mesiodistally a proximally-fused appendix masculina with distal setae, provided mesiolaterally with a proximally-fused appendix interna. Telson wider than long and trapezoid, posterior margin concave, without median spine. Uropodal endopod longer than broad, and with tuft of setae dorsally near posterodistal corner. [Cf. Lemaitre & Felder, 1996, figs. 6b, d, e, j.]

Type locality. — Caribbean coast of Colombia, S.W. shoreline of Barú, beach facing Rosario Islands.

Distribution. — Only known from the type locality.

Genus **Thailandcallichirus** gen. nov.

Diagnosis. — Front of carapace with three low, subtriangular projections. Carapace with dorsal oval, but without rostral carina, cardiac prominence, or transverse cardiac sulcus(i). A1 peduncle shorter than A2 peduncle. Mxp3 ischium-merus operculiform; propodus subovate, broadly rounded on ventral margin; dactylus subovate, rounded distally; exopod absent. P1 chelate, unequal, and dissimilar; in male larger cheliped merus with meral hook. P2 chelate. P3 propodus broadened. P4 subchelate. P5 chelate. Abdominal somites 3-5 not ornamented dorsally. Male Plp1 uniramous and bisegmented, distal segment subchelate distally; male Plp2 biramous, endopod bearing mesiodistally appendix masculina with distal setae, provided with appendix interna mesiomedially (cf. Sakai, 1983, fig. 1); male Plps3-5 biramous and foliaceous, endopods with stubby, embedded appendix interna. Telson wider than long and trapezoid. Uropodal endopod rhombic. Uropodal exopod convex on lateral margin, bearing dorsal plate.

Remarks. — In the previous revision, *Callianassa ranongensis* Sakai, 1983 was included by Sakai (1999c) in *Neocallichirus*. However, it is found that *N. ranongensis* is different from the type species of *Neocallichirus*, *N. horneri* Sakai, 1988. In *N. ranongensis* the Mxp3 dactylus is rounded distally, and the male Plp2 endopod bears mesiodistally an appendix masculina with distal setae, provided with an appendix interna mesiomedially, whereas in

N. horneri the Mxp3 dactylus is obtuse distally, and the male Plp2 endopod bears distally a proximally-fused appendix masculina with distal setae, and a proximally-fused appendix interna distolaterally. Therefore, *N. ranongensis* is excluded from *Neocallichirus*, and reclassified under the present new genus *Thailandcallichirus* as *T. ranongensis*.

Type species. — *Callianassa ranongensis* Sakai, 1983, by present designation and monotypy. The gender of the generic name, *Thailandcallichirus*, is masculine.

Species included. — *Thailandcallichirus ranongensis* (Sakai, 1983).

Etymology. — The new generic name *Thailandcallichirus* is composed of a generic name, *Callichirus* and the type locality, Thailand.

Thailandcallichirus ranongensis (Sakai, 1983)

Callianassa ranongensis Sakai, 1983: 111-115, figs. 1, 2; Sakai, 1987b: 45, figs. 1, 2.
Neocallichirus ranongensis — Sakai, 1999c: 107; Sakai, 2005b: 183.
Lepidophthalmus ranongensis — Tudge et al., 2000: 144.

Type locality. — Hatsaikhao, Ranong Province, Thailand, muddy mangrove swamp.

Distribution. — Ranong Province, Thailand; Halmahera, Indonesia.

Genus **Tirmizicallichirus** gen. nov.

Diagnosis. — Carapace with dorsal oval. A1 peduncle longer than A2 peduncle. Mxp3 ischium-merus pediform, with parallel mesial and lateral margins; propodus subovate, broadened and strongly convex on ventral margin; dactylus digitiform and obtuse distally. Male Plp1 uniramous and bisegmented, distal segment obtuse distally; male Plp2 biramous, endopod obtuse distally, lacking appendices interna and masculina; Plps3-5 with inconspicuous appendix interna. Telson subquadrate, wider than long, with low median convexity on posterior margin. Uropodal endopod oval; uropodal exopod broadly rounded on lateral margin, bearing dorsal plate.

Remarks. — *Podocallichirus masoomi* (Tirmizi, 1970) (cf. Sakai, 1999c), has turned out to be different from the type species of *Podocallichirus*, *Podocallichirus madagassus* (Lenz & Richters, 1881), in the forms of male Plps1-2. In *P. masoomi* the male Plp1 is uniramous and bisegmented, and the distal segment is simple and obtuse distally, the male Plp2 is biramous, and the endopod bears neither an appendix interna nor an appendix masculina. Whereas in *P. madagassus* the male Plp1 is uniramous and bisegmented, but the distal segment is short and chelate distally, the male Plp2 is biramous, and

the endopod bears mesiodistally a fusiform appendix masculina, fused mesiomedially with an appendix interna with hooklets. Therefore, *Podocallichirus masoomi* is excluded from *Podocallichirus* and reclassified under the present new genus, *Tirmizicallichirus* gen. nov. as *Tirmizicallichirus masoomi* (Tirmizi, 1970).

Type species. — *Callianassa* (*Callichirus*) *masoomi* Tirmizi, 1970, by present designation and monotypy. The gender of the generic name, *Tirmizicallichirus*, is masculine.

Species included. — *Tirmizicallichirus masoomi* (Tirmizi, 1970).

Etymology. — The new generic name is dedicated to the late Prof. Dr. N.M. Tirmizi, who was a leading carcinologist in Pakistan, by adding her name as a prefix to *Callichirus*.

Tirmizicallichirus masoomi (Tirmizi, 1970)

[Abbreviated list of synonymy.]
Callianassa (*Callichirus*) *masoomi* Tirmizi, 1970: 245, figs. 1-3.
Callianassa (*Callichirus*) *kewalramanii* Sankolli, 1971: 94, figs. 5, 8. [Type locality. — Ratnagiri, Bombay, India.]
Podocallichirus masoomi — Sakai, 1999c: 58; Sakai, 2005b: 192.

Material examined. — Invertebrate Reference Museum, Karachi Univ., holotype, female (TL 22.5 mm), Karachi, sandy shore.

Diagnosis. — Male Plp1 uniramous and bisegmented, distal segment obtuse distally; male Plp2 biramous, endopod obtuse distally, bearing neither appendix interna nor appendix masculina; Plps3-5 with inconspicuous appendix interna. Telson subquadrate, wider than long, with low median convexity on posterior margin. [Cf. Sankolli, 1971: 94, figs. 5c, 6h, 8a, b.]

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.

FAMILY CALLIANOPSIDAE MANNING & FELDER, 1991 **(SENSU NOV.)**

Diagnosis. — Rostrum sharply triangular, bearing rostral carina. Carapace with or without dorsal oval, and without cardiac sulcus. Eyestalks flattened and contiguous. A2 scaphocerite present as a small process. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus subrectangular; propodus broadened; dactylus ovate or subovate; exopod absent. P1 chelate, unequal in size, and dissimilar in shape; in larger cheliped merus with small hook ventroproximally; palm oblong; fingers as long as or shorter than palm; in smaller cheliped merus with hook ventroproximally; fingers longer than palm. P2 chelate. P3 propodus broadened. P4 simple. P5 subchelate. Abdominal pleuron 2 unarmed ventrally, pleura 4-5 with or without spine-like projection posteroventrally; and abdominal somite 6 with spine-like projection medioventrally. Male Plp1 uniramous and bisegmented, distal segment sickle-shaped; male Plp2 endopod bearing appendix masculina with distal setae and small appendix interna; male Plps3-5 similar, endopods with finger-like appendix interna. Telson subsquare, bearing proximal lobe on lateral margin. Uropodal exopod without dorsal plate or lateral notch.

Remarks. — The present family Callianopsidae is different from the Callianassidae by the form of the uropodal exopod; in the Callianopsidae the uropodal exopod lacks both dorsal plate and lateral notch, while in the Callianassidae the uropodal exopod bears a dorsal plate but no lateral notch.

Subfamilies included. — Callianopsinae Manning & Felder, 1991; Neocallianopsinae subfam. nov.

KEY TO THE SUBFAMILIES OF THE FAMILY CALLIANOPSIDAE

1 – Carapace with dorsal oval . . . . . Callianopsinae
– Carapace without dorsal oval . . . . . Neocallianopsinae subfam. nov.

Subfamily CALLIANOPSINAE Manning & Felder, 1991

Callianopsinae Manning & Felder, 1991: 787; Hopkins & Feldmann, 1997: 237; Sakai, 2005b: 226.

Diagnosis. — Rostrum sharply triangular, bearing rostral carina. Carapace with dorsal oval and cardiac prominence, but without cardiac sulcus. Eye-

stalks flattened and contiguous. Linea thalassinica present. A2 scaphocerite present as a small process. Mxp3 ischium-merus rectangular or subrectangular; propodus subrectangular; dactylus ovate; exopod absent. Male Plp1 uniramous, bisegmented; male Plp2 biramous. Uropodal exopod bearing neither dorsal plate nor lateral notch.

Remarks. — *C. goniophthalma* (Rathbun, 1902), the type species of *Callianopsis*, the type genus of the Callianopsinae, was described by Hopkins & Feldmann (1997: 238) with their figures (1997, fig. 1j, k) as follows: "The first pleopod in the male of the species is sickle-shaped and second pleopod possesses an ovate exopod that is longer than wide and a longer than wide obovate endopod that possesses a bifurcate appendix interna". However, it has turned out by the present examination of the type specimen of *C. goniophthalma* (USNM 25238, type, male), that the male Plp2 endopod bears mesiomedially an appendix masculina with distal setae and a small appendix interna proximally.

Type genus. — *Callianopsis* De Saint Laurent, 1973.

Genera included. — *Callianopsis* De Saint Laurent, 1973; *Pleurocalliax* gen. nov.

KEY TO THE GENERA OF THE SUBFAMILY CALLIANOPSINAE

1 – Pleura 2-6 with spine ..... *Pleurocalliax* gen. nov.
– Pleura 5-6 with spine-like projection ..... *Callianopsis*

Genus **Callianopsis** De Saint Laurent, 1973

Callianopsis De Saint Laurent, 1973: 515; Hopkins & Feldmann, 1997: 237; Sakai, 2005b: 227.

Diagnosis. — Rostrum small and triangular, bearing rostral carina. Carapace with dorsal oval and cardiac prominence, but without cardiac sulcus.

TABLE X
Major features of Callianopsinae

	Dorsal oval on carapace	Dorsal plate on uropodal exopod	Mxp3 exopod	Spine or spine-like projection on abdominal pleura
Callianopsis	present	absent	absent	present on pleura 5-6
Pleurocalliax gen. nov.	present	absent	absent	present on pleura 2-6

Eyestalks flattened and contiguous. Linea thalassinica present. A2 scaphocerite present as a small process. Mxp3 ischium-merus subrectangular; propodus subrectangular; dactylus subovate; exopod absent. P1 chelate, unequal in size, and dissimilar in shape; in larger cheliped merus with small meral hook ventroproximally; palm rectangular; fingers almost as long as palm; in smaller cheliped merus with small meral hook ventroproximally; fingers longer than palm. P2 chelate. P3 propodus broadened. P4 simple. P5 subchelate. Abdominal pleura 2-4 unarmed ventrally; pleuron 5 with spine-like projection posteroventrally; and abdominal pleuron 6 with spine-like projection anteroventrally. Male Plp1 uniramous and bisegmented, distal segment sickle-shaped; male Plp2 endopod bearing mesiomedially appendix masculina with distal setae and small appendix interna proximally; male Plps3-5 similar, endopods with finger-like appendix interna. Telson subsquare. Uropodal exopod bearing neither dorsal plate nor lateral notch.

Type species. — *Callianassa goniophthalma* Rathbun, 1902, by original designation and monotypy. The gender of the generic name, *Callianopsis*, is feminine.

Species included. — *Callianopsis goniophthalma* (Rathbun, 1902).

Callianopsis goniophthalma (Rathbun, 1902)
(fig. 63H-J)

Callianassa goniophthalma Rathbun, 1902: 886; Rathbun, 1904: 154, pl. 8; Schmitt, 1921: 121, fig. 82; Balss, 1925: 211; Stevens, 1928: 342, fig. 19; Williams et al., 1989: 28.

?*Callianassa* (*Calliactites*) *goniophthalma* — Borradaile, 1903: 545; De Man, 1928b: 25 (list), 95, 96.

Callianopsis goniophthalma — Hart, 1982: 54, fig. 13; Manning & Felder, 1991: 789 (list), figs. 7, 18; Hendrickx, 1995: 390 (list); Hopkins & Feldmann, 1997: 238, figs. 1-4; Tudge et al., 2000: 142; Hendrickx et al., 2005: 170 [in the family Ctenochelidae]; Sakai, 2005b: 229.

Material examined. — USNM 25238, type, male, damaged, off Point Conception, California, 278 fms, Sta. 3198, R/V "Albatross".

Diagnosis. — Maxilla 2 scaphognathite without posterior whip (cf. Hopkins & Feldmann, 1997, fig. iC). Mxp3 ischium-merus subrectangular, propodus subrectangular, and dactylus subovate; exopod absent. Male Plp1 uniramous and bisegmented, distal segment sickle-shaped (fig. 63H); male Plp2 biramous, endopod bearing mesiomedially appendix masculina with distal setae and small appendix interna proximally (fig. 63I); male Plps3-5 endopods with appendix interna (fig. 63J). Uropodal exopod bearing neither dorsal plate nor lateral notch.

Remarks. — Rathbun (1902) established *Callianassa goniophthalma* Rathbun, 1902, which was later described as ?*Callianassa* (*Calliactites*) *gonioph-*

thalma by Borradaile (1903: 545) and De Man (1928: 25). However, the type species of *Calliactites*, *C. secura* Lanchester, 1902 is a synonym of *Callianidea typa* H. Milne Edwards, 1837, now included in the Callianideidae, and is, therefore, not any more a member of the Callianassidae. So, Manning & Felder (1991: 787) established a new subfamily Callianopsinae in the Ctenochelidae, based on *Callianopsis* as the type genus. However, the type species of *Callianopsis*, *C. goniophthalma*, bears a dorsal oval, which suggests that *C. goniophthalma* seems not to be included in the Ctenochelidae but probably in the Callianassidae. However, *C. goniophthalma* is not included in the Callianassidae either, in which the Mxp3 dactylus is digitiform, but in the Callianopsidae sensu nov., in which the Mxp3 dactylus is oval.

Type locality. — Off Point Conception, California, "Albatross" Sta. 3198, 513 m.

Distribution. — Alaska — Clarence Strait (Rathbun, 1902; Hopkins & Feldmann, 1997), Funter Bay (Stevens, 1928), Yes Bay (Hopkins & Feldmann, 1997). California — off Point Conception (Rathbun, 1902; Hopkins & Feldmann, 1997), off Harris Point, San Miguel Island (Schmitt, 1921). Baja California — San Cristobal Bay, Mexico (Hopkins & Feldmann, 1997); 351-595 m.

Genus **Pleurocalliax** gen. nov.

Diagnosis. — Carapace with dorsal oval, cardiac prominence, and linea thalassinica, but without transverse cardiac sulcus. Mxp3 ischium-merus broadened and pediform; dactylus ovate. P1 unequal and dissimilar; in larger cheliped merus with hook ventroproximally. Abdominal pleuron 2 with laterally-directed acute projection posteroventrally; pleura 3-4 with laterally-directed spine medioventrally; and pleura 5-6 with laterally-directed spine anteroventrally. Male Plps1-2 unknown. Telson convergent toward posterior margin. Uropodal exopod bearing neither dorsal plate nor lateral notch. [Described by Alcock & Anderson, 1894: 163; Alcock & Anderson, 1896, pl. 26 fig. 2.]

Remarks. — *Callianassa coecigena* Lanchester, 1902 was included by Borradaile (1903: 545) and De Man (1928: 26) in the genus *Calliactites* s. str. Borradaile, 1903 (syn. of *Callianidea* H. Milne Edwards, 1837a). However, *Calliactites coecigena*, which is differrent from the type species of *Calliactites*, *C. secura* Lanchester, 1902, is rather similar to the type species of the genus *Callianopsis*, *C. goniophthalma*, in that the carapace bears a dorsal oval and a cardiac prominence (Alcock & Anderson, 1896, pl. 26 fig. 2), but differs in

that in *Calliactites coecigena* abdominal pleuron 2 is armed with a laterally-directed acute projection posteroventrally, pleura 3-4 with a laterally-directed acute projection medioventrally, and pleura 5-6 with a laterally-directed acute projection anteroventrally; whereas in *Callianopsis goniophthalma* abdominal pleura 2-5 are unarmed and pleuron 6 is armed with a laterally-directed acute projection anteroventrally; which means that *Calliactites coecigena* is not to be included in the genus *Callianopsis*, either. Therefore, *Calliactites coecigena* is reclassified under the present new genus, *Pleurocalliax* gen. nov.

Type species. — *Callianassa coecigena* Alcock & Anderson, 1894. The gender of the generic name, *Pleurocalliax*, is feminine.

Species included. — *Pleurocalliax coecigena* (Alcock & Anderson, 1894).

Etymology. — The type species of the present new genus *Pleurocalliax* is characterized by the lateral projections on the abdominal pleura, so that the new generic name is composed of a Greek word "pleura" meaning "side", and the generic name *Calliax*.

Pleurocalliax coecigena (Alcock & Anderson, 1894)

Callianassa coecigena Alcock & Anderson, 1894: 163; Alcock & Anderson, 1896, pl. 26 fig. 2, 2a-b; Alcock, 1901: 198; Balss, 1925: 211.
(?) *Callianassa* (*Calliactites*) *coecigena* — Borradaile, 1903: 545.
Callianassa (*Calliactites*) *coecigena* — De Man, 1928b: 25 (list), 96 (key).
Callianopsis coecigena — De Saint Laurent & Le Loeuff, 1979: 95.
Callianopsis coecigena — Sakai, 2005b: 229.

Diagnosis. — Rostrum acutely triangular, reaching distal margin of eyestalks. Carapace with dorsal oval, cardiac prominence, and linea thalassinica, but without cardiac sulcus. Eyestalks petaloid; cornea absent. Mxp3 ischium-merus rectangular, propodus rectangular, and dactylus ovate. P1 unequal; in larger cheliped palm setose on lateral surface. Abdominal pleuron 2 with laterally-directed acute projection posteroventrally; pleura 3-4 with laterally-directed spine medioventrally; and pleura 5-6 with laterally-directed spine anteroventrally. Male Plps1-2 unknown. Telson convergent toward convex posterior margin. Uropodal exopod bearing neither dorsal plate nor lateral notch. [Cf. Alcock & Anderson, 1894: 163; Alcock & Anderson, 1896, pl. 26 fig. 2a.]

Remarks. — The type specimen is inaccessible. However, this species is very characteristic in that abdominal pleuron 2 is armed with a laterally-directed acute projection posteroventrally, pleura 3-5 with a laterally-directed acute projection medioventrally, and pleuron 6 with a laterally-directed acute projection anteroventrally, so that *Callianassa coecigena* is reclassified under the new genus *Pleurocalliax* as *P. coecigena*.

Type locality. — Off Sri Lanka, Bay of Bengal, 365-690 m.

Distribution. — Off Sri Lanka (Alcock & Anderson, 1894); 365-690 m.

Subfamily NEOCALLIANOPSINAE subfam. nov.

Diagnosis. — Rostrum sharply triangular, bearing rostral carina. Carapace bearing median longitudinal carina with cardiac prominence, and linea thalassinica, but without dorsal oval and cardiac sulcus. Mxp3 ischium-merus rectangular; propodus rectangular; dactylus ovate; exopod absent. Abdominal pleura 2-4 unarmed ventrally; pleuron 5 armed with spine-like projection posteroventrally; abdominal somite 6 with spine-like projection anteroventrally. Uropodal exopod bearing neither dorsal plate nor lateral notch.

Remarks. — The present new subfamily Neocallianopsinae is distinguished from the Callianopsinae Manning & Felder, 1991 by the absence of a dorsal oval on the carapace.

Genus **Neocallianopsis** gen. nov.

Diagnosis. — Rostrum sharply triangular, bearing rostral carina. Carapace bearing median longitudinal carina with cardiac prominence, extending from rostral carina to posterior margin of carapace, and also bearing linea thalassinica, but without dorsal oval or cardiac sulcus. Eyestalks flattened and contiguous; lacking cornea. A2 scaphocerite present as a small process. Mxp3 ischium-merus rectangular; propodus rectangular; dactylus ovate; exopod absent. P1 chelate and unequal in size, and dissimilar in shape; in larger cheliped merus with small hook ventroproximally; palm rectangular; fingers shorter than palm; in smaller cheliped merus usually with small hook ventroproximally; fingers longer than palm. P2 chelate. P3 propodus broadened. P4 simple. P5 subchelate. Abdominal pleura 2-4 unarmed ventrally; pleuron 5 with spine-like projection posteroventrally; and abdominal somite 6 with spine-like projection anteroventrally. Male Plp1 uniramous and bisegmented, distal segment sickle-shaped; male Plp2 endopod bearing mesiomedially appendix masculina with distal setae and small appendix interna proximally; male Plps3-5 similar, endopods with finger-like appendix interna. Telson subsquare. Uropodal exopod bearing neither dorsal plate nor lateral notch.

Type species. — *Callianopsis anovalis* Lin, Komai & Chan, 2007, by present designation and monotypy. The gender of the generic name, *Neocallianopsis*, is feminine.

Species included. — *Neocallianopsis anovalis* (Lin, Komai & Chan, 2007).

Neocallianopsis anovalis (Lin, Komai & Chan, 2007)

Callianopsis anovalis Lin, Komai & Chan, 2007b: 1195, figs. 1, 2.

Material examined. — NTOU A00162, holotype, male (TL/CL, 35.0/9.4 mm), Dasi fishing port, Yilan County, Taiwan.

Remarks. — Lin et al. (2007b) described *Callianopsis anovalis* and included the species in the Ctenochelidae Manning & Felder, 1991, mentioning that the carapace bears no dorsal oval, though Manning & Felder (1991) described in the definition of *Callianopsis*, of the Callianopsinae, that the carapace has a dorsal oval, as earlier described by Hopkins & Feldmann (1997: 237). It thus seems that things were confused and complicated, because apparently there has been some kind of misunderstanding. However, according to the result of the present examination, in the genus *Callianopsis* the carapace bears a dorsal oval, and is therefore included in the subfamily Callianopsinae, in which the carapace bears a dorsal oval, although Lin et al. (2007b) described that the carapace bears no dorsal oval in their *Callianopsis anovalis*; and in the family Ctenochelidae the carapace bears no dorsal oval, though Manning & Felder (1991) included the Callianopsinae (bearing a dorsal oval on the carapace) in the Ctenochelidae (which have no dorsal oval on the carapace). Therefore, Lin et al.'s (2007b) *Callianopsis anovalis* is not to be included in the genus *Callianopsis*, for lack of a dorsal oval on the carapace, but is reclassified under the present new genus *Neocallianopsis*, which does not belong to the Callianopsinae, but to the new subfamily Neocallianopsinae subfam. nov. under the family Callianopsidae, instead of under the family Ctenochelidae.

Neocallianopsis anovalis from Taiwan is similar to *Callianopsis goniophthalma* (Rathbun, 1902) from off Point Conception, California, 513 m, in that the Mxp3 dactylus is ovate, the male Plp1 is uniramous and bisegmented, with the distal segment sickle-shaped; the male Plp2 is biramous, the endopod bears an appendix masculina with distal setae and a small appendix interna proximally; and the uropodal exopod bears neither a dorsal plate nor a lateral notch. However, they differ from each other in that in *N. anovalis* the carapace bears no dorsal oval, but bears a median longitudinal carina with a cardiac prominence, extending from the rostral carina to the posterior margin of the carapace, and the fixed finger of the larger cheliped bears no median tooth on the cutting edge. While in *C. goniophthalma* the carapace bears a dorsal oval and a cardiac prominence, but lacks a median longitudinal carina; and the fixed finger of the larger cheliped bears a distinct triangular median tooth on the cutting edge.

Type locality. — Dasi fishing port, Yilan County, Taiwan.

Distribution. — Only known from the type locality.

FAMILY CTENOCHELIDAE MANNING & FELDER, 1991

Ctenochelinae Manning & Felder, 1991: 784; Poore, 1994: 103; Hendrickx, 1995: 387 (key), fig. 8; Tudge et al., 2000: 135; Davie, 2002: 463.
Ctenochelidae — Sakai, 2005b: 235; Sakai & Sawada, 2006: 1358.

Diagnosis. — Rostrum acutely triangular and unarmed on lateral margins, bearing rostral carina extending posteriorly to gastric region. Carapace bearing neither dorsal oval nor cardiac sulcus; cardiac prominence present or absent; and linea thalassinica present. Eyestalks flattened and contiguous; cornea unpigmented. A2 scaphocerite strong. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus rectangular; propodus rectangular; dactylus digitiform; exopod present or not. P1 chelate and unequal in size, dissimilar in shape; in larger cheliped merus without hook ventroproximally, palm subglobular, fingers elongate and pectinate; in smaller cheliped merus without hook ventroproximally, fingers elongate but not pectinate. P2 chelate. P3 propodus rectangular. Male Plp1 uniramous and bisegmented or four-segmented; male Plp2 biramous and foliaceous, endopod with appendices interna and masculina mesiodistally, and male Plp2 smaller than Plps3-5. Abdominal somites 3-5 with a tuft of setae. Telson subquadrate to trapezoid. Uropodal exopod with lateral notch, but without dorsal plate.

Remarks. — Manning & Felder (1991: 784) established the family Ctenochelidae Manning & Felder, 1991, including three subfamilies, Ctenochelinae Manning & Felder, 1991 (including 4 genera, *Ctenocheles* Kishinouye, 1926; *Dawsonius* Manning & Felder, 1991; *Gourretia* De Saint Laurent, 1973; *Paracalliax* De Saint Laurent, 1979), Anacalliacinae Manning & Felder, 1991 (including one genus *Anacalliax* De Saint Laurent, 1973), and Callianopsinae Manning & Felder, 1991 (including one genus *Callianopsis* De Saint Laurent, 1973). However, it is found that the type genus *Ctenocheles* Kishinouye, 1926 in the subfamily Ctenochelinae Manning & Felder, is clearly different from the other two type genera, i.e., *Anacalliax* of the subfamily Anacalliacinae and *Callianopsis* of the subfamily Callianopsinae, in that the carapace bears no dorsal oval and the male larger cheliped bears pectinate chelae. Therefore, the Anacalliacinae and the Callianopsinae, which bear a dorsal oval on the carapace and non-pectinate chelae in the male larger cheliped, are excluded from the family Ctenochelidae.

Type genus. — *Ctenocheles* Kishinouye, 1926.

Genera included. — *Ctenocheles* Kishinouye, 1926.

Genus **Ctenocheles** Kishinouye, 1926

?*Pentacheles* Balss, 1914: 75.

Thaumastocheles — Doflein, 1906: 522 (partim).

Ctenocheles Kishinouye, 1926: 63; Powell, 1949b: 369; Holthuis, 1967: 377; De Saint Laurent, 1973: 514; Le Loeuff & Intès, 1974: 24; Poore & Griffin, 1979: 277; De Saint Laurent & Le Loeuff, 1979: 47 (key), 81; Coelho & Ramos-Porto, 1987: 29 (key), 31; Manning, 1987: 397 (list); Sakai, 1987a: 306 (list); Manning & Felder, 1991: 784, figs. 2, 7; Poore, 1994: 103 (key); Sakai, 1999a: 88; Davie, 2002: 464; Sakai, 2005b: 237.

Diagnosis. — Carapace with rostral carina with or without cardiac prominence, but without dorsal oval and transverse cardiac sulcus. Eyestalks flattened. Mxp3 usually without exopod, merus usually with spine on distal margin; propodus rectangular; and dactylus digitiform. P1 chelate, unequal, and dissimilar; in larger cheliped merus with or without median tooth; palm subglobular; fingers elongate and pectinate. P2 chelate. P3 propodus rectangular. P4 simple. P5 subchelate. Male Plp1 uniramous and bisegmented or four-segmented; male Plp2 biramous and foliaceous, endopod with appendices interna and masculina. Female Plp1 uniramous and bisegmented; female Plp2 biramous, endopod with appendix interna. Plps3-5 different from Plps1-2 in size and shape, bearing appendices internae. Telson subquadrate. Uropodal exopod with lateral notch, lacking dorsal plate. [Adapted from Sakai, 2005b.]

Type species. — *Ctenocheles balssi* Kishinouye, 1926, by original designation and monotypy. Gender of generic name, *Ctenocheles*, masculine.

Species included. — *Ctenocheles balssi* Kishinouye, 1926; *C. collini* Ward, 1945; *C. holthuisi* Rodrigues, 1978; *C. leviceps* Rabalais, 1979; *C. serrifrons* Le Loeuff & Intès, 1974; *C. maorianus* Powell, 1949a; *C.* "A", Holthuis, 1967; *C.* "B", Holthuis, 1967; *C.* sp., De Saint Laurent & Le Loeuff, 1979; *C.* sp. Coelho, 1997.

Key to the Species of the Genus *Ctenocheles*

1 – Uropods slender ..... *C. maorianus*
– Uropods broadened 2

2 – Cardiac prominence present 3
– Cardiac prominence absent 4

3 – Male Plp1 bisegmented ..... *C. serrifrons*
– Male Plp1 four-segmented ..... *C. balssi*

4 – Merus of larger cheliped with median tooth on ventral margin ..... *C. holthuisi*
– Merus of larger cheliped unarmed on ventral margin 5

5 – Ischium of larger cheliped smooth on ventral margin ..... *C. leviceps*
– Ischium of larger cheliped serrated on ventral margin ..... *C. collini*

Ctenocheles balssi Kishinouye, 1926

Thaumastocheles Doflein, 1906: 522.
?*Pentacheles* sp. nov.? — Balss, 1914: 75, fig. 43.
Ctenocheles balssi Kishinouye, 1926: 63, fig. 1; Yokoya, 1933: 55; Makarov, 1938: 76, fig. 29; Holthuis, 1967: 377; Suzuki, 1979: 296, pl. 18 fig. 234; Sakai, 1987a: 306 (list); Manning & Felder, 1991: 784 (list); Noguchi & Akamine, 1992: 25, fig. 1; Liu & Zhong, 1994: 562 (list); Matsuzawa & Hayashi, 1997: 39, 42 (in key), figs. 1-3; Sakai, 1999a: 88, figs. 1a-e, 2a-g, 3a-g; Komai, 2000b: 346 (list); Tudge et al., 2000: 142; Sakai, 2005b: 240; Sakai & Sawada, 2006: 1358, figs. 13, 14.
Ctenocheles Balssi — De Man, 1928b: 25 (list).

Diagnosis. — Cardiac prominence present. Mxp3 exopod absent. In larger cheliped ischium and merus both smooth on ventral margin. Male Plp1 four-segmented. Uropods broadened.

Type locality. — Ohsu near Kashiwasaki, Niigata Prefecture, Japan.

Distribution. — Japan, East China Sea to South China Sea (Liu & Zhong, 1994: 562).

Ctenocheles collini Ward, 1945

Ctenocheles collini Ward, 1945: 134, pl. 13; Holthuis, 1967: 377; Poore & Griffin, 1979: 277, fig. 37; Manning & Felder, 1991: 784 (list); Matsuzawa & Hayashi, 1997: 45 (in key); Sakai, 1999a: 88 (list); Tudge et al., 2000: 142; Sakai, 2005b: 241, figs. 43, 44.

Diagnosis. — Cardiac prominence absent. Mxp3 exopod absent. In larger cheliped ischium finely serrated on ventral margin; merus unarmed on ventral margin. Uropods broadened.

Type locality. — Moreton Bay, Queensland, Australia.

Distribution. — Moreton Bay, Queensland, Australia (Ward, 1945; Poore & Griffin, 1979); 15-40 m.

Ctenocheles holthuisi Rodrigues, 1978

Ctenocheles holthuisi Rodrigues, 1978: 113, figs. 1-21; Coelho & Ramos-Porto, 1987: 31; Manning, 1987: 397 (list); Manning & Felder, 1991: 784 (list); Coelho, 1997: 150; Matsuzawa & Hayashi, 1997: 45 (in key); Rodrigues et al., 1998: 382; Melo, 1999: 392, figs. 263-264; Sakai, 1999a: 88 (list); Tudge et al., 2000: 142; Sakai, 2005b: 239; Coelho et al., 2007: 5 (tab. 2).

Diagnosis. — Cardiac prominence absent. Mxp3 ischium-merus pediform; merus armed with a strong distomedian spine; exopod vestigial. In larger cheliped ischium serrated on ventral margin; merus with median tooth on

ventral margin. Plps1-2 unknown. Telson pentagonal, and convex on posterior margin; uropods broadened. [Cf. Rodrigues, 1978: 113, figs. 1-10, 1-21.]

Type locality. — Off mouth of Rio São Francisco, Brazil, 10°37′09″S 36°14′00″W, 75 m.

Distribution. — Brazil — Alagoas (Coelho, 1997); off mouth of Rio São Francisco (Rodrigues, 1978; Coelho & Ramos-Porto, 1987); 75 m.

Ctenocheles leviceps Rabalais, 1979

Ctenocheles leviceps Rabalais, 1979: 295, figs. 2-29; Rabalais et al., 1981: 100; Manning, 1987: 397 (list); Williams et al., 1989: 28; Manning & Felder, 1991: 784 (list), fig. 7; Matsuzawa & Hayashi, 1997: 45 (in key); Sakai, 1999a: 88 (list); Tudge et al., 2000: 142; Sakai, 2005b: 239.

Diagnosis. — Cardiac prominence absent. Mxp3 exopod vestigial. In larger cheliped ischium and merus unarmed on ventral margin, respectively. Uropods broadened.

Type locality. — Port Aransas, Texas, U.S.A., 27°38′N 96°41′W.

Distribution. — Texas — Port Aransas (Rabalais, 1979); Gulf of Mexico (Rabalais et al., 1981); 10-49 m.

Ctenocheles maorianus Powell, 1949

Ctenocheles maorianus Powell, 1949a: 408; Powell, 1949b: 369, pl. 68 figs. 3-7; Dell, 1956: 149; Holthuis, 1967: 378; Manning & Felder, 1991: 784 (list); Dworschak, 1992: 209, figs. 12a-b, 13a-c; Matsuzawa & Hayashi, 1997: 45 (in key); Sakai, 1999a: 88 (list); Tudge et al., 2000: 142; Sakai, 2005b: 243.

Diagnosis. — Rostrum very short and acute, reaching proximal third of eyestalks. Uropods slender. [Adapted from Dworschak, 1992.]

Type locality. — Hauraki Gulf, New Zealand.

Distribution. — New Zealand — Hauraki Gulf, Tiritiri Island, off Plate Island, Bay of Plenty and Tasman Bay (Powell, 1949a); off Cape Runaway, off Kaikoura, Marlborough, Castlecliffian (upper Pleistocene) near Castlecliff (Holthuis, 1967); Little Town (Dworschak, 1992); 35-73 m.

Ctenocheles serrifrons Le Loeuff & Intès, 1974

Ctenocheles sp. Crosnier, 1969: 536, fig. 18.

Ctenocheles serrifrons Le Loeuff & Intès, 1974: 24, fig. 3a-u; De Saint Laurent & Le Loeuff, 1979: 83; Manning & Felder, 1991: 784 (list), fig. 2; Matsuzawa & Hayashi, 1997: 42 (in key); Sakai, 1999a: 88 (list); Tudge et al., 2000: 142; Sakai, 2005b: 238.

Diagnosis. — Cardiac prominence present. Mxp3 exopod vestigial. Larger cheliped unknown. Male Plp1 bisegmented. Uropods broadened.

Type locality. — Ivory Coast, 5°2′N 5°4.5′W; 50 m.
Distribution. — Only known from the type locality.

Ctenocheles "A", Holthuis, 1967

Ctenocheles "A", Holthuis, 1967: 379, figs. 1, 2a; Manning, 1987: 397 (list); Manning & Felder, 1991: 784 (list); Sakai, 1999a: 88; Sakai, 2005b: 240.

Distribution. — Strait of Florida; 109-406 m (Holthuis, 1967).

Ctenocheles "B", Holthuis, 1967

Ctenocheles "B", Holthuis, 1967: 382, fig. 2b; Manning, 1987: 398 (list); Manning & Felder, 1991: 784 (list); Sakai, 1999a: 88; Sakai, 2005b: 240.

Distribution. — Colombia (Holthuis, 1967).

Ctenocheles sp. De Saint Laurent & Le Loeuff, 1979

Ctenocheles sp., De Saint Laurent & Le Loeuff, 1979: 83, fig. 25; Sakai, 1999a: 88 (list); Sakai, 2005b: 239.

Distribution. — Gabon; Benin; 48-110 m (De Saint Laurent, 1979).

Ctenocheles sp. Coelho, 1997

Ctenocheles sp., Coelho, 1997: 150.

Distribution. — Amapá and Rio Grande do Sul, Brazil.

FAMILY EUCALLIACIDAE MANNING & FELDER, 1991 **(SENSU NOV.)**

Eucalliinae Manning & Felder, 1991: 781 [misspelling].
Eucalliacinae — Sakai, 1999c: 108; Ngoc-Ho, 2003: 487; Sakai, 2005b: 195.

Diagnosis. — Carapace with or without dorsal oval. Maxilla 2 scaphognathite without posterior whip. Mxp3 propodus broadened; dactylus subtriangular or digitiform. P1 chelate, unequal, and dissimilar, lacking meral hook in both chelipeds. Uropodal exopod with dorsal plate but without lateral notch.

Subfamilies included. — Calliapaguropinae Sakai, 1999c; Eucalliacinae Manning & Felder, 1991.

KEY TO THE SUBFAMILIES OF THE FAMILY EUCALLIACIDAE

1 – Mxp3 dactylus subovate or subtriangular ..... Eucalliacinae
– Mxp3 dactylus digitiform ..... Calliapaguropinae

Subfamily CALLIAPAGUROPINAE Sakai, 1999

Calliapaguropinae Sakai, 1999c: 7; Sakai, 2005b: 205.

Diagnosis. — Rostrum narrowly elongate, lacking rostral carina. Carapace without dorsal oval (in sensu Ngoc-Ho, 2002a, with faint dorsal oval), cardiac prominence, or hepatic sulcus. Eyestalks cylindrical and set apart. Abdominal somite 6 lacking lateral projections. A2 peduncle remarkably thick; A2 scaphocerite present as a small process. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus suboperculiform, bearing meral teeth; propodus subtriargular; dactylus digitiform. P1 chelate, unequal, and dissimilar, lacking meral hook in both chelipeds. P2 chelate. P3 propodus broadened. Ps4-5 chelate. Male Plp1 uniramous, slender, and bisegmented. Male Plp2 biramous and blade-like, endopod with appendix interna. Female Plp2 biramous and blade-like, endopod with appendix interna. Male and female Plps1-2 smaller than Plps3-5. Plps3-5 biramous and foliaceous, endopods with appendix interna in both sexes. Uropodal exopod with dorsal plate. [Cf. Sakai, 2005b: 206.]

Remarks. — Ngoc-Ho (2003: 486) included *Calliapagurops* in the Callichirinae sensu Tudge et al. (2000). However, *Calliapagurops* is different

from *Callichirus*, type genus of the Callichirinae. In the type species of *Calliapagurops*, *C. charcoti* De Saint Laurent, 1973, the carapace bears no dorsal oval, the eyestalks are cylindrical and set apart, and the corneae are present distally; the male Plp2 endopod bears mesiodistally a small appendix interna. Whereas in the type species of *Callichirus*, *C. major* (Say, 1818), the carapace bears a dorsal oval, the eyestalks are flattened and contiguous; and the male Plp2 endopod bears neither an appendix interna nor an appendix masculina. As a result, *Calliapagurops* is not included in the Callichirinae, but in the Calliapaguropinae.

Type genus. — *Calliapagurops* De Saint Laurent, 1973.

Genus included. — *Calliapagurops* De Saint Laurent, 1973 is the only known genus so far.

Genus **Calliapagurops** De Saint Laurent, 1973

Calliapagurops De Saint Laurent, 1973: 515; Sakai, 1999c: 8; Ngoc-Ho, 2002a: 540; Sakai, 2005b: 207.

Diagnosis. — Male Plp1 uniramous and bisegmented, distal segment pointed distally; male Plp2 biramous and blade-like, endopod with appendix interna mesiodistally, but without appendix masculina.

Type species. — *Calliapagurops charcoti* De Saint Laurent, 1973, by original designation. Gender of the generic name, *Calliapagurops*, masculine.

Species included. — *Calliapagurops charcoti* De Saint Laurent, 1973; *C. foresti* Ngoc-Ho, 2002a.

Key to the Species of the Genus *Calliapagurops*

1 – Mxp3 merus with 3-4 spines on distal margin; eyestalks not narrowing distally, corneas as wide as proximal part of eyestalks, overreaching distal end of A1 penultimate segment . . . . . *C. charcoti*

– Mxp3 merus with 6-10 spines on distal margin; eyestalks narrowing distally, corneas small, not reaching distal end of A1 penultimate segment . . . . . *C. foresti*

Calliapagurops charcoti De Saint Laurent, 1973

Calliapagurops charcoti De Saint Laurent, 1973: 515; Manning & Felder, 1991: 771; Sakai, 1999c: 8, fig. 1a-e; d'Udekem d'Acoz, 1999: 155; Tudge et al., 2000: 143; Costello et al., 2001: 289; Türkay, 2001: 289; Ngoc-Ho, 2002a: 540; Ngoc-Ho, 2003: 487, fig. 16; Sakai, 2005b: 207.

Diagnosis. — Eyestalks not narrowing distally; corneas as wide as proximal part of eyestalks, overreaching distal end of A1 penultimate segment. Mxp3 merus with 3-4 spines on distal margin.

Type locality. — Off Azores Is. near Flores Islands, Sta. 109, 39°33′N 31°17′W, 190-230 m; Expedition "Biacores", 1971, R/V "Jean Charcot".

Distribution. — Only known from the type locality.

Calliapagurops foresti Ngoc-Ho, 2002

Calliapagurops foresti Ngoc-Ho, 2002a: 539, figs. 1-3; Sakai, 2005b: 208.

Diagnosis. — Eyestalks narrowing distally; corneas small, not reaching distal end of A1 penultimate segment. Mxp3 merus with 6-10 spines on distal margin.

Remarks. — Ngoc-Ho (2002a: 546) mentioned two differentiating characters: (1) the eyestalks are narrowing distally, and the corneas are small in *C. foresti* (vs. the eyestalks are not narrowing distally, and the corneas are as wide as the proximal part of the eyestalks in *C. charcoti*); (2) the Mxp3 merus bears 3-10 spines on the distal margin in *C. foresti* (vs. 3-4 spines on that margin in *C. charcoti*).

Type locality. — Philippines, MUSORSTOM 2, Sta. 71, 14°00.1′N 120°17.8′E, 192 m.

Distribution. — Only known from the type locality.

Subfamily EUCALLIACINAE Manning & Felder, 1991 **(sensu nov.)**

Eucalliinae Manning & Felder, 1991: 781 (misspelling).
Eucalliacinae — Sakai, 1999c: 108; Ngoc-Ho, 2003: 487; Sakai, 2005b: 195.

Diagnosis. — Rostrum developed or reduced, lacking rostral carina. Carapace with or without dorsal oval, and with or without cardiac prominence and cardiac sulcus(i). Eyestalks flattened and contiguous. A2 scaphocerite developed as a small process. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus subpediform; propodus subrectangular or subquadrate; dactylus subtriangular or subovate; exopod present or not. P1 chelate, unequal or subequal in size, and similar or dissimilar in shape, lacking meral hook in both chelipeds. P2 chelate. P3 propodus broadened. P4 simple. P5 chelate. Abdominal somite 6 without lateral projections. Male Plp1 present; male Plp2 biramous, endopod with appendices masculina and interna, or with either appendix interna or appendix masculina. Plps3-5 biramous and foliaceous, endopods bearing appendix interna in both sexes. Uropodal endopod oval or subtriangular; uropodal exopod with dorsal plate. [Adapted from Sakai, 2005b.]

Remarks. — In the previous revision (Sakai, 2005b), *Calliax* De Saint Laurent, 1973 was stated to be the type genus of the Eucalliacinae, because

the type genus of the Eucalliacinae, *Eucalliax* Manning & Felder, 1991 was considered to be a junior synonym of *Calliax* on account of its similarity to *Calliax* in the shapes of male Plp2 and Mxp3. However, it has turned out that they are different from each other in the shapes of male Plp1, telson, and uropodal endopod, so that *Eucalliax* is safely defined again as the type genus of the Eucalliacinae.

The genus *Calliaxina* Ngoc-Ho, 2003 was established by designating *C. punica* as the type species, which is characterized by the presence of the Mxp3 exopod, and including two other species. However, such a characteristic is not of vital importance in distinguishing the genera, but, in contrast, the presence of (a) cardiac sulcus(i) on the carapace is considered to be much more important in the classification of the genera. In the present revision, the classification made by applying the presence of (a) sulcus(i) proposes that *Calliaxina* Ngoc-Ho, 2003, until now including three species, should be expanded, now including 8 species and thus presenting a new concept.

Type genus. — *Eucalliax* Manning & Felder, 1991, by original designation, and as the nominate genus.

Genera included. — *Andamancalliax* gen. nov.; *Calliax* De Saint Laurent, 1973; *Calliaxina* Ngoc-Ho, 2003 (sensu nov.); *Eucalliax* Manning & Felder, 1991; *Eucalliaxiopsis* gen. nov.; *Paraglypturus* Türkay & Sakai, 1995; *Pseudocalliax* gen. nov.

KEY TO THE GENERA OF THE SUBFAMILY EUCALLIACINAE

1 – Cardiac sulcus present ..... *Calliaxina* sensu nov.
– Cardiac sulcus absent 2

2 – Mxp3 exopod present 3
– Mxp3 exopod absent 4

3 – Male Plp1 small and simple ..... *Pseudocalliax* gen. nov.
– Male Plp1 uniramous and bisegmented, distal segment chelate ..... *Paraglypturus*

4 – Rostrum obscurely present 5
– Rostrum triangular 6

5 – Male Plp1 distal segment simple ..... *Eucalliax*
– Male Plp1 distal segment sickle-shaped ..... *Calliax*

6 – Male Plp1 distal segment emarginate distally ..... *Andamancalliax* gen. nov.
– Malpe Plp1 distal segment strongly incurvate distally ..... *Eucalliaxiopsis* gen. nov.

Genus **Andamancalliax** gen. nov.

Diagnosis. — Carapace without dorsal oval. Cardiac sulcus absent. Mxp3 ischium-merus rectangular; propodus subquadrate, and rounded ventrally;

dactylus subtriangular and truncate distally, with thick setae; exopod absent. Male Plp1 uniramous and bisegmented, distal segment shorter than proximal one, and emarginate distally; male Plp2 biramous, endopod bearing mesiodistally appendix masculina with long apical setae, but no appendix interna. Telson subsquare. Uropodal exopod with dorsal plate.

Type species. — *Calliax andamanica* Sakai, 2002, by present designation and monotypy. The gender of the generic name, *Andamancalliax*, is feminine.

Species included. — *Andamancalliax andamanica* (Sakai, 2002).

Etymology. — The new genus is named after the type locality of the type species by adding Andaman as a prefix to *Calliax*.

Andamancalliax andamanica (Sakai, 2002)

Calliax andamanica Sakai, 2002: 463, figs. 1A-G, 2A-D; Sakai, 2005b: 201.

Diagnosis. — Rostrum triangular in dorsal view, reaching distal part of eyestalks. Eyestalks with cornea distally. Mxp3 ischium-merus rectangular; propodus subquadrate, and rounded ventrally; dactylus subtriangular and longer than propodus, and truncate distally, with thick setae; exopod absent. P1 unequal. Male Plp1 uniramous and bisegmented, distal segment shorter than proximal one, and emarginate distally; male Plp2 biramous, endopod bearing mesiodistally distinct appendix masculina with long apical setae, but no appendix interna. Telson subsquare. Uropodal exopod with dorsal plate. [Cf. Sakai, 2002: 463, figs. 1D, C, 2A.]

Type locality. — Andaman Sea, 9°30.364′N 97°57.346′E, 42.5 m, sand with shell fragments.

Distribution. — Andaman Sea (7°44.638′N 98°16.496′E; 7°45.002′N 98°15.103′E; 9°30.364′N 97°57.346′E, 30.5-70.0 m, coarse and fine sand, mud, sandy mud, with shell fragments).

Genus **Calliax** De Saint Laurent, 1973

Calliax De Saint Laurent, 1973: 514; Manning, 1987: 397; Sakai, 1987a: 306; Sakai, 1988: 61; Manning & Felder, 1991: 783, figs. 3, 15f-j; Poore, 1994: 101; Sakai, 1999c: 109; Davie, 2002: 459; Sakai, 2005b: 196.

Diagnosis. — Carapace without dorsal oval and cardiac sulcus. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus rectangular; propodus subtriangular or subquadrate dactylus subtriangular and truncate distally, with thick setae; exopod absent. P1 unequal in size and dissimilar in shape. Male Plp1 uniramous and bisegmented, distal segment sickle-shaped;

male Plp2 biramous, endopod mesiodistally with stout appendix masculina exceeding distal margin of endopod; appendix interna present or absent. Telson convex distally. Uropodal endopod oval and much longer than telson; uropodal exopod with dorsal plate. [Cf. Ngoc-Ho, 2003: 490, figs. 17, 18.]

Type species. — *Calliax lobata* De Gaillande & Lagardère, 1966, by original designation. The gender of the generic name, *Calliax*, is feminine.

Species included. — *Calliax doerjesti* Sakai, 1999c; *Calliax lobata* De Gaillande & Lagardère, 1966.

KEY TO THE SPECIES OF THE GENUS *CALLIAX*

1 – Eyestalks rounded distally; telson broader than long, narrowing in posterior half toward straight posterior margin ..... *C. doerjesti*
– Eyestalks triangular distally; telson broader than long, slightly narrowing laterally toward rounded posterior margin ..... *C. lobata*

Calliax doerjesti Sakai, 1999

Calliax doerjesti Sakai, 1999c: 112, figs. 27d-g, 28, 29a-f; Sakai, 2005b: 199.

Diagnosis. — Carapace without dorsal oval or cardiac sulci. Mxp3 ischium-merus subrectangular; merus subtriangular; propodus subquadrate; dactylus subtriangular and truncate distally, with thick setae; exopod absent. P1 unequal. Male Plp1 uniramous and bisegmented, distal segment curved distally, with pointed tip; male Plp2 biramous, endopod mesiomedially with stout appendix masculina exceeding distal margin of endopod; appendix interna absent. Telson subrectangular, posterior margin broadly convex, lacking median spine. Uropodal exopod with dorsal plate. [Cf. Sakai, 1999c: 112, figs. 27g, 28, 29e.]

Type locality. — Florida Bay, Key Largo, U.S.A.

Distribution. — Only known from the type locality.

Calliax lobata (De Gaillande & Lagardère, 1966)

[Abbreviated list of synonymy.]

Callianassa (*Callichirus*) *lobata* De Gaillande & Lagardère, 1966: 259, pls. 1-4.

Calliax lobata — De Saint Laurent & Božić, 1976: 28, figs. 7, 15, 23, 27, 34; Sakai, 1999c: 110, fig. 27a-c; Sakai, 2000: 110, figs. 27a-c; Costello et al., 2001: 289; Ngoc-Ho, 2003: 490, figs. 17, 18; Sakai, 2005b: 197.

Diagnosis. — Carapace without dorsal oval or cardiac sulcus. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus subrectangular; merus subtriangular; propodus subtriangular; dactylus subtriangular; exopod

absent. Male Plp1 uniramous and bisegmented, distal segment curved distally, with pointed tip; male Plp2 biramous, endopod bearing mesiomedially distinct appendix masculina extending over distal margin of endopod, and small and slender appendix interna. Telson slightly wider than long and rounded on posterior margin. Uropodal exopod with dorsal plate. [Cf. Sakai, 1999c, fig. 27b.]

Type locality. — Port Miou, Toulon, France, Mediterranean; 2-8 m.

Distribution. — Port Miou, Toulon, France, Mediterranean, 2-8 m (de Gaillande & Lagardère, 1966); Patraikos Gulf, Greece, 15 m, sandy mud (Thessalou-Legaki, 1985, 1986).

Genus **Calliaxina** Ngoc-Ho, 2003 **(sensu nov.)**

Calliaxina Ngoc-Ho, 2003: 493.

Diagnosis. — Carapace without dorsal oval, but with cardiac sulcus (or sulci). Mxp3 ischium-merus subrectangular; propodus subtriangular or approximately so; dactylus subovate or subtriangular; exopod present or absent. P1 subequal. Male Plp1 uniramous and bisegmented, distal segment simple or subchelate distally, with or without appendix inerna; male Plp2 biramous, endopod bearing mesiomedially appendix masculina with apical setae, and a small appendix interna. Telson straight on posterior margin. Uropodal endopod oval and much longer than telson; uropodal exopod with dorsal plate.

Remarks. — Ngoc-Ho (2003: 487) established the genus *Calliaxina* Ngoc-Ho, 2003 by designating *C. punica* De Saint Laurent & Manning, 1982, as the type species, mentioning that "This work considers the presence of an exopod on the Mxp3 an important taxonomic character", and included two other species (*Calliaxina novaebritanniae* and *C. sakaii*) in *Calliaxina*. However, in the present revision 5 species (*Calliax jonesi* Heard, 1989, *C. aequimana* (Baker, 1907), *C. bulimba* (Poore & Griffin, 1979), *Eucalliax mcilhennyi* Felder & Manning, 1994, and the recent species, *E. panglaoensis* (Dworschak, 2006)) are also included in *Calliaxina*, because they have in common with one another such characteristics as the presence of a cardiac sulcus or sulci, and the typical forms of Mxp3 ischium-merus, propodus, and dactylus, though four of them have no Mxp3 exopod.

Type species. — *Calliax punica* De Saint Laurent & Manning, 1982, by original designation. The gender of the generic name, *Calliaxina*, is feminine.

Species included. — *Calliaxina aequimana* (Baker, 1907); *C. bulimba* (Poore & Griffin, 1979); *C. jonesi* (Heard, 1989); *C. mcilhennyi* (Felder & Manning, 1994); *C. novaebritanniae* (Borradaile, 1900); *C. panglaoensis*

(Dworschak, 2006); *C. punica* De Saint Laurent & Manning, 1982; *C. sakaii* De Saint Laurent & Le Loeuff, 1979.

KEY TO THE SPECIES OF THE GENUS *CALLIAXINA*

1 – Mxp3 exopod absent 2
– Mxp3 exopod present 5

2 – Male Plp1 uniramous and bisegmented, distal segment with median lobe . . . . . *C. aequimana*
– Male Plp1 uniramous and bisegmented, distal segment subchelate 3

3 – Male Plp1 longer branch of subchela incurvate distally and shorter one bilobed distally . . . . . *C. jonesi*
– Male Plp1 longer branch of subchela incurvate distally and shorter one simple distally 4

4 – Male Plp1 longer branch of subchelate distal segment obtuse distally . . . . . *C. panglaoensis*
– Male Plp1 longer branch of subchelate distal segment pointed distally . . . *C. mcilhennyi*

5 – Mxp3 exopod rudimentary . . . . . *C. bulimba*
– Mxp3 exopod distinct 6

6 – A1 peduncle reaching distal margin of A2 penultimate segment . . . . . *C. punica*
– A1 peduncle overreaching distal margin of A2 penultimate segment 7

7 – Mxp3 exopod elongate, overreaching ischium . . . . . *C. novaebritanniae*
– Mxp3 exopod short . . . . . *C. sakaii*

Calliaxina aequimana (Baker, 1907)

Callianassa aequimana Baker, 1907: 182-185, pl. 24 figs. 1-8; Hale, 1927a: 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, 1928b: 29 (partim). [Not *Callianassa novae-britanniae* Borradaile, 1900.]
Callianassa (*Callichirus*) *novae-britanniae* var. — De Man, 1928b: 114.
Calliax aequimana — De Saint Laurent & Manning, 1982: 222; Sakai, 1988: 222; Sakai, 1999c: 118, fig. 31a-e; Tudge et al., 2000: 145; Davie, 2002: 459; Sakai, 2005b: 202.

Diagnosis. — Carapace without dorsal oval, but with cardiac sulcus. Mxp3 ischium-merus subovate; propodus subtriangular and broader proximally than distally; dactylus subovate; exopod absent. P1 subequal, in larger cheliped ischium denticulate on ventral margin. Male Plp1 uniramous and bisegmented, distal segment with median lobe, and obtuse distally; male Plp2 biramous, endopod bearing mesiomedially distinct appendix masculina with a small appendix interna subproximally. Telson wider than long and slightly concave on posterior margin. Uropodal exopod with dorsal plate. [Cf. Poore & Griffin, 1979: 245, figs. 12c, 13f, i, j.]

Remarks. — Poore & Griffin (1979: 257) mentioned that "This species (*Callianassa bulimba* Poore, 1979) is closely related to *C. aequimana* common in southern Australia". However, those two species are different. In *C. aequimana* the rostrum is reduced, the cardiac sulcus is incomplete, and Mxp3 lacks an exopod; whereas in *C. bulimba* the rostrum is triangular, the cardiac sulcus is complete, and Mxp3 bears a rudimentary exopod.

Type locality. — Kingston, in the south of Western Australia.

Distribution. — Intertidal and subtidal mudflats down to 9 m, often in estuaries; southern Queensland through N.S.W., Victoria, South Australia, to the south of Western Australia (Poore & Griffin, 1979).

Calliaxina bulimba (Poore & Griffin, 1979)

Callianassa bulimba Poore & Griffin, 1979: 257, fig. 21.
Calliax bulimba — De Saint Laurent & Manning, 1982: 222; Sakai, 1999c: 119, fig. 32a-c; Sakai, 2005b: 202.

Diagnosis. — Rostrum triangular, reaching proximal third of eyestalks. Eyestalks contiguous except for distal part shaped as triangle; cornea distinct and located at distal third. Mxp3 propodus subquadrate, with three proximal teeth; dactylus subovate; exopod rudimentary. Telson widest on proximal margin, slightly narrowing and curving to straight posterior margin. [Adapted from Poore & Griffin, 1979.]

Type locality. — Mud Island, Moreton Bay, Queensland Australia.

Distribution. — Only known from the type locality.

Calliaxina jonesi (Heard, 1989)

Calliax jonesi Heard, 1989: 129, figs. 1-5; Sakai, 1999c: 116; Sakai, 2005b: 200.
Eucalliax jonesi — Tudge et al., 2000: 145.

Diagnosis. — Carapace without dorsal oval, but with cardiac sulcus. Mxp3 ischium-merus subrectangular; merus triangular; propodus subtriangular; dactylus subtriangular; exopod absent. Male Plp1 uniramous and bisegmented, distal segment subchelate distally, longer branch of subchela incurvate distally and shorter one bilobed distally; male Plp2 biramous, endopod bearing mesiodistally distinct appendix masculina with a small, proximally-fused appendix interna subproximally. Telson subrectangular, weakly trilobate on posterior margin. Uropodal exopod with dorsal plate. [Cf. Heard, 1989: 129, figs. 3E, 4F, 5A, C.]

Remarks. — The present species was included in *Calliax*, but it belongs to *Calliaxina*, because in *Calliax* the carapace bears no cardiac sulcus, and Plp1

is not subchelate but sickle-shaped distally; whereas in *Calliaxina* the carapace bears a cardiac sulcus, and Plp1 is subchelate distally.

Type locality. — Bimini Harbor, Bahamas, 25°44′N 79°15′W, 3-5 m.

Distribution. — Only known from the type locality.

Calliaxina mcilhennyi (Felder & Manning, 1994)

Eucalliax mcilhennyi Felder & Manning, 1994: 341, figs. 1-6.
Calliax mcilhennyi — Sakai, 1999c: 116; Sakai, 2005b: 200.

Diagnosis. — Carapace without dorsal oval, but with cardiac sulcus. Mxp3 ischium-merus subovate; merus subtriangular; propodus subtriangular; dactylus subtriangular; exopod absent. Male Plp1 uniramous and bisegmented, distal segment subchelate distally; longer branch incurvate and truncate distally, and shorter one simple distally; male Plp2 biramous, endopod bearing mesiomedially a distinct appendix masculina with a small appendix interna subproximally. Telson wider than long, posterior margin slightly concave. Uropodal exopod with dorsal plate. [Cf. Felder & Manning, 1994: 341, figs. 1-6.]

Remarks. — The present species, *Calliaxina mcilhennyi*, which was included in *Calliax*, is reclassified here under *Calliaxina*, because it bears a cardiac sulcus on the carapace.

Type locality. — Indian River lagoon, St. Lucie County (27°27.7′N 80°18.7′W), Florida, sandflat with sparse seagrass, south side of Fort Pierce Inlet.

Distribution. — Santa Marta, Colombia; Indian River lagoon, St. Lucie County, Florida.

Calliaxina novaebritanniae (Borradaile, 1900)

[Abbreviated list of synonymy.]
Callianassa novae-britanniae Borradaile, 1900: 419, pl. 39 fig. 14a-d.
Calliax novaebritanniae — De Saint Laurent & Manning, 1982: 211-224, figs. 1c, 2b, 6c; Sakai, 2005b: 202.
Paraglypturus novaebritanniae — Sakai, 1999c: 123, fig. 32d-f.
Calliaxina novaebritanniae — Ngoc-Ho, 2003: 493.

Diagnosis. — Carapace without dorsal oval, but with cardiac sulcus. Mxp3 ischium-merus subovate; merus subquadrate; propodus subtriangular; dactylus subtriangular, distal margin truncate, with setae; exopod long, overreaching ischium. Male Plp1 uniramous and bisegmented, distal segment subchelate, with appendix interna; Plp2 biramous, endopod bearing appendix masculina with a small appendix interna. Telson wider than long, and posterior margin

almost straight. Uropodal exopod with dorsal plate. [Cf. De Man, 1928a: 49; Sakai, 1999c: 123, fig. 32c, f.]

Remarks. — The present species is included in *Calliaxina* by the form of the male Plps1-2 and the presence of a cardiac sulcus.

Type locality. — New Britain.

Distribution. — New Britain, Papua New Guinea.

Calliaxina panglaoensis (Dworschak, 2006)

Eucalliax panglaoensis Dworschak, 2006: 349, figs. 1-7.

Diagnosis. — Rostrum without rostral carina. Carapace without dorsal oval, but with cardiac sulcus. Mxp3 ischium-merus rectangular; propodus subtriangular; dactylus subovate; exopod absent. Male Plp1 uniramous and bisegmented, distal segment subchelate, longer branch and shorter branch both obtuse distally; male Plp2 biramous, endopod bearing mesiomedially a distinct appendix masculina and a small appendix interna subproximally. Telson about 1.6 times as wide as long, and posterior margin straight. Uropodal exopod with dorsal plate. [Quoted from Dworschak, 2006.]

Remarks. — The present species *Calliaxina panglaoensis* (Dworschak, 2006) was described as a species of the genus *Eucalliax*. However, it is not included in *Eucalliax*, but in *Calliaxina*, because in *Eucalliax* the carapace bears no cardiac sulcus, whereas in *Calliaxina* it bears a cardiac sulcus.

Type locality. — Alona Beach, Panglao Isl., Bohol, Philippines, 09°32.9′N 123°46.6′E, intertidal.

Distribution. — Only known from the type locality.

Calliaxina punica (De Saint Laurent & Manning, 1982)

[Abbreviated list of synonymy.]

Calliax punica De Saint Laurent & Manning, 1982: 211-224, figs. 1-6; Sakai, 2005b: 198; Sakai & Sawada, 2006: 1357.

Paraglypturus punica — Sakai, 1999c: 122; Costello et al., 2001: 289; Sakai, 2005b: 205.

Calliaxina punica — Ngoc-Ho, 2003: 496, figs. 19, 20.

Diagnosis. — Carapace without dorsal oval. Cardiac sulcus present. Mxp3 ischium-merus subovate; merus subquadrate; propodus subquadrate; dactylus subquadrate; exopod distinct. Male Plp1 uniramous and bisegmented, distal segment subchelate distally, exceptionally bearing appendix interna mesiomedially; male Plp2 biramous, endopod bearing mesiomedially a distinct appendix masculina with a small appendix interna subproximally. Telson wider than long. Uropodal exopod with dorsal plate.

Remarks. — The present species is included neither in the genus *Paraglypturus*, nor in the genus *Calliax*, in neither of which the carapace bears any sulcus, but instead in *Calliaxina*, in which the carapace does bear a sulcus.

Type locality. — Gulf of Tunisia.

Distribution. — Salammbô, Tunisia (De Saint Laurent & Božić, 1976); Port of Carthago, Tunisia (De Saint Laurent & Manning, 1982); Sardegna (= Sardinia), and Naples, Italy (De Saint Laurent & Manning, 1982); southern Euboikos Gulf, Messolongi lagoon, Salamina, Saronikos Gulf, Crete, Greece (Thessalou-Legaki, 1986).

Calliaxina sakaii (De Saint Laurent & Le Loeuff, 1979)

[Abbreviated list of synonymy.]
Callianassa (*Callichirus*) *novaebritanniae* — Sakai, 1966: 161, figs. 1-4. [Not Borradaile, 1900.]
Calliax sakaii De Saint Laurent & Le Loeuff, 1979: 95; Sakai, 2005b: 2003.
Paraglypturus sakaii — Sakai, 1999c: 124, fig. 33d, e.
Calliaxina sakaii — Ngoc-Ho, 2003: 493; Itani, 2007: 203.

Diagnosis. — Carapace without dorsal oval but cardiac sulcus present. Mxp3 ischium-merus subovate; merus subquadrate; propodus subtriangular; dactylus subtriangular; exopod short. Male Plp1 uniramous and bisegmented, distal segment subchelate distally, longer branch incurvate and shorter one bilobed distally, bearing appendix interna; male Plp2 biramous, endopod bearing mesiomedially a distinct appendix masculina with a small appendix interna subproximally. Telson wider than long and posterior margin straight. Uropodal exopod with dorsal plate. [Cf. Sakai, 1966: 161, figs. 1c, 2g, 4a, c.]

Type locality. — Tomioka, Amakusa, Japan, intertidal under *Zostera* vegetation.

Distribution. — Urauch-gawa, Iriomote Is., Ryukyu Archipelago (Itani, 2007); Amakusa, East China Sea (Sakai, 1966).

Genus **Eucalliax** Manning & Felder, 1991

Eucalliax Manning & Felder, 1991: 781, figs. 7, 15a-e; Poore, 1994: 101.
Eucalliax s. str. — Felder, 2001: 440.

Diagnosis. — Carapace without dorsal oval and cardiac sulcus. Mxp3 ischium-merus rectangular; propodus subsquare; dactylus subtriangular; exopod absent. Male Plp1 uniramous and bisegmented, distal segment simple and obtuse distally; male Plp2 biramous, endopod bearing distally a distinct

appendix masculina with setae, and an appendix interna subdistally on the lateral margin (Biffar, 1970, fig. 2m). Telson distinctly wider than long. Uropodal exopod with dorsal plate. [Cf. Sakai, 1999c: 117, fig. 30C.]

Remarks. — The genus *Eucalliax* Manning & Felder, 1991 is very similar to the genus *Eucalliaxiopsis* gen. nov., but they differ in that in *Eucalliaxiopsis* the male Plp1 is uniramous and bisegmented, but the distal segment is broadened medially and strongly incurvate distally, and the male Plp2 endopod bears mesiomedially a distinct appendix masculina with setae, provided subproximally with a small, proximally-fused protrusion as appendix interna.

Type species. — *Callianassa quadracuta* Biffar, 1970, by original designation and monotypy. The gender of the generic name, *Eucalliax*, is feminine.

Species included. — *Eucalliax quadracuta* (Biffar, 1970).

Eucalliax quadracuta (Biffar, 1970)

Callianassa quadracuta Biffar, 1970: 40, fig. 2; Biffar, 1971a: 694, figs. 17, 18. [Type species of *Eucalliax* Manning & Felder, 1991.]

Calliax quadracuta — De Saint Laurent & Manning, 1982: 222; Manning, 1987: 397; Sakai, 1999c: 117, fig. 30a-c; Sakai, 2005b: 200.

Eucalliax quadracuta — Manning & Felder, 1991: 781; Tudge et al., 2000: 145.

Diagnosis. — Cardiac sulci absent. Mxp3 ischium-merus rectangular; merus subquadrate; propodus subsquare; dactylus subtriangular; exopod absent. Male Plp1 uniramous and bisegmented, distal segment simple and obtuse distally; male Plp2 biramous, endopod distally bearing a distinct appendix masculina with setae, and an appendix interna subdistally on the lateral margin; Plps3-5 with appendix interna. Telson wider than long, posterior margin convex medially. Uropodal exopod with dorsal plate. [Cf. Biffar, 1970: 40, fig. 2f, i, k, m; Sakai, 1999c: 117, fig. 30b.]

Type locality. — Venezuela, Cumaná.

Distribution. — Gulf of Uraba, Colombia, Caribbean coast; Cumaná, Venezuela.

Genus **Eucalliaxiopsis** gen. nov.

Diagnosis. — Carapace without dorsal oval or cardiac sulci. Mxp3 ischium-merus suboperculiform; propodus subtriangular; dactylus subtriangular; exopod absent. Male Plp1 uniramous and bisegmented, distal segment broadened medially and incurvate distally, bearing long marginal setae; male Plp2 biramous, endopod bearing mesiomedially a distinct appendix masculina overreaching top of endopod, provided subproximally with small, proximally-fused protrusion as appendix interna. Telson wider than long, posterior margin

almost straight. Uropodal exopod with dorsal plate. [Adapted from Rodrigues & Manning, 1992, fig. 2.]

Remarks. — The type species of the new genus *Eucalliaxiopsis*, *E. cearaensis*, is very similar to that of the genus *Eucalliax*, *E. quadracuta*, but they are different from each other in the forms of Plps1-2. In *E. cearaensis* the male Plp1 is uniramous and bisegmented; the distal segment is broadened medially and incurvate distally, bearing long marginal setae; the male Plp2 is biramous and the endopod bears mesiomedially a distinct appendix masculina overreaching the top of the endopod, provided subproximally with a small subproximally-fused protrusion as an appendix interna (cf. Rodrigues & Manning, 1992: 329, fig. 2t); whereas in *E. quadracuta* the male Plp1 is uniramous and bisegmented, but the distal segment is simple and obtuse distally; the male Plp2 is biramous, but the endopod bears distally a distinct appendix masculina and a small appendix interna; Plps3-5 with finger-like appendix interna.

Type species. — *Eucalliax cearaensis* Rodrigues & Manning, 1992, by present designation and monotypy. The gender of the generic name, *Eucalliaxiopsis*, is feminine.

Species included. — *Eucalliaxiopsis cearaensis* (Rodrigues & Manning, 1992).

Eucalliaxiopsis cearaensis (Rodrigues & Manning, 1992)

Eucalliax cearaensis Rodrigues & Manning, 1992a: 327, fig. 2; Tudge et al., 2000: 145; Coelho et al., 2007: 5 (tab. 2).
Eucalliax cearensis – Rodrigues et al., 1998: 380; Melo, 1999: 368, figs. 245-246.
Calliax cearaensis — Sakai, 1999c: 112; Sakai, 2005b: 199.

Type locality. — Barro de Ceará, Fortaleza, right bank of river mouth (3°45′S 38°35′W), Brazil.

Distribution. — Only known from the type locality.

Genus **Paraglypturus** Türkay & Sakai, 1995

Paraglypturus Türkay & Sakai, 1995: 26; Sakai, 2005b: 204.

Definition. — Rostrum poorly developed, lacking rostral carina. Carapace without dorsal oval, cardiac sulcus, and hepatic prominence. Mxp3 ischium-merus rectangular; merus bullet-headed in shape; propodus broadened and subquadrate; dactylus subtriangular, bearing setae on distal margin; exopod distinct. P1 unequal, larger cheliped without meral hook. P2 chelate. P3 propodus subtrapezoid; dactylus triangular. P4 subchelate. P5 chelate. Male

Plp1 uniramous and bisegmented, distal segment subchelate distally; male Plp2 biramous and foliaceous, endopod bearing mesiomedially appendix masculina with distal setae and shorter appendix interna with hooklets; male Plps3-5 biramous and foliaceous, endopods bearing appendix interna. Telson wider than long and subtrapezoid. Uropodal endopod oval and much longer than telson; uropodal exopod with dorsal plate and lateral notch, bearing proximolateral portion with thick setae, and transparent yellow circle in middle of mesial half. [Adapted from Sakai, 1999c: 122.]

Type species. — *Paraglypturus calderus* Türkay & Sakai, 1995, by original designation and monotypy. Gender of generic name, *Paraglypturus*, masculine.

Species included. — Only the type species, *Paraglypturus calderus* Türkay & Sakai, 1995.

Paraglypturus calderus Türkay & Sakai, 1995

Paraglypturus calderus Türkay & Sakai, 1995: 27, figs. 2-6; Sakai, 2005b: 200.

Type locality. — North rim of Esmeralda Caldera, Marianas, 14°58.03′N 145°15.14′E; 63 m.

Distribution. — Only known from the type locality.

Genus **Pseudocalliax** gen. nov.

Diagnosis. — Carapace with dorsal oval and cardiac sulcus. Mxp3 ischium-merus rectangular; propodus subtriangular; dactylus subovate; exopod present. P1 subequal, larger cheliped without meral hook. Male Plp1 uniramous and simple; male Plp2 biramous, endopod with appendix interna mediolaterally, but without appendix masculina. Telson wider than long and subtrapezoid. Uropodal endopod oval and much longer than telson; uropodal exopod with dorsal plate.

Remarks. — *Callianassa tooradin* Poore & Griffin, 1979 was included in the genus *Calliax* De Saint Laurent, 1973 by Sakai (1988: 61), because in *Callianassa tooradin* the male Plp1 is absent (Poore & Griffin, 1979: 227), and therefore it differs from the type species of the genus *Callianassa*, *C. subterranea* (Montagu, 1808), in which the male Plp1 is present. Later, the species was reclassified under the genus *Paraglypturus* Türkay & Sakai, 1995 by Sakai (1999c), and then once again under the genus *Calliax* by Sakai (2005b). The present examination of the male specimen preserved in the USNM shows, however, that in *Callianassa tooradin* the carapace bears a

cardiac sulcus and a dorsal oval as shown by Poore & Griffin (1979: 275), and the male Plp1 is small and simple as informed by G.C.B. Poore (in litt.), so that *Calliax tooradin* is reclassified under the new genus *Pseudocalliax* gen. nov., belonging to the family Eucalliacidae.

Type species. — *Callianassa tooradin* Poore & Griffin, 1979, by present designation and monotypy. Gender of the generic name, *Pseudocalliax*, feminine.

Species included. — *Pseudocalliax tooradin* (Poore & Griffin, 1979).

Pseudocalliax tooradin (Poore & Griffin, 1979)

Callianassa tooradin Poore & Griffin, 1979: 275, fig. 36.
Calliax tooradin — Sakai, 1988: 61; Davie, 2002: 459; Sakai, 2005b: 204.
Paraglypturus tooradin — Sakai, 1999c: 124, figs. 33a-c; Sakai, 2005b: 204.

Material examined. — USNM, 1 male, Victoria Australia.

Diagnosis. — Rostrum obtusely triangular, lacking rostral carina. Carapace with dorsal oval, cardiac prominence, cardiac sulcus, and linea thalassinica. Eyestalks flattened and contiguous. A2 scaphocerite present as a small process. Mxp3 ischium-merus rectangular; propodus subrectangular; dactylus subovate; exopod present. P1 chelate, unequal in size, and dissimilar in shape; larger and smaller chelipeds without meral hook ventroproximally. P2 chelate. P3 propodus broadened. P4 simple. P5 subchelate. Abdominal pleura 2-5 unarmed ventrally. Abdominal somite 6 lacking lateral projections. Male Plp1 small and simple; male Plp2 biramous, endopod bearing appendix interna mediolaterally, but no appendix masculina. Telson wider than long and subtrapezoid; parallel-sided in proximal half and narrowing toward slightly rounded posterior margin. Uropodal exopod with dorsal plate.

Type locality. — Australia, Victoria, Crib Point, Western Port, fine sand sediment, 5 m.

Distribution. — Only known from the type locality.

FAMILY GOURRETIIDAE SAKAI, 1999

Gourretiinae Sakai, 1999a: 95; Ngoc-Ho, 2003: 498.
Ctenochelidae — Ngoc-Ho, 2003: 498.
Gourretiidae — Sakai, 2005b: 217; Sakai & Sawada, 2006: 1357.
Dawsoniinae Sakai, 2006: 1276.

Diagnosis. — Rostrum small and unarmed on lateral margins, bearing no rostral carina. Carapace with linea thalassinica, but without dorsal oval, and cardiac sulcus incomplete or absent; vertical row of setae rarely present on branchial region. Eyestalks flattened and contiguous. A2 scaphocerite present as a small process. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus rectangular; merus with mesial spine; propodus rectangular; dactylus digitiform; exopod present or absent. P1 chelate, unequal in size, and dissimilar in shape; in larger cheliped merus with hook ventroproximally, palm rectangular, fingers elongate; in smaller cheliped merus usually with hook ventroproximally (not in *Gourretia lahouensis*), fingers elongate. P2 chelate. P3 propodus subpediform. P4 simple. P5 chelate. Male Plp1 uniramous and bisegmented, distal segment simple, subchelate, or chelate distally; male Plp2 biramous and slender, endopod bearing appendix masculina provided with appendix interna, or bearing only appendix interna. Abdominal somite 6 with or without lateral projection. Telson subtriangular or subsquare. Uropodal exopod without dorsal plate, and with or without lateral notch.

Remarks. — The subfamily Pseudogourretiinae Sakai, 2005b was established and tentatively classified under the family Gourretiidae. However, it has turned out that the Pseudogourretiinae is to be included neither in the family Gourretiidae because of the presence of pleurobranchs, nor in the family Axiidae Huxley, 1878 because of its distinct characteristics as follows. The eyestalks are flattened and contiguous, the linea thalassinica is present incompletely, and the maxilla 2 scaphognathite bears no posterior whip, which features are not observed in the Axiidae, though the Pseudogourretiinae are closely similar to the Axioidea in that the pleurobranchs are present as in the genera of the Axioidea: *Axius* Leach, 1815; *Bouvieraxius* Sakai & De Saint Laurent, 1989; *Calaxius* Sakai & De Saint Laurent, 1989; *Calocaris* Bell, 1846; *Eiconaxius* Bate, 1888; *Neaxius* Borradaile, 1903; *Parascytoleptus* Sakai & De Saint Laurent, 1989; *Scytoleptus* Gerstaecker, 1856; *Spongiax-*

ius Sakai & De Saint Laurent, 1989; and *Strahlaxius* Sakai & De Saint Laurent, 1989. Whereas they are absent in the axioid genera *Acanthaxius* Sakai & De Saint Laurent, 1989; *Allaxius* Sakai & De Saint Laurent, 1989; *Ambiaxius* Sakai & De Saint Laurent, 1989; *Axiopsis* Borradaile, 1903; *Axiorygma* Kensley & Simmons, 1988; *Calastacus* Faxon, 1893; *Calaxiopsis* Sakai & De Saint Laurent, 1989; *Calocarides* Wollenbaeck, 1908; *Dorphinaxius* Sakai & De Saint Laurent, 1989; *Eutrichocheles* Wood-Mason, 1876b; *Oxyrhynchaxius* Parisi, 1917; and *Paraxius* Bate, 1888. In the present revision, therefore, the Pseudogourretiinae are elevated to family-level, and are distinguished from the Axiidae and Gourretiidae.

Type genus. — *Gourretia* De Saint Laurent, 1973.

Genera included. — *Dawsonius* sensu Sakai, 2005 (not Manning & Felder, 1991); *Gourretia* Sakai, 1999c; *Laurentgourretia* Sakai, 2004b; *Paracalliax* De Saint Laurent, 1979; *Paragourretia* Sakai, 2004b.

KEY TO THE GENERA OF THE FAMILY GOURRETIIDAE

1 – Eyestalks elongate and rectangular, without cornea ..... *Paracalliax*
– Eyestalks shorter, with cornea 2

2 – Abdominal somite 6 with lateral projections ..... *Dawsonius*
– Abdominal somite 6 without lateral projections 3

3 – Uropodal exopod without lateral notch ..... *Gourretia*
– Uropodal exopod with lateral notch 4

4 – A2 scaphocerite strong, Mxp3 exopod absent ..... *Laurentgourretia*
– A2 scaphocerite obtuse, Mxp3 exopod present ..... *Paragourretia*

Genus **Dawsonius** Manning & Felder, 1991 sensu Sakai, 2005

Dawsonius Manning & Felder, 1991 sensu Sakai, 2005b.
Dawsonius — Sakai, 2005b: 245.

Diagnosis. — Rostrum triangular. Carapace without dorsal oval and cardiac sulcus, but with low dorsal carina in anterior half. A2 scaphocerite small and pointed. Mxp3 propodus rectangular; dactylus digitiform; exopod present. Abdominal somite 6 bearing lateral projection anteriorly on each side. Male Plp1 uniramous and bisegmented, distal segment subchelate distally; male Plp2 biramous, endopod bearing mesiodistally appendix masculina provided mesiomedially with proximally-fused appendix interna. Telson subquadrate, posterior margin rounded. Uropodal exopod without lateral notch.

Type species. — *Callianassa latispina* Dawson, 1967, by original designation and monotypy. The gender of the generic name, *Dawsonius*, is masculine.

Species included. — *Dawsonius latispina* (Dawson, 1967).

Dawsonius latispina (Dawson, 1967)
(fig. 69E)

Callianassa latispina Dawson, 1967: 190, fig. 1; Biffar, 1971a: 651 (key), 654 (key), 679, figs. 11-12; Herper, 1975: 619; Rabalais et al., 1981: 105, fig. 3g-k.
Gourretia latispina — Manning, 1987: 398 (list); Williams et al., 1989: 28.
Dawsonius latispina — Manning & Felder, 1991: 785 (list), figs. 4, 16; Poore, 1994: 103 (key); Coelho, 1997: 150; Melo, 1999: 394, figs. 265-266; Tudge et al., 2000: 142; Sakai, 2005b: 245; Coelho et al., 2007: 5 (tab. 2); Robles et al., 2009: 317.
Callianopsis latispina — Sakai, 2005b: 228.

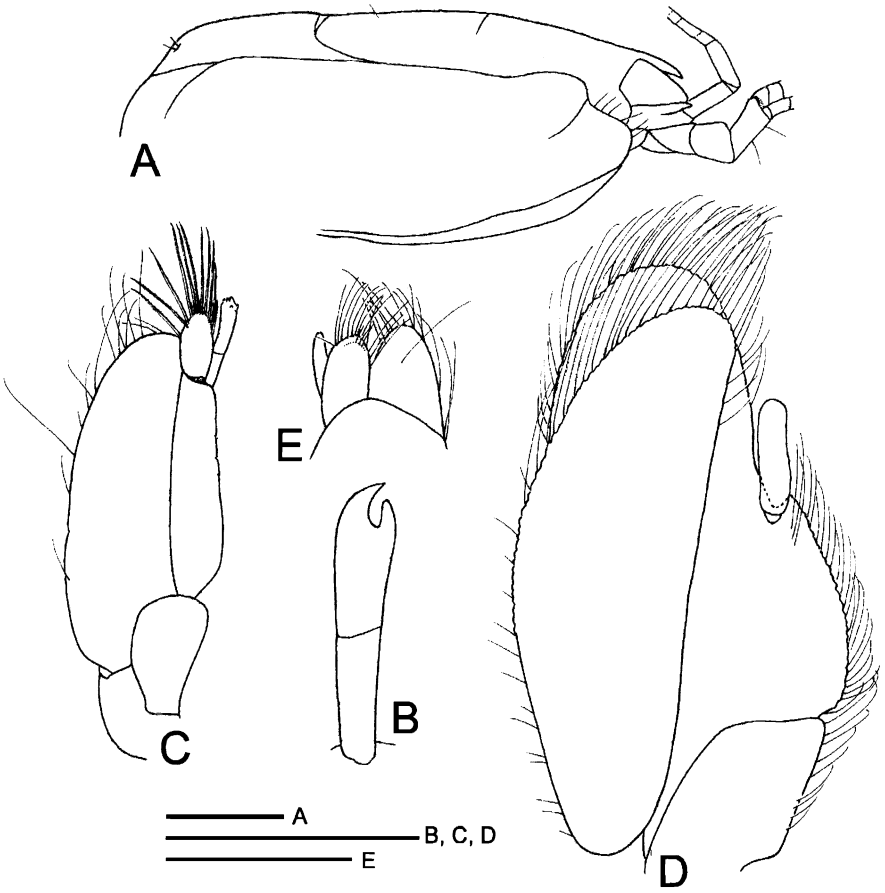

Fig. 69. *Gourretia denticulata* (Lutze, 1937) and *Dawsonius latispina* (Dawson, 1967). A, carapace lateral view, B, male Plp1, C, male Plp2; D, male Plp3, E, distal end of male Plp2 endopod. A-D, *Gourretia denticulata*, SMF 28053, neotype, 1 male (20.0/4.4, left minor cheliped detached, lacking left P/4), in front of Sotto Castello, Limski Canal, Istria, Croatia, 45°08.020′N 013°39.030′E, 29 m; E, *Dawsonius latispina*, USNM 103755, paratype, male (TL/CL, 30.0/9.0 mm), S. of Grand Isle, Louisiana, 13.7 m. Scales 1 mm.

Material examined. — USNM 103755, paratype, male (TL/CL, 30.0/9.0 mm), S. of Grand Isle, Louisiana, 7.5 fms [ca. 13.5 m], 4.ii.1959, leg. et don. C.E. Dawson; USNM 172310, lectotype, female (CL, 6.0 mm), Sta. I-4, 28°14′N 96°29′W, 10 m, 13.vi.1976.

Diagnosis. — Rostrum triangular. Carapace lacking dorsal oval, but bearing low dorsal carina in anterior half. A2 scaphocerite pointed and 0.6 mm long. Mxp3 ischium-merus pediform; merus with mesiodistal spine; propodus rectangular; dactylus digitiform; exopod present. P1 unequal, both chelipeds with meral hook ventroproximally. Abdominal somite 6 with lateral projection anteriorly on each side. Male Plp1 uniramous and bisegmented, distal segment subchelate distally; male Plp2 (fig. 69E) biramous, endopod longer than exopod, bearing mesiodistally appendix masculina with apical setae, provided mesiomedially with proximally-fused appendix interna; Plps3-5 with appendix interna. Telson subquadrate, posterior margin rounded. Uropodal exopod without lateral notch. [Adapted from Dawson, 1967: 190; Biffar, 1971a: 679, figs. 11b, I, 12b, e.]

Remarks. — The type species of *Dawsonius*, *Dawsonius latispina* was examined in order to confirm the presence or absence of the Mxp3 exopod, because the Mxp3 exopod is shown and described in the figure and description of *Dawsonius latispina* by Biffar (1971a, fig. 11b), though it is shown neither in the figure and description by Dawson (1967, fig. 1f, h), nor in those of Manning & Felder (1991, fig. 16c, d). It was found through the present examination of the type specimens that the Mxp3 exopod is present.

Type locality. — Off Grand Isle, Louisiana, 135 m.

Distribution. — Louisiana; Texas; off south-western Florida; Honduras; Amapá, Pará, and Alagoas, Brazil (Coelho, 1997).

Genus **Gourretia** De Saint Laurent, 1973

Gourretia De Saint Laurent, 1973: 514; Le Loeuff & Intès, 1974: 26; Poore & Griffin, 1979: 278; De Saint Laurent & Le Loeuff, 1979: 48 (key), 78; Manning, 1987: 398 (list); Manning & Felder, 1991: 785, fig. 3; Poore, 1994: 103 (key); Davie, 2002: 464; Sakai, 2002: 468; Ngoc-Ho, 2003: 498; Sakai, 2005b: 218.

Diagnosis. — Rostum triangular, without rostral carina. Carapace lacking dorsal oval, transverse cardiac sulcus, and cardiac prominence; linea thalassinica present (fig. 67A). A2 scaphocerite rudimentary. Dorsal surfaces of eyestalks flattened. Mxp3 ischium-merus subpediform; merus usually with mesiodistal spine; propodus rectangular; dactylus digitiform; exopod present. P1 with proximal meral hook. P3 propodus broadened. P4 simple. P5 chelate. Abdominal somite 6 lacking lateral projection. Male Plp1 uniramous and

bisegmented, distal segment chelate distally; male Plp2 biramous, endopod bearing mesiodistally appendix masculina with distal setae, provided proximally with proximally-fused appendix interna; Plps3-5 with triangular appendix interna. Telson subtriangular or subsquare. Uropodal exopod lacking lateral notch. [Adapted from Sakai, 2005b.]

Type species. — *Callianassa denticulata* Lutze, 1937, by original designation and monotypy. Gender of the generic name, *Gourretia*, feminine.

Species included. — *Gourretia barracuda* Le Loeuff & Intès, 1974; *G. denticulata* (Lutze, 1937); *G. laresi* Blanco Rambla & Liñero Arana, 1994; *G. loeuffintesi* Sakai, 2005b; *G. manihinae* Sakai, 1984; *G. nosybeensis* Sakai, 2004b; *Gourretia* sp. Robles et al., 2009: 317.

KEY TO THE SPECIES OF THE GENUS *GOURRETIA*

1 – Telson subquadrate, recorded from Nosy Bé, Moçambique Channel . . . . *G. nosybeensis*
– Telson trapezoid 2

2 – P3 propodus rectangular 3
– P3 propodus ovate 4

3 – P1 chela of larger cheliped much wider than carpus, from Ivory Coast, 100-250 m . . . . . *G. barracuda*
– P1 chela of larger cheliped as wide as carpus, from the Gulf of Guinea, Benin, 39 m . . . . . *G. loeuffintesi*

4 – P3 propodus wide on distal margin, from Tanzania, 35 m . . . . . *G. manihinae*
– P3 propodus narrow on distal margin 5

5 – Male Plp1 with stout proximal and distal segments, from eastern Atlantic Ocean and Mediterranean Sea . . . . . *G. denticulata*
– Male Plp1 with elongate, slender proximal and distal segments, from northwestern Chimana Island, Venezuela, 71 m . . . . . *G. laresi*

Gourretia barracuda Le Loeuff & Intès, 1974

Gourretia barracuda Le Loeuff & Intès, 1974: 30, fig. 6a-t; De Saint Laurent & Le Loeuff, 1979: 80, fig. 24a; Manning & Felder, 1991: 785 (list); Tudge et al., 2000: 142; Sakai, 2005b: 219.

Type locality. — Abidjan, Ivory Coast, 100-250 m.

Distribution. — Abidjan, Ivory Coast (Le Loeuff & Intès, 1974; De Saint Laurent & Le Loeuff, 1979); 100-250 m.

Gourretia denticulata (Lutze, 1937)
(fig. 69A-D)

[Abbreviated list of synonymy.]
Callianassa subterranea var. *minor* Gourret, 1887: 1034; Gourret, 1888: 96, pl. 8 figs. 1-15.

Callianassa denticulata Lutze, 1937: 6, figs. 1-7; Lutze, 1938: 170; Vatova, 1949: 65, tabs. 22, 31, 32.

Callianassa minor — Holthuis & Gottlieb, 1958: 56, figs. 11-12; Harmelin, 1964: 68, 95; Picard, 1965: 59, 104 (list); Števčić, 1969a: 128 (list); Štjepčević & Parenzan, 1980: 47.

Gourretia serrata De Saint Laurent & Le Loeuff, 1979: 79, 80 (key), fig. 24c; Thessalou-Legaki & Zenetos, 1985: 311; Thessalou-Legaki, 1986: 182, 184 (list); Dounas et al., 1993: 49.

Gourretia denticulata — Lewinsohn & Holthuis, 1986: 24; Števčić, 1990: 218; Manning & Felder, 1991: 785 (list), fig. 3; Dworschak, 1992: 210; Koukouras et al., 1992: 223; López de la Rosa et al., 1998: 394, fig. 1; Sakai, 1999c: 128; d'Udekem d'Acoz, 1999: 156; Tudge et al., 2000: 142; Costello et al., 2001: 289; Ngoc-Ho, 2003: 499, fig. 21; Sakai, 2005b: 220; Sakai & Türkay, 2005: 323, figs. 1-3, tabl. 1; Sakai & Sawada, 2006: 1357.

Not: *Gourretia minor* — Le Loeuff & Intès, 1974: 26, fig. 4a-k (= *Gourretia* sp. De Saint Laurent & Le Loeuff, 1979) (*Gourretia loeuffintesi* Sakai, 2005b).

Material examined. — SMF 28053, neotype, 1 male (20.0/4.4, left minor cheliped detached, lacking left P4), in front of Sotto Castello, Limski Canal, Istria, Croatia, 45°08.020′N 013°39.030′E, 29 m, soft mud, R/V "Burin", 1.ix.1999.

Diagnosis. — Male Plp1 uniramous and bisegmented, distal segment chelate distally (fig. 69B); male Plp2 biramous, endopod bearing mesiodistally appendix masculina with distal setae, provided proximally with proximally-fused appendix interna (fig. 69C); male Plps3-5 biramous and broad, endopods with appendix interna mesiomedially (fig. 69D); Plps3-5 with small triangular appendix interna. Telson subsquare.

Remarks. — The male neotype specimen from the Limski Canal, Istria, Croatia, is probably an immature one, because the male Plp1 distal segment is emarginate distally, as shown by López de la Rosa et al. (1998: 394, fig. 1F), which suggests that it has not yet developed into a chela.

Type locality. — Limski-Kanal, Istria, Croatia, 29 m, Adriatic Sea.

Distribution. — Eastern Atlantic Ocean — Bay of Cadiz, Spain (López de la Rosa et al., 1998). Mediterranean — Gulf of Marseille, Ionian Sea, Cyprus, Malta, and along the coast of Israel; Baie de Kotor (De Saint Laurent & Božić, 1976); Piran Gulf (Manning & Ševcic, 1982). Adriatic Sea (Lutze, 1937; Dworschak, 1992). Tyrrhenian Sea — Ischia (Dworschak, 1992), Malta; Ionian Sea. Aegean Sea — N. Euboikos Gulf, Patraikos, and Rhodos, 5-15 m, in pure sand (Thessalou-Legaki, 1986; Koukouras et al., 1992). Cyprus; Israel (Lewinsohn & Holthuis, 1986); 2.5-146 m.

Gourretia laresi Blanco Rambla & Liñero Arana, 1994

Gourretia laresi Blanco Rambla & Liñero Arana, 1994: 25, fig. 8; Tudge et al., 2000: 142; Sakai, 2005b: 222.

Diagnosis. — Rostrum sharply triangular, not reaching distal end of eyestalks. Eyestalks separated at distal part, shaped in triangle. Mxp3 ischium

with strong, curved projection on ventral margin. P1 unequal. Male Plp1 uniramous and bisegmented, distal segment slightly subchelate distally; male Plp2 biramous, endopod bearing mesiodistally appendix masculina with small appendix interna mesiodistally. [Adapted from Blanco Rambla & Liñero Arana, 1994.]

Type locality. — Northwest Chimana Islands, 10°18.40′N 64°47.40′W, Venezuela.

Distribution. — Only known from the type locality.

Gourretia loeuffintesi sp. nov.

Gourretia minor — Le Loeuff & Intès, 1974: 26, fig. 4a-k.
Gourretia sp., De Saint Laurent & Le Loeuff, 1979: 81, fig. 24b.
Gourretia loeuffintesi Sakai, 2005b: 221 (name invalid).

Material examined. — Holotype, male, Dahomey, 6°11.5′N 2°12.5′W, Republic of Benin, Gulf of Guinea, 3.x.1963 (cf. Le Loeuff & Intès, 1974: 26).

Diagnosis. — Rostrum acutely triangular, reaching middle of eyestalks. Eyestalks contiguous and rounded distally. Mxp3 ischium-merus pediform. P3 propodus oval. Telson subtriargular, narrowing in posterior half and rounded on posterior margin. [Adapted from Sakai, 2005b: 222.]

Remarks. — The present species was described by Sakai (2005b), without designating a type specimen, so that the species name was invalid according to Art. 72.3 of the ICZN. In the present revision, this species is properly named *G. loeuffintesi* by designating a type.

Type locality. — Benin, 6°11.5′N 2°12.5′W, 39 m, Gulf of Guinea.

Distribution. — Only known from the type locality.

Gourretia manihinae Sakai, 1984

Gourretia manihinae Sakai, 1984: 101, figs. 4-5; Tudge et al., 2000: 142.

Type locality. — Pangani Bay, Tanzania, 5°29.2′S 39°03.2′E, 35 m.

Distribution. — Tanzania — Pangani Bay (Sakai, 1984); 35 m.

Gourretia nosybeensis Sakai, 2004

Gourretia nosybeensis Sakai, 2004b: 563, figs. 4-6; Sakai, 2005b: 224.

Diagnosis. — Rostrum shaped as slender triangle, reaching distal end of eyestalks. A1 peduncle as long as A2 peduncle. Mxp3 merus with distinct subdistal tooth. P3 propodus rounded. Male Plp1 uniramous, bisegmented; distal segment subchelate distally; male Plp2 biramous, exopod shorter than

endopod; endopod bilobed distally, mesial lobe bearing distally appendix masculina with long setae distally and fused appendix interna mesiodistally. Telson subsquare. Uropodal exopod without lateral notch. [Adapted from Sakai, 2004b.]

Type locality. — Nosy Bé, Madagascar, and near Île d'Ampasindava, 47 m.

Distribution. — Only known from the type locality.

Gourretia sp. Robles et al., 2009

Gourretia sp. Robles et al., 2009: 317.

Genus **Laurentgourretia** Sakai, 2004

Laurentgourretia Sakai, 2004b: 558; Sakai, 2005b: 224.

Diagnosis. — Rostrum sharply triangular, without rostral carina, and slightly overreaching middle of eyestalks. Eyestalks obtuse distally; cornea small and located mesiodistally. Carapace lacking dorsal oval, transverse cardiac sulcus, and cardiac prominence. A2 scaphocerite distinct, overreaching middle of P2 penultimate segment. Mxp3 ischium-merus subpediform; merus with three mesial spines; propodus rectangular; dactylus digitiform; exopod absent. P3 propodus ovate. P4 simple. P5 subchelate. Abdominal somite 6 lacking triangular anteroventral projections. Male Plps1-2 unknown. Telson subsquare and convex on proximal third of lateral margin. Uropodal exopod with lateral notch. [Adapted from Sakai, 2004b.]

Remarks. — The type-species of the genus *Laurentgourretia*, *L. rhopalommata* Sakai, 2004b from Nosy Mitsio, Mozambique channel, is closely similar to *Paragourretia phuketensis* Sakai, 2002 from the Andaman Sea. However, they differ from each other in that in *L. rhopalommata* the Mxp3 exopod is absent, whereas in *P. phuketensis* the Mxp3 exopod is present.

Type species. — *Laurentgourretia rhopalommata* Sakai, 2004b, by original designation and monotypy. Gender of generic name, *Laurentgourretia*, feminine.

Species included. — *Laurentgourretia rhopalommata* Sakai, 2004b.

Laurentgourretia rhopalommata Sakai, 2004

Laurentgourretia rhopalommata Sakai, 2004b: 557, figs. 1-3.

Diagnosis. — Rostrum sharply triangular, slightly overreaching middle of eyestalks. Eyestalks obtuse distally; cornea small and located mesiodistally. A2 scaphocerite strongly protruded. Mxp3 merus with three strong mesial

teeth. Telson subsquare and convex on proximal third of lateral margin. Uropodal exopod with lateral notch.

Type locality. — Nosy Mitsio, Mozambique channel, 12°38.400′S 48°33.200′E, 50 m.

Distribution. — Only known from the type locality.

Genus **Paracalliax** De Saint Laurent, 1979

Paracalliax De Saint Laurent, 1979: 1396; De Saint Laurent & Le Loeuff, 1979: 47 (key), 84; Manning & Felder, 1991: 785, figs. 1, 7; Poore, 1994: 103 (key): Sakai, 2005b: 215.

Diagnosis. — Rostrum small and triangular, bearing obscure rostral carina. Carapace without dorsal oval and transverse cardiac sulcus, but with cardiac prominence. Eyestalks distinct, elongate, flattened, and contiguous. A2 peduncle about as long as A1 peduncle; A2 scaphocerite small. Mxp 3 ischium-merus pediform, bearing meral spine; propodus rectangular; dactylus digitiform; exopod present. P1 chelate, unequal in size and dissimilar in shape, lacking proximal meral hook in both chelipeds. P2 chelate. P3 propodus rectangular. Abdominal somite 6 with lateral projections. Male Plps1-2 unknown; female Plp1 uniramous, bisegmented, distal segment foliaceous; female Plp2 biramous and foliaceous, endopod with appendix interna; Plps3-5 biramous and foliaceous, endopods with appendix interna (cf. De Saint Laurent & Le Loeuff, 1979: 87). Telson subquadrate, posterior margin with median spine. Uropodal exopod lacking lateral notch.

Remarks. — The present genus *Paracalliax* was included in the family Ctenochelidae by Manning & Felder (1991: 784). However it was subsequently included in the family Gourretiidae Sakai, 1999a by Sakai (2005b), because in the Gourretiidae the rostral carina is absent; the fingers of the larger cheliped are not pectinate and the palm is subquadrate; and the uropodal exopod bears no lateral notch. In the Ctenochelidae, however, the rostral carina is present; the fingers of the larger cheliped are pectinate and the palm is oval; and the uropodal exopod bears a lateral notch; so that *Paracalliax* is safely included in the Gourretiidae.

Type species. — *Paracalliax bollorei* De Saint Laurent, 1979, by original designation and monotypy. Gender of generic name, *Paracalliax*, feminine.

Species included. — *Paracalliax bollorei* De Saint Laurent, 1979.

Paracalliax bollorei De Saint Laurent, 1979

Paracalliax bollorei De Saint Laurent, 1979: 1396; De Saint Laurent & Le Loeuff, 1979: 86, figs. 26a-I, 27a-c, 28a-h; Manning & Felder, 1991: 785 (list), figs. 1, 7; Tudge et al., 2000: 142; Sakai, 2005b: 216.

Diagnosis. — Rostrum triangular, not reaching proximal fifth of eyestalks. Eyestalks elongate and compressed; cornea absent. P1 unequal. Mxp3 ischium-merus pediform; merus with mesiodistal spine; exopod present. Male Plps1-2 unknown. Telson subquadrate, and convex on proximal third of lateral margin, bearing median spine on posterior margin. [Adapted from De Saint Laurent & Le Loeuff, 1979: 86, figs. 26-28.]

Type locality. — Banc d'Arguin, Mauritania, 20-100 m?

Distribution. — Only known from the type locality.

Genus **Paragourretia** Sakai, 2004

Paragourretia Sakai, 2004b: 568; Sakai, 2005b: 225.

Diagnosis. — Rostrum triangular, without rostral carina. Carapace large and thick, lacking dorsal oval, but bearing cardiac prominence and incomplete, transverse cardiac sulcus; row of transverse setae present in anterior branchial region. Eyestalks flattened. A2 scaphocerite obtuse or reduced. Mxp3 ischium-merus subpediform; merus with or without subdistal spine on mesial margin; propodus rectangular; dactylus digitiform; exopod present. Larger cheliped with proximal meral hook. P3 simple, propodus rectangular. P4 subchelate. P5 chelate. Abdominal somite 6 without lateral projections. Male Plp1 uniramous and bisegmented, distal segment subchelate distally; male Plp2 biramous, endopod bearing appendix masculina with distal setae, provided with elongate appendix interna, or bearing only appendix interna; Plps3-5 with triangular appendix interna. Telson subtriangular or subsquare. Uropodal exopod with lateral notch.

Remarks. — The present genus *Paragourretia* is closely similar to *Gourretia*, but they differ in that in *Paragourretia* the uropodal exopod has a lateral notch, whereas in *Gourretia* it does not have a lateral notch, although this was described (Sakai, 2002) for the type-species of the genus *Paragourretia*, *P. phuketensis*, i.e., that the uropodal exopod bears no notch on the lateral margin, which may have been caused by misobservation, because the notch is present on the lateral margin of the uropodal exopod as later described by Sakai (2005b).

Type species. — *Gourretia phuketensis* Sakai, 2002, by original designation. Gender of generic name, *Paragourretia*, feminine.

Species included. — *Paragourretia aungtonyai* (Sakai, 2002); *P. biffari* Blanco Rambla & Liñero Arana, 1994; *P. coolibah* Poore & Griffin, 1979; *P. crosnieri* Ngoc-Ho, 1991; *P. lahouensis* Le Loeuff & Intès, 1974; *P. phuketensis* (Sakai, 2002).

KEY TO THE SPECIES OF THE GENUS *PARAGOURRETIA*

1 – Mxp3 merus with subdistal spine on mesial margin 2
– Mxp3 merus without subdistal spine on mesial margin 3

2 – Telson subtriangular . . . . . *P. biffari*
– Telson subquadrate . . . . . *P. phuketensis*

3 – Uropodal exopod without lateral notch . . . . . *P. lahouensis*
– Uropodal exopod with lateral notch 4

4 – Mxp3 exopod overreaching ischium . . . . . *P. coolibah*
– Mxp3 exopod not reaching distal margin of ischium 5

5 – A1 peduncle reaching distal part of A2 distal segment . . . . . *P. crosnieri*
– A1 peduncle reaching middle of A2 distal segment . . . . . *P. aungtonyai*

Paragourretia aungtonyai (Sakai, 2002)

Gourretia aungtonyai Sakai, 2002: 476, figs. 6A-H, 7A-F, 8A-G.
Paragourretia aungtonyai — Sakai, 2005b: 225.

Diagnosis. — Mxp3 ischium-merus pediform; merus unarmed on mesial margin; propodus rectangular; and dactylus digitiform; exopod present. Male Plp1 absent (probably just missing); male Plp2 biramous, endopod only with appendix interna distally. Telson subtriangular, though deformed (see fig. 6G by Sakai, 2002).

Type locality. — Andaman Sea, 9°30.351′N 97°57.168′E, 60.7 m, sandy mud, fine sand and shell fragments.

Distribution. — Andaman Sea, 9°30.351′N 97°57.168′E; 7°29.921′N 99°00.977′E; 20.5 m.

Paragourretia biffari (Blanco Rambla & Liñero Arana, 1994)

Gourretia biffari Blanco Rambla & Liñero Arana, 1994: 22, figs. 6, 7; Tudge et al., 2000: 142; Sakai, 2005b: 222.

Diagnosis. — Rostrum short and triangular, with acute and upturned apex, reaching middle of eyestalks. Eyestalks flattened, overreaching proximal half length of A1 segment 1. Mxp3 ischium-merus pediform; merus with mesiodistal spine; exopod present. Male Plps1-2 undescribed. Telson narrowing toward convex posterior margin, bearing low median convexity on lateral margin. [Cf. Blanco Rambla & Liñero Arana, 1994: 22, figs. 6, 7.]

Type locality. — Northwest Barcelona, 10°15.30′N 64°42.30′W, 50 m, Venezuela.

Distribution. — Northwest Barcelona, Venezuela; off Trujillo, Honduras.

Paragourretia coolibah (Poore & Griffin, 1979)

Gourretia coolibah Poore & Griffin, 1979: 278, figs. 38, 39; Manning & Felder, 1991: 785 (list); Tudge et al., 2000: 142; Davie, 2002: 465; Sakai, 2005b: 223; Dworschak, 2009: 130, figs. 1-34, tab. 1.

Diagnosis. — Rostrum acutely triangular, reaching middle of eyestalks. Eyestalks compressed, tapering to broad mesiodistal lobe, and bearing a few minute pigment spots subdistally. P1 unequal. Mxp3 ischium-merus pediform; merus lacking mesiodistal spine; exopod present. Male Plps1-2 unknown. Telson slightly broader than long, parallel-sided in proximal half, then tapering to broadly rounded posterior margin. Uropodal exopod with notch on distal margin. [Adapted from Poore & Griffin, 1979: 278, figs. 38c, 39f.]

Type locality. — 350 km ENE of Troughton Is., Joseph Bonaparte Gulf, Western Australia, 58 m.

Distribution. — Only known from the type locality.

Paragourretia crosnieri (Ngoc-Ho, 1991)

Gourretia crosnieri Ngoc-Ho, 1991: 294, fig. 6; Tudge et al., 2000: 142; Sakai, 2005b: 223.

Diagnosis. — Rostrum acutely triangular, reaching middle of eyestalks. Eyestalks rounded distally; cornea distinct and located centrally. Mxp3 ischium-merus pediform; merus lacking mesiodistal spine; exopod present. Male Plps1-2 unknown. Telson longer than broad, broadened in proximal third, then convergent to almost straight posterior margin. [Adapted from Ngoc-Ho, 1991: 294, fig. 6e, n.]

Type locality. — Prony Bay, Île Ouen, New Caledonia, 29 m.

Distribution. — Only known from the type locality.

Paragourretia lahouensis (Le Loeuff & Intès, 1974)

Gourretia lahouensis Le Loeuff & Intès, 1974: 28, fig. 5a-v; De Saint Laurent & Le Loeuff, 1979: 79 (key), 80; Manning & Felder, 1991: 785 (list); Tudge et al., 2000: 142; Sakai, 2005b: 221.

Diagnosis. — Rostrum triangular, reaching proximal third of eyestalks. Eyestalks depressed and pointed mesiodistally; cornea located centrally. Mxp3 ischium-merus pediform; exopod present. Male Plp1 uniramous and biseg-mented, distal segment subchelate distally; male Plp2 biramous, endopod bearing at distal third on mesial margin appendix masculina with small appendix interna mesiomedially. Telson longer than broad, broadened in

proximal third, then convergent to slightly rounded posterior margin. [Adapted from Le Loeuff & Intès, 1974: 28, fig. 5j, p, r, r′, s.]

Type locality. — Grand Lahou, Ivory Coast, 5°7.4′N 5°4.5′W, 15 m.

Distribution. — Only known from the type locality.

Paragourretia phuketensis (Sakai, 2002)

Gourretia phuketensis Sakai, 2002: 469, figs. 4A-H, 5A-H.
Paragourretia phuketensis — Sakai, 2005b: 226.

Diagnosis. – Rostrum sharply triangular, almost reaching distal end of eyestalks. Eyestalks rounded distally and directed downward from rostrum, cornea spotted and located centrally, in distal half. Mxp3 ischium-merus pediform; merus with mesiodistal spine; exopod present. Male Plp1 uniramous and bisegmented; male Plp2 biramous, endopod bearing at distal third of mesial margin appendix masculina with appendix interna mesiomedially. Telson longer than broad, broadened in proximal third, then convergent to almost straight posterior margin. [Cf. Sakai, 2002: 469, figs. 4E, 5B, G.]

Type locality. — Andaman Sea, 8°29.993′N 98°06.162′E, 42.0 m, muddy sand.

Distribution. — Only known from the type locality.

FAMILY LIPKECALLIANASSIDAE SAKAI, 2005 (NEW STATUS)

Lipkecallianassinae Sakai, 2005b: 212.

Diagnosis. — Rostrum acutely triangular and longer than eyestalks, lacking rostral carina. Carapace without dorsal oval, cardiac prominence, and transverse hepatic sulcus. Eyestalks short, contiguous, and semicircular on lateral margins. Linea thalassinica present. A2 scaphocerite present as a small process. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus subpediform; merus with mesiodistal tooth; propodus rectangular; dactylus digitiform. P1 uncertain. P2 chelate. P3 propodus rectangular. P4 elongate, overreaching P2. Abdominal somite 6 lacking lateral projections. Male Plp1 uniramous and slender; male Plp3 biramous and foliaceous, endopod with appendix interna. Male Plps2, 4-5 and female Plps1-5 unknown. Telson longer than wide and slightly convergent toward w-shaped posterior margin with median spine. Uropodal endopod shaped as elongate triangle, about twice as long as wide, and longer than telson. Uropodal exopod without dorsal plate.

Remarks. — *Lipkecallianassa* Sakai, 2002, type genus of the family Lipkecallianassidae (new status) was originally included in the subfamily Callianassinae under the family Callianassidae. Subsequently (Sakai, 2005b) the genus was distinguished from the other callianassid taxa into a separate subfamily, Lipkecallianassinae Sakai, 2005. However, the present revision has made it possible to distinguish this genus even further from the other genera and families included in the Callianassoidea, because *Lipkecallianassa* is very characteristic and distinguishable; in the type-species of the genus *Lipkecallianassa*, *Lipkecallianassa abyssa* Sakai, 2002 the uropodal exopod lacks a dorsal plate, and P4 is elongate, overreaching P2, whereas in the type species of *Callianassa*, type genus of the Callianassidae, *Callianassa subterranea* (Montagu, 1808) the uropodal exopod bears a dorsal plate, and P4 does not overreach P2. Therefore, the genus *Lipkecallianassa* Sakai, 2002 was reclassified and included into a new subfamily Lipkecallianassinae as the type genus, by Sakai (2005b); this subfamily is now raised to family level (new status).

Type genus. — *Lipkecallianassa* Sakai, 2002.

Genera included. — *Lipkecallianassa* Sakai, 2002.

Genus **Lipkecallianassa** Sakai, 2002

Lipkecallianassa Sakai, 2002: 477; Sakai, 2005b: 212.

Diagnosis. — Rostrum acutely triangular, overreaching eyestalks. Carapace without dorsal oval and cardiac prominence, but with linea thalassinica. A1 peduncle shorter than A2 peduncle. Mxp3 ischium-merus subrectangular, with parallel sides; merus with mesiodistal tooth; propodus rectangular; dactylus digitiform; exopod absent. P1 uncertain. P3 propodus rectangular. P4 elongate, overreaching P2. Male Plps1-2 unknown; male Plp3 biramous and foliaceous, endopod with appendix interna. Telson longer than wide and slightly convergent toward w-shaped posterior margin with median spine. Uropodal exopod about 2.2 times as long as wide, much longer than endopod, and broadly rounded on posterior margin, with setae, lacking dorsal plate.

Type species. — *Lipkecallianassa abyssa* Sakai, 2002, by original designation and monotypy. Gender of generic name, *Lipkecallianassa*, feminine.

Species included. — Only the type-species, *Lipkecallianassa abyssa* Sakai, 2002.

Lipkecallianassa abyssa Sakai, 2002

Lipkecallianassa abyssa Sakai, 2002: 477, figs. 9A-D, 10A-H; Sakai, 2005b: 213.

Type locality. — Andaman Sea, 7°45.179′N 97°19.907′E, 493.0 m.

Distribution. — Only known from the type locality.

FAMILY PSEUDOGOURRETIIDAE SAKAI, 2005 (NEW STATUS)

Pseudogourretiinae Sakai, 2005b: 230.

Diagnosis. — Rostrum triangular, lacking rostral carina. Carapace without dorsal oval and cardiac sulcus, but with cardiac prominence. Linea thalassinica incompletely present. Eyestalks flattened and contiguous. A2 scaphocerite small. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischium-merus rectangular; merus with subdistal tooth at mesiodistal angle; propodus rectangular; dactylus digitiform; exopod present. Ps1-2 unknown. P3 propodus rectangular. Pleurobranchs present on Ps2-4. Abdominal somite 6 unknown. Male Plp1 uniramous and bisegmented, distal segment chelate. Male Plps2-5 and female Plps1-5 unknown. Uropodal exopod unknown.

Type genus. — *Pseudogourretia* Sakai, 2005b.

Genera included. — *Pseudogourretia* Sakai, 2005b.

Genus **Pseudogourretia** Sakai, 2005

Pseudogourretia Sakai, 2005b: 230.

Diagnosis. — Male Plp1 chelate; male Plp2 unknown. Pleurobranchs present on Ps2-4.

Remarks. — *Pseudogourretia* is similar to *Gourretia* De Saint Laurent, 1973, *Laurentgourretia* Sakai, 2004b, and *Paragourretia* Sakai, 2004b, in that the rostral carina is absent; the maxilla 2 scaphognathite bears no posterior whip; and the male Plp1 is chelate distally, but differs from these, in that in *Pseudogourretia* pleurobranchs are present on Ps2-4, whereas in the genera *Gourretia*, *Laurentgourretia*, and *Paragourretia* these pleurobranchs are absent on Ps2-4. Therefore, *Pseudogourretia* was earlier assigned to its own subfamily (Sakai, 2005b), which is here reclassified as the family Pseudogourretiidae (new status).

Type species. — *Pseudogourretia portsudanensis* Sakai, 2005b by original designation and monotypy. Gender of generic name, *Pseudogourretia*, feminine.

Species included. — *Pseudogourretia portsudanensis* Sakai, 2005b.

Pseudogourretia portsudanensis Sakai, 2005

Pseudogourretia portsudanensis Sakai, 2005b: 231.

Diagnosis. — Rostrum triangular, pointed apically, reaching middle of eyestalks. Eyestalks oval, and obtuse distally; cornea small and located centrally. Mxp3 ischium-merus pediform; merus with mesiodistal spine; exopod present. P1 unknown. Male Plp1 uniramous, bisegmented, and chelate distally; male Plp2 unknown. Telson unknown. [Adapted from Sakai, 2005b.]

Type locality. — Port Sudan (19°43.3′N 37°40.5′E – 19°42.5′N 37°40.2′E), Red Sea, 517-583 m.

Distribution. — Only known from the type locality.

FAMILY THOMASSINIIDAE DE SAINT LAURENT, 1979

Thomassiniinae De Saint Laurent, 1979: 1396; De Saint Laurent & Le Loeuff, 1979: 95; Sakai, 1992c: 18.
Callianideidae — Kensley & Heard, 1991: 497 (partim).
Thomassiniidae — Poore, 1994: 104; Poore, 1997: 398.

Diagnosis. — Rostrum obsolete or triangular. Carapace without dorsal oval, cardiac sulcus, cardiac prominence, and posterolateral lobes; linea thalassinica completely or incompletely present. Cervical groove present, barely present, or absent. Eyestalks flattened and contiguous, either completely, or except for distal part; cornea medially or distally present, or absent. A2 scaphocerite small or absent. Maxilla 2 scaphognathite with posterior whip. Mxp3 ischial crista dentata present or reduced to smooth carina; ischium and merus with or without brush of stiff setae; propodus rectangular; dactylus ovate with marginal setae; exopod present or absent. P1 subequal. P3 propodus rectangular or ovate. P5 simple or subchelate. Epipods present on Mxps2-3 and Ps1-3, or Mxps2-3 and Ps1-4, those occasionally rudimentary. Abdominal somite 1 with row of setae. Male Plp1 present or absent; male Plp2 biramous, endopod bearing appendices interna and masculina, or bearing only appendix interna; male Plps3-5 endopods with appendix interna. Telson wider than long, and trapezoid. Uropodal endopod oval, bearing transverse row of setae at proximolateral angle. Uropodal exopod with or without dorsal plate, bearing neither distal flap nor lateral notch. [Adapted from Kensley & Heard, 1991: 528.]

Remarks. — Kensley & Heard (1991: 497) included 7 genera (*Callianidea*, *Michelea*, *Mictaxius*, *Thomassinia*, *Crosniera*, *Marcusiaxius*, and *Meticonaxius*) in the family Callianideidae. Later Poore (1997) classified eight genera under three families, Callianideidae (*Callianidea*), and Thomassiniidae (*Crosniera*, *Mictaxius*, and *Thomassinia*) in the superfamily Callianassoidea, and Micheleidae (*Michelea*, *Tethisea*, *Meticonaxius*, and *Marcusiaxius*) in the superfamily Axioidea.

In the Thomassiniidae the linea thalassinica shows a variety of patterns; it is complete in *Garyia* gen. nov.; *Mictaxius*; and *Heardaxius* gen. nov.; and incomplete in *Crosniera*, *Ngochoaxius* gen. nov., and *Thomassinia*, while in the Callianideidae the linea thalassinica is absent as in *Callianidea* H. Milne

Edwards, 1837a, though it can be present as a very short one, as in *Paracallianidea* Sakai, 1992c, so that the Callianideidae are safely reclassified under the Axioidea.

Type genus. — *Thomassinia* De Saint Laurent, 1979, by being the nominate genus.

Genera included. — *Crosniera* Kensley & Heard, 1991; *Garyia* gen. nov.; *Heardaxius* gen. nov.; *Mictaxius* Kensley & Heard, 1991; and *Thomassinia* De Saint Laurent, 1979.

KEY TO THE GENERA OF THE FAMILY THOMASSINIIDAE

1 – Uropodal exopod with dorsal plate ..... *Mictaxius*
– Uropodal exopod without dorsal plate 2

2 – Linea thalassinica complete 3
– Linea thalassinica incomplete 4

3 – Male Plp1 bisegmented; male Plp2 appendices masculina and interna fused .....
..... *Heardaxius* gen. nov.
– Male Plp1 absent; male Plp2 appendix masculina with appendix interna .....
..... *Garyia* gen. nov.

4 – Male Plp1 absent ..... *Thomassinia*
– Male Plp1 present ..... *Crosniera*

TABLE XI
Species characters in the Thomassiniidae

	Dorsal plate of uropodal exopod	Linea thalassinica	Male Plp1	Male Plp2
Crosniera corindon	absent	incomplete	unsegmented	masculina and interna fused
Crosniera dayrati	absent	incomplete	unknown	unknown
Crosniera minima	absent	incomplete	bisegmented	masculina with interna
Crosniera panie	absent	incomplete	unsegmented	masculina and interna fused
Crosniera sp. 1	absent	incomplete	unsegmented	masculina and interna fused
Crosniera sp. 2	unknown	unknown	unknown	unknown
Garyia arno	absent	complete	absent	masculina and interna fused
Garyia moorea	absent	complete	absent	masculina with interna
Heardaxius salvati	absent	complete	bisegmented	masculina and interna fused
Mictaxius thalassicola	present	complete	absent	masculina and interna fused
Thomassinia aimsae	absent	incomplete	unknown	unknown
Thomassinia gebioides	absent	incomplete	absent	masculina and interna fused
Thomassinia sp. 1	absent	incomplete	absent	masculina and interna fused

Genus **Crosniera** Kensley & Heard, 1991

Crosniera Kensley & Heard, 1991: 500, fig. 2B; Poore, 1994: 104 (key); Poore, 1997: 399.

Diagnosis. — Rostrum triangular. Cervical groove incomplete. Linea thalassinica incompletely present. Eyestalk flattened, and pointed or obtuse distally; cornea medially present or reduced. A2 scaphocerite vestigial. Mxp3 ischial crista dentata present; ischium and merus without brush of stiff setae; exopod present. P1 subequal. P3 propodus rectangular. Male Plp1 uniramous, unsegmented and obtuse distally, or bisegmented, proximal segment elongate and distal one short and leaf-like or obtuse distally. Male Plp2 biramous, elongate and leaf-like, endopod bearing mesiomedially appendix masculina with stiff distal setae, provided mesiomedially with appendix interna, or fused appendices masculina and interna. Male Plps3-5 endopods with appendix interna. Telson with proximal lobe without spine on lateral margin, posterior margin rounded. Uropodal exopod ovate, lacking dorsal plate. Setal rows present on carapace and abdominal somite 6, and present or absent on abdominal somites 1-5. [Adapted from Kensley & Heard, 1991; Poore, 1997.]

Type species. — *Callianassa minima* Rathbun, 1901, by original designation. Gender of generic name, *Crosniera*, feminine.

Species included. — *Crosniera corindon* Poore, 1997; *C. dayrati* Ngoc-Ho, 2005; *C. minima* (Rathbun, 1901); *C. panie* Poore, 1997; *Crosniera* sp. 1, Poore, 1997; *Crosniera* sp. 2, Poore, 1997.

Key to the Species of the Genus *Crosniera*

1 – Telson with distinct median spine on lateral margin ..... *C. panie*
– Telson without distinct spine on lateral margin 2

2 – A1 peduncle reaching distal end of A2 penultimate segment ..... *C. minima*
– A1 peduncle slightly longer than A2 peduncle 3

3 – Rostrum shaped as elongate triangle, reaching distal end of eyestalks ..... *C. corindon*
– Rostrum triangular, overreaching distal end of eyestalks ..... *C. dayrati*

Crosniera corindon Poore, 1997

Crosniera corindon Poore, 1997: 400, figs. 28, 29A-H.

Material examined. — MNHN Th 1217, holotype, male (TL/CL, 15.0/4.0 mm), Makassar Strait, 0°14.9′S 117°51.7′E, 150 m, 31.x.1980.

Diagnosis. — Scaphocerite short and drop-shaped. Male Plp1 uniramous and unsegmented, and curved and cylindrical; male Plp2 endopod bearing mesiomedially fused appendices interna and masculina, represented by distal

hooklets and subdistal long setae on lateral margin. [Cf. Poore, 1997: 402, fig. 29-M, O.]

Remarks. — It was confirmed by the present re-examination that the holotype regarded as a female by Poore is a male, the male Plp1 is uniramous and cyrindrical, and the male Plp2 endopod bears mesiomedially fused appendices interna and masculina, though the figures of Plps1-2 are shown as those of a female by Poore, who considered the holotype to be a female.

Type locality. — Makassar Strait, Indonesia, 0°14.9′S 117°51.7′E, 150 m.

Distribution. — Indonesia, Makassar Strait (Poore, 1997); 150 m.

Crosniera dayrati Ngoc-Ho, 2005
(fig. 70)

Crosniera dayrati Ngoc-Ho, 2005: 63, figs. 8, 9.

Material examined. — MNHN Th 418, holotype, female (TL/CL, ca. 20.0/5.2 mm, posterior part of telson missing), Marquesas Islands, Nuku Hiva, MUSORSTOM 9, R/V "Alis" Sta. 1306, 283-448 m, 10.ix.1997, leg. P. Bouchet, B. Dayrat, and B. Richer de Forges.

Diagnosis. — Eyestalks rounded, cornea pale. Linea thalassinica incomplete. Mxp3 merus with subdistal spine on mesial margin (fig. 70A). P2 chelate (fig. 70B). Ps3-4 propodi simple, lacking setal rows on ventrolateral surfaces. Female Plp1 uniramous and bisegmented, distal segment simple; female Plps2-5 biramous, endopods with appendix interna.

Crosniera minima (Rathbun, 1901)

Callianassa minima Rathbun, 1901: 92, fig. 16; Schmitt, 1935b: 5 (key); Biffar, 1971a: 651 (key), 654 (key); De Saint Laurent & Le Loeuff, 1979: 95; Manning, 1987: 397 (list); Manning & Felder, 1991: 765.

Callianassa (*Cheramus*) *minima* — Borradaile, 1903: 546; De Man, 1928b: 26 (list), 94, 97; Schmitt, 1935a: 195.

Crosniera minima — Kensley & Heard, 1991: 503, figs. 5, 6, table 1B.

Material examined. — USNM 23779, syntypes, 1 male, carapace and abdomen separated, lacking Plp1; 1 female, one carapace with abdomen; and pair of P1 (shown by Kensley & Heard, 1991, fig. 5E, F); USNM 266258, 1 female (TL/CL, 14.0/4.0 mm), Puerto Rico, Caribbean Sea, 11.vi.1980, leg. B.F. Kensley; USNM 253452, 1 male (TL/CL. 11.0/3.6 mm), S. of Mobile, Alabama, United States, Gulf of Mexico, 12 m, 29.vi.1980, leg. B. Kensley; USNM 253543, 1 male (TL/CL, 10.0/3.5 mm, rostrum broken), San Juan, Puerto Rico, Caribbean Sea, 282 m, 10.vi.1980, leg. B.F. Kensley; USNM 24668, 1 female (no carapace), Fish Hawk Sta. 6062, Mayagüez Harbour, Puerto Rico, 45-55 m; USNM 1100476, 2 males (TL/CL, 12.0/4.0; 6.0/2.8 mm); 1 male (18.0/4.8 mm), A-141 (M2 A-1), Puerto Rico, deep water; 1 female (15.0/5.3 mm), M2, A-2, Puerto Rico, deep water.

Diagnosis. — Rostrum acutely triangular, reaching beyond eyestalks. Linea thalassinica incomplete, reaching posterior fourth of carapace. P1 dissimilar.

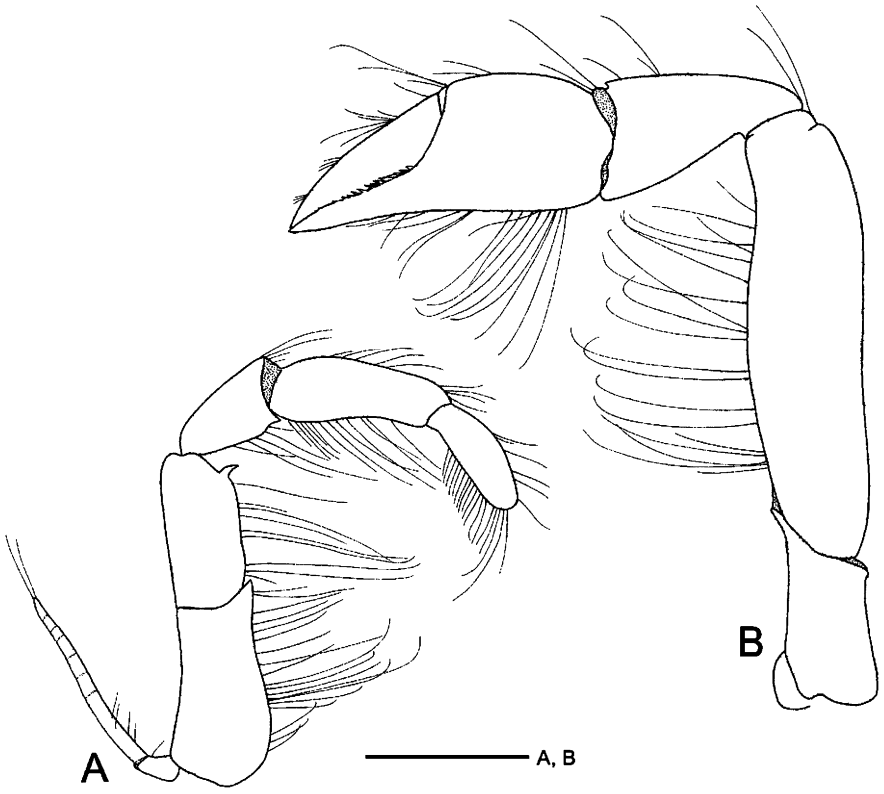

Fig. 70. *Crosniera dayrati* (Ngoc-Ho, 2005). A, Mxp3, lateral view; B, P2, lateral view. A, B, MNHN Th 418, holotype, female (TL/CL, ca. 20.0/5.2 mm, posterior part of telson missing), Marquesas Islands, Nuku Hiva, MUSORSTOM 9, R/V "Alis" Sta. 1306, 283-448 m. Scale 1 mm.

Male Plp1 uniramous and bisegmented, distal segment leaf-like; male Plp2 biramous, endopod bearing mesiomedially appendix masculina with long stiff setae, provided mesiomedially with slender appendix interna. Male Plps3-5 biramous, endopods with appendix interna. Female Plp1 uniramous and trisegmented. Telson with proximal lobe followed posteriorly by three denticles on lateral margin, bearing setae on posterior margin. Uropodal endopod bearing subdistal spine on anterior margin, and median carina on dorsal surface; uropodal exopod with two longitudinal carinae.

Type locality. — Mayagüez Harbour, Puerto Rico.

Distribution. — Alabama — off Mobile (Kensley & Heard, 1991); Puerto Rico — (Kensley & Heard, 1991), Mayagüez Harbour (Rathbun, 1901; Poore, 1997); Venezuela; 35-75 m.

Crosniera panie Poore, 1997

Crosniera panie Poore, 1997: 402, figs. 29I-N, 30.

Diagnosis. — Male Plp1 simple, curved, and cylindrical. Male Plp2 biramous, endopod with fused appendices interna and masculina, represented only by long stiff setae.

Type locality. — East Lagoon, near Mt Panié, New Caledonia, 20°33.25′S 164°49.3′E, 40 m.

Distribution. — New Caledonia — East Lagoon (Poore, 1997); 40 m.

Crosniera sp. 1, Poore, 1997

Crosniera sp. 1, Poore, 1997: 402, fig. 31.

Distribution. — Sulu Archipelago (Poore, 1997); 2570 m.

Crosniera sp. 2, Poore, 1997

Crosniera sp. 2, Poore, 1997: 406.

Distribution. — Angeles Bay, Gulf of California (Poore, 1997); 4 m.

Genus **Garyia** gen. nov.

Diagnosis. — Rostrum obsolete. Cervical groove present. Linea thalassinica complete. Eyestalks closely depressed and contiguous, with acute mesial apex, cornea present apically. A2 scaphocerite absent. P1 subequal. P3 propodus rectangular. P5 simple. Male Plp1 absent; male Plp2 biramous, endopod bearing subproximally appendix masculina with distal setae on mesial margin, provided mesiomedially with slender appendix interna; male Plps3-5 endopods with appendix interna. Telson wider than long and trapezoid. Uropodal exopod ovate, lacking dorsal plate. Setal rows present on carapace and uropodal endopod.

Remarks. — *Thomassinia moorea* Poore, 1997 is excluded from the genus *Thomassinia*, because *T. moorea* is different from the type species of *Thomassinia*, *T. gebioides* De Saint Laurent, 1979 as follows. In *T. moorea* the linea thalassinica is complete, and the Plp2 endopod bears an appendix masculina with appendix interna; whereas in *T. gebioides* the linea thalassinica is incomplete, running on the anterior three-fourths of the carapace only, and the male Plp2 endopod bears fused appendices masculina and interna. Those differences are to be considered as important characteristics at the generic level rather than on the species level, and those two species are thus distinguishable

from each other at the generic level, so that *T. moorea* is reclassified under the new genus *Garyia* gen. nov. as *G. moorea*.

Type species. — *Thomassinia moorea* Poore, 1997, by present designation. The gender of the generic name, *Garyia*, is feminine.

Species included. — *Garyia arno* (Poore, 1997); *G. moorea* (Poore, 1997).

Etymology. — The new genus is named *Garyia* in honour of Dr. Gary C. B. Poore, Museum of Victoria, who described the present species through his study on Thalassinidea.

Garyia arno (Poore, 1997)

Mictaxius arno Poore, 1997: 407, figs. 32, 33A-G.

Material examined. — *Mictaxius arno* Poore, 1997, USNM 95570, holotype, male (TL/CL, 14.5/4.1 mm), S.E. of Arno lagoon, Arno Atoll, Marshall Islands, 22.vii.1950, leg. J.W. Wells, det. G. Poore (L.B. Holthuis, 1957 as *Callianassa*).

Diagnosis. — Rostrum short and triangular. Eyestalks tapering to narrowly protruded mediodistal apex; cornea spotted and located distally. Linea thalassinica complete. A1 peduncle as long as A2 peduncle. Mxp3 ischium without crista dentata; exopod small and digitiform. Male Plp1 absent; male Plp2 with totally fused appendices interna and masculina. Telson as long as basal width, broadened at proximal third, then converging to slightly rounded posterior margin. [Adapted from Poore, 1997.]

Type locality. — Arno Atoll, Marshall Islands, 36 m.

Distribution. — Only known from the type locality.

Garyia moorea (Poore, 1997)
(figs. 71, 72)

Thomassinia moorea Poore, 1997: 416, fig. 38.

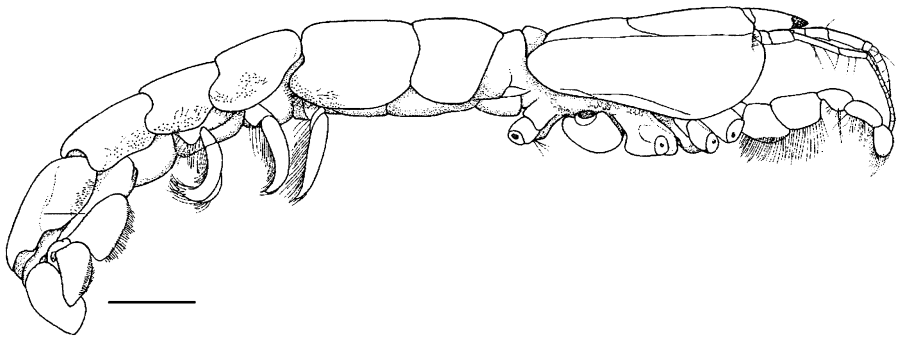

Fig. 71. *Garyia moorea* (Poore, 1997). Whole body, lateral view. MNHN Th 1220, holotype, Tiahura, Moorea Is., Tahiti, 17°30′S 149°50′E. Scale 1 mm.

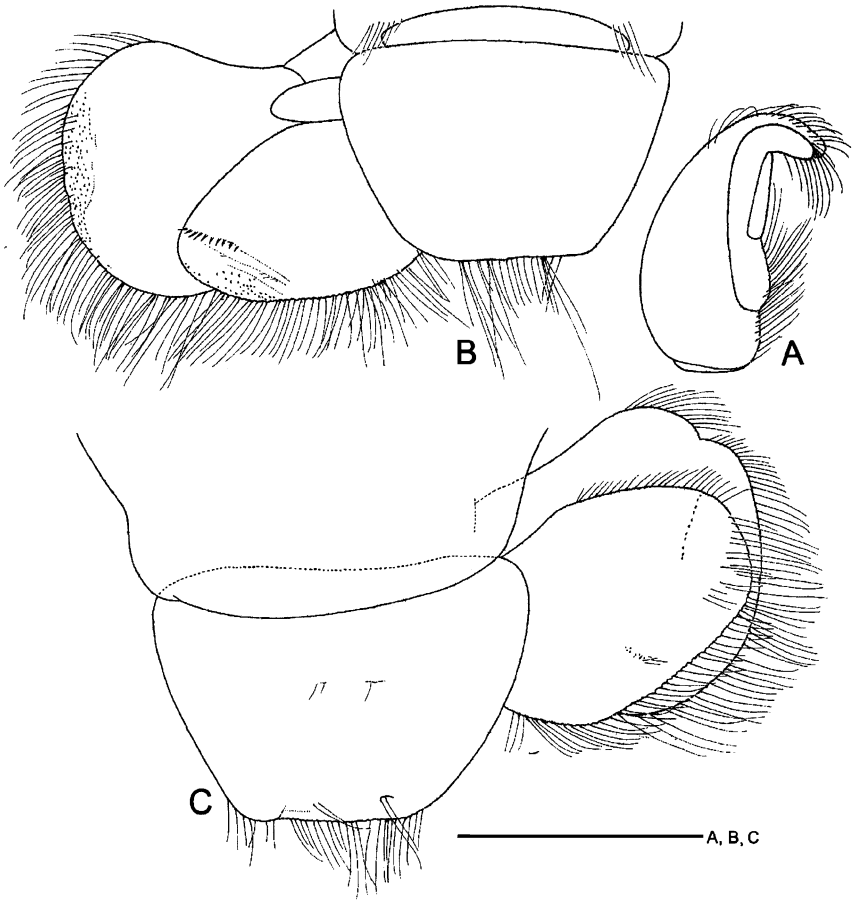

Fig. 72. *Garyia moorea* (Poore, 1997). A, male Plp2; B, telson and uropod on left side; C, telson and uropod on right side. A-C, MNHN Th 1220, holotype, Tiahura, Moorea Is., Tahiti, 17°30′S 149°50′E. Scale 1 mm.

Material examined. — MNHN Th 1220, holotype of *Thomassinia moorea* Poore, 1997, 1 male (TL/CL, 12.0/3.5 mm), Tahiti, Moorea Is., 17°30′S 149°50′E, leg. B.A. Thomassin.

Diagnosis. — Cephalothorax with submarginal setal row behind anterolateral margin (fig. 71). Linea thalassinica complete. Abdominal somites convex or straight ventrally. Male Plp1 absent. Male Plp2 biramous, endopod bearing mesially subproximal appendix masculina with distal setae, provided mesiomedially with slender appendix interna (fig. 72A). Telson wider than long and trapezoid (fig. 72B, C). Uropodal endopod with transverse row of spiniform setae. Uropodal exopod broadly rounded on distal margin, bearing no dorsal plate.

Type locality. — Moorea Is., Tiahura, 17°30′S 149°50′E, Tahiti.

Distribution. — Only known from the type locality.

Genus **Heardaxius** gen. nov.

Diagnosis. — Rostrum reduced to small triangle. Cervical groove weakly present. Linea thalassinica complete. Eyestalks flattened and pointed distally; cornea pigmented and situated subapically. A2 scaphocerite vestigial. Maxilla 2 scaphognathite with posterior whip. Mxp3 ischial crest moderately dentate; ischium and merus without brush of stiff setae; dactylus ovate; exopod vestigial. P1 subequal. P3 propodus subcircular. P5 simple or subchelate. Male Plp1 uniramous and bisegmented; male Plp2 biramous, endopod bearing mesiomedially fused appendices interna and masculina, represented by distal hooklets and subdistal long setae on lateral margin; male Plps3-5 biramous, endopods with appendix interna. Telson wider than long, and convergent toward convex posterior margin without median spine, bearing proximal lobe on lateral margin. Uropodal exopod ovate, lacking dorsal plate. Setal rows present on carapace, Ps2-4, and abdominal somites 1-6. [Adapted from Kensley & Heard, 1991; Poore, 1997.]

Remarks. — The type species of the genus *Mictaxius*, *M. thalassicola* Poore & Heard, 1991 is similar to *M. salvati*, because in those two species the linea thalassinica is complete, and the male Plp2 endopod bears mesiomedially fused appendices interna and masculina, represented by distal hooklets and subdistal long setae on the lateral margin. However, they are different from each other at the generic level: in *M. thalassicola* the uropodal exopod bears a dorsal plate, while in *M. salvati* the uropodal exopod lacks a dorsal plate, so that *M. salvati* is excluded from *Mictaxius*, and reclassified under the new genus *Heardaxius* as *H. salvati*.

Type species. — *Mictaxius salvati* Ngoc-Ho, 2005, by present designation and monotypy. Gender of generic name, *Heardaxius*, masculine.

Species included. — *Heardaxius salvati* (Ngoc-Ho, 2005).

Etymology. — The new genus is named *Heardaxius* in honour of Dr. Richard W. Heard, Gulf Coast Research Laboratory, Ocean Springs, MS, who is one of the leading carcinologists in the U.S.A.

Heardaxius salvati (Ngoc-Ho, 2005)

Mictaxius salvati Ngoc-Ho, 2005: 66, figs. 10, 11.

Material examined. — MNHN Th 1417, holotype, hermaphroditic with ova (TL/CL, 14.0/4.0 mm), French Polynesia, Mururoa, Mission II Tuamotu, 40 m, 1965, B. Salvat coll.

Diagnosis. — Rostrum weakly developed. Eyestalks slightly flattened, and acute mesiodistally; cornea distinct and located distolaterally. Linea thalassinica complete. Mxp3 ischium and merus rectangular; ischium with weak crista dentata; bearing small exopod. P1 subequal. Telson slightly broader than long, and broadened in proximal half, then tapering to slightly rounded posterior margin. Uropodal endopod and exopod rounded, and about as long as telson. Hermaphrodite. [Adapted from Ngoc-Ho, 2005.]

Remarks. — The hermaphroditic type-specimen is broken and in poor condition.

Type locality. — Mururoa, French Polynesia, 40 m.

Distribution. — Only known from the type locality.

Genus **Mictaxius** Kensley & Heard, 1991

Mictaxius Kensley & Heard, 1991: 527; Poore, 1994: 104 (key); Poore, 1997: 399 (key), 406.

Diagnosis. — Rostrum obsolete. Carapace with cervical groove. Linea thalassinica complete. Eyestalks moderately flattened and pointed distally; cornea moderately pigmented and situated subapically. A2 scaphocerite vestigial. Maxilla 2 scaphognathite with posterior whip. Mxp3 ischial crest moderately dentate; ischium and merus without brush of stiff setae; dactylus oval; exopod vestigial. P1 subequal. P3 propodus subcircular. P5 simple or subchelate. Male Plp1 absent; male Plp2 biramous, endopod bearing fused appendices interna and masculina, represented by stiff distal setae and hooklets; male Plps3-5 biramous, endopods with appendix interna. Telson wider than long and semicircular. Uropodal exopod ovate, bearing dorsal plate. Setal rows present on carapace, Ps2-4, and abdominal somites 1-6. [Adapted from Kensley & Heard, 1991; Poore, 1997.]

Remarks. — Kensley & Heard (1991: 527) established *Mictaxius* based on the type species, *M. thalassicola* Kensley & Heard, 1991 from Pico Feo, Atlantic Panama, in a shallow water *Thalassia* patch, as a new genus of the family Callianideidae. Later Poore (1994: 104) excluded *Mictaxius* from the Callianideidae, and included it in the Thomassiniidae De Saint Laurent, 1979.

The type species of the genus *Mictaxius*, *M. thalassicola* is distinguished from the other three species (*M. arno*, *M. salvati*, and *M.* sp. 1, Poore, 1997) that were hitherto classified under *Mictaxius*, because in *M. thalassicola* the uropodal exopod bears a dorsal plate, whereas in the other three species the uropodal exopod lacks a dorsal plate. Hence, these three last mentioned species are herein reclassified, i.e., *M. arno* under *Garyia* gen. nov., *M. salvati* under *Heardaxius* gen. nov., and *M.* sp. 1, Poore, 1997 under *Thomassinia*.

Type species. — *Mictaxius thalassicola* Kensley & Heard, 1991, by original designation and monotypy. Gender of generic name, *Mictaxius*, masculine.

Species included. — *M. thalassicola* Kensley & Heard, 1991.

Mictaxius thalassicola Kensley & Heard, 1991

Mictaxius thalassicola Kensley & Heard, 1991: 527, figs. 22-24, table 1 L.; Poore, 1997: 408.

Material examined. — USNM 1011798, 1 male (TL/CL, 15.0/4.0 mm) and 2 females (TL/CL, 15.0/4.0-19.0/4.5 mm), Klein Lagoen, Aruba, Netherlands Antilles, Caribbean Sea, 1.5 m, 10.i.1987, leg. R. Lemaitre.

Diagnosis. — Male Plp1 absent; male Plp2 biramous, endopod with fused appendices masculina and interna; male Plps3-5 endopods with appendix interna. Uropodal endopod without longitudinal carina; uropodal exopod with longitudinal carina, bearing dorsal plate.

Type locality. — Pico Feo, Atlantic Panama.

Distribution. — Atlantic Panama — Pico Feo and Isla Mira, San Blas Islands (Kensley & Heard, 1991).

Genus **Thomassinia** De Saint Laurent, 1979

Thomassinia De Saint Laurent, 1979: 1396; Kensley & Heard, 1991: 528; Poore, 1994: 104 (key); Poore, 1997: 399 (key), 410.

Diagnosis. — Rostrum obsolete. Cervical groove present dorsally. Linea thalassinica incomplete. Eyestalks slightly flattened and contiguous; cornea present apically. A2 scaphocerite absent. Mxp3 ischium without crista dentata; ischium and merus with brush of stiff setae; dactylus ovate and setose; exopod absent. P1 subequal. P3 propodus oval. P5 simple or subchelate. Male Plp1 absent; male Plp2 biramous, endopod with fused appendices interna and masculina; male Plps3-5 endopods with appendix interna. Telson wider than long, evenly tapering toward straight posterior margin. Uropodal exopod subcircular, and rounded at anterolateral corner, with dense marginal setae, bearing no dorsal plate. Setal rows present on carapace and uropodal endopod. [Adapted from Kensley & Heard, 1991; Poore, 1997.]

Remarks. — The type species of the genus *Thomassinia*, *T. gebioides* De Saint Laurent, 1979 was described by Poore (1997: 413) as follows; “linea thalassinica beginning at lateral margin of eyes, longitudinal and reaching three-quarters along cephalothorax”. In *T. aimsae* Poore, 1997 the linea thalassinica is as incomplete as in *T. gebioides*. However, it has turned out through the present examination that in *T. moorea* Poore, 1997 included in

the genus *Thomassinia* by Poore (1997), the linea thalassinica is complete. Therefore, *T. moorea* is reclassified under the new genus *Garyia*.

Type species. — *Thomassinia gebioides* De Saint Laurent, 1979, by original designation and monotypy. Gender of generic name, *Thomassinia*, feminine.

Species included. — *Thomassinia aimsae* Poore, 1997; *T. gebioides* De Saint Laurent, 1979; *Thomassinia* sp. 1 (Poore, 1997).

Thomassinia aimsae Poore, 1997

Thomassinia aimsae Poore, 1997: 410, figs. 34, 35.

Diagnosis. — Rostrum weakly developed. Eyestalks flattened, contiguous, and acute distally; cornea located distally. Linea thalassinica beginning at lateral margin of eyestalks, and reaching posterior third of carapace. Mxp3 ischium with crista dentata. Telson shaped as inverted trapezoid. Uropodal endopod triangular, bearing transverse row of 9 spiniform setae at anterolateral corner. [Adapted from Poore, 1997.]

Type locality. — Davies Reef, Queensland, Australia, 18°50′S 147°39′E, 5 m.

Distribution. — Australia — Davies Reef, Queensland (Poore, 1997); 5 m.

Thomassinia gebioides De Saint Laurent, 1979

Thomassinia gebioides De Saint Laurent, 1979: 1396; Poore, 1997: 413, figs. 36, 37.

Material examined. — MNHN Th 818, paratype of *Thomassinia gebioides*, 1 female (TL/CL, 14.0/3.2 mm); MNHN Th 822, paratypes of *Thomassinia gebioides*, 3 males, 2 females, Madagascar, Tuléar, leg. B.A. Thomassin.

MNHN Th 1220, Tiahura, Moorea Is., Tahiti, 17°30′S 149°50′E (= *Thomassinia moorea* Poore, 1997, holotype).

Diagnosis. — Small species. Rostrum short and triangular in dorsal view. Dorsal oval absent. Cervical groove present in middle of carapace; linea thalassinica incomplete. Eyestalks slightly flattened and contiguous, cornea distal, ommatidia scattered. A2 scaphocerite absent. Setal row present along anterolateral margin of carapace. Mxp3 ischial crista dentata absent; ischium and merus with brush of stiff setae, but different in shape. P1 unequal; in larger cheliped fingers shorter than palm; in smaller cheliped fingers longer than palm, cutting edge of fixed finger with distinct tooth. P2 chelate, fingers longer than palm. P3 propodus subsquare. P4 propodus rectangular. P5 subchelate. Abdominal somites 2-6 bearing tufts of fine setae along ventral margin. Male Plp1 absent; male Plp2 biramous, endopod bearing elongate, fused appendices

masculina and interna, represented only by long setae and distal hooklets; male Plps3-5 biramous, endopods with elongate appendix interna.

Type locality. — Tuléar, Madagascar.

Distribution. — Madagascar, Tuléar (De Saint Laurent, 1979; Poore, 1997).

Thomassinia sp. 1 (Poore, 1997)

Mictaxius sp. 1; Poore, 1997: 408, figs. 33H-J.

Diagnosis. — Linea thalassinica incomplete. Male Plp1 absent. Male Plp2 biramous, endopod with fused appendices interna and masculina. Uropodal exopod without dorsal plate. [Cf. Poore, 1997: 408, fig. H, I, J.]

Remarks. — The present species, which was defined as a species of the genus *Mictaxius*, is different, however, from the type species of *Mictaxius*, *M. thalassicola*, in that the linea thalassinica is incomplete, so that *Mictaxius* sp. 1 Poore is here reclassified under the genus *Thomassinia*, as *T.* sp. 1 (Poore, 1997).

Distribution. — Tahiti — Tiahura, Moorea Island (Poore, 1997).

DATA ON BIOGEOGRAPHY

In order to facilitate references to the ranges of various species, the known distribution of the species of the family Axiidae as well as of those of the subfamilies Callianassinae and Callichirinae of the family Callianassidae, are here summarized in three tables, i.e., tables XII, XIII, and XIV.

TABLE XII

The distribution of the species in the family Axiidae as currently known

Atlantic Ocean and Mediterranean Sea	
Mediterranean Sea	*Axius mediterraneus* *Axius stirhynchus* *Levantocaris hornungae*
West Africa	*Calocarides capensis* *Calocarides macphersoni* *Calocarides rudolfi* *Manaxius kensleyi*
North and western Atlantic	*Axiopsis serratifrons* *Axiorygma nethertoni* *Axius armatus* *Axius serratus* *Axius stirhynchus* *Bouvieraxius longipes* *Calocarides coronatus* *Calocarides laevis* *Coelhocalaxius spinosus* *Eutrichocheles defensus* *Eutrichocheles foveolatus* *Eutrichocheles granulimanus* *Eutrichocheles spinipleurus* *Guyanacaris hirsutimana* *Heterocalaxius carneyi* *Manaxius angulatus* *Manaxius inaequalis* *Paraxiopsis gracilimana* *Paraxiopsis hispida* *Paraxiopsis pindatyba* *Paraxiopsis vicina* *Pillsburyaxius kirkmilleri*

TABLE XII
(Continued)

Indo-Pacific	
Eastern Pacific	*Axiopsis baronai* *Calocarides lev* *Calocarides quinqueseriatus* *Calocarides rostriserratus* *Guyanacaris caespitosa* *Leonardsaxius spinulicauda* *Manaxius galapagensis* *Manaxius jenneri*
Hawaii, central and southern Pacific, and eastern Australia	*Acanthaxius clevai* *Acanthaxius garawa* *Acanthaxius gadaletae* *Acanthaxius miyazakiensis* *Acanthaxius spinosissimus* *Albatrossaxius bythos* *Alienaxiopsis lizardensis* *Allaxiopsis bougainvillensis* *Axiopsis consobrina* *Axiopsis serratifrons* *Bouvieraxius rudis* *Bruceaxius polychaetes* *Calaxius acutirostris* *Calocarides vigilus* *Dorphinaxius kermadecensis* *Eutrichocheles modestus* *Eutrichocheles tuamotu* *Leonardsaxius werribee* *Manaxius aganaensis* *Manaxius euophthalmus* *Manaxius pailoloensis* *Marianaxius kroppi* *Michelaxiopsis australiensis* *Newzealandaxius novaezealandiae* *Oxyrhynchaxius tricarinatus* *Parascytoleptus tridens* *Paraxiopsis brocki* *Paraxiopsis johnstoni* *Paraxiopsis majuro* *Paraxiopsis paulayi* *Paraxiopsis plumosimanus* *Paraxius altus* *Planaxius brevifrons*

TABLE XII
(Continued)

Indo-Pacific	
	Platyaxiopsis odontorhyncha *Pseudoaxiopsis carpentariaensis* *Scytoleptus barbatus* *Spongiaxius brucei*
Japan, eastern China, and Taiwan	*Acanthaxius miyazakiensis* *Acanthaxius pilocheirus* *Amakusaxius amakusanus* *Axiopsis consobrina* *Balssaxius habereri* *Boasaxius princeps* *Calaxius acutirostris* *Calocarides chani* *Calocarides okhotskensis* *Calocarides soyoi* *Leonardsaxius amurensis* *Litoraxius boshu* *Manaxius mimasensis* *Manaxius ohsumiensis* *Oxyrhynchaxius japonicus* *Paraxiopsis brocki* *Planaxius brevifrons*
Sarawak, Gulf of Thailand	*Manaxius thailandensis*
Indonesia	*Acanthaxius miyazakiensis* *Acanthaxius pilocheirus* *Acanthaxius spinosissimus* *Allaxiopsis picteti* *Allaxiopsis bougainvillensis* *Allaxiopsis spinimana* *Anophthalmaxius eccoptodactylus* *Axiopsis consobrina* *Axiopsis serratifrons* *Bouvieraxius michelae* *Bouvieraxius springeri* *Calocarides tenuicornis* *Colemanaxius pitatucensis* *Manaxius euophthalmus* *Manaxius sibogae* *Paraxiopsis brocki* *Ralumcaris bisquamosa*

TABLE XII
(Continued)

Indo-Pacific	
Northern and Western Australia	*Acanthaxius clevai* *Acanthaxius ningaloo* *Acanthaxius pilocheirus* *Acanthaxius spinosissimus* *Australocaris pinjarup* *Bouvieraxius keiensis* *Bouvieraxius rudis* *Eutrichocheles austrinus* *Leonardsaxius werribee* *Leonardsaxius* sp. aff. *werribee* *Oxyrhynchaxius manningi* *Paratrichocheles pumilus* *Paraxiopsis brocki* *Pilbaraxius kariyarra* *Planaxius brevifrons* *Platyaxius bardi* *Platyaxius brevirostris* *Scytoleptus barbatus* *Spongiaxius brucei*
India	*Axiopsis serratifrons* *Eutrichocheles modestus*
Persian Gulf and Gulf of Oman	*Calocarides longispinis*
Gulf of Aden	*Allaxius aethiopicus* *Axiopsis serratifrons*
Red Sea	*Allaxius aethiopicus* *Axiopsis serratifrons*
Madagascar	*Bouvieraxius rudis* *Calaxius acutirostris* *Parascytoleptus tridens* *Scytoleptus serripes*
East and South Africa	*Axiopsis serratifrons* *Axiopsis* sp. *Calaxius acutirostris* *Calocarides capensis* *Michelaxiopsis australiensis* *Scytoleptus serripes*

TABLE XIII
The distribution of the species in the subfamily Callianassinae as currently known

Atlantic Ocean and Mediterranean Sea	
Mediterranean Sea	*Callianassa subterranea* *Gilvossius candidus* *Gilvossius tyrrhenus* *Gilvossius whitei* *Trypaea acanthura* *Trypaea truncata*
West Africa	*Callianassa subterranea* *Cheramus oblongus* *Gilvossius candidus* *Gilvossius convexus* *Gilvossius diaphorus* *Gilvossius marchali* *Gilvossius tyrrhenus*
North and western Atlantic	*Cheramoides marginata* *Cheramus gaucho* *Cheramus profundus* *Gilvossius setimanus* *Notiax delicatulus* *Trypaea berylae* *Trypaea biformis* *Trypaea caesari* *Trypaea costaricensis* *Trypaea fragilis*
Indo-Pacific	
Eastern Pacific	*Gilvossius pacificus* *Notiax brachyophthalma* *Trypaea biffari* *Trypaea californiensis* *Trypaea debilis* *Trypaea gigas* *Trypaea rochei* *Trypaea santarita* *Trypaea tabogensis* *Trypaea uncinata*
Hawaii, central and south Pacific, and eastern Australia	*Cheramus modestus* *Gilvossius bouvieri* *Notiax ceramica* *Notiax limosa* *Notiax ngochoae*

TABLE XIII
(Continued)

Indo-Pacific	
	Trypaea amboinae *Trypaea arenosa* *Trypaea australiensis* *Trypaea bangensis* *Trypaea caledonica* *Trypaea filholi* *Trypaea gruneri* *Trypaea lewtonae* *Trypaea parva* *Trypaea poorei* *Trypaea tonkinae*
Japan, eastern China, and Taiwan	*Cheramus longicauda* *Cheramus spinophthalmus* *Gilvossius bouvieri* *Trypaea exilimaxilla* *Trypaea japonica* *Trypaea joculatrix* *Trypaea petalura* *Trypaea thermophila*
Sarawak, Gulf of Thailand	*Cheramus anoplourus* *Cheramus contipes* *Cheramus malaccaensis* *Cheramus nigroculatus* *Gilvossius brachytelson* *Trypaea amplimaxilla* *Trypaea brevirostris* *Trypaea chakratongae* *Trypaea lignicola* *Trypaea matzi* *Trypaea nieli* *Trypaea propriopedis* *Trypaea spinoculata* *Trypaea stenomastaxa* *Trypaea tenuipes* *Trypaea thailandica* *Trypaea tonkinae*
Indonesia	*Cheramus lobetobensis* *Cheramus modestus* *Cheramus praedatrix* *Cheramus propinquus* *Gilvossius bouvieri* *Notiax amboinensis*

TABLE XIII
(Continued)

Indo-Pacific	
	Notiax ngochoae *Trypaea amboinae* *Trypaea intermedia* *Trypaea joculatrix* *Trypaea parva* *Trypaea pugnatrix* *Trypaea pygmaea* *Trypaea sahul* *Trypaea sibogae*
Northern and Western Australia	*Cheramus orientalis* *Cheramus parvulus* *Cheramus propinquus* *Notiax ceramica* *Notiax ngochoae* *Trypaea acutirostella* *Trypaea joculatrix* *Trypaea melissae* *Trypaea poorei* *Trypaea sibogae*
India	*Gilvossius gravieri* *Trypaea pugnatrix*
Persian Gulf and Gulf of Oman	*Gilvossius persicus* *Trypaea thorsoni*
Gulf of Aden	*Gilvossius bouvieri* *Gilvossius gravieri*
Red Sea	*Cheramus aqabaensis* *Gilvossius bouvieri* *Gilvossius gravieri* *Notiax ngochoae*
Madagascar	–
East and South Africa	*Callianassa subterranea* *Gilvossius rotundicaudatus* *Trypaea joculatrix* *Trypaea mocambiquensis* *Trypaea plantei*

TABLE XIV
The distribution of the species in the subfamily Callichirinae sensu nov. as currently known

Atlantic Ocean and Mediterranean Sea	
Mediterranean Sea	–
West Africa	*Balsscallichirus balssi* *Balsscallichirus guineensis* *Barnardcallichirus tenuimanus* *Callichirus adamas* *Corallichirus intesi* *Forestcallichirus foresti* *Neocallichirus pentagonocephalus* *Neocallichirus sassandrensis* *Sergio monodi* *Sergio pachydactylus*
Western Atlantic	*Callichirus islagrande* *Callichirus major* *Glypturoides trilobatus* *Glypturus acanthochirus* *Glypturus longiventris* *Glypturus rabalaisae* *Lepidophthalmoides eiseni* *Lepidophthalmoides jamaicense* *Lepidophthalmoides louisianensis* *Lepidophthalmoides richardi* *Lepidophthalmoides siriboia* *Lepidophthalmus sinuensis* *Lepidophthalmus turneranus* *Neocallichirus branneri* *Neocallichirus grandimanus* *Neocallichirus guaiqueri* *Neocallichirus guarus* *Neocallichirus mirim* *Neocallichirus nickellae* *Neocallichirus rathbunae* *Sergio cacahuate* *Sergio guassutinga* *Sergio lemaitrei* *Sergio mericeae* *Sergio sulfureus*
Indo-Pacific	
Eastern Pacific	*Callichirus seilacheri* *Corallichirus xuthus* *Lepidophthalmus bocourti* *Lepidophthalmus rafai* *Neocallichirus mortenseni*

TABLE XIV
(Continued)

Indo-Pacific	
Hawaii, central and south Pacific, and eastern Australia	*Corallichirus bayeri* *Glypturus armatus* *Glypturus articulatus* *Glypturus assimilis* *Glypturus collaroy* *Glypturus lanceolatus* *Glypturus longiventris* *Glypturus martensi* *Lepidophthalmoides rosae* *Neocallichirus denticulatus* *Neocallichirus indicus* *Neocallichirus karumba* *Neocallichirus mucronatus* *Neocallichirus winslowi*
Japan, eastern China, and Taiwan	*Glypturus lanceolatus* *Glypturus longiventris* *Glypturus martensi* *Grynaminna tamakii* *Lepidophthalmoides tridentatus* *Neocallichirus kempi*
Sarawak, Gulf of Thailand	*Neocallichirus kempi* *Thailandcallichirus ranongensis*
Indonesia	*Glypturus armatus* *Glypturus assimilis* *Glypturus longiventris* *Glypturus martensi* *Lepidophthalmoides rosae* *Lepidophthalmoides tridentatus* *Michaelcallianassa indica* *Neocallichirus indicus* *Neocallichirus kempi* *Neocallichirus moluccensis* *Neocallichirus mucronatus* *Neocallichirus vigilax* *Thailandcallichirus ranongensis*
Northern and Western Australia	*Glypturus haswelli* *Glypturus lanceolatus* *Neocallichirus angelikae* *Neocallichirus caechabitator* *Neocallichirus darwinensis* *Neocallichirus horneri*

TABLE XIV
(Continued)

Indo-Pacific	
India	*Glypturus armatus* *Glypturus borradailei* *Glypturus longiventris* *Glypturus martensi* *Michaelcallianassa indica* *Neocallichirus audax* *Neocallichirus indicus* *Neocallichirus kempi* *Neocallichirus manningi* *Neocallichirus mauritianus* *Tirmizicallichirus masoomi*
Persian Gulf and Gulf of Oman	*Lepidophthalmoides socotrensis* *Michaelcallianassa indica* *Neocallichirus calmani* *Neocallichirus indicus* *Neocallichirus jousseaumei* *Neocallichirus mucronatus*
Gulf of Aden	*Glypturus armatus* *Glypturus longiventris* *Neocallichirus calmani* *Neocallichirus indicus* *Neocallichirus jousseaumei* *Neocallichirus mucronatus*
Red Sea	*Glypturus armatus* *Lepidophthalmoides rosae* *Neocallichirus calmani* *Neocallichirus indicus* *Neocallichirus jousseaumei* *Neocallichirus mauritianus*
Madagascar	*Glypturus longiventris* *Lepidophthalmoides rosae* *Lepidophthalmus grandidieri* *Neocallichirus mucronatus* *Podocallichirus madagassus*
East and South Africa	*Barnardcallichirus gilchristi* *Callichirus adamas* *Callichirus kraussi* *Neocallichirus indicus* *Neocallichirus mucronatus*

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ADDENDUM I

Meanwhile, Liu & Liu (2009) have described a second species in the genus *Michaelcallianassa*, i.e., *M. sinica* Liu & Liu, 2009 from the South China Sea. The authors mentioned that their species, *Michaelcallianassa sinica*, is different from the type species of the genus, *M. indica* Sakai, 2002.

I here include this additional species as follows.

Michaelcallianassa sinica Liu & Liu, 2009

Michaelcallianassa sinica Liu & Liu, 2009: 40, figs. 1-5.

Remarks. — The present species is added as the second species of the genus *Michaelcallianassa* from the Beibu Gulf (Tonkin Gulf) of the northern South China Sea. *M. sinica* differs from the type species of *Michelcallianassa*, *M. indica* Sakai, 2002 in the short uropodal endopod and exopod, and the elongated carpus of the smaller cheliped. In addition, another difference is observed in the shapes of the eyestalks: in *M. indica* the eyestalks are tapering distally, while in *M. sinica* they are distally obtuse (Liu & Liu, 2009, fig. 2A).

REFERENCE

LIU, W. & L. RUIYU [= J. Y. LIU], 2009. *Michaelcallianassa sinica* sp. nov. (Crustacea, Decapoda, Thalassinidea, Callianassidae) from the South China Sea. Zootaxa, **2294**: 39-46.

ADDENDUM II

Recently, Anker (2010) has reported a new genus and species from Nosi-Bé, Madagascar, *Ctenocheloides attenboroughi* Anker, 2010, assigning the new genus to the family Ctenochelidae Manning & Felder, 1991. However, according to the criteria adopted in the present monograph, this species does not belong in the Ctenochelidae, because of the following considerations. *Ctenocheloides attenboroughi* bears a moderately developed dorsal oval, and the uropodal exopod bears neither a dorsal plate nor a lateral notch, and is, therefore, different from the other species currently included in the Ctenochelidae. This family, viz., is not only characterized by: (1) the rostrum is distinct and acutely triangular, (2) the P1 chelipeds are unequal in size, and dissimilar in shape, and (3) the fingers of the larger cheliped being elongate and pectinate, but also by (4) the dorsal oval being absent and (5) the uropodal exopod lacking a dorsal plate, but bearing a lateral notch (please refer to table VIII herein). As a result, the genus *Ctenocheloides* is here separated at family level from the Ctenochelidae as a new family, Ctenocheloidae fam. nov., thus constituting the 11th family in the superfamily Callianassoidea Dana, 1852a, according to the present classification.

Family CTENOCHELOIDAE **fam. nov.**

Diagnosis. — Carapace with moderately developed dorsal oval; cardiac prominence present; cervical groove clearly delimited; linea thalassinica running complete length of carapace. Rostrum weakly developed, lacking cardiac mediodorsal carina with mid-pit. Eyestalks somewhat flattened dorsally. A2 scaphocerite strong. Maxilla 2 scaphognathite without posterior whip. Mxp3 ischiomerus pediform; dactylus digitiform; exopod absent. P1 chelate, and almost equal in size and similar in shape; ischium armed with teeth on ventral margin; merus with small tooth on ventral margin; palm ovoid; finger elongate and pectinate. Plp2-5 biramous, and endopods with stubby appendix interna. Telson trapezoid. Uropodal exopod without lateral notch and dorsal plate. [Modified from Anker, 2010.]

Remarks. — This new family is similar to the Ctenochelidae in that the fingers of the larger cheliped of P1 are pectinate, but otherwise they

are fundamentally different from each other, because in the present new family Ctenocheloidae the rostrum is weakly developed; the carapace bears a moderately developed dorsal oval; P1 are chelate and almost equal in size and similar in shape; the ischium is armed with teeth on the ventral margin; the merus is armed with a small tooth on the ventral margin; the fingers of both chelipeds are elongate and pectinate; the telson is trapezoid; the uropodal exopod bears neither a lateral notch nor a dorsal plate. Whereas in the Ctenochelidae, the rostrum is distinct, acutely triangular, and unarmed on the lateral margins; the carapace bears no dorsal oval; P1 are chelate, unequal in size, and dissimilar in shape; in the larger cheliped the ischium and merus bear no teeth ventroproximally; the palm is subglobular; the fingers are elongate and pectinate; in smaller cheliped the ischium and merus bear no teeth ventroproximally; the fingers are elongate but not pectinate; the telson is subquadrate to trapezoid; the uropodal exopod bears a lateral notch, but no dorsal plate.

Type genus. — *Ctenocheloides* Anker, 2010, as the nominate genus.

Genera included. — Only the type genus is known.

Ctenocheloides Anker, 2010

Ctenocheloides Anker, 2010: 1790.

Diagnosis. — Same as for the family, above.

Type species. — *Ctenocheloides attenboroughi* Anker, 2010, by original designation, and monotypy. The gender of the generic name is masculine.

Species included. — Only the type species is known.

Ctenocheloides attenboroughi Anker, 2010

Ctenocheloides attenboroughi Anker, 2010: 1789, figs. 1-8, table 1.

Diagnosis. — With the characters of the genus.

Remarks. — Only the female holotype is known.

Type locality. — Madagascar, Nosy-Bé, the large bay east of Hellville, 1.5 m depth.

REFERENCE

ANKER, A., 2010. *Ctenocheloides attenboroughi* n. gen., n. sp. (Crustacea: Decapoda: Axiidea: Ctenochelidae), a new ghost shrimp with pectinate claw fingers from Madagascar. Journ. nat. Hist., London, **44**(29-30): 1789-1805, figs. 1-6, table 1.

ERRATA

In:

SAKAI, K., 2005b. Callianassoidea of the world (Decapoda, Thalassinidea). Crustaceana Monographs, **4**: i-vi, 1-285, figs. 1-44.

Please correct:

Error: ..... **Correction:**

p. 17, line 8 from bottom: *Pseudotrypaea* ..... *Eucallichirus*
p. 31, line 6 from bottom: Alupka — Black Sea [the type locality of *Callianassa candida*] .... Kuvi Bay, ca. 2.5 km South of Rovinj, Istria, Croatia (Sakai, 1999c: 16).
pp. 35, 36, captions of figs. 5, 6: *Callianassa subterranea* (Montagu, 1808). SMF 25800 .... SMF 27250
p. 37, caption fig. 7: *Callianassa subterranea* (Montagu, 1808). SMF 27250 ..... SMF 25800
p. 43, line 6 from top: Mediterranean [the type locality of *Callianassa whitei*] .... Rovinj, Adriatic Sea.
p. 236, line 10 from bottom: *Eucallichirus* ..... *Eucalliax*

Please add in References:

MELO, G. A. S. DE, 1999. Manuel de identificação dos Crustacea Decapoda do litoral brasileiro: Anomura, Thalassinidea, Palinuridea, Astacidea: 1-551. (Editora Pleiâde/ FAPESP, São Paulo).

TAXONOMIC INDEX