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A new classification of Callianassidae and related families (Crustacea: Decapoda: Axiidea) derived from a molecular phylogeny with morphological support

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Abstract

Poore, G.C.B., Dworschak, P.C., Robles, R., Mantelatto, F., and Felder, D.L. 2019. A new classification of Callianassidae and related families (Crustacea: Decapoda: Axiidea) derived from a molecular phylogeny with morphological support. *Memoirs of Museum Victoria* 78: 73–146.

The classification of the families and genera of Callianassidae and related families (Crustacea: Decapoda: Axiidea) is significantly revised based on the results of a separately published molecular phylogeny with morphological support. Seven families are recognised: Anacalliacidae Manning and Felder, 1991; Callianassidae Dana, 1852; Callianopsidae Manning and Felder, 1991; Callichiridae Manning and Felder, 1991; Ctenochelidae Manning and Felder, 1991; Eucalliacidae Manning and Felder, 1991; and Paracalliacidae Sakai, 2005.

The families comprise 53 genera, 17 new:

Anacalliacidae—*Anacalliax* de Saint Laurent, 1973.

Callianassidae—*Aqaballianassa* gen. nov.; *Arenallianassa* gen. nov.; *Biffarius* Manning and Felder, 1991; *Callianassa* Leach, 1814; *Caviallianassa* gen. nov.; *Cheramoides* Sakai, 2011; *Cheramus* Bate, 1888; *Coriollianassa* gen. nov.; *Filhollianassa* gen. nov.; *Fragillianassa* gen. nov.; *Gilvossius* Manning and Felder, 1992; *Jocullianassa* gen. nov.; *Lipkecallianassa* Sakai, 2002; *Necallianassa* Heard and Manning, 1998; *Neotrypaea* Manning and Felder, 1991; *Notiax* Manning and Felder, 1991; *Paratrypaea* Komai and Tachikawa, 2008; *Poti* Rodrigues and Manning, 1992; *Praedatrypaea* gen. nov.; *Pugnatrypaea* gen. nov.; *Raylianassa* Komai and Tachikawa, 2008; *Rudisullianassa* gen. nov.; *Scallasis* Bate, 1888; *Spinicallianassa* gen. nov.; *Tastrypaea* gen. nov. and *Trypaea* Dana, 1852.

Callianopsidae—*Bathycalliax* Sakai and Türkay, 1999; *Callianopsis* de Saint Laurent, 1973; and *Vulcanocalliax* Dworschak and Cunha, 2007.

Callichiridae—*Audacallichirus* gen. nov.; *Balsscallichirus* Sakai, 2011; *Calliapagurops* de Saint Laurent, 1973; *Callichirus* Stimpson, 1866; *Corallianassa* Manning, 1987; *Glypturoides* Sakai, 2011; *Glypturus* Stimpson, 1866; *Grynaminna* Poore, 2000; *Karumballichirus* gen. nov.; *Kraussillichirus* gen. nov.; *Laticallichirus* Komai, Yokooka, Henmi and Itani, 2019; *Lepidophthalmus* Holmes, 1904; *Michaelcallianassa* Sakai, 2002; *Mocallichirus* gen. nov.; *Mucrollichirus* gen. nov.; *Neocallichirus* Sakai, 1988; and *Thailandcallichirus* Sakai, 2011.

Ctenochelidae—*Ctenocheles* Kishinouye, 1926; *Ctenocheloides* Anker, 2010; *Dawsonius* Manning and Felder, 1991; *Kiictenocheloides* Sakai, 2013; *Gourretia* de Saint Laurent, 1973; *Laurentgourretia* Sakai, 2004; and *Paragourretia* Sakai, 2004.

Eucalliacidae—*Andamancalliax* Sakai, 2011; *Calliax* de Saint Laurent, 1973; *Calliaxina* Ngoc-Ho, 2003; *Eucalliax* Manning and Felder, 1991; *Eucalliaxiopsis* Sakai, 2011; *Pseudocalliax* Sakai, 2011; and *Paraglypturus* Türkay and Sakai, 1995.

Paracalliacidae—*Paracalliax* de Saint Laurent, 1979.

Of 19 available family-level names that have accumulated since 1852, ten have been previously synonymised or are synonymised in this work. Of 74 available genus-level names of extant species, 43 have been previously synonymised. The following are synonymised in this work. *Anacalliaopsis* Sakai, 2011, is synonymised with *Anacalliax* de Saint Laurent, 1973. *Nihonotrypaea* Manning and Tamaki, 1998, and *Pseudobiffarius* Heard and Manning, 2000, are synonymised with *Neotrypaea* Manning and Felder, 1991. *Calliaxiopsis* Sakai and Türkay, 2014; *Bakercalliax* Sakai, 2018; *Heardcalliax* Sakai, 2018; and *Manningcalliax* Sakai, 2018, are synoymised with *Eucalliaxiopsis* Sakai, 2011. *Forestcallichirus* Sakai, 2011, and *Capecalliax* Sakai, 2011, are synonymised with *Balsscallichirus* Sakai, 2011. *Podocallichirus* Sakai, 1999; *Lepidophthalmoides* Sakai, 2011; and *Lepidophthalminus* Sakai, 2015, are synonymised with *Lepidophthalmus* Holmes, 1904. *Sergio* Manning and Lemaitre, 1994, and *Callichiropsis* Sakai, 2010, are synonymised with *Neocallichirus* Sakai, 1988. *Ivorygourretia* Sakai, 2017; *Plantesgourretia* Sakai, 2017; and *Ruiyuliugourretia* Sakai, 2017, are synonymised with *Gourretia* de Saint Laurent, 1973. *Heterogourretia* Sakai, 2017, and *Tuerkaygourretia* Sakai, 2017, are synoymised with *Paragourretia* Sakai, 2004.

Keys are presented to families and to genera within families. All available species names are tabulated within the new family and genus arrangement. Some remain *incertae sedis* because they have been only partially described.

Accepted species of Callianassidae and related families number 265, excluding junior synonyms, of which one third (87) are placed in new genus–species combinations. These are tabulated alphabetically by species and in systematic order.

Keywords Crustacea, Decapoda, Axiidea, Anacalliacidae, Callianassidae, Callianopsidae, Callichiridae, Ctenochelidae, Eucalliacidae, Paracalliacidae, taxonomy, new genera

Contents

Introduction

The earliest published descriptions of callianassids were at the end of the 18th century and the beginning of the 19th century (fig. 1). The genus name *Callianassa* Leach, 1814, was introduced shortly thereafter. The number of available species names now totals 305, with 262 accepted by WoRMS (2019) at the time of writing, twice that number if fossils are included. However, despite 72 more generic names having been erected over the last 200 years, authors remain undecided about the generic affinities of new species and *Callianassa* continues to be used as a catch-all genus. The affinities of many species have changed over time, some often, such that about 940 generic recombinations now exist (Sakai, 2011, and later papers), which is more than three times the number of accepted species.

The unsatisfactory state of ghost shrimp systematics has been recently outlined by us in a linked study on which this paper depends (Robles et al., in press). Here, we present a classification of the family and genera of Callianassidae and related families based on Robles et al.'s (in press) phylograms that were derived by multigene analysis of two mitochondrial (16S, 12S) and two nuclear (histone 3, 18S) markers from 123 named species, one half of all extant described species (265 species; WoRMS, 2019), including 24 as yet undescribed or not confidently identified to species. The present phylogeny was supported by a parsimonious analysis of morphological data from 195 species that recovered terminal clades compatible with those of the genetic analyses, though not always with the same deep relationships between terminal taxa. Fitting the morphological data to the molecular phylogram discovered characters that could be viewed as synapomorphies of terminal clades that we treated as families and genera.

As in Robles et al. (in press), we use "callianassoid" as a short-hand term to refer to a monophyletic group of taxa that includes Ctenochelidae and Callianassidae (sensu Dworschak et al., 2012; Poore et al., 2014) in a well-supported clade found in the most recent molecular treatment of "Thalassinidea" (Robles et al., 2009) and subclades Eucalliacinae, Ctenochelidae and Callianassidae (Callichirinae and Callianassinae) in another molecular treatment of Callianassidae and related families (Felder and Robles, 2009). The complex taxonomy of Callianassoidea is explained below.

Here, seven callianassoid families of Axiidea and their genera are diagnosed. For diagnoses of the other families, see Sakai (2011) for Axiidae and Strahlaxiidae, see Poore (2015a) for Callianideidae, and see Poore and Collins (2015) for Micheleidae. A key to all families of Axiidea and keys to all callianassoid genera within the seven families are offered. Tables 1 and 2 list all 265 accepted species, synonyms excepted, alphabetically by species and by family and genus, respectively. One third of all species, 87, are in new combinations. Species authorities are given in these tables and are not repeated for the species mentioned by name in this text.

Methods

Representatives of numerous species were examined in museum collections: University of Louisiana, Lafayette (ULLZ); US National Museum of Natural History, Washington (USNM); Florida Museum of Natural History, Gainsville (UF); Naturhistorisches Museum, Vienna (NHMW); Muséum national d'Histoire naturelle, Paris (MNHN); Senckenberg Museum, Frankfurt (SMF); Zoological Museum, Hamburg (ZMH); Phuket Marine Biological Center, Phuket (PMBC); Museums Victoria, Melbourne (NMV); Northern Territory Museum and Art Gallery, Darwin (NTMAG); Australian Museum, Sydney (AM); and Queensland Museum, Brisbane (QM). The morphological data assembled during examination of the literature and examination of specimens representing about 200 of these species were the basis of the phylogenetic analysis (Robles et al., in press). The same data, stored in a DELTA database (Dallwitz, 2010), were used to generate diagnoses of genera. Another DELTA database was assembled for families of Axiidea. The *Diagnose* facility in the interactive key program Intkey was used to discover a combination of three characters that would differentiate families or genera (in those families with three or more genera). Single characters, or more if necessary, that uniquely diagnose a family or genus are in ***bold italics***. Only the aggregate of these characters was used to diagnose families or genera, fewer than were assembled to build the phylograms. The diagnoses generated by DELTA were edited for sense and additional characters were highlighted if these were felt to more readily diagnose genera.

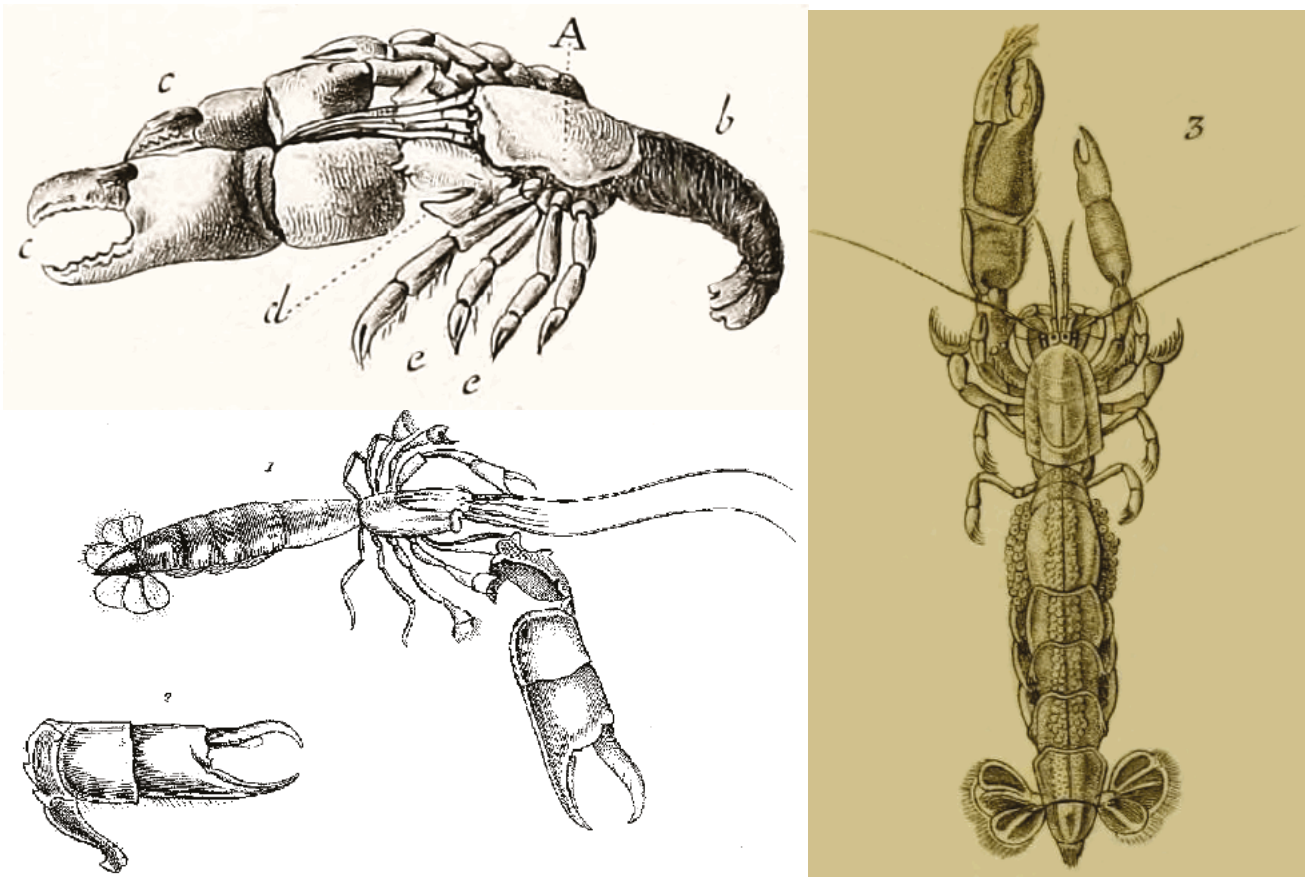

Figure 1. Earliest published figures of callianassids. Clockwise: *Cancer candidus* Olivi, 1792, pl. 3 fig. 3; *Astacus tyrrhenus* Petagna, 1792, pl. 5 fig. 3; *Cancer* (*Astacus*) *subterraneus* Montagu, 1808, pl. 3 figs 1, 2.

To shorten diagnoses, character attributes common to the vast majority of genera in the larger families are not repeated for these genera. These are listed after the keys under the heading *Implicit attributes*, and as a corollary, only the exceptions to these attributes appear in generic diagnoses. For example, a triangular sclerite is absent from the anterior branchiostegite except in *Aqaballianassa*. Intkey was used as an aid to generate dichotomous keys to the families and genera within families, much as explained by Coleman et al. (2010).

Characters used to differentiate families and genera are illustrated by line drawings (figs 2–20) accompanying the keys. Most of these were prepared by tracing published illustrations in Adobe Illustrator but confirmed by our own observations. Illustrations are simplified, rescaled and reoriented for better comparison. The mesial margin of pleopods is on the left. Setae are omitted from these diagnostic drawings unless they are critical characters. Original illustrations, most by GCBP, are identified in figure captions.

Infraorder Axiidea de Saint Laurent, 1979

Axiidea de Saint Laurent, 1979b: 19, 28.—Robles et al., 2009: 310–314.—Dworschak et al., 2012: 187.

Callianassoidea.—Sakai, 2005a: 1125.

Callianassidea.—Sakai and Sawada, 2006: 1357–1358.

Callianassida.—Sakai, 2011: 3.

Remarks. The Axiidea have been diagnosed simply as decapods having pereopods 1 and 2 chelate. The name Axiidea, rather than others suggested by Sakai (2005a, 2011) and Sakai and Sawada (2006), has become almost universally adopted (Poore et al., 2014).

Poore's (1994) Callianassoidea included Laomediidae Borradaile, 1903; Upogebiidae Borradaile, 1903; Callianideidae Kossmann, 1880; Thomassiniidae de Saint Laurent, 1979a; Ctenochelidae Manning and Felder, 1991; and Callianassidae Dana, 1852. This concept was first doubted by a reappraisal of morphology (Sakai, 2005a; Sakai and Sawada, 2006) and later by molecular data (Robles et al., 2009; Tsang et al., 2008). Sakai (2005a) included in Callianassoidea, families Callianassidae; Axiidae Huxley, 1879; Callianideidae; Ctenochelidae and Gourretiidae Sakai,

1999, in fact, all Axiidea. But in a later synthesis, Sakai (2005b) omitted Axiidae and Callianideidae from Callianassoidea. Sakai and Sawada (2006) expanded Callianassoidea to five families. Sakai (2011) included ten families in Callianassoidea, four with two subfamilies each, and included nine families in Axioidea. This dichotomy does not reflect the two clades discovered by investigation of molecular relationships (Robles et al., 2009), where Axiidae are sister to a clade with all other families. This history was summarised by Robles et al. (2009) and Dworschak et al. (2012). The relationships in the phylograms of both Tsang et al. (2008) and Robles et al. (2009) led to our expanded study (Robles et al., in press).

We do not recognise Callianassoidea at the formal superfamily level within Axiidea because, firstly, it has such a convoluted history (outlined above), secondly, doing so leaves other axiidean families hanging, and thirdly, it is impossible to diagnose unambiguously with a unique synapomorphy. Axiidae have been shown to belong to one of two axiidean clades (Robles et al., 2009; Tsang et al., 2008), while the "callianassoid" subclade plus Strahlaxiidae, Micheleidae and Callianideidae belong to the other in a paraphyletic relationship (Robles et al., 2009; Tsang et al., 2008). All callianassoids have a lobster-like form with a flaccid pleon longer than the carapace (but so do most callianideids); all lack a long seta on the triangular posterior lobe of the scaphognathite (but so do some Strahlaxiidae); all have a complete linea thalassinica, a hinge separating the dorsal regions of the carapace from the branchiostegite (but this is partially evident in some Callianideidae); all except one species have flat contiguous eyestalks (but so do callianideids). Pleopods 3–5 of callianassoids have triangular or subtriangular endopods with straight mesial margins that are closely connected to their pairs by short or moderately long appendices internae and exopods that are usually longer than and enclosing the endopods. This condition is less pronounced in some ctenochelids and callianopsids, which approach axiids, strahlaxiids and micheleids in having the endopods of pleopods 3–5 linear or oval, weakly connected to their pairs by long appendices internae, and the exopods shorter than or as long as the endopods, but not enclosing the endopods. Species of *Callianidea* have pleopods 3–5 as in most callianassoids. The uropodal exopod of most callianassoids has an elevated dorsal plate, a region at the end of the anterior margin defined by a transverse row of setae but, again, it is not true of all because a dorsal plate is absent in Callianopsidae, Ctenochelidae and *Paracalliax*.

The number of well-defined clades with consistent molecular support prompted us to recognise seven "callianassoid" families. All had been previously recognised at least as subfamilies. Four other families of Axiidea are Axiidae, Callianideidae, Micheleidae and Strahlaxiidae. The following family diagnoses use 21 characters adequate to distinguish all 11 families. The bold italic parts in diagnoses are character states, generated with the aid of Intkey (Dallwitz, 2010), that distinguish each family from every other family in at least one respect.

Key to families of Axiidea

Figures 2–4

1. Rostrum prominent, often with erect lateral spines, carapace with lateral gastric carinae originating from lateral margins of rostrum, often with submedian and median gastric carinae (figs 2a, b, c); linea thalassinica absent (figs 2e–g); eyestalks cylindrical (figs 2a, b, c) 2

– Rostrum triangular-flat or reduced to short spine shorter than eyestalk, carapace without median and lateral gastric carinae (fig. 2f), *or* rostrum flat-unornamented, longer than eyestalk, carapace with lateral gastric carinae (fig. 2e); linea thalassinica present over all or part of carapace length (figs 2h–o), *or* absent, *or* short; eyestalks contiguous, flat or cylindrical (figs 2d, f, g) 3

2. Rostrum apex bifid, with lateral teeth (fig. 2c); propodi of pereopods 3 and 4 without lateral spiniform setae (fig. 3q); pleopods 3–5 with oblique peduncles meeting mesially, endopods oval, exopods attached laterally, triangular, shorter than endopods, wider proximally than distally (fig. 4p); maxilla scaphognathite with (fig. 3a) or without (fig. 3b) long setae extending from posterior lobe into branchial chamber ..... Strahlaxiidae

– Rostrum with acute or rounded apex (figs 2a, b); propodi of pereopods 3 and 4 with lateral spiniform setae (fig. 3p); pleopods 3–5 with linear peduncles not meeting mesially, endopods linear to elongate-oval, exopods linear-oval, attached subdistally, shorter than or as long as endopod, not overlapping endopods (fig. 4o); maxilla scaphognathite with long setae extending from posterior lobe into branchial chamber (fig. 3a) ..... Axiidae

3. Maxilla scaphognathite with long setae extending from posterior lobe into branchial chamber (fig. 3a); linea thalassinica complete, partial or absent 4

– Maxilla scaphognathite without long setae extending from posterior lobe into branchial chamber (fig. 3b); linea thalassinica complete over full carapace length (fig. 2h) 5

4. Posterior margin of carapace evenly curved, not interacting with anterolateral lobes on pleomere 1 (fig. 2f); eyestalk flat, contiguous (fig. 2f); chelipeds flattened, asymmetrical (fig. 3j) ..... Callianideidae

– Posterior margin of carapace with lateral lobes interacting with anterolateral lobes on pleomere 1 (fig. 2g); eyestalks cylindrical even if continuous (fig. 2g); chelipeds cylindrical, symmetrical (fig. 3i) ..... Micheleidae

5. Pleomere 1 with dorsal pair of lobes interacting with posterior margin of carapace (fig. 2i); female pleopod 1 with single broad expanded ramus (fig. 4b); pleopod 2 (at least of female) similar to pleopods 3–5 (fig. 4c); epipods present above maxilliped 3 to pereopod 4 ..... Paracalliacidae (1 species, *Paracalliax bollorei* de Saint Laurent, 1979)

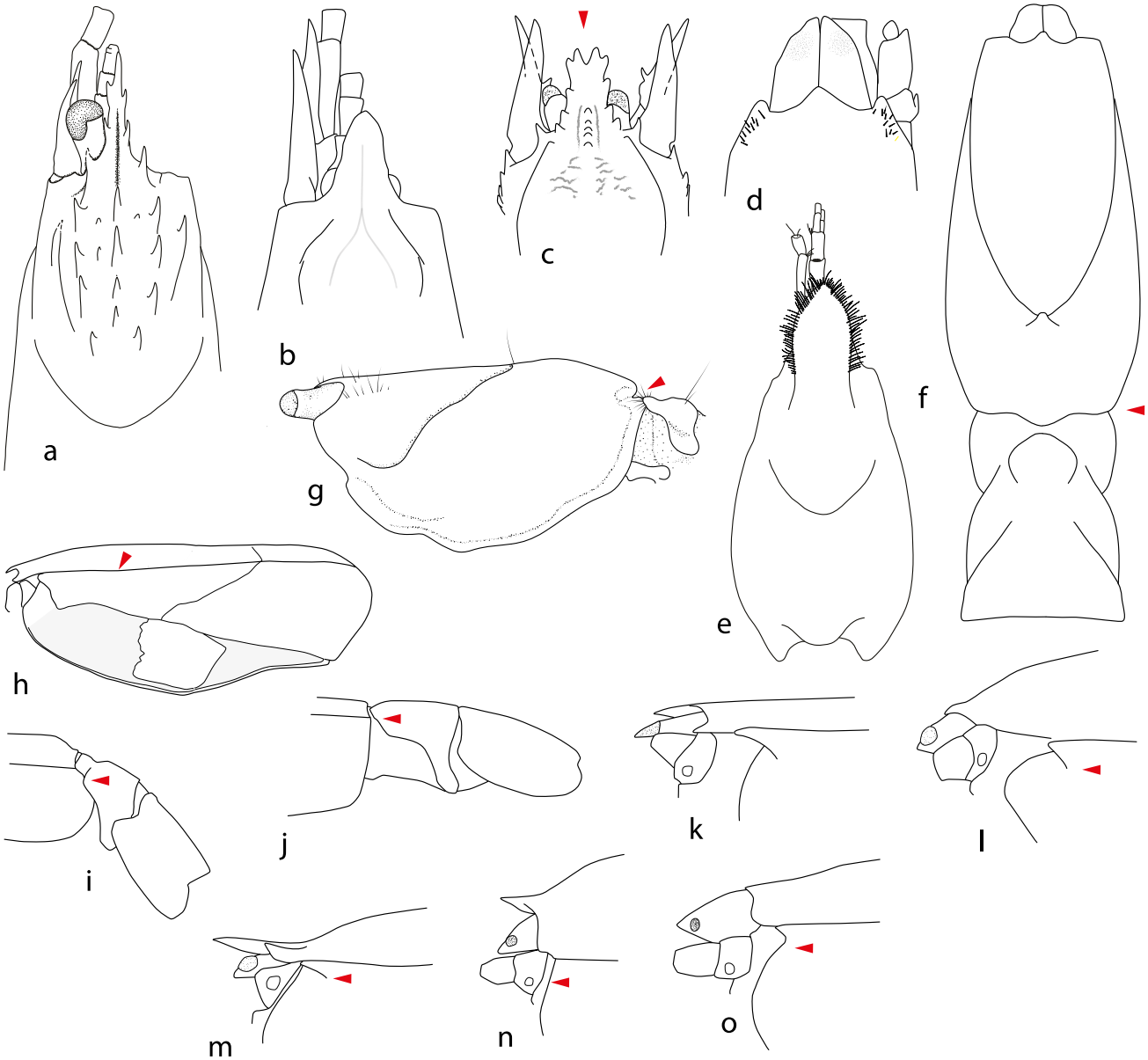

Figure 2. Diagnostic characters for families of Axiidea. Anterior carapace, dorsal: a, Axiidae, *Pillsburyaxius*; b, Axiidae, *Eiconaxius*; c, Strahlaxiidae, *Neaxius*; d, Eucalliacidae, *Calliaxina*; e, Micheleidae, *Tethisea*; f, Callianeidae, *Callianidea*. Carapace, lateral: g, Micheleidae, *Michelea*; h, Eucalliacidae, *Calliaxina*. Posterior carapace, pleomeres 1, 2: i, Paracalliacidae; j, Callianassidae. Anterior carapace, branchiostegite, epistome, basal antenna and eyestalk: k, Eucalliacidae, *Calliaxina*; l, Callichiridae, *Callichirus*; m, Callichiridae, *Lepidophthalmus*; n, Callianassidae, *Coriollianassa*; o, Callianassidae, *Biffarius*.

Original illustrations: i, *Paracalliax bollorei*, MNHN Th1517; k, *Calliaxina sakaii*, ULLZ; l, *Callichirus islagrande*, ULLZ; m, *Lepidophthalmus richardi*, ULLZ; n, *Coriollianassa coriolisae*, MNHN-IU-2014-18276; o, *Biffarius biformis*.

– Pleomere 1 with evenly curved dorsal margin, not interacting with posterior margin of carapace (fig. 2j); female pleopod 1 with reduced ramus (fig. 4a); pleopod 2 in both sexes (figs 5d–g) smaller than pleopods 3–5 (fig. 5q); epipods absent above maxilliped 3 to pereopod 4 (exception, 2 species of Callianopsidae) 6

6. Maxilliped 3 dactylus ovate, distally truncate, with dense distal field of setae (fig. 3e) 7

– Maxilliped 3 dactylus linear, with scattered groups of setae (fig. 3f), *or* densely setose on upper or lower margin (figs 3g, h) 8

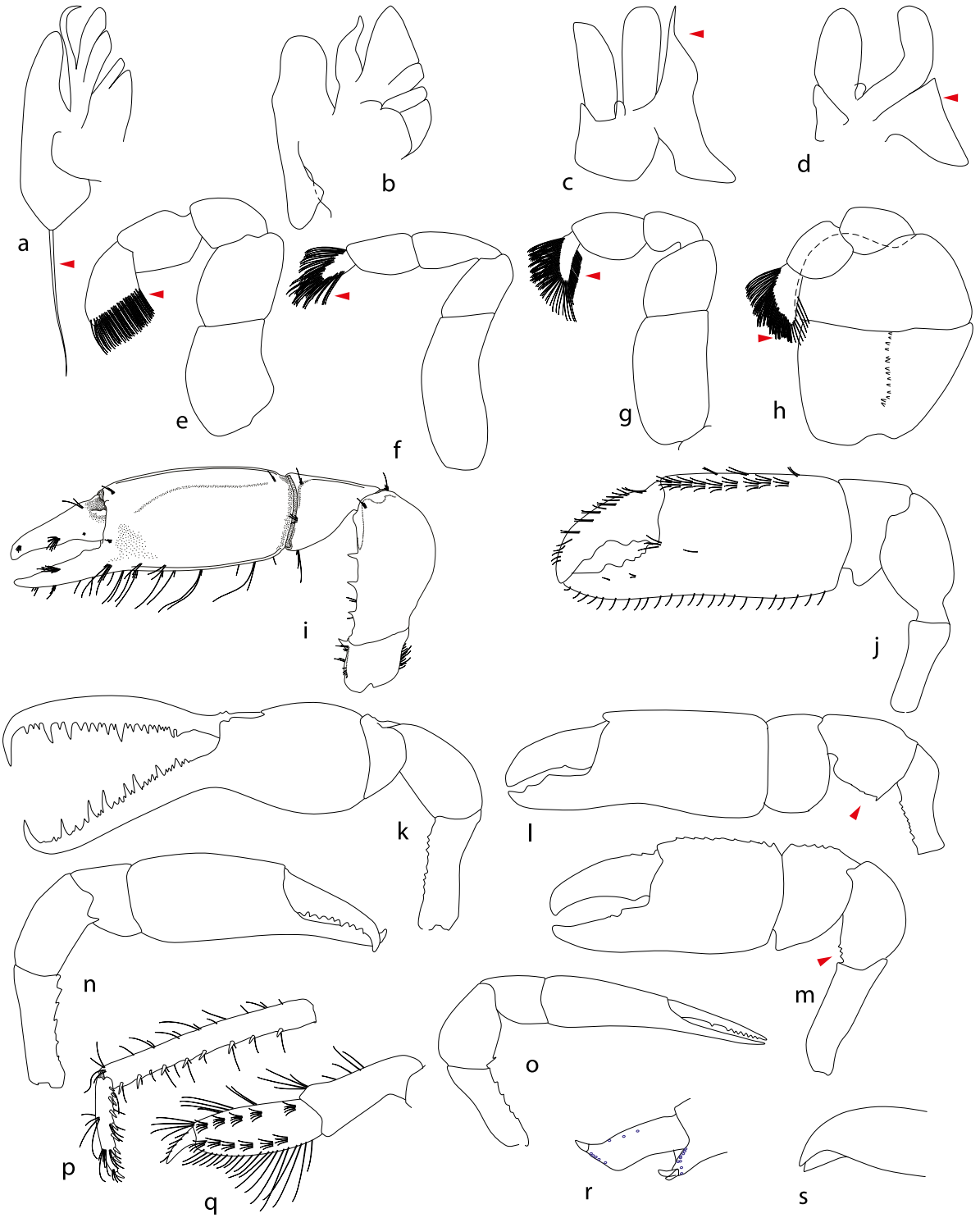

Figure 3. Diagnostic characters for families of Axiidea. Maxilla: a, Axiidae, *Eutrichocheles*; b, Callianassidae, *Arenallianassa*. Maxilliped 1: c, Callichiridae; d, Callianassidae. Maxilliped 3: e, Callianopsidae; f, Anacalliacidae; g, Callianassidae, *Callianassa*; h, Callianassidae, *Caviallianassa*. Major cheliped: i, Micheleidae, *Tethisea*; j, Callianideidae, *Callianidea*; k, Ctenochelidae, *Ctenocheles*; l, Ctenochelidae, *Gourretia*; m, Anacalliacidae. Minor cheliped: n, Ctenochelidae, *Ctenocheles*; o, Ctenochelidae, *Gourretia*. Pereopod 3, propodus, dactylus: p, Axiidae, *Acanthaxius*; q, Strahlaxiidae, *Neaxius*. Pereopod 5, fingers: r, Ctenochelidae, *Ctenocheloides*; s, Anacalliacidae. The arrows indicate features of interest.

Original illustrations: d, *Callianassa subterranea*, NMV J16779; h, *Caviallianassa* FP-11, UF 29204.

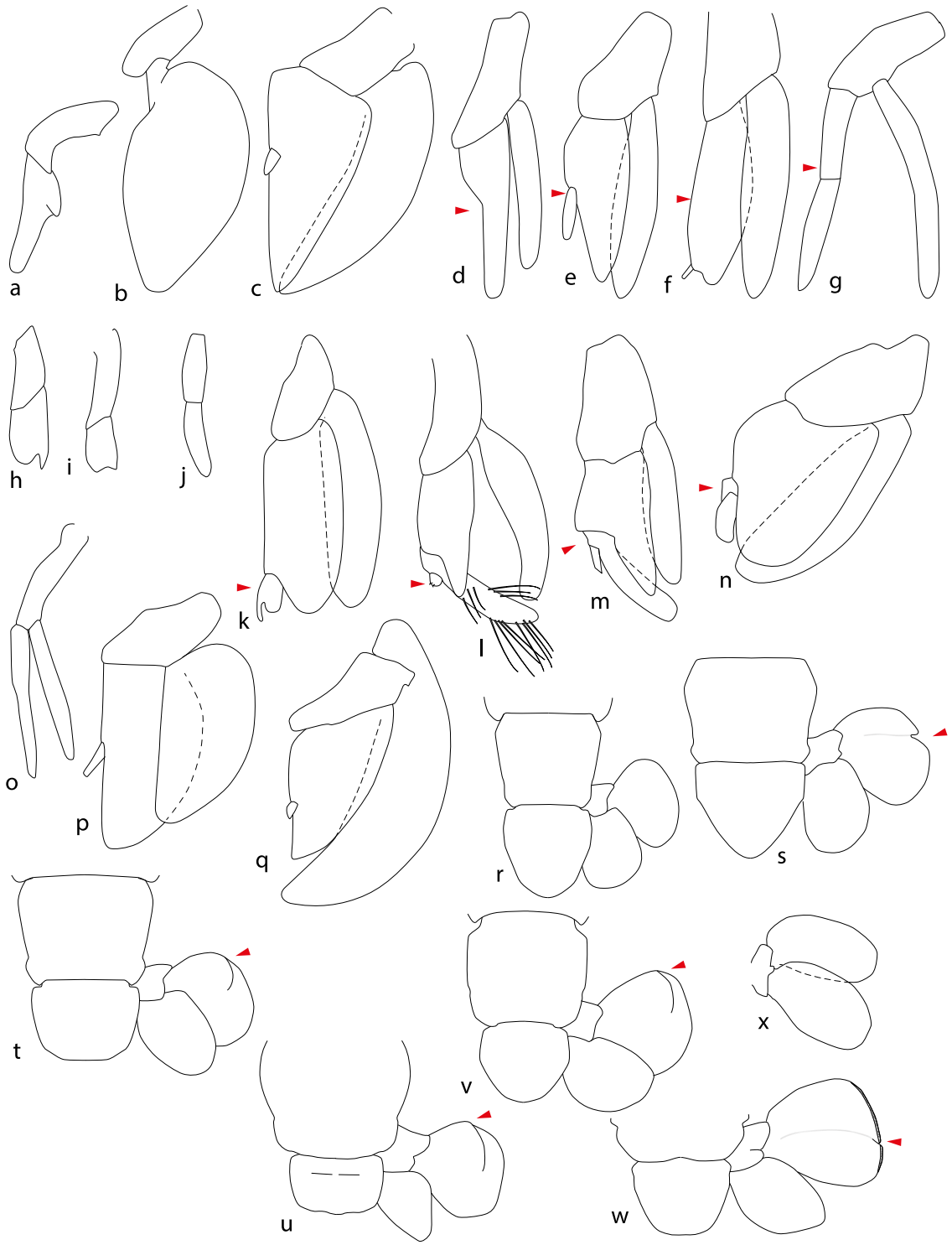

Figure 4. Diagnostic characters for families of Axiidea. Female pleopod 1: a, Eucalliacidae, *Paraglypturus*; b, Paracalliacidae. Female pleopod 2: c, Paracalliacidae; d, Eucalliacidae, *Calliax*; e, Eucalliacidae, *Calliaxina*; f, Callichiridae; g, Callianassidae. Male pleopod 1: h, i, Callichiridae; j, Callianassidae. Male pleopod 2: k, Ctenochelidae, *Ctenocheles*; l, Eucalliacidae, *Eucalliax*; m, Eucalliacidae, *Calliaxina*; n, Eucalliacidae, *Paraglypturus*. Pleopod 3: o, Axiidae, *Marianaxius*; p, Strahlaxiidae, *Neaxiopsis*; q, Callichiridae. Pleomere 6, uropod, telson: r, Ctenochelidae, *Gourretia*; s, Ctenochelidae, *Paragourretia*; t, Eucalliacidae, *Calliaxina*; u, Eucalliacidae, *Eucalliax*; v, Callianassidae; w, Anacalliacidae; x, Callianopsidae. Arrows indicate features of interest.

Original illustrations: s, *Eucalliax quadracuta*, NHMW 25916; w, *Anacalliax agassizi* MNHN Th1206.

7. Uropodal exopod oval, without dorsal plate (fig. 4x); telson parallel-sided over proximal half, then tapering to evenly rounded apex, *or* widest basally over anterior third, sharp lateral step, then tapering posteriorly to broadly rounded apex; maxilliped 3 propodus longer than wide, not prominently lobed on lower margin (fig. 3e); male pleopod 1 with article 2 triangular, with lobed mesial margin, *or* flagellate ..... Callianopsidae

– Uropodal exopod with dorsal plate, indicated by secondary row of setae diverging on upper surface from anterior margin (figs 4t, u); telson convex-sided, widest near midpoint, *or* semicircular, *or* curving to broad convex apex (figs 4t, u); maxilliped 3 propodus about as wide as long; male pleopod 1 with article 2 linear, *or* blade like, with bifid or simple apex, *or* digitiform (sometimes fused) ..... Eucalliacidae

8. Uropodal exopod without dorsal plate (fig. 4r), *or* with distal margin interrupted by weak notch (fig. 4s) 9

– Uropodal exopod with dorsal plate, secondary row of setae on upper surface branching subdistally from anterior margin (fig. 4v) 10

9. Pereopod 5 semichelate (fixed finger closing on proximal part of dactylus), dactylus a twisted plate longer than fixed finger (fig. 3r); major cheliped merus lower margin with weakly toothed squarish blade plus proximal erect spine (fig. 3l), *or* simple proximal spine, *or* oblique blade or spine near midpoint; propodus evenly tapering or cylindrical, with fingers tapering and irregularly toothed or thin and pectinate (fig. 3k); minor cheliped merus with spine on lower margin (figs 3n, o); telson mostly parallel-sided, with rounded posterolateral corners (fig. 4r), *or* parallel-sided over proximal half, then tapering to evenly rounded apex (fig. 4s) ..... Ctenochelidae

– Pereopod 5 chelate (fixed finger closing complete length of dactylus; fig. 3s); major cheliped merus lower margin with 1 or 2 small proximal teeth, propodus parallel-sided, fixed finger as long as dactylus (fig. 3m); minor cheliped merus lower margin smooth; uropodal endopod with small distal notch (fig. 4w); maxilliped 3 ischium linear, with curved lower margin, palp narrow, dactylus linear, generally setose (fig. 3f); telson tapering from greatest width near base (fig. 4w) ..... Anacalliacidae

10. Anterior branchiostegal lobe well-produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle (figs 2l, m); male pleopod 1 article 2 usually of 2 articles, article 2 simple or apically notched (figs 4h, i); male and female pleopod 2 rami narrower and with less setation than pleopods 3–5, endopod flattened and 2–5 times as long as wide (fig. 4f); maxilliped 1 epipod with acute anterior lobe lying obliquely and along oblique suture of exopod (fig. 3c) ..... Callichiridae

– Anterior branchiostegal lobe merging smoothly with anterodorsal branchiostegal angle (figs 2n, o), *or* with small independent triangular sclerite; male pleopod 1 absent, *or* if present, uniarticulate or with second simple article (fig. 4j); male pleopod 2 absent or reduced; female pleopod 2 rami styliform, endopod much longer than wide (fig. 4g); maxilliped 1 epipod truncate, without anterior lobe (fig. 3d) ..... Callianassidae

Anacalliacidae Manning and Felder, 1991

Figure 5

Anacalliinae Manning and Felder, 1991: 786.
Anacalliacinae.—Sakai, 1999a: 126.—Sakai, 2005b: 208–210.
Anacalliacidae.—Sakai, 2011: 341.

Type genus. *Anacalliax* de Saint Laurent, 1973.

Diagnosis. ***Rostrum flat, short, triangular, shorter than eyestalks***; median carina on rostrum only; gastric carinae absent; cervical groove well defined; suture between ocular lobe and end of linea thalassinica horizontal in lateral view; anterior branchiostegal margin sinusoidal or semicircular; anterior branchiostegal lobe simple, scarcely calcified, merging smoothly with anterodorsal branchiostegal angle and anterolateral margin of carapace; posterior margin of carapace without lateral lobes, pleomere 1 without anterolateral lobes, weakly chitinised. Eyestalks flattened, contiguous, with subdistal dorsal cornea. Antennal scaphocerite elongate. Maxilla scaphognathite without long seta on posterior lobe extending into branchial chamber. Maxilliped 1 epipod with acute anterior lobe lying alongside exopod. Maxilliped 3 propodus longer than wide, not prominently lobed on lower margin; dactylus slender, digitiform, with setae irregularly spaced along all margins. Cheliped merus lower margin spinose; major cheliped palm oval in cross-section, barely crested above or below. Pereopod 3 propodus broad, with proximal lobe on lower margin, without distal spiniform setae on lateral face (often with 1 distal spiniform seta on lower margin). Pereopod 5 minutely chelate or subchelate. Female pleopod 2 rami narrower and with more reduced setation than pleopods 3–5; endopod 2–5 times as long as wide. Pleopods 3–5 with oblique peduncles, endopods oval, exopods attached laterally, not proximally lobed, shorter than and barely overlapping endopods; appendices internae reduced and almost embedded in mesial margin of endopod. ***Uropodal exopod with margin divided by notch***.

Remarks. The only genus, *Anacalliax* de Saint Laurent, 1973, is recognised by the unique combination of a short flat rostrum and the uropodal exopod having a marginal notch.

The subfamily Anacalliacinae (misspelled Anacalliinae) was erected by Manning and Felder (1991) as one of three subfamilies of Ctenochelidae, the others being Ctenochelinae and Callianopsinae. Manning and Felder (1991) included *Paracalliax*, *Gourretia* and *Dawsonius* in the nominate subfamily and only their type genus in the other two. This arrangement reflects in a single family, with all four basally derived families recognised in Robles et al.'s (in press) analysis as a paraphyletic grouping. Sakai (2005b) treated the taxon as a subfamily of Callianassidae while retaining Gourretiidae for

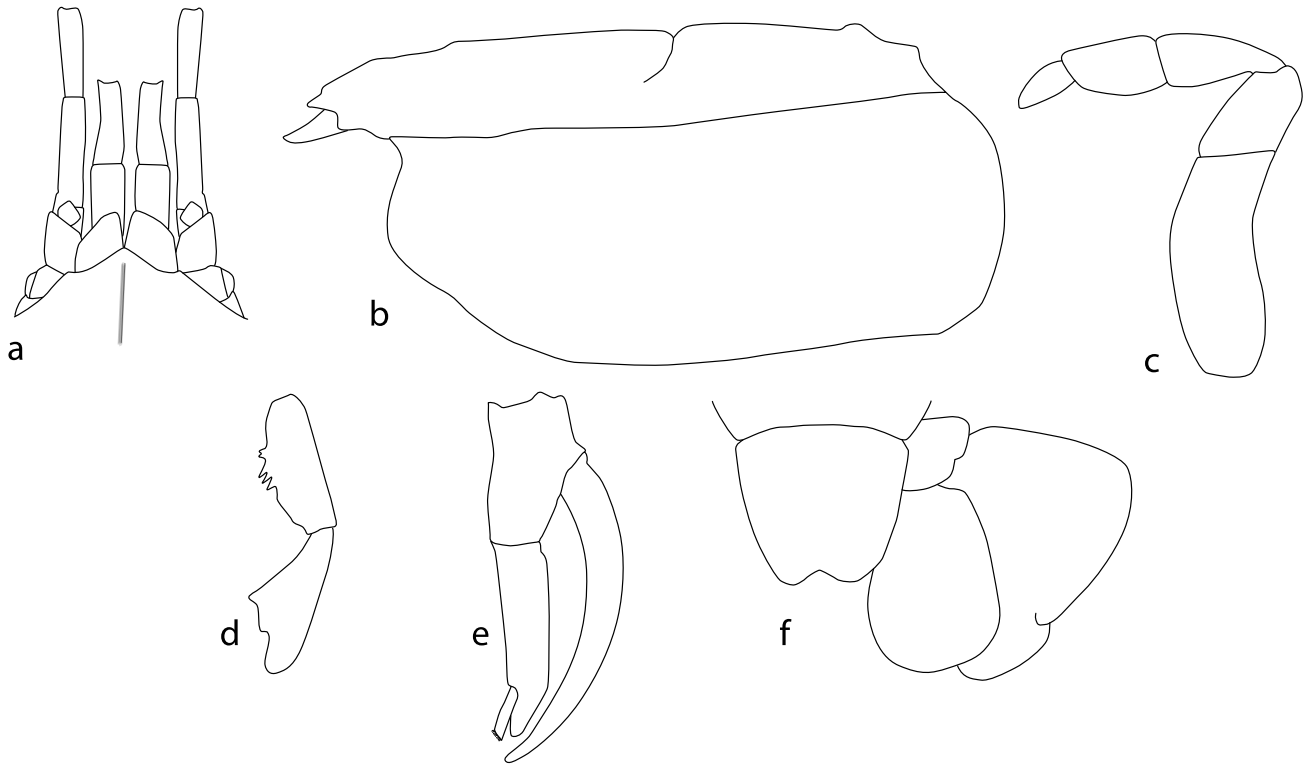

Figure 5. Diagnostic characters of Anacalliacidae, *Anacalliax*: a, dorsal anterior carapace, eyestalks, antennules, antennae; b, lateral carapace; c, maxilliped 3; d, male pleopod 1; e, female pleopod 2; f, telson, uropod.

other subfamilies. Sakai (2011) elevated the taxon to family level. The family comprises a single genus. Two genera erected by Sakai (2011) are herein synonymised, *Anacalliaopsis* with *Anacalliax*, and *Capecalliax* with *Balsscallichirus* (Callichiridae; see below).

The similarity of the "dorsal oval" to that of *Callianassa* s.s. was highlighted in Sakai's (2011) discussion of this group, but this character grades to such an extent throughout all families that we were unable to use it at any level. The broad (almost axiid-like) article 2 of the male pleopod 1, presence of an appendix masculina on the male pleopod 2, absence of any tooth on the merus of the cheliped, absence of a dorsal plate on the uropodal exopod and absence of a distal lobe on the epipod of maxilliped 1 suggest a basal position for this family, as realised by Manning and Felder (1991).

The family is known only from the type material of its two species. No specimen was available for inclusion in the molecular analysis.

Anacalliax de Saint Laurent, 1973

Anacalliax de Saint Laurent, 1973: 515.—Manning and Felder, 1991: 786–787.—Sakai, 1999a: 126.—Sakai, 2005b: 210.—Sakai, 2011: 343.

Anacalliaopsis Sakai, 2011: 342 (type species: *Callianassa agassizi* Biffar, 1971, by original designation and monotypy) **syn. nov.**

Type species. *Callianassa argentinensis* Biffar, 1971b, by original designation and monotypy.

Diagnosis. With characters of the family.

Remarks. The genus is the sole member of the family. Sakai (2011) erected a new genus *Anacalliaopsis* for a single species *Callianassa agassizi*. He did not explain how the species differed from *Anacalliax argentinensis* except in his key where the only difference was in the posterior margin of the telson (other characters used are identical or not compared). *Anacalliax argentinensis* has a concave margin whereas *A. agassizi* has a convex margin, differences that, if substantiated, would be best treated at species level. Otherwise, the two share similar maxillipeds, chelipeds and pleopods.

Callianassidae Dana, 1852

Figures 6–11

Callianassidae Dana, 1852a: 12, 14.—Dana, 1852b: 508.—Bouvier, 1940: 100.—Balss, 1957: 1581.—de Saint Laurent, 1973: 513.—de Saint Laurent, 1979a: 1395.—Manning and Felder, 1991: 766.—Poore, 1994: 101—Sakai, 1999a: 7.—Sakai, 2005b: 9–11.—Sakai and Sawada, 2006: 1357.—Sakai, 2011: 353–357 partim.

Callianassinae.—Bouvier, 1940: 100.—Balss, 1957: 1582.—de Saint Laurent, 1973: 514.—de Saint Laurent, 1979a: 1395–1396.—Manning and Felder, 1991: 767.—Sakai, 1999a: 10.—Sakai, 2005b: 11–25.—Sakai, 2011: 357–358.

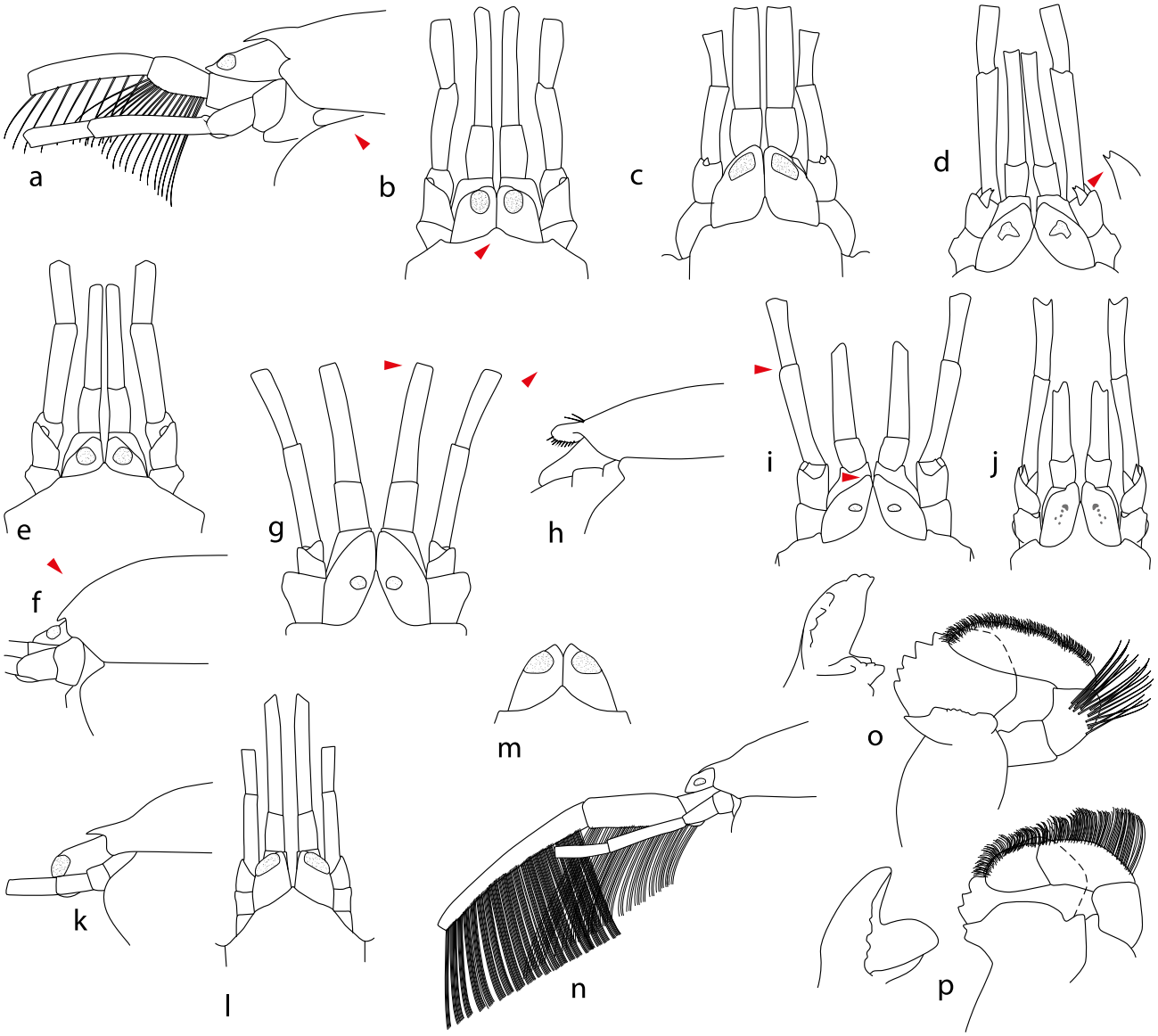

Figure 6. Diagnostic characters for genera of Callianassidae. Anterior carapace, eyestalks, antennules, antennae: a, *Aqaballianassa*; b, *Arenallianassa*; c, *Caviallianassa*; d, *Coriollianassa*; e, f, *Filhollianassa*; g, *Jocullianassa*; h, *Notiax* i, *Praedatrypaea*; j, *Pugnatrypaea*; k, l, *Rayllianassa*; m, *Rudisullianassa*; n, *Trypaea*. Mandible, mesial and lower views: o, *Callianassa*; p, *Rayllianassa*.

Original illustrations: a, *Aqaballianassa lewtonae*, MNHN-IU-2016-8152; c, *Caviallianassa* FP-11, UF 29204; j, *Pugnatrypaea* GMX, USNM 1559553 (ULLZ 17962); o, *Callianassa subterranea*, NMV J16779; p, *Rayllianassa amboinensis*, MNHN-IU-2014-2778.

Cheraminae Manning and Felder, 1991: 780.—Tudge et al., 2000: 136.

Lipkecallianassinae Sakai, 2005: 212.

Lipkecallianassidae Sakai, 2011: 521.

Diagnosis. Rostrum flat, short, triangular, shorter than eyestalks, *or* spike-like, longer than wide; gastric carinae absent; cervical groove well defined; suture between ocular lobe and end of linea thalassinica oblique in lateral view; anterior branchiostegal margin sinusoidal or semicircular; ***anterior branchiostegal lobe sclerotised, merging smoothly with anterodorsal branchiostegal angle***; posterior margin of carapace without lateral lobes, pleomere 1 without anterolateral lobes, weakly chitinised. Eyestalks flattened, contiguous, with subdistal dorsal cornea. Antennal scaphocerite rudimentary. Maxilla scaphognathite without long seta on posterior lobe extending into branchial chamber. ***Maxilliped 1 epipod truncate, without anterior lobe.*** Maxilliped 3 dactylus slender, digitiform, with setae irregularly spaced along all margins. Cheliped merus

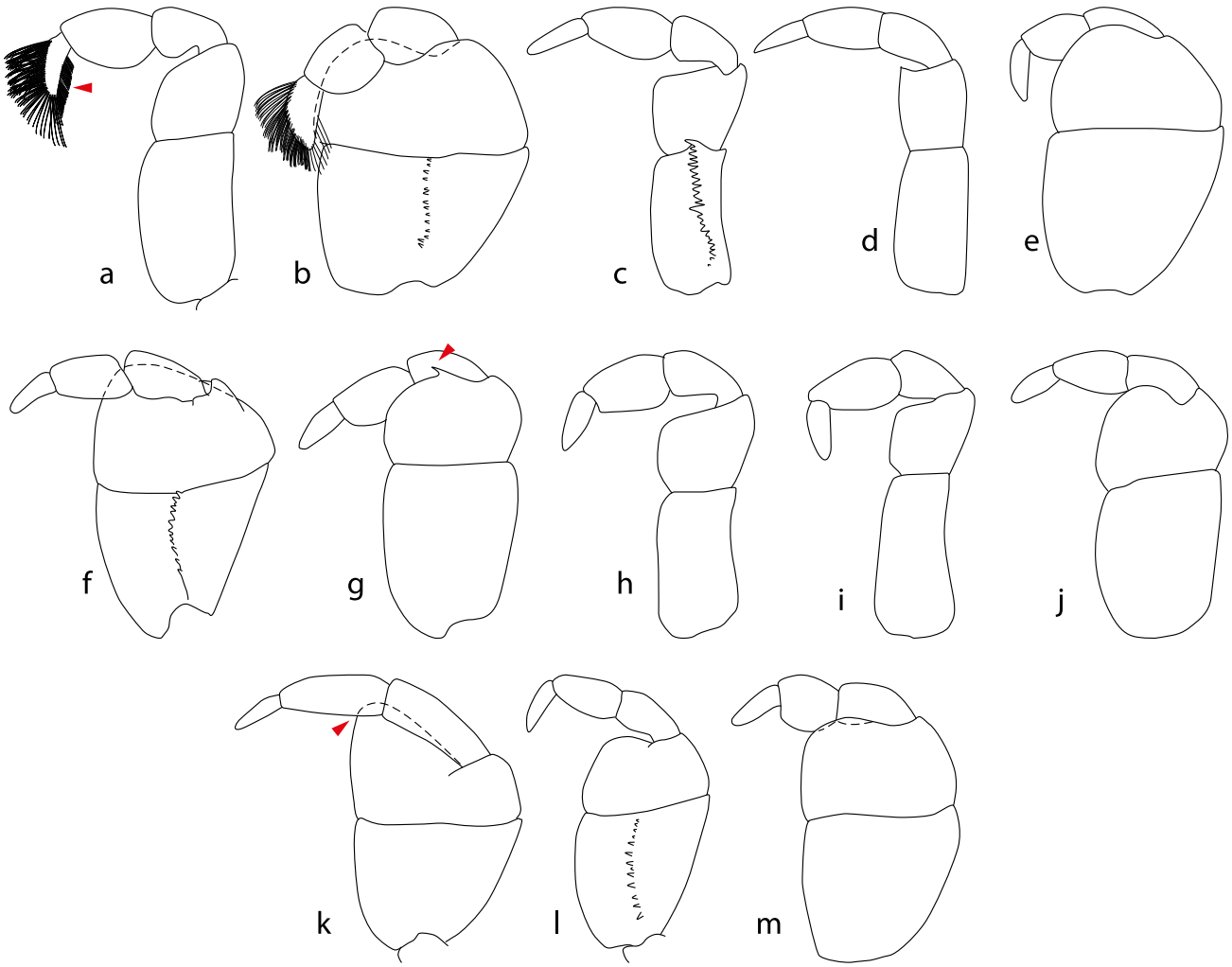

Figure 7. Diagnostic characters for genera of Callianassidae. Maxilliped 3: a, *Callianassa*; b, *Caviallianassa*; c, *Cheramoides*; d, *Lipkecallianassa*; e, *Necallianassa*; f, *Neotrypaea*; g, *Praedatrypaea*; h, *Pugnatrypaea*; i, *Scallasis*; j, *Spinicallianassa*; k, *Trypaea*; l, *Arenallianassa*; m, *Biffarius*.

Original illustrations: a, *Callianassa*; b, *Caviallianassa*; c, *Cheramoides*; d, *Lipkecallianassa*; e, *Necallianassa*; m, *Biffarius delicatulus*, NHMW 25542.

lower margin smooth, *or* with prominent proximal tooth; major cheliped with distinctively flattened palm, sometimes with strong crest above and below. Pereopod 3 propodus wide, with proximal lobe on lower margin, without distal spiniform setae on lateral face (often with 1 distal spiniform seta on lower margin). Pereopod 5 minutely chelate or subchelate. ***Female pleopod 2 rami styliform; endopod much longer than wide, or absent***. Pleopods 3–5 with oblique peduncles meeting mesially, endopods triangular, with straight mesial margin, exopods attached laterally, proximally lobed, longer than and enclosing endopods; appendices internae elongate, much longer than wide, *or* reduced and almost embedded in mesial margin of endopod. Uropodal exopod with elevated dorsal plate.

Remarks. Callianassidae differs from its sister taxon Callichiridae in having the rami of the female pleopod 2 styliform and lacking an appendix interna, often absent in the male, rather than broad and often with an appendix interna, and the truncate epipod on maxilliped 1, whereas an anterior lobe runs alongside the exopod in Callichiridae.

The clades resolved in the molecular analysis of over 50 species (Robles et al., in press) bore little resemblance to existing classifications. This necessitated the acceptance of 14 existing genera, the creation of 12 new genera and the synonymy of others. All 26 can be differentiated using morphological features, some of which had been overlooked in earlier accounts. The following key does not reflect phylogeny but attempts to eliminate the most distinctive genera first.

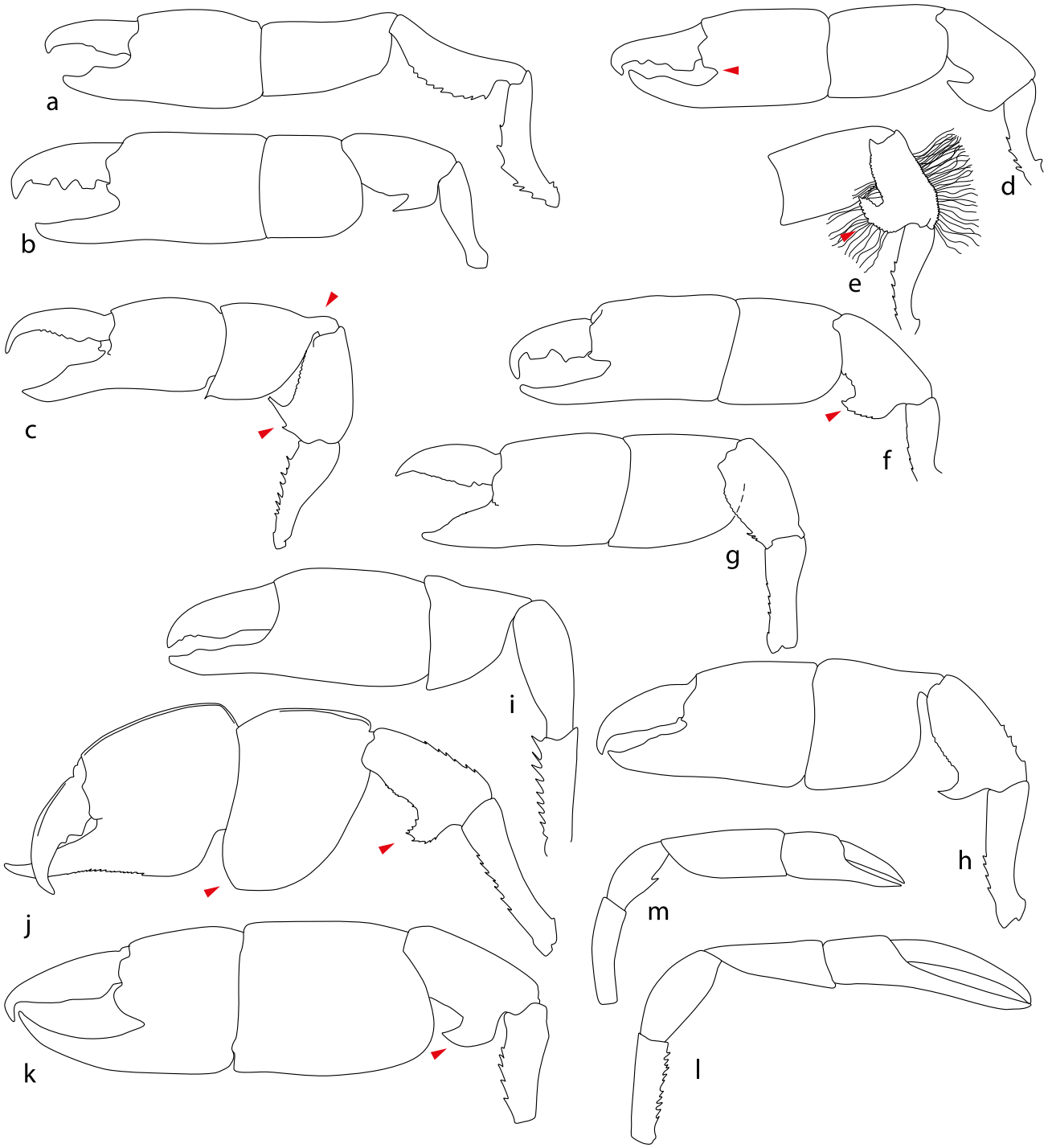

Figure 8. Diagnostic characters for genera of Callianassidae. Male major cheliped: a, *Cheramus*; b, *Fragillianassa*; c, *Coriollianassa*; d, e, *Biffarius*; f, *Arenallianassa*; g, *Caviallianassa*; h, *Callianassa*; i, *Cheramoides*; j, *Filhollianassa*; k, *Gilvossius*. Minor cheliped: l, *Cheramoides*; m, *Neotrypaea*.

Original illustrations: c, *Coriollianassa* MOZ-33, MNHN-IU-2008-10314; e, *Biffarius biformis*, NMV J20793; g, *Caviallianassa* FP-11, UF 29204; j, *Filhollianassa filholi*, NMV J62111.

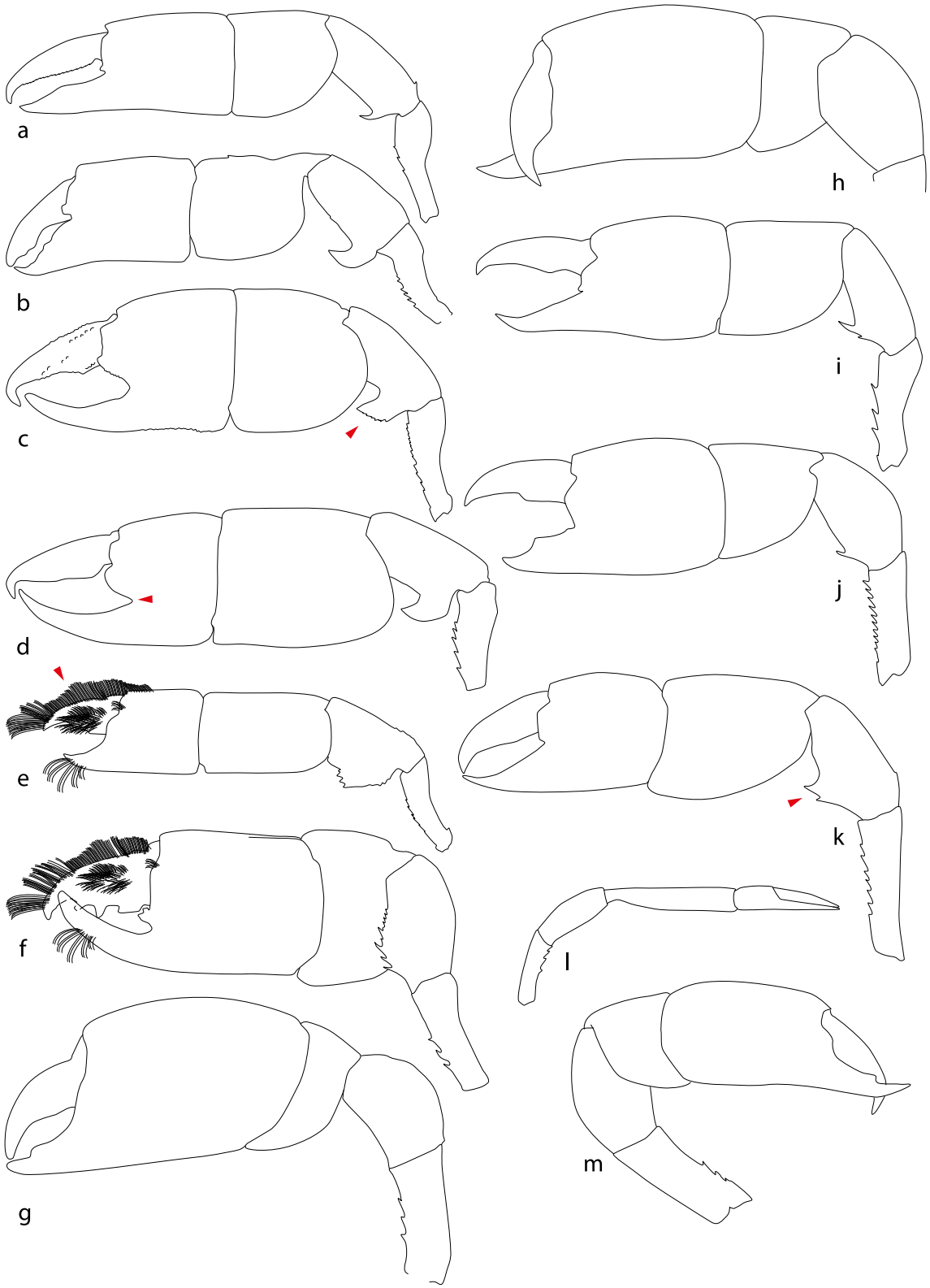

Figure 9. Diagnostic characters for genera of Callianassidae. Male major cheliped: a, *Jocullianassa*; b, *Notiax*; c, *Necallianassa*; d, *Neotrypaea*; e, f, *Paratrypaea*; g, *Rayllianassa*; h, *Rudisullianassa*; i, *Scallasis*; j, *Spinicallianassa*; k, *Tastrypaea*. Minor cheliped: l, *Jocullianassa*; m, *Rudisullianassa*.

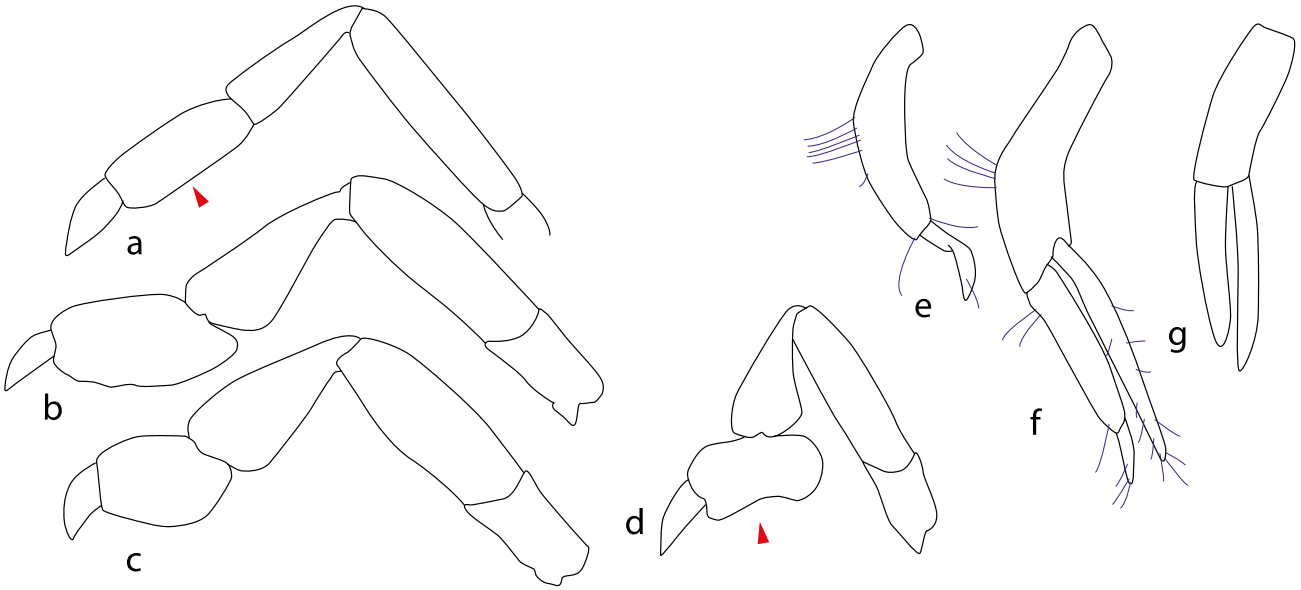

Figure 10. Diagnostic characters for genera of Callianassidae. Pereopod 3: a, *Lipkecallianassa*; b, *Scallasis*; c, *Spinicallianassa*; d, *Jocullianassa*. Male pleopod 1: e, *Caviallianassa*. Male pleopod 2: f, *Caviallianassa*; g, *Poti*.
Original illustration: e, f, *Caviallianassa* FP-11, UF 29204.

Key to genera of Callianassidae

1. Antennular peduncle about 4 times the width of both eyestalks, twice as long as antennal peduncle, with 2 dense rows of adjacent long setae on lower surface (fig. 6n); maxilliped 3 merus produced as massive triangular lobe alongside palp (fig. 7k) ..... *Trypaea*

– Antennular peduncle at most 3 times the width of both eyestalks, with at most bands of scattered long setae on lower surface (fig. 6a); maxilliped 3 merus distally convex at most 2

2. Small triangular sclerite present on branchiostegite at anterior end of linea thalassinica (fig. 6a) ..... *Aqaballianassa*

– Without triangular sclerite on branchiostegite at anterior end of linea thalassinica (figs 6f, k, h) 3

3. Telson tapering, posterior margin with medial spine in deep notch (figs 11g, o) 4

– Telson posterior margin convex, truncate or at most with shallow medial concavity, sometimes with small medial spine 5

4. Maxilliped 3 merus almost rectangular, distally truncate with squarish angle between distal and lower margins (fig. 7d); pereopod 3 propodus linear, without lobe on lower margin (fig. 10a); uropodal exopod distal margin with anterodistal angle obtuse; telson with pair of broad posterior lobes, widely excavate at midpoint (fig. 11g) ..... *Lipkecallianassa*

– Maxilliped 3 merus distally oblique with obtuse angle between distal and lower margins (fig. 7h); pereopod 3 propodus oval, lower margin slightly convex, leading to narrow, distinctly rounded proximal lobe; uropodal exopod distal margin clearly differentiated from anterior margin, anterodistal corner right-angled; telson tapering over distal third to pair of posterior lobes separated by deep notch (fig. 11o) ..... *Pugnatrypaea*

5. Antennular peduncle exceeded by all or most of antennal peduncular article 5 (figs 6d, i) 6

– Antennular peduncle as long as or longer than antennal peduncle (figs 6b, c, e, l) 10

6. Maxilliped 3 merus with spine on distal free margin (fig. 7g); proximolateral lobe of telson prominent, defined posteriorly by clear unchitinised region (fig. 11n) ..... *Praedatrypaea*

– Maxilliped 3 merus without spine on distal free margin; proximolateral lobe of telson prominent or not, indefinitely defined posteriorly 7

7. Major cheliped carpus articulating by means of a short neck with merus, merus with bifid proximal spine (fig. 8c); scaphocerite bifid (fig. 6d) ..... *Coriollianassa*

– Major cheliped carpus without neck, lower margin evenly curved, merus lower margin simple, with simple spine or blade; scaphocerite simple 8

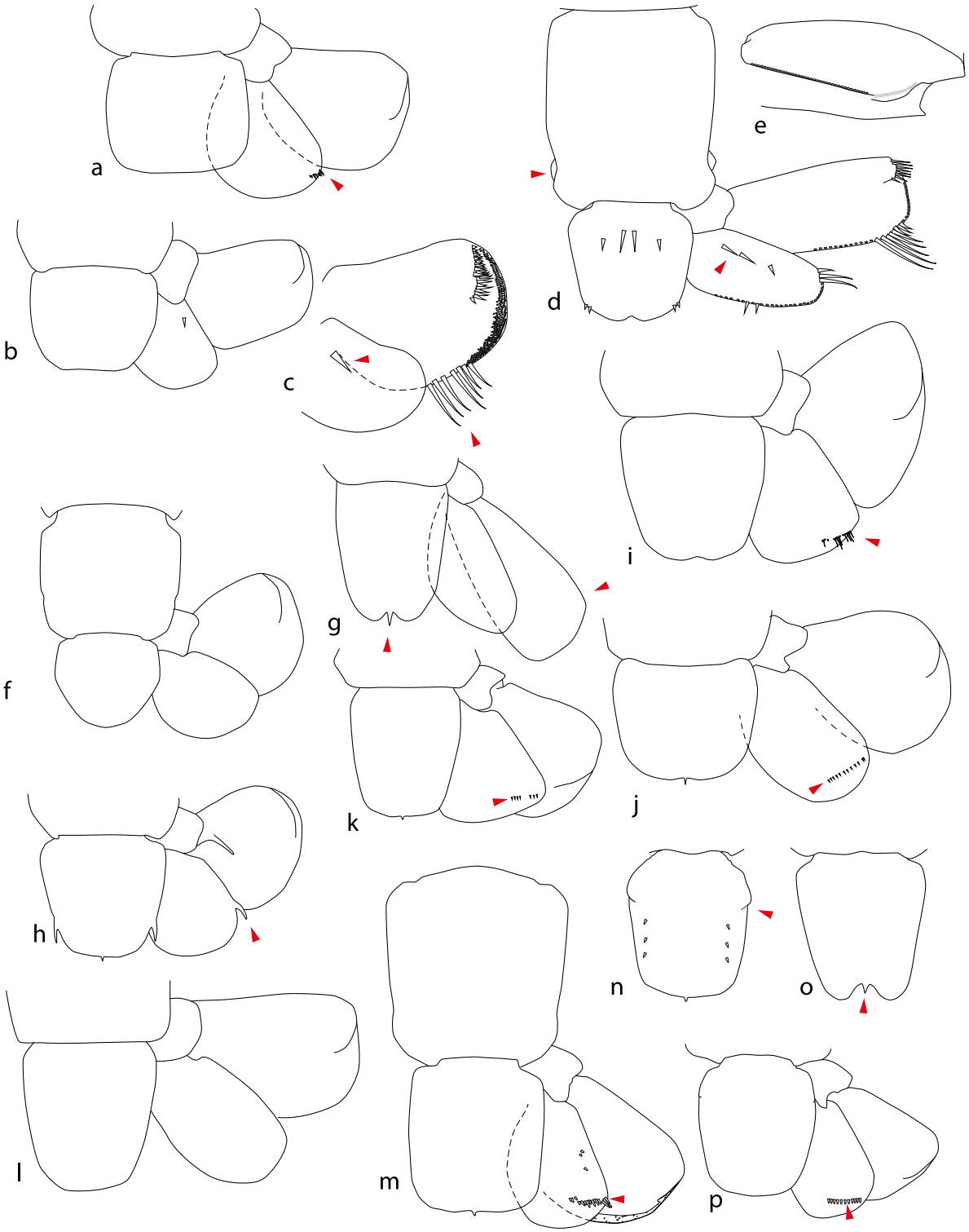

Figure 11. Diagnostic characters for genera of Callianassidae. Pleomere 6, telson, uropod: a, *Arenallianassa*; b, c, *Caviallianassa* (uropod in detail); d, e, *Cheramoides* (with pleomere 6 lateral); f, *Gilvossius*; g, *Lipkecallianassa*; h, *Necallianassa*; i, *Neotrypaea californiensis*; j, *N. petalura*; k, *Notiax*; l, *Poti*; m, *Paratrypaea*; n, *Praedatrypaea*; o, *Pugnatrypaea*; p, *Tastrypaea*.

Original illustrations: a, *Arenallianassa arenosa*, NMV J31887; b, c, *Caviallianassa* FP-11, UF 29204; d, e, *Cheramoides marginata*, MNHN-IU-2016-2462; i, *Neotrypaea californiensis*, NMV J20600; i, *N. petalura*, NMV J59981; k, *Notiax brachyophthalma*, NMV J58880; m, *Paratrypaea maldivensis*, UF 28781.

8. Major cheliped upper margins of ischium and merus, lower margins of merus and carpus beaded, with dense row of fine setae, propodus with deep notch at base of fingers (figs 8d, e) ..... *Biffarius*

– Major cheliped upper margins of ischium and merus, lower margins of merus and carpus smooth, with few well-spaced setae, propodus without deep notch at base of fingers 9

9. Rostrum acute, as long as eyestalk (fig. 6i); cornea diffuse; maxilliped 3 longer than wide at ischium-merus suture (fig. 7c); major and minor chelipeds similar, with saw-tooth blade on lower margin of merus, upper margin concave (fig. 8a); pleomere with sublateral ventral sharp ridge, flared posteriorly (figs 11d, e) ..... *Cheramus*

– Rostrum obtusely triangular, not reaching cornea (fig. 6m); cornea well defined; maxilliped 3 wider at ischium-merus suture than long (fig. 7m); major and minor chelipeds dissimilar, merus unarmed or with small teeth (figs 8h, m); pleomere without sublateral ventral sharp ridge ..... *Rudisullianassa*

10. Rostrum acute, reaching beyond cornea (figs 6g, i) 11

– Rostrum obsolete or triangular, not reaching cornea (figs 6b–f, h, l, m) 15

11. Pereopod 3 propodus bean-shaped, lower margin concave, with broadly rounded proximal lobe (fig. 10d); major cheliped merus with simple perpendicular proximal spine (fig. 9a) ..... *Jocullianassa*

– Pereopod 3 propodus oval or with straight lower margin (Figs 10b, c); major cheliped merus smooth (fig. 8i), *or* with spine (fig. 9h), *or* with blade (figs 9i, j) 12

12. Maxilliped 3 almost rectangular, distally truncate with squarish angle between distal and lower margins (fig. 7c); major cheliped merus without prominent hooked blade (unknown in *Poti*; fig. 8i) 13

– Maxilliped 3 distally convex, extending beyond articulation of carpus (fig. 7j), *or* distally oblique with obtuse angle between distal and lower margins (fig. 7i); major cheliped merus with prominent hooked blade (figs 9i, k) 14

13. Uropodal exopod at least twice as long as wide (fig. 11d); pleopod 2 absent in male ..... *Cheramoides*

– Uropodal exopod about as long as wide (fig. 11l); pleopod 2 present in male (fig. 10g) ..... *Poti*

14. Maxilliped 3 merus wider at ischium-merus suture than long, distally convex, extending only slightly beyond articulation of carpus (fig. 7j); male major cheliped merus with oblique spine about one third or half-way along lower margin, propodus swollen, longer than carpus (fig. 9j); pereopod 3 propodus subrectangular (fig. 10c) ..... *Spinicallianassa*

– Maxilliped 3 merus longer than wide at ischium-merus suture, distally oblique with obtuse angle between distal and lower margins (fig. 7i); male major cheliped merus with 1 or 2 proximal similar teeth and distal denticles on lower margin, propodus narrow, shorter than carpus (fig. 9i); pereopod 3 propodus oval (fig. 10b) ..... *Scallasis*

15. Major cheliped with dorsodistolateral propodus and lateral dactylus with dense brush of setae (figs 9e, f); uropodal endopod with facial distal transverse row of short spiniform setae (fig. 11m) ..... *Paratrypaea*

– Major cheliped with dorsodistolateral propodus and lateral dactylus sparsely setose; uropodal endopod sometimes with facial spiniform setae but not as obvious transverse row 16

16. Anterior carapace strongly depressed by about 45° in lateral view, rostrum blunt (figs 6e, f) ..... *Filhollianassa*

– Anterior carapace moderately or not depressed in lateral view (fig. 6h) 17

17. Antennular peduncle exceeding antennal peduncle by about half length of article 3 (fig. 6l); major and minor chelipeds similar, merus without prominent hook or spine on lower margin, carpus and propodus ovoid in cross-section, upper and lower margins not carinate, carpus of both shorter than upper margin of propodus (fig. 9g); mandibular molar dominating, calcified, swollen projection without sharp edge, incisor without teeth (fig. 6p) ..... *Rayllianassa*

– Antennular peduncle about as long as or a little longer than antennal peduncle (figs 6b, c); chelipeds dissimilar, major cheliped merus with prominent hook or spine on lower margin, carpus and propodus flattened, upper and especially lower margins carinate, submarginal mesial face slightly concave (figs 8b, g); minor cheliped carpus longer than upper margin of propodus (fig. 8m); mandibular molar with simple sharp margin, incisor toothed (fig. 6o) 18

18. Maxilliped 3 dactylus with dense brush of long setae over most of upper-distal margin, few setae along lower margin (fig. 7b) 19

– Maxilliped 3 dactylus with scattered setae over upper margin, dense brush of short setae distally on lower margin (fig. 7a) 20

19. Male and female major cheliped merus with prominent truncate hook armed with serrations along lower margin, excavate laterally at base, with deep notch at base of fingers (fig. 8b); pleopod 1 present in male, pleopod 2 absent in male; uropodal endopod without facial spiniform setae ..... *Fragillianassa*

– Male major cheliped merus with 3 oblique similar short proximal spines on lower margin, beaded beyond (fig. 8g), female with simple hook; pleopods 1 and 2 present in male (figs 10e, f); uropodal endopod with at least 1 facial spiniform seta (figs 11b, c) ..... *Caviallianassa*

20. Maxilliped 3 merus longer than width at ischium-merus suture, distally oblique with obtuse angle between distal and lower margins (see above; fig. 7a); male major cheliped merus with simple proximal hook on lower margin (fig. 8h) ..... *Callianassa*

– Maxilliped 3 merus wider at ischium-merus suture than long, distally convex, extending beyond articulation of carpus (figs 7e, f); male major cheliped merus with prominent complex truncate hook (figs 8f, k, 9c) 21

21. Uropodal endopod anterior margin with distal spine (fig. 11h); telson usually with 1 or 2 pairs of lateral spines ..... *Necallianassa*

– Uropodal endopod anterior margin and telson lateral margin without spines (figs 11f, i, j) 22

22. Telson wider than long, posterior margin semicircular (fig. 11f) or subtruncate; uropodal endopod without facial spiniform setae ..... *Gilvossius*

– Telson as wide as long as or longer than wide, posterior margin truncate, slightly concave or slightly convex between posterolateral angles; uropodal endopod with short distal transverse row of facial spiniform setae (figs 11i–k, p) 23

23. Male major cheliped merus with dentate blade at midpoint (fig. 9k); uropodal exopod posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin (fig. 11c) ..... *Tastrypaea*

– Male major cheliped merus with prominent basal truncate tooth (figs 8f, 9b, d); uropodal exopod distal and posterior margins densely setose, without blade-like setae 24

24. Rostrum acute, anteriorly directed, with ventral broad swelling (fig. 6h); maxilliped 3 crista dentata absent or comprising few proximal denticles; male major cheliped with distal margin of propodus bearing tooth at base of dactylus (fig. 9b); uropodal endopod distal margin well differentiated from anterior margin, distal margin truncate; telson longer than wide, tapering from base (fig. 11k) ..... *Notiax*

– Rostrum flat against eyestalks (fig. 6b); maxilliped 3 crista dentata consisting of a row of denticles (fig. 7f); male major cheliped with distal margin of propodus having deep notch at base of fingers (fig. 9d); uropodal exopod distal margin well or poorly differentiated from anterior margin; telson wider than or about as wide as long 25

25. Maxilliped 3 merus distally convex, extending only slightly beyond articulation of carpus (fig. 7l); telson wider than long, posterior margin as wide as base, weakly convex between rounded posterolateral angles (fig. 11a) ..... *Arenallianassa*

– Maxilliped 3 merus expanded distally as rounded lobe beyond articulation with ischium (fig. 7f); telson at least as wide as long, usually wider than long, posterior margin narrower than base, often with median spine (figs 11i, j) ..... *Neotrypaea*

Implicit attributes. Unless indicated otherwise, the following attributes are implicit throughout the generic diagnoses. Gonochoristic. Triangular sclerite absent from branchiostegite at anterior end of linea thalassinica; anterior carapace almost flat in lateral view. Rostrum flat against eyestalk. Pleomere 6 without sublateral ventral sharp ridge. Cornea well defined, pigmented, eyestalk distal lobes rounded, largely contiguous. Antennular peduncle length about twice width of both eyestalks, about as long as or a little longer than antennal peduncle; articles 2 and 3 with lateral band (3–5 setae wide) of 20–30 irregularly placed long setae along lower margin, and mesial row of shorter setae. Antennal scaphocerite simple, about as long as wide, apically rounded. Mandibular molar flat, with sharp margin; incisor dentate. Maxilliped 3 merus distally convex, extending only slightly beyond articulation of carpus, without distal spine on mesial margin; crista dentata consisting of a row of numerous denticles; dactylus tapering, with scattered setae over upper margin, dense brush of short setae distally on lower margin. Male major cheliped merus with spine or tooth or variously denticulate along lower margin; upper margins of ischium and merus, and lower margins of merus and carpus, smooth with few well-spaced setae; carpus proximal and lower margins evenly convex; carpus and propodus flattened, upper and especially lower margins carinate, submarginal mesial face slightly concave; propodus distal margin unornamented, oblique; upper distal margin of propodus and dactylus with scattered lateral clusters of setae. Minor cheliped slender, considerably narrower than major cheliped; carpus upper margin longer than propodus. Male pleopod 2 present. Uropodal endopod anterior margin unarmed, without facial setae. Uropodal exopod about as long as wide, distal margin poorly differentiated from anterior margin, anterodistal corner rounded, posterodistal margin densely setose, with short spiniform setae along upper margin.

Aqaballianassa gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:27E2FC97-B393-48F5-B69F-83AFD8FF49D7

Type species. *Callianassa aqabaensis* Dworschak, 2003, by present designation.

Diagnosis. Hermaphrodite. ***Triangular sclerite separate from branchiostegite at anterior end of linea thalassinica***. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided, *or* with weak transverse ridge. Pleomere 6 with sublateral ventral sharp ridge, flared posteriorly. Antennular peduncle articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. Mandibular molar calcified, swollen projection without sharp edge; incisor with few teeth. Maxilliped 3 merus wider at ischium-merus suture than long. Male major cheliped merus with oblique spine about one third to half-way along lower margin; propodus distal margin with small lateral tooth; dactylus with dense setae along upper margin. Minor cheliped two-thirds width of major cheliped, both flattened. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 present or absent. Uropodal endopod ovoid, usually longer than wide,

anterior margin straight or slightly convex, posterodistal margin evenly convex, with spiniform setae near anterior and distal margins, *or* with facial spiniform setae on rib. Uropodal exopod 1.0–1.8 times as long as wide, distal margin clearly differentiated from anterior margin, anterodistal corner right-angled, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson anterolateral lobe obsolete, undefined; truncate or slightly convex between posterolateral angles, *or* slightly concave, sometimes with medial spine.

Etymology. An alliteration of the name of the type species and *Callianassa*, type genus of the family.

Remarks. The genus is recognisable by the unique triangular sclerite separated by a clear suture or discontinuity from the branchiostegite at the anterior end of the linea thalassinica. All specimens of *A. aqabaensis* have male and female gonopores, but pleopods 1 and 2 are sexually dimorphic (Dworschak, 2003; Markham and Dworschak, 2005). Two species are included besides the type species, *A. brevirostris* from Thailand and *A. lewtonae* from Queensland, plus an undescribed species from Papua New Guinea.

Arenallianassa gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:7A9C78DE-06CA-4407-BA4A-0A2BA6258BDE

Type species. *Callianassa arenosa* Poore, 1975, by present designation.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse ridge. Maxilliped 3 merus wider at ischium-merus suture than long. Male major cheliped merus with prominent truncate hook armed with serrations along lower margin, excavate laterally at base; carpus and propodus flattened, upper and lower margins carinate, blade-like, submarginal mesial face especially of carpus deeply concave; propodus distal margin with deep notch at base of fixed finger. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 absent. ***Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex***, with facial distal transverse row of short spiniform setae (reduced). Uropodal exopod distal margin clearly differentiated from anterior margin, anterodistal corner right-angled. ***Telson lateral margins convex***.

Etymology. An alliteration of the name of the type species and *Callianassa*, type genus of the family.

Remarks. Only the type species is known, a common shallow subtidal species in south-eastern Australia. *Arenallianassa arenosa* resembles *Paratrypaea* but lacks the dense setation on the major cheliped of the latter genus and has a prominent truncate meral hook on the major cheliped, whereas *Paratrypaea* has a dentate blade, widest proximally instead. The chelipeds resemble those of species of *Neotrypaea*, a genus defined by a prominent distal lobe on the merus of maxilliped 3, but this is not especially more developed in some species than in *A. arenosa*. The telson is widest at its midpoint, whereas species of *Paratrypaea* and *Neotrypaea* have a tapering telson. *Arenallianassa* differs from *Trypaea* in lacking an extremely long and setose antennule, and differs from *Filhollianassa* in the anterior carapace being flat in profile and the uropodal endopod being ovoid rather than asymmetrical.

Biffarius Manning and Felder, 1991

Biffarius Manning and Felder, 1991: 769–771.—Poore, 2004: 181 (partim).

Trypaea.—Sakai, 2011: 385–387 (partim; not *Trypaea* Dana, 1952).

Type species. *Callianassa biformis* Biffar, 1971, by original designation.

Diagnosis. ***Rostrum obsolete or obtusely triangular, flat, not reaching cornea***. Pleomere 1 tergite undivided or with weak transverse ridge. Antennular peduncle exceeded by most to all of antennal peduncular article 5; articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along the lower margin. Maxilliped 3 merus wider at ischium-merus suture than long; crista dentata absent (or few proximal spines only). Male major cheliped merus with prominent truncate hook armed with serrations along lower margin, excavate laterally at base; upper margins of ischium and merus, and ***lower margins of merus and carpus beaded, with dense row of long fine setae***; propodus distal margin with deep notch at base of fixed finger. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 present or absent. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex. Uropodal exopod distal margin clearly differentiated from anterior margin, anterodistal corner right-angled, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson longer than wide, tapering evenly from near base; anterolateral lobe defined posteriorly by short transverse slit; transverse ridge with only fine setae; truncate or slightly convex between posterolateral angles.

Remarks. *Biffarius* has been widely misused by several authors, with up to a dozen species allocated to it, possibly because it was a genus of last resort in Poore's (1994) key. In fact, the type species shares with one other species, *B. limosus*, and possibly *B. delicatulus*, a long antennal peduncle and the lower margins of the major cheliped merus and carpus being beaded and with a dense row of long fine setae. *Biffarius biformis* occurs from the North Atlantic to Caribbean waters, *B. delicatulus* occurs in the South Atlantic and *B. limosus* is known from south-eastern Australia, a somewhat enigmatic generic distribution.

Callianassa Leach, 1814

Callianassa Leach, 1814: 386, 400.—Sakai, 2011: 359 (comprehensive synonymy).

Type species. *Cancer* (*Astacus*) *subterraneus* Montagu, 1808, by original designation and monotypy.

Diagnosis. ***Rostrum obsolete or obtusely triangular, flat, not reaching cornea***. Pleomere 1 tergite undivided or with weak transverse ridge. ***Maxilliped 3 merus distally oblique with obtuse angle between distal and lower margins***, longer than wide at ischium-merus suture. Male major cheliped merus with simple proximal hook on lower margin. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 rarely present. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex or asymmetrical, at least as wide as long, distal margin truncate-convex, at right angles to straight anterior margin. Uropodal exopod distal margin clearly differentiated from anterior margin, anterodistal corner right-angled.

Remarks. *Callianassa* differs from *Paratrypaea*, *Arenallianassa*, *Filhollianassa* and *Trypaea*, genera it most resembles in these analyses, in having the telson tapering evenly from near base, the merus of maxilliped 3 longer than wide and tapering, the major cheliped with simple proximal hook on its lower margin and absence of facial setae on the uropodal endopod.

Callianassa has been the common catch-all genus for many species whose systematic position was uncertain. Sakai (2011) restricted the genus to a single species but his diagnosis of few characters could refer to any of numerous callianassid genera. The name *Montagua* Leach, 1814, is sometimes listed as a synonym. *Montagua* appears only in the index of Leach (1814: 436) referring to "Genus 44", *Callianassa* in the main text. *Gebios* Risso, 1822, was treated as a junior synonym of *Callianassa* by Sakai (2011) and in many earlier works. If anything, *Gebios* Risso, 1822, is a synonym of *Gilvossius* and is discussed below.

Caviallianassa gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:9819F120-10C6-496D-80E2-BDDAD3FBAE07

Type species. *Cheramus cavifrons* Komai and Fujiwara, 2012, by present designation.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse ridge. Antennular peduncle articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. Maxilliped 3 merus wider at ischium-merus suture than long; ***dactylus ovate, with dense brush of long setae over most of upper-distal margin, few setae along lower margin***. Male major cheliped merus with 1–3 oblique similar short proximal spines on lower margin, beaded beyond; propodus distal margin unornamented, oblique, *or* with small lateral tooth. ***Minor cheliped two-thirds width of major cheliped, both flattened***. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, with facial spiniform setae on rib. Uropodal exopod posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson about as wide as long, tapering from anterolateral lobe; anterolateral lobe obsolete, undefined.

Etymology. An alliteration of the name of the type species and *Callianassa*, type genus of the family.

Remarks. A group of two, possibly three, undescribed species from Papua New Guinea and French Polynesia was revealed by our molecular treatment (Robles et al., in press). Morphological examination revealed these to be similar to *Cheramus cavifrons*, of which only the female is known. The chelipeds are similarly compact in all species and have a row of tubercles on the lower margin of the merus beyond a proximal tooth or series of small short spines. Komai and Fujiwara (2012) did not illustrate the unusual setation of the dactylus of maxilliped 3 but its proportions are otherwise similar to the undescribed species, nor did they illustrate the spiniform setae on the face of the uropodal endopod; both features are generally overlooked.

Caviallianassa shares with two genera related on genetic and molecular evidence (Robles et al., in press) a maxilliped 3 dactylus with a dense brush of long setae over most of the upper-distal margin and few setae along the lower margin. *Caviallianassa* differs from the first, *Rudisullianassa*, in having the antennular peduncle about as long as or a little longer than the antennal peduncle (vs exceeded by all or most of the antennal peduncular article 5) and having a small spine on the merus of the major cheliped (vs smooth). Males and females of *Caviallianassa* are known but only females with male gonopores of *Rudisullianassa* are known. *Caviallianassa* differs from *Fragillianassa* in having a wider minor cheliped, lacking a prominent hook on the merus of the major cheliped and having facial setae on the uropodal endopod.

Cheramoides Sakai, 2011

Cheramoides Sakai, 2011: 362.
Cheramus.—Sakai, 2011: 363–365 (partim).

Type species. *Callianassa marginata* Rathbun, 1901, by original designation and monotypy.

Diagnosis. Rostrum acute, anteriorly directed, as long as eyestalks. Pleomere 1 tergite fused, divided into 2 sections by transverse step. Pleomere 6 with sublateral ventral sharp ridge, flared posteriorly. Cornea with scattered reduced pigmentation. Antennular peduncle articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. Antennal scaphocerite simple, longer than wide, acute. Maxilliped 3 merus almost rectangular, distally truncate with squarish angle between distal and lower margins, longer than wide at ischium-merus suture; crista dentata a prominent toothed ridge extending beyond proximal margin of merus. Male major cheliped ***merus without prominent hook or spine on lower margin***. Minor cheliped slender, narrower than major cheliped, with attenuated curved dactylus, longer than palm. Pereopod 3 propodus oval, lower margin slightly convex, leading to narrow sharply rounded proximal lobe. Male pleopod 2 absent. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, with facial spiniform setae on rib. ***Uropodal exopod***

twice as long as wide, distal margin clearly differentiated from anterior margin, anterodistal corner right-angled, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson anterolateral lobe obsolete, undefined; slightly concave, sometimes with medial spine.

Remarks. Cheramoides is unique in that the uropodal exopod is twice as long as wide and much longer than the endopod. The maxilliped 3 merus is rectangular, distally truncate with a squarish angle between the distal and lower margins. Only *C. oblonga* from West Africa and *C. brachytelson* from the Andaman Sea are similar to the type species from the Caribbean deep sea.

Cheramus Bate, 1888

Cheramus Bate, 1888: 30.—Manning and Felder, 1991: 91.—Poore, 1994: 101.—Davie, 2002: 459.—Sakai, 2011: 363–366 (partim).—Komai et al., 2014b: 504–505 (partim).

Callianassa (*Cheramus*).—Borradaile, 1903: 545–546.—De Man, 1928: 26, 95.—Gurney, 1944: 8.

Type species. Cheramus occidentalis Bate, 1888, preoccupied, replaced by *Callianassa profunda* Biffar, 1973, by subsequent designation.

Diagnosis. Rostrum acute, anteriorly directed, as long as eyestalks. Pleomere 1 tergite fused, divided into 2 sections by transverse step. Pleomere 6 with sublateral ventral sharp ridge, flared posteriorly. Cornea with scattered reduced pigmentation. ***Antennular peduncle exceeded by all or most of antennal peduncular article 5***. Maxilliped 3 merus almost rectangular, distally truncate with squarish angle between distal and lower margins, longer than wide at ischium-merus suture; crista dentata a prominent toothed ridge extending beyond proximal margin of merus. Male major cheliped merus with serrate blade over lower margin, upper margin concave. ***Minor and major chelipeds similar, both attenuated, with swollen palms***; carpus upper margin as long as or shorter than propodus. Pereopod 3 propodus oval, lower margin slightly convex, leading to narrow sharply rounded proximal lobe. Male pleopod 2 present. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex. Uropodal exopod about 1.5–1.8 times as long as wide, distal margin clearly differentiated from anterior margin, anterodistal corner right-angled. Telson anterolateral lobe obsolete, undefined.

Remarks. Cheramus is similar to *Cheramoides* but differs in having uniquely similar minor and major chelipeds, both attenuated and with swollen palms. Contrary to the views in recent accounts, only the type species agrees with this characterisation. Komai et al. (2014b) explained the complex taxonomic history of the type species but followed Manning and Felder (1991) in including other species, *C. marginatus* (type species of *Cheramoides*), *C. orientalis* and *C. oblonga*. Several other species have been included since 1991 (Komai et al., 2014b), but it has to be concluded from Robles et al.'s (in press) phylogeny, supported by morphology, that these and the 16 species included by Sakai (2011) are a diverse assemblage. Komai et al. (2014b) could list only "possibly diagnostic characters", most of which, in our analyses, are features of more than one genus.

Coriollianassa gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:A26A8A5B-426A-4110-9945-31A8B1F5831B

Type species. Callianassa coriolisae Ngoc-Ho, 2014, by present designation.

Diagnosis. ***Rostrum*** acute, anteriorly directed, as long as eyestalks, ***with a ventral keel***. Pleomere 1 tergite fused, divided into 2 sections by transverse step. Cornea with scattered reduced pigmentation. Antennular peduncle exceeded by all or most of antennal peduncular article 5; articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. Antennal scaphocerite bifid. Maxilliped 3 merus distally oblique with obtuse angle between distal and lower margins, longer than wide at ischium-merus suture; crista dentata a prominent toothed ridge extending beyond proximal margin of merus. Male major cheliped merus with proximal curved spine on lower margin; carpus ***articulating by means of a short neck with merus***. Pereopod 3 propodus oval, lower margin slightly convex, leading to narrow sharply rounded proximal lobe. Male pleopod 2 present or absent. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, with facial spiniform setae on rib. Uropodal exopod about 1.5–1.8 times as long as wide, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson anterolateral lobe obsolete, undefined.

Etymology. An alliteration of the name of the type species and *Callianassa*, type genus of the family.

Remarks. Robles et al. (in press) recognised a well-defined genus on molecular and morphological grounds. Two of the four species included were undescribed. The genus is defined by the sharp anteriorly directed rostrum with a ventral keel, the long antennal peduncle, bifid scaphocerite, the unusual neck at the base of the carpus of the chelipeds and the usually bifid meral tooth on the major cheliped. Ngoc-Ho (2014) recognised the similarity between *C. coriolisae* and *C. sibogae*, notably the characteristic chelipeds, and realised their differences from *Cheramus* where they had been placed.

Filhollianassa gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:9A34F27E-ABF5-46ED-AFE8-BA399225F2C6

Type species. Callianassa filholi A. Milne-Edwards, 1878, by present designation.

Diagnosis. ***Anterior carapace strongly domed, depressed over anterior quarter.*** Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse step. Antennular peduncle length about 2.5–3 times the width of both eyestalks. Maxilliped 3 merus wider at ischium-merus suture than long. Male major cheliped merus with prominent truncate hook armed with serrations along

lower margin, excavate laterally at base; ***carpus and propodus flattened, upper and lower margins carinate, blade-like, submarginal mesial face especially of carpus deeply concave***; propodus distal margin with deep notch at base of fixed finger. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 absent. Uropodal endopod asymmetrical, at least as wide as long, distal margin truncate-convex, at right angles to straight anterior margin, with facial distal transverse row of short spiniform setae. Uropodal exopod posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson lateral margins convex.

Etymology. An alliteration of the name of the type species and *Callianassa*, type genus of the family.

Remarks. The two species of *Filhollianassa* from south-eastern Australia and New Zealand are immediately recognisable from the strongly domed anterior carapace and strongly inwardly curved carinate upper and lower margins of the carpus and propodus of the major chelipeds. The major cheliped of *Trypaea australiensis*, also in south-eastern Australia but ecologically separate, is similar but this species has a flat dorsum, much longer and more setose antennule, considerably expanded merus of maxilliped 3 and narrower uropodal endopod.

Fragillianassa gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:CFA11DDC-A9C5-4ACC-AC90-E2C6A5456E82

Type species. *Callianassa fragilis* Biffar, 1970, by present designation.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse step. ***Antennular peduncle length about 2.5–3 times the width of both eyestalks***. Antennal scaphocerite reduced to small floating disc. Maxilliped 3 merus wider at ischium-merus suture than long; ***dactylus ovate, with dense brush of long setae over most of upper-distal margin, few setae along lower margin***. Male major cheliped merus with prominent truncate hook armed with serrations along lower margin, excavate laterally at base; propodus distal margin with deep notch at base of fixed finger. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 absent. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex. Uropodal exopod posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson truncate, *or* slightly convex between posterolateral angles, *or* slightly concave, sometimes with medial spine.

Etymology. An alliteration of the name of the type species and *Callianassa*, type genus of the family.

Remarks. Fragillianassa, with two species recognised so far, is most similar to *Necallianassa* and *Neotrypaea*, with which it shares a similar eyestalk, antennule and maxilliped 3 merus. *Fragillianassa* differs from both in having an extremely reduced scaphocerite, a dense brush of long setae over most of the upper-distal margin of the dactylus of maxilliped 3 and an ovoid uropodal endopod longer than wide, more symmetrical than in the other two. *Fragillianassa* differs from *Necallianassa* most obviously in lacking spines on the sides of the telson and on the anterior margin of the uropodal endopod, and it differs from *Neotrypaea* in lacking a transverse facial row of setae on the uropodal endopod.

Gilvossius Manning and Felder, 1992

Gebios Risso, 1822: 243 (type species, *Gebios davianus* Risso, 1822, junior subjective synonym of *Cancer candidus* Olivi, 1792, by monotypy) ***nomen oblitum.***

Gebius Agassiz, 1846: 160 (unjustified emendation of *Gebios* Risso, 1822).

Gilvossius Manning and Felder, 1992: 558.—Sakai, 2011: 372 (partim).

Pestarella Ngoc-Ho, 2003: 475 (type species: *Astacus tyrrhenus* Petagna, 1792, by original designation).

Type species. *Gonodactylus setimanus* DeKay, 1844, by original designation and monotypy.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite fused, divided into 2 sections by transverse step. Antennular peduncle length about 2.5–3 times the width of both eyestalks, length exceeding narrower antennal peduncle. Maxilliped 3 merus wider at ischium-merus suture than long. Male major cheliped merus with prominent truncate hook armed with serrations along lower margin, excavate laterally at base. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 present or absent. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex. ***Telson wider than long, almost semicircular***; *or* rarely posterior margin subtruncate.

Remarks. The genus is recognised by the telson being wider than long, almost semicircular in most species, but rarely subtruncate posteriorly. *Gilvossius* differs from *Trypaea, Arenallianassa* and *Paratrypaea*, which share uropodal exopods with densely setose margins, in lacking a deep notch at the base of the cheliped fingers and lacking a facial distal transverse row of short spiniform setae on the uropodal endopod.

Manning and Felder (1992) and Ngoc-Ho (2003) compared *Gilvossius* and *Pestarella* respectively with *Callianassa*, but this latter genus is only remotely similar in Robles et al.'s (in press) analyses. Both *Pestarella* and *Gilvossius* are in the recent literature. *Gilvossius* was erected for a single species, *Gonodactylus setimanus*, shown by molecular and morphological evidence (Robles et al., in press) to be congeneric with *Gilvossius tyrrhenus*, *G. candidus* and *G. whitei* (Sakai, 1999a). Ngoc-Ho (2003) erected *Pestarella* for the type species (*Astacus tyrrhenus*), *G. candidus* and three others; *Pestarella* is here treated as a subjective junior synonym of *Gilvossius*.

Gebios davianus Risso, 1822, is generally agreed to be a junior subjective synonym of *Cancer candidus* Olivi, 1792. *Gebios*, therefore, could be invoked as a senior subjective

synonym of both *Pestarella* Ngoc-Ho, 2003, and *Gilvossius* Manning and Felder, 1992. However, *Gebios* has never been used as a generic name. Ngoc-Ho (2003) provided a comprehensive synonymy of *Pestarella*, a junior synonym of *Gilvossius*, and its included species. The conditions of the International Code of Zoological Nomenclature Article 23.9.1 required for prevailing usage are met. We therefore invoke International Code of Zoological Nomenclature Article 23.9 and designate *Gebios* Risso, 1822, as *nomen oblitum* and both *Pestarella* Ngoc-Ho, 2003, and *Gilvossius* Manning and Felder, 1992, as *nomina protecta*.

Jocullianassa gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:1AC3D163-8895-45EF-8EC6-E87B435B9FDF

Type species. *Callianassa joculatrix* De Man, 1905, by present designation.

Diagnosis. Rostrum acute, anteriorly directed, as long as eyestalks. Pleomere 1 tergite fused, divided into 2 sections by transverse step. Cornea with scattered reduced pigmentation. Antennular peduncle articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. Antennal scaphocerite simple, longer than wide, acute. ***Maxilliped 3 merus tapering, not mesially produced***, longer than wide at ischium-merus suture. Male major cheliped merus with proximal perpendicular spine on lower margin; propodus distal margin with deep notch at base of fixed finger. ***Pereopod 3 propodus bean-shaped***, lower margin concave, leading to broadly rounded proximal lobe. Male pleopod 2 absent. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex. Uropodal exopod about 1.5–1.8 times as long as wide, distal margin clearly differentiated from anterior margin, anterodistal corner right-angled, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson anterolateral lobe obsolete, undefined.

Etymology. An alliteration of the name of the type species and *Callianassa*, type genus of the family.

Remarks. *Jocullianassa joculatrix* is relatively easily recognised by the combination of its acute rostrum, sharp basal spine on the merus of the major cheliped and the excavate lower margin of the propodus on pereopod 3 (Komai and Tachikawa, 2008). *Jocullianassa joculatrix* is far removed from the type species of *Trypaea*, the genus in which it was included by Sakai (2011). The species is common in collections from the Indo-West Pacific.

Lipkecallianassa Sakai, 2002

Lipkecallianassa Sakai, 2002: 477.—Sakai, 2005b: 212.—Sakai, 2011: 522.

Type species. *Lipkecallianassa abyssa* Sakai, 2002, by original designation and monotypy.

Diagnosis. Rostrum acute, anteriorly directed, as long as eyestalks. Cornea with scattered reduced pigmentation. ***Maxilliped 3 merus*** almost rectangular, distally truncate with squarish angle between distal and lower margins, longer than wide at ischium-merus suture, ***with acute distomesial angle***. Pereopod 3 propodus linear, without lobe on lower margin. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex. Uropodal exopod about 1.5–1.8 times as long as wide. Telson anterolateral lobe obsolete, undefined; ***posterior margin with pair of broad posterolateral lobes, widely excavate at midpoint, with mesial spine***.

Remarks. The monotypic genus *Lipkecallianassa* is known from a single damaged incomplete specimen of the type species. But based on Sakai's (2002) short description and figures, the species has a linear propodus of pereopod 3, seen elsewhere only in *Praedatrypaea longicauda* and *P. modesta* but neither of these species has a strongly excavate posterior telsonic margin. The telson resembles that of species of *Pugnatrypaea* in having an excavate posterior margin; both genera have a narrow ischium-merus of maxilliped 3. All of these three genera have a tooth or spine on the distal margin of the merus of maxilliped 3 but are not allied in the molecular or morphological trees of Robles et al. (in press).

Necallianassa Heard and Manning, 1998

Necallianassa Heard and Manning, 1998: 883–884.
Trypaea.—Sakai, 2011: 385–387 (partim) (not *Trypaea* Dana, 1952).

Type species. *Necallianassa berylae* Heard and Manning, 1998, by original designation.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea, *or* acute, anteriorly directed, as long as eyestalks. Pleomere 1 tergite undivided or with weak transverse step. Antennular peduncle length about 2.5–3 times the width of both eyestalks. Antennal scaphocerite simple, longer than wide, acute. Maxilliped 3 merus wider at ischium-merus suture than long. Male major cheliped merus with prominent truncate hook armed with serrations along lower margin, excavate laterally at base; propodus distal margin with deep notch at base of fixed finger. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 absent. Uropodal endopod asymmetrical, at least as wide as long, distal margin truncate-convex, at right angles to straight anterior margin, ***anterior margin with distal spine***. Uropodal exopod posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin.

Remarks. The sharp spine on the anterior margin of the uropodal endopod and usually one or two spines on the lateral margins of the telson uniquely differentiate *Necallianassa* from all other callianassids (Heard and Manning, 1998). *Necallianassa truncata* lacks lateral spines on the telson but the male major cheliped has the same setose propodus and dactylus as *N. acanthura* (cf. Ngoc-Ho, 2003). The genus was synonymised with the very different *Trypaea* by Sakai (2011) without explanation.

Neotrypaea Manning and Felder, 1991

Neotrypaea Manning and Felder, 1991: 711–712.

Nihonotrypaea Manning and Tamaki, 1998: 889–891 (type species, *Callianassa japonica* Ortmann, 1891, by original designation) **syn. nov.**

Pseudobiffarius Heard and Manning, 2000: 70.—Sakai, 2005b: 26 (as synonym of *Callianassa*).—Sakai, 2011: 286 (as synonym of *Trypaea*) (type species, *Pseudobiffarius caesari* Heard and Manning, 2000, by original designation and monotypy) **syn. nov.**

Trypaea.—Sakai, 2011: 385–387 (partim; not *Trypaea* Dana, 1852).

Type species. *Callianassa californiensis* Dana, 1854, by original designation.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse step. ***Eyestalk distal lobes triangular, apices separate or contiguous, produced and tapering over distal half***. Antennular peduncle length about 2.5–3 times the width of both eyestalks. Maxilliped 3 merus expanded distomesially as rounded lobe beyond articulation with ischium, wider at ischium-merus suture than long. Male major cheliped merus with prominent truncate hook armed with serrations along lower margin, excavate laterally at base; propodus distal margin with deep notch at base of fixed finger. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 absent. ***Uropodal endopod asymmetrical, at least as wide as long, distal margin truncate-convex, at right angles to straight anterior margin, with facial distal transverse row of short spiniform setae***. Uropodal exopod distal margin clearly differentiated from anterior margin, anterodistal corner right-angled. Telson lateral margins convex; posterior margin slightly concave, sometimes with medial spine.

Remarks. *Neotrypaea* probably includes more species than any genus of Callianassidae. Species have a triangular distal lobe on the eyestalk, the appendix interna of pleopods 3–5 embedded in the endopod, or only slightly protruding, and the merus of maxilliped 3 projecting as a rounded lobe beyond the articulation of the carpus (Manning and Felder, 1991) but not as much as in *Trypaea*. The uropodal endopod is asymmetrical, at least as wide as long, with the distal margin truncate-convex, at right angles to straight anterior margin.

Manning and Tamaki (1998) differentiated *Nihonotrypaea* with the appendix interna of pleopods 3–5 projecting from the endopod margin from *Neotrypaea*, in which the appendix interna is completely embedded in the margin. The same difference was used for erection of *Pseudobiffarius* by Heard and Manning (2000) but this difference is slight. Two clades were evident in the molecular analyses of Robles et al. (in press) but not in the morphological treatment. Species assigned to *Nihonotrypaea* were reported to differ from *Neotrypaea* in having the antennular peduncle shorter than the antennal peduncle (Lin et al., 2007a) but this is true, or they are of similar lengths, in all species from both genera. Both *Nihonotrypaea* and *Pseudobiffarius* were synonymised with *Trypaea* by Sakai (2011).

Notiax Manning and Felder, 1991

Notiax Manning and Felder, 1991: 772–773.—Sakai, 2005b: 18 (as synonym of *Callianassa*).

Not *Notiax*.—Sakai, 2011: 381–382.

Type species. *Callianassa brachyophthalma* A. Milne-Edwards, 1870, by original designation and monotypy.

Diagnosis. ***Rostrum acute, reaching middle of cornea, with ventral broad swelling***. Pleomere 1 tergite undivided or with weak transverse step. Maxilliped 3 merus wider at ischium-merus suture than long; crista dentata absent (or few proximal spines only). Male major cheliped merus with prominent truncate hook armed with serrations along lower margin, excavate laterally at base; carpus and propodus flattened, upper and lower margins carinate, blade-like, submarginal mesial face especially of carpus deeply concave. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 present or absent. Uropodal endopod asymmetrical, at least as wide as long, distal margin truncate-convex, at right angles to straight anterior margin, with facial distal transverse row of short spiniform setae. Telson longer than wide, tapering evenly from near base; anterolateral lobe defined posteriorly by short transverse slit; transverse ridge with only fine setae; truncate or slightly convex between posterolateral angles.

Remarks. Manning and Felder (1991) differentiated *Notiax* from other callianassids because of its "rostral spine" but it is not the only genus with this feature. *Notiax* differs, at least as adults, in having a broad swelling under the rostrum not seen in others. The telson is longer than wide, tapering from its base, whereas it is more rectangular in similar genera such as *Neotrypaea* and *Arenallianassa*. The maxilliped 3 merus is not lobed as in *Neotrypaea*.

Sakai (2011) redefined *Notiax* to include, besides the type species, five species here included in *Rayllianassa*, *Filhollianassa* and *Biffarius*. His diagnosis included alternate states for the shapes of the maxilliped 3, male pleopods 1 and 2 and the telson. Nothing was given that would unify these five species.

Paratrypaea Komai and Tachikawa, 2008

Paratrypaea Komai and Tachikawa, 2008: 36.—Komai and Fujita, 2014: 5–6.

Gilvossius.—Sakai, 2011: 372–373 (partim).

Type species. *Callianassa* (*Trypaea*) *bouvieri* Nobili, 1904, by original designation.

Diagnosis. Rostrum broadly or sharply triangular, almost or as long as eyestalks. Pleomere 1 tergite fused, divided into 2 sections by transverse step. Antennular peduncle length about 2.5–3 times the width of both eyestalks. Maxilliped 3 merus wider at ischium-merus suture than long. Male major cheliped merus with blade dentate over lower margin, widest proximally; carpus and propodus flattened, upper and lower margins carinate, blade-like, submarginal mesial face especially of carpus deeply concave; propodus distal margin with deep notch at base of fixed finger; ***upper distal margin of propodus and dactylus with dense brush of setae***. Pereopod 3 propodus

rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 absent. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, with facial distal transverse row of short spiniform setae. Uropodal exopod distal margin differentiated from anterior margin, anterodistal corner rounded or right-angled. Telson longer than wide, tapering evenly from near base; anterolateral lobe defined posteriorly by short transverse slit; transverse ridge with only fine setae; truncate or slightly convex between posterolateral angles.

Remarks. Species of *Paratrypaea* are immediately recognisable by the dense brush of setae on the propodus and lateral dactylus of the major cheliped, and the merus of the male major cheliped having a dentate blade on its lower margin, rather than a hook as in many other genera.

Paratrypaea was synonymised with *Gilvossius* by Sakai (2011) because the two genera share the same type of male pleopods 1 and 2, but the two genera differ in many ways (Komai and Fujita, 2014). *Gilvossius chichijimaensis* Sakai, 2015, was shown to be a junior synonym of *Paratrypaea bouvieri* (see Komai, 2017).

Poti Rodrigues and Manning, 1992

Poti Rodrigues and Manning, 1992a: 9–10.
Callianassa.—Sakai, 1999a: 11–13 (partim).
Cheramus.—Sakai, 2011: 363–365 (partim).

Type species. *Poti gaucho* Rodrigues and Manning, 1992, by original designation and monotypy.

Diagnosis. Rostrum acute, anteriorly directed, as long as eyestalks. Pleomere 1 tergite fused, divided into 2 sections by transverse step. Cornea with scattered reduced pigmentation. Antennular peduncle articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. ***Maxilliped 3 merus almost rectangular, distally truncate with squarish angle between distal and lower margins***, longer than wide at ischium-merus suture; crista dentata a prominent toothed ridge extending beyond proximal margin of merus. Pereopod 3 propodus oval, lower margin slightly convex, leading to narrow sharply rounded proximal lobe. Male pleopod 2 present. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex. Uropodal exopod about 1.5–1.8 times as long as wide, distal margin clearly differentiated from anterior margin, anterodistal corner right-angled, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson anterolateral lobe obsolete, undefined.

Remarks. *Poti* was said to differ from all other callianassid genera in having an incomplete linea thalassinica (Rodrigues and Manning, 1992a), a condition we were unable to confirm. Otherwise, the maxilliped 3 and minor cheliped of the only species resembles those of species of *Cheramoides*. The uropodal exopod is broad, while it is exceptionally long and narrow in *Cheramoides*.

Poti was synonymised with *Callianassa* by Sakai (1999a), along with seven other genera, and with a redefined *Cheramus* by Sakai (2011) who took a broad view of both genera.

Praedatrypaea gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:CDBA883E-288C-4CDA-80F4-1BEE665FA3D0

Type species. *Callianassa praedatrix* De Man, 1905, by present designation.

Diagnosis. Rostrum acute, anteriorly directed, as long as eyestalks. Pleomere 1 tergite fused, divided into 2 sections by transverse step. Pleomere 6 with sublateral ventral sharp ridge, flared posteriorly. Antennular peduncle exceeded by all or most of antennal peduncular article 5; articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. Antennal scaphocerite simple, longer than wide, acute. ***Maxilliped 3 merus*** wider at ischium-merus suture than long, ***with distal spine on distal free margin***. Male major cheliped merus with blade dentate over lower margin, widest proximally. Pereopod 3 propodus oval, lower margin slightly convex, leading to narrow sharply rounded proximal lobe. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, with spiniform setae near anterior and distal margins. Uropodal exopod about 1.5–1.8 times as long as wide, distal margin clearly differentiated from anterior margin, anterodistal corner right-angled, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. ***Telson anterolateral lobe prominent, defined posteriorly by clear unchitinised region***; truncate or slightly convex between posterolateral angles, *or* slightly concave, posterior margin sometimes with medial spine.

Etymology. An alliteration of the name of the type species and *Trypaea*, a genus of the family.

Remarks. The hooked spine on the distal margin of the merus of maxilliped 3 immediately defines *Praedatrypaea*. The genus is also unusual in that the proximolateral lobes at the base of the telson are prominent, especially ventrally, and are defined by a weakly chitinised suture dorsally and laterally. In other genera, these lobes may be evident and defined at most by a narrow slit.

Pugnatrypaea gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:0F41845B-F526-4AB8-80B7-A60B6538919E

Type species. *Callianassa pugnatrix* De Man, 1905, by present designation.

Diagnosis. Rostrum acute, anteriorly directed, as long as eyestalks. Pleomere 1 tergite fused, divided into 2 sections by transverse step. Cornea with scattered reduced pigmentation. Antennular peduncle from about as long exceeded by all of antennal peduncular article 5; articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin.

Maxilliped 3 merus distally oblique with obtuse angle between distal and lower margins, without distal spine on mesial margin. Male major cheliped merus with simple proximal hook on lower margin; propodus distal margin with deep notch at base of fixed finger. Pereopod 3 propodus oval, lower margin slightly convex, leading to narrow sharply rounded proximal lobe. Male pleopod 2 present or absent. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, with spiniform setae near anterior and distal margins, *or* with facial spiniform setae on rib. Uropodal exopod about 1.5–1.8 times as long as wide, distal margin clearly differentiated from anterior margin, anterodistal corner right-angled, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. ***Telson anterolateral lobe obsolete, undefined; tapering over distal third to pair of posterior lobes separated by deep notch, with medial spine***.

Etymology. An alliteration of the name of the type species and *Trypaea*, a genus of the family.

Remarks. The telson tapers over its distal third to a pair of lobes separated by a deep notch with a medial spine. The two pairs of spiniform setae typically found on the posterolateral angles of the telson of callianassids are prominently enlarged and displaced anteriorly. *Pugnatrypaea pugnatrix* and an unidentified species *Pugnatrypaea* GMX lie on the same molecular clade (Robles et al. 2019). Both have a simple curved spine on the lower margin of the merus of the major cheliped. The antennular peduncle is shorter than the antennal peduncle in *Pugnatrypaea* GMX (fig. 6j) while they appear to be of similar lengths in *Pugnatrypaea pugnatrix* (De Man, 1928: fig. 23). Species with similar maxillipeds 3, telsons and short antennular peduncles are *P. intermedia* and *P. lobetobensis* but these differ in having a truncate, instead of rounded, uropodal exopod and the merus of the major cheliped dentate along the lower margin and with a spine on the upper margin.

Rayllianassa Komai and Tachikawa, 2008

Rayllianassa Komai and Tachikawa, 2008: 42–43.—Komai and Fujita, 2014: 551–552.

Notiax.—Sakai, 2011: 381 (partim).

Type species. *Callianassa amboinensis* De Man, 1888, by original designation and monotypy.

Diagnosis. Hermaphrodite. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse step. ***Eyestalk distal lobes obliquely truncated, apices diverging***. Antennular peduncle exceeding antennal peduncle by about half length of article 3; articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. Antennal scaphocerite simple, longer than wide, acute. Mandibular molar calcified, swollen projection without sharp edge, incisor with few teeth. Maxilliped 3 merus wider at ischium-merus suture than long. Male ***major cheliped merus without prominent hook or spine on lower margin; carpus and propodus ovoid in cross-section, upper and lower margins not markedly carinate***; propodus distal margin with small lateral tooth. Minor cheliped about two-thirds width of major cheliped, both swollen; carpus upper margin as long as or shorter than propodus. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, with facial spiniform setae on rib. Uropodal exopod posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson lateral margins convex; anterolateral lobe obsolete, undefined; slightly concave, sometimes with medial spine.

Remarks. *Rayllianassa amboinensis* is recognisable by the absence of a hook on the merus of the major cheliped, the propodi being swollen and the pair being little different in size. The lobes on the eyestalks are truncate-oblique and the maxilliped 3 particularly broad. Komai et al. (2014a) added a second species *R. rudisulcus* and emended the generic diagnosis to accommodate the presence or absence of a dorsal oval, but the authors were ambivalent about the value of this character in callianassid systematics. This species and another were shown by Robles et al. (in press) to differ on both molecular and morphological criteria (see *Rudisullianassa* below where the two genera are compared).

Rayllianassa amboinensis has been reported from throughout the Indo-West Pacific and illustrated several times since its discovery in Ambon, Indonesia (Komai et al., 2014a; Komai and Tachikawa, 2008; Ngoc-Ho, 2005; Poore and Griffin, 1979; Sakai, 1984, 1988, 1999a). There is considerable discrepancy between the illustrations. Robles et al. (in press) found substantial genetic difference between eight individuals from Papua New Guinea, Philippines and the Line Islands pointing to the probability of more than one species in this genus.

All authors cited above have reported only females with the exception of Sakai (1999a) who reported two males and a female from Ambon, all twice as long as the "female" holotype and other subsequent records. Examination of all the material available to us shows them to be hermaphrodites with both male and female gonopores. Ngoc-Ho (1991) illustrated minute pleopods 1 and 2 on a single male that was renamed *Callianassa ngochoae* by Sakai (1999a) and later synonymised by Komai et al. (2014a). The generic position of *Callianassa ngochoae* is uncertain. Males of species of *Rudisullianassa* and *Spinicallianassa* have also never been reported. All "females" with typical pleopods 1 and 2, including ovigerous individuals, have both female gonopores on coxae of pereopods 3 and male gonopores on coxae of pereopods 5 and are probable hermaphrodites.

Rudisullianassa gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:C2EFC849-6C6B-4466-8B47-9DF66EBF5D46

Type species. *Rayllianassa rudisulcus* Komai, Fujita and Maenosono, 2014, by present designation.

Diagnosis. ***Hermaphrodite***. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse step. Antennular peduncle

exceeded by all or most of antennal peduncular article 5; articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. Maxilliped 3 merus wider at ischium-merus suture than long; dactylus ***ovate, with dense brush of long setae over most of upper-distal margin, few setae along lower margin***. Male major cheliped merus without prominent hook or spine on lower margin; propodus distal margin with small lateral tooth. Minor cheliped about two-thirds width of major cheliped, both swollen; carpus upper margin as long as or shorter than propodus. Pereopod 3 propodus oval, lower margin slightly convex, leading to narrow sharply rounded proximal lobe. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, with or without facial spiniform setae on rib. Uropodal exopod 1.0–1.8 times as long as wide, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson about as wide as long, tapering from anterolateral lobe; anterolateral lobe obsolete, undefined; posterior margin slightly concave, sometimes with medial spine.

Etymology. An alliteration of the name of the type species and *Callianassa*, type genus of the family.

Remarks. Komai et al. (2014a) described *Rayllianassa rudisulcus* based on one female; they did not note how the setation on the dactylus of maxilliped 3, which they correctly described as "stout", differed from that of *R. amboinensis*. The form found in *Rayllianassa*, tapering with few long setae on the upper surface and a dense brush of short setae below, is typical of most callianassids. *Rudisullianassa* differs further from *Rayllianassa* in having the antennular peduncle shorter than the antennal peduncle, whereas the opposite is true in *Rayllianassa*, and the minor cheliped is relatively smaller. The atypical maxilliped 3 dactylus seen in *R. rudisulcus* is also seen in *Biffarius*, *Fragillianassa* and *Caviallianassa* but these are gonochoristic genera. *Rudisullianassa rudisulcus* and a second undescribed species were common in collections from Papua New Guinea (Robles et al. 2019). All individuals had both male and female gonopores. Both species were associated with submerged wood.

The unusual maxilliped 3 was initially mistaken by one of us (GCBP) for the form seen in eucalliacids, also with swollen similar chelipeds. In eucalliacids, the dactylus is also extremely setose but in this case the apex is decidedly truncate.

Scallasis Bate, 1888

Scallasis Bate, 1888: 34.—Manning and Felder, 1991: 780.
Callianassa (*Scallasis*).—Borradaile, 1903: 547–548 (partim).
Cheramus.—Sakai, 2011: 363–365 (partim).

Type species. *Scallasis amboinae* Bate, 1888, by monotypy.

Diagnosis. ***Rostrum acute, anteriorly directed, as long as eyestalks***. Pleomere 1 tergite fused, divided into 2 sections by transverse step. Pleomere 6 with sublateral ventral sharp ridge, flared posteriorly. ***Eyestalk distal lobes acute, apices separate***. Antennular peduncle articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. Antennal scaphocerite simple, longer than wide, acute. ***Maxilliped 3 merus distally oblique with obtuse angle between distal and lower margins, longer than wide at ischium-merus suture***; crista dentata a prominent toothed ridge extending beyond proximal margin of merus. Male major cheliped merus with 2 or 3 proximal similar teeth and distal denticles on lower margin; propodus distal margin with small lateral tooth. Pereopod 3 propodus oval, lower margin slightly convex, leading to narrow sharply rounded proximal lobe. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, anterior margin unarmed or with spine at midpoint, with facial spiniform setae on rib. Uropodal exopod 1.0–1.8 times as long as wide, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson lateral margins convex; transverse ridge with fine setae and spiniform setae; posterior margin truncate, *or* slightly convex between posterolateral angles, *or* slightly concave, sometimes with medial spine.

Remarks. We now follow Clark (2018) in attributing this genus to Bate rather than Spence Bate. The holotype of *Scallasis amboinae* was examined (by GCBP) and additional specimens were found in Papua New Guinea, enabling the species to be well characterised. The genus is recognised by the combination of a narrow rostrum, eyestalks with acute apices, a narrow maxilliped 3, a simple or bifid spine on the merus of the major cheliped, and exceptionally strong spiniform setae on the face of the uropodal endopod and on the face of the telson.

Spinicallianassa gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:DCD1DFBE-9DFF-481E-89CA-483A0AC6DDD8

Type species. *Cheramus spinicauda* Komai, Maenosono and Fujita, 2014, by present designation.

Diagnosis. Hermaphrodite. Rostrum acute, anteriorly directed, as long as eyestalks. Pleomere 1 tergite undivided or with weak transverse step. Pleomere 6 with or without sublateral ventral sharp ridge, flared posteriorly. Antennular peduncle articles 2 and 3 with single lateral row of 6–10 well-spaced long setae along lower margin. Antennal scaphocerite simple, longer than wide, acute. Mandibular molar calcified, swollen projection without sharp edge, incisor with few teeth. Maxilliped 3 merus wider at ischium-merus suture than long. ***Male major cheliped merus*** with oblique spine one third to half-way along lower margin; ***dactylus with dense setae along upper margin***. Minor cheliped two-thirds width of major cheliped, both flattened. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, with spiniform setae near anterior and distal margins, *or* on rib. Uropodal exopod about 1.5–1.8 times as long as wide, distal margin clearly differentiated from anterior margin, anterodistal corner right-angled, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. ***Telson about as wide as long, tapering from anterolateral lobe***;

anterolateral lobe obsolete, undefined; transverse ridge sometimes with spiniform setae; posterior margin slightly concave, sometimes with medial spine.

Etymology. An alliteration of the name of the type species and *Callianassa*, type genus of the family.

Remarks. Species of *Spinicallianassa* have dense setae on the upper margin of the dactylus of the male major cheliped, approaching that of *Paratrypaea* but differing from this genus in many ways, notably having a small meral spine on the major cheliped rather than a prominent toothed blade. The row of short spiniform setae along the posterior margin of the telson may be characteristic of this genus only. *Spinicallianassa* shares with *Aqaballianassa* and *Rayllianassa* a dominating calcified mandibular molar without a sharp edge and an incisor without teeth.

Tastrypaea gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:B5299239-C36C-4B78-8A7A-BB82710B67B5

Type species. *Callianassa poorei* Sakai, 1999, herein designated.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse step. Maxilliped 3 merus wider at ischium-merus suture than long. ***Male major cheliped merus with 1 or 2 small teeth just before midpoint***; carpus and propodus flattened, upper and lower margins carinate, blade-like, submarginal mesial face especially of carpus deeply concave; propodus distal margin with deep notch at base of fixed finger. Minor cheliped two-thirds width of major cheliped, both flattened. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 absent. ***Uropodal endopod asymmetrical, at least as wide as long, distal margin truncate-convex, at right angles to straight anterior margin***, with facial distal transverse row of short spiniform setae. Uropodal exopod distal margin clearly differentiated from anterior margin, anterodistal corner right-angled, posterodistal margin with row of 6–8 long blade-like setae proximal to long setae on distal margin. Telson lateral margins convex.

Etymology. An alliteration of Tasmania, type locality of the type species, and *Trypaea*, a genus of the family.

Remarks. We have no molecular data to support this genus but *Callianassa poorei* displays several significant morphological differences from its nearest neighbours to justify a new genus (Sakai, 1999b). *Tastrypaea* resembles species of *Paratrypaea* in having a well-developed transverse row of spiniform setae near the anterodistal angle of the uropodal endopod but differs in not having especially setose fingers on the major cheliped. The species also differs from *Paratrypaea* and from *Arenallianassa arenosa*, which has an obsolete row of spiniform setae on the uropodal endopod, in that the chelipeds are not extremely dissimilar, in not having a well-developed blade on the major cheliped, the uropodal endopod being asymmetrical, as wide as long, with its distal margin truncate-convex, at right angles to the straight anterior margin (rather than ovoid and longer than wide) and the uropodal exopod having a row of long blade-like setae proximal to long setae on the distal margin (rather than having densely setose margins). *Tastrypaea* differs from *Filhollianassa*, its sister taxon in Robles et al. (in press), in not having a depressed anterior carapace and chelipeds without prominent marginal crests.

Trypaea Dana, 1852

Trypaea Dana, 1852a: 14.—Poore, 2004: 184.—Sakai, 2011: 385–387 (partim).

Callianassa (*Trypaea*).—Borradaile, 1903: 546 .—De Man, 1928: 27, 96 (partim).

Type species. *Trypaea australiensis* Dana, 1852, by monotypy.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse step. ***Eyestalk distal lobes obsolete, truncate***. ***Antennular peduncle length about 4 times the width of both eyestalks, twice as long as antennal peduncle; articles 2 and 3 with 2 single similar rows of closely spaced setae laterally and mesially along lower margin, extending on to flagellum***. Maxilliped 3 merus grossly expanded distomesially beyond articulation with ischium, wider at ischium-merus suture than long; crista dentata absent (or few proximal spines only). Male major cheliped merus with prominent truncate hook armed with serrations along lower margin, excavate laterally at base; carpus and propodus flattened, upper and lower margins carinate, blade-like, submarginal mesial face especially of carpus deeply concave; propodus distal margin with deep notch at base of fixed finger. Pereopod 3 propodus rectangular, lower margin deeply convex, leading to broadly rounded free proximal lobe. Male pleopod 2 absent. Uropodal endopod ovoid, usually longer than wide, anterior margin straight or slightly convex, posterodistal margin evenly convex, with facial distal transverse row of short spiniform setae. Telson lateral margins convex; slightly concave, sometimes with medial spine.

Remarks. Trypaea australiensis is immediately distinguished from all other callianassids by the massive antennular peduncles, far exceeding the antennal peduncles, bearing on their lower margin a double row of adjacent long setae. The merus of maxilliped 3 is more grossly expanded distally than in any other genus. In all other genera that appear to have setose antennae, the setae are scattered in broad bands and not adjacent. *Trypaea* has only one species which is genetically well separated from its sister taxa (Robles et al. 2019). These are *Arenallianassa* from south-east Australia, *Filhollianassa* from south-east Australia and New Zealand, and the more widespread Indo-West Pacific *Paratrypaea*.

Sakai (1999a) synonymised *Trypaea* and eight other genera with *Callianassa*, and later, Sakai (2005b) added a further two genera to this synonymy. Sakai (2011) revived the genus and synonymised five genera with *Trypaea* based on shared features of the male pleopods 1 and 2, which are poorly developed or absent in all callianassids. In doing so, he included 53 species.

Callianopsidae Manning and Felder, 1991

Figure 12

Callianopsinae Manning and Felder, 1991: 787–789.—Schweitzer Hopkins and Feldmann, 1997: 237.—Sakai, 2005b: 226–227.—Sakai, 2011: 477–478.—Sakai et al., 2015: 122–124.

Callianopsidae.—Sakai, 2011: 477.—Sakai et al., 2015: 121–122.—Dworschak and Poore, 2018: 66–67.

Neocallianopsinae Sakai, 2011: 482.

Bathycalliacinae Sakai and Türkay, 1999a: 204.—Sakai, 2005b: 213–214.—Sakai, 2011: 347–348 **syn. nov.**

Bathycalliacidae Sakai, 2011: 347 **syn. nov.**

Vulcanocalliacinae Dworschak and Cunha, 2007: 37.—Sakai, 2011: 350 **syn. nov.**

Diagnosis. Rostrum flat, short, triangular, shorter than eyestalks, *or* spike-like; median carina absent, *or* on rostrum only; gastric carinae absent; cervical groove well defined; suture between ocular lobe and end of linea thalassinica horizontal in lateral view; anterior branchiostegal margin sinusoidal or semicircular; anterior branchiostegal lobe simple, scarcely calcified, merging smoothly with anterodorsal branchiostegal angle and anterolateral margin of carapace; posterior margin of carapace without lateral lobes; pleomere 1 without anterolateral lobes, weakly chitinised. Eyestalks flattened, contiguous, with subdistal dorsal cornea. Antennal scaphocerite usually elongate, rarely rudimentary. Maxilla scaphognathite without long seta on posterior lobe extending into branchial chamber. Maxilliped 1 epipod with acute anterior lobe lying alongside exopod. ***Maxilliped 3 dactylus dilating, truncate, with dense field of setae on distal margin***. ***Cheliped merus lower margin spinose, or with small proximal tooth***; palm oval in cross-section, barely crested above or below. Pereopod 3 propodus rectangular or oval, up to twice as long as wide, with proximal lobe on lower margin, without distal spiniform setae on lateral face (often with 1 distal spiniform seta on lower margin). Pereopod 5 minutely chelate. Female pleopod 2 rami narrower and with more reduced setation than pleopods 3–5; endopod flattened and 3–5 times as long as wide. Pleopods 3–5 with oblique peduncles meeting mesially, endopods triangular, with straight mesial margin, exopods attached laterally, proximally lobed, longer than and enclosing endopods; appendices internae elongate, much longer than wide. ***Uropodal exopod without elevated dorsal plate***.

Remarks. Callianopsids differ from other callianassoids except eucalliacids in having the dactylus of maxilliped 3 dilating, truncate and with a dense field of setae on its distal margin. The uropodal exopod lacks a dorsal plate, which is present in eucalliacids. Members of the family have lateral ridges on the eyestalks and maxilliped 3 ischium with a strong proximal lobe on the lower margin. These features place the family far removed from Callianassidae, with which it was compared by Sakai (2011).

Callianopsinae was treated as a subfamily of Ctenochelidae by Manning and Felder (1991) and by Schweitzer Hopkins and Feldmann (1997), as a subfamily of Gourretiidae by Sakai (2005b) and as a full family by Sakai (2011).

Dworschak and Poore (2018) showed that *Neocallianopsis* is a synonym of *Callianopsis*, and therefore, Neocallianopsinae Sakai, 2011, is a synonym of Callianopsidae. Bathycalliacinae and Vulcanocalliacinae, both monotypic and originally subfamilies of Callianassidae, were included in Bathycalliacidae, newly elevated to family rank by Sakai (2011). Dworschak and Cunha (2007) noted that the two taxa shared epipods on maxilliped 3 to pereopod 4 (found also in the only species of Paracalliacidae), similar maxillipeds 3, propodi on pereopod 3, telsons and uropods, and blindness. The morphological analysis found the absence of an appendix masculina on male pleopod 2 to be a synapomorphy.

In his discussion of Bathycalliacinae, Sakai (2011) contradicted Dworschak and Cunha's (2007) assertion that the holotype of *Bathycalliax geomar* is a male (as originally stated). Subsequent examination by PCD has shown the original observation was correct. Sakai (2011) erroneously stated that the male pleopod 1 is absent and that *Vulcanocalliax arutyunovi* possesses a dorsal plate on the uropodal exopod, again not true.

The molecular analysis of Robles et al. (in press) found one bathycalliacid representative, *Vulcanocalliax arutyunovi*, to be a sister taxon to one example of Callianopsidae, *Callianopsis goniophthalma*, a result consistent with the morphological analysis that found *Bathycalliax* to be closely allied. On the basis of this evidence, we synonymise Bathycalliacidae with Callianopsidae and move Vulcanocalliacinae to Callianopsidae without recognising subfamilies.

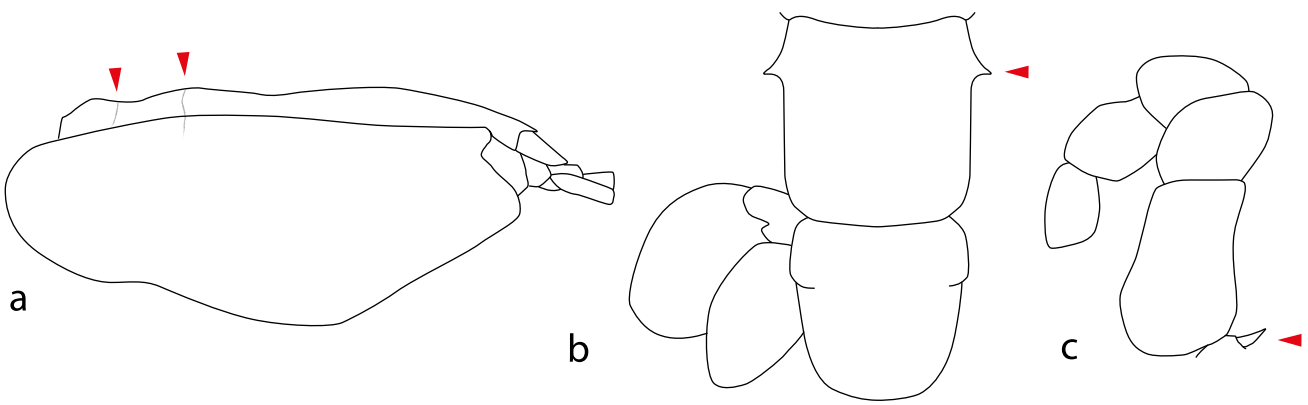

Figure 12. Diagnostic characters for genera of Callianopsidae. Carapace: a, *Bathycalliax*. Pleomere 6: c, *Callianopsis*. Maxilliped 3: c, *Bathycalliax*.

Key to genera of Callianopsidae

1. Pleomere 6 with prominent lateral projections (fig. 12b); carapace with longitudinal carina running from rostrum; epipods absent ..... *Callianopsis*

– Pleomere 6 without prominent lateral projections; carapace without longitudinal carina; epipods present on maxilliped 3 to pereopod 4 2

2. Two cardiac sulci present (fig. 12a); maxilliped 3 with rudimentary exopod (fig. 12c) ..... *Bathycalliax* (1 species, *B. geomar*)

– Cardiac sulci absent; maxilliped 3 exopod absent ..... *Vulcanocalliax* (1 species, *V. arutyunovi*)

Bathycalliax Sakai and Türkay, 1999

Bathycalliax Sakai and Türkay, 1999: 204.—Sakai, 2005b: 214.—Sakai, 2011: 349.

Type species. *Bathycalliax geomar* Sakai and Türkay, 1999, by original designation and monotypy.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea; carapace without median carina; ***cardiac sulci present***. Pleomere 6 without lateral projections. Maxilliped 3 exopod present. Male major cheliped merus lower margin straight, with proximal row of denticles.

Remarks. *Bathycalliax geomar* is the sole species, placed by its authors in its own callianassid subfamily, Bathycalliacinae. Dworschak and Cunha (2007) confirmed that the holotype male pleopod 1 has a unique flagellate article 2 but that the smaller male paratype lacks pleopod 1. Sakai (2011) contradicted his earlier observations, saying that the male pleopod 1 is absent.

Callianopsis de Saint Laurent, 1973

Callianopsis de Saint Laurent, 1973: 515.—Schweitzer Hopkins and Feldmann, 1997: 237–238.—Sakai, 2005b: 226.—Sakai, 2011: 478–479.—Dworschak and Poore, 2018: 67.

Pleurocalliax Sakai, 2011: 480–481 (type species, *Callianassa caecigena* Alcock and Anderson, 1894, by original designation and monotypy).

Neocallianopsis Sakai, 2011: 482 (type species, *Callianopsis anovalis* Lin, Komai and Chan, 2007, by original designation and monotypy).

Phaetoncalliax Sakai, Türkay, Beuck and Freiwald, 2015: 124–128 (type species, *Phaetoncalliax mauritana* Sakai, Türkay, Beuck and Freiwald, 2015, by original designation and monotypy).

Type species. *Callianassa goniophthalma* Rathbun, 1902, by original designation and monotypy.

Diagnosis. ***Rostrum acute, produced, with dorsal carina leading to gastric region***; carapace with median carina strong on rostrum, weaker more posteriorly; cardiac sulci absent. Pleomere 6 with lateral projections. Maxilliped 3 exopod absent. Male major cheliped merus with straight or weakly convex blade on lower margin bearing a short proximal curved spine and 1 or more distal spines.

Remarks. *Callianopsis* is recognised by the combination of a dorsally carinate rostrum and lateral projections on pleomere 6.

Callianopsis was placed in its own subfamily of the Ctenochelidae by Manning and Felder (1991). The subfamily was included as a member of Gourretiidae by Sakai (2005b) and at family rank by Sakai (2011). Sakai (2005b: 227) treated *Dawsonius*, a gourretiid genus, as a junior synonym of *Callianopsis* but in a note added in proof to the same paper (p. 245) recognised it as a separate genus. Dworschak and Poore (2018) synonymised *Neocallianopsis* Sakai, 2011, *Pleurocalliax* Sakai, 2011, and *Phaetoncalliax* Sakai, Türkay, Beuck and Freiwald, 2015, with *Callianopsis*. All had been inadequately diagnosed or based on errors.

Vulcanocalliax Dworschak and Cunha, 2007

Vulcanocalliax Dworschak and Cunha, 2007: 37.—Sakai, 2011: 350–351.

Type species. *Vulcanocalliax arutyunovi* Dworschak and Cunha, 2007, by original designation and monotypy.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea; carapace without median carina; cardiac sulci absent. Pleomere 6 without lateral projections. Maxilliped 3 exopod absent. ***Male major cheliped merus with 1–2 small proximal teeth on lower margin***.

Remarks. The sole species, *Vulcanocalliax arutyunovi* Dworschak and Cunha, 2007, was placed in its own subfamily of Callianassidae close to Bathycalliacinae by its authors but the subfamily was transferred to Bathycalliacidae by Sakai (2011). Contrary to Sakai's (2011) assertion, the only species does not have a dorsal plate on the uropodal exopod. It differs from *Bathycalliax geomar* in the absence of cardiac sulci and possession of a maxilliped 3 exopod.

Callichiridae Manning and Felder, 1991

Figures 13–15

Callichirinae Manning and Felder, 1991: 775–776.—Hyžný and Müller, 2012: 968–969.

Calliapaguropinae Sakai, 1999a: 7.—Sakai, 2005: 205.—Sakai, 2011: 491–492.

Callichiridae.—Sakai, 2011: 418.—Sakai et al., 2014: 490 (lapsus, Callichirinae on p. 500).—Dworschak, 2018: 21.

Diagnosis. Rostrum flat, short, triangular, shorter than eyestalks, *or* spike-like, longer than wide; median carina absent; gastric carinae absent; cervical groove well defined; suture between ocular lobe and end of linea thalassinica oblique in lateral view; ***anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle***; posterior margin of carapace without lateral lobes; pleomere 1 without anterolateral lobes, weakly chitinised. Eyestalks flattened, contiguous, with subdistal dorsal cornea, *or* cylindrical, with terminal subspherical cornea (*Calliapagurops* only). Antennal scaphocerite rudimentary. Maxilla scaphognathite without long seta on posterior lobe extending into branchial chamber. Maxilliped 1 epipod with acute anterior lobe lying alongside exopod. Maxilliped 3 dactylus slender, digitiform,

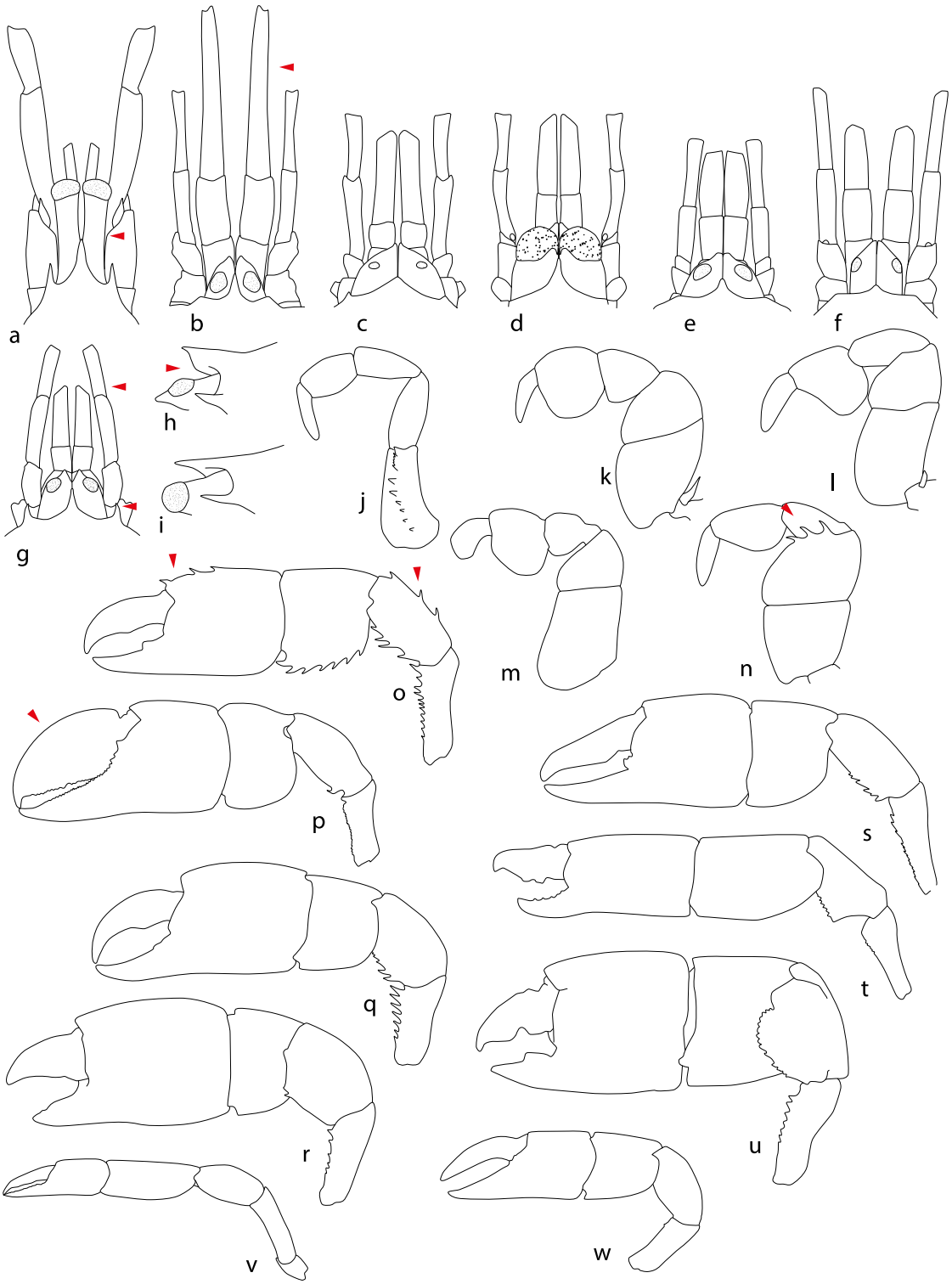

Figure 13. Diagnostic characters for genera of Callichiridae. Rostrum, eyestalks, antennules, antennae: a, *Calliapagurops*; b, *Lepidophthalmus*; c, *Mocallichirus*; d, *Mucrollichirus*; e, *Karumballichirus*; f, *Audacallichirus*; g, h, *Glypturus*; i, *Corallianassa*. Maxilliped 3: j, *Mocallichirus*; k, *Glypturoides*; l, *Karumballichirus*; m, *Thailandcallichirus*; n, *Calliapagurops*. Male major pereopod 1: o, *Glypturus*; p, *Thailandcallichirus*; q, *Corallianassa*; r, *Mucrollichirus*; s, *Karumballichirus*; t, *Glypturoides*; u, *Laticallichirus*. Minor pereopod 1: v, *Balsscallichirus*; w, *Laticallichirus*.

Original illustrations: c, *Mocallichirus mocambiquensis*, UF 13986; d, r, *Mucrollichirus mucronatus*, MNHN-IU-2013-2777.

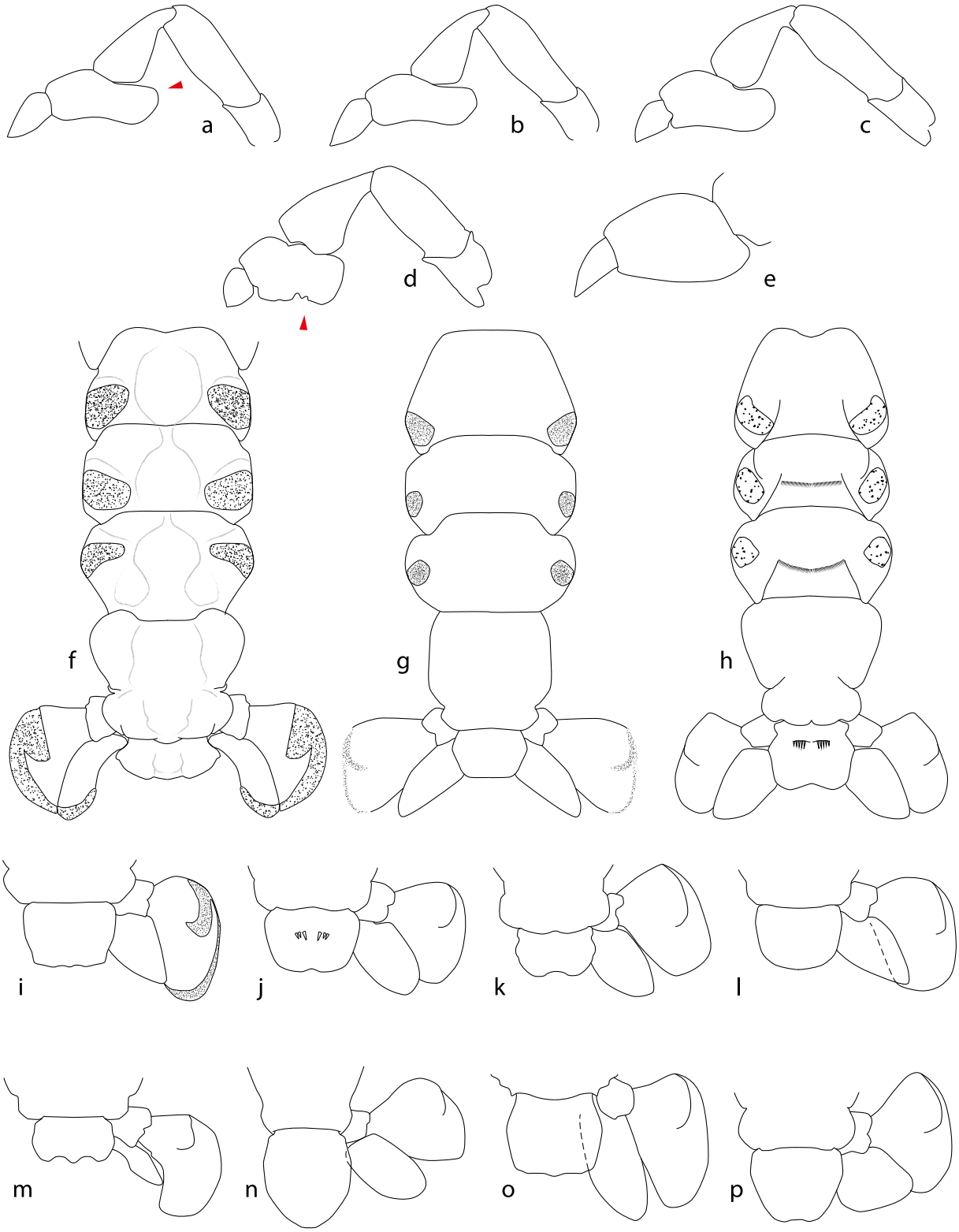

Figure 14. Diagnostic characters for genera of Callichiridae. Pereopod 3: a, *Audacallichirus*; b, *Karumballichirus*; c, *Neocallichirus*; d, *Lepidophthalmus*; e, *Mucrollichirus*. Pleon, telson, uropods: f, *Callichirus*; g, *Grynaminna*; h, *Michaelcallianassa*. Telson, uropod: i, *Audacallichirus*; j, *Balsscallichirus*; k, *Glypturoides*; l, *Karumballichirus*; m, *Lepidophthalmus*; n, *Mocallichirus*; o, *Kraussillichirus*; p, *Neocallichirus*.

Original illustrations: n, *Mocallichirus mocambiquensis*, UF 13986; e, *Mucrollichirus mucronatus*, MNHN-IU-2013-2777.

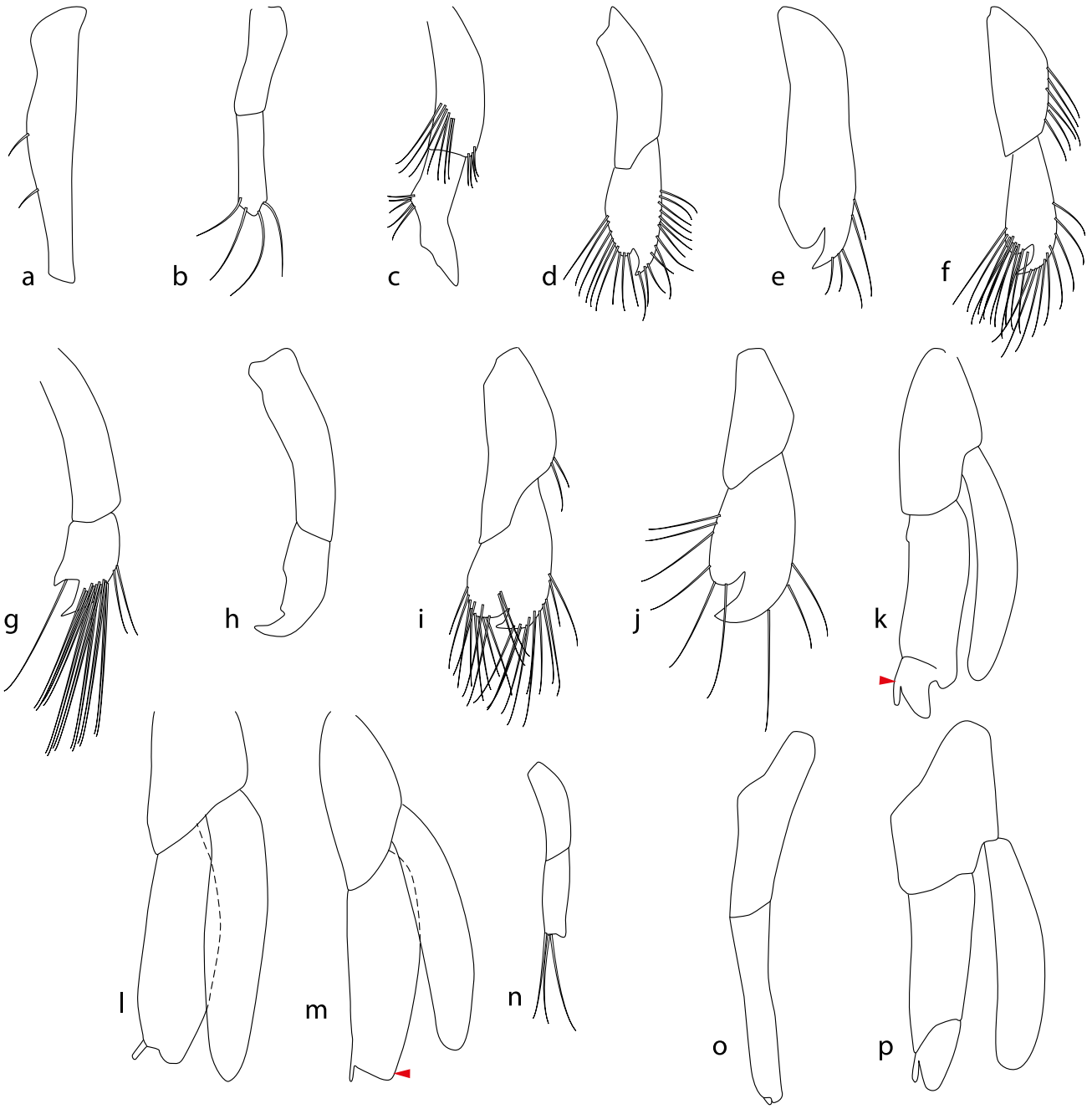

Figure 15. Diagnostic characters for genera of Callichiridae. Male pleopod 1: a, *Mocallichirus mocambiquensis*; b, *Balsscallichirus balssi*; c, *B. pixii*; d, *Corallianassa martensi*; e, *C. xutha*; f, *Glypturus armatus*; g, *Lepidophthalmus eiseni*; h, *L. madagassus*; i, *Neocallichirus raymanningi*; j, *N. vigilax*. Male pleopod 2: k, *Glypturus armatus*; l, *Corallianassa coutierei*; m, *Grynaminna tamakii*; n, *Michaelcallianassa indica*. Female pleopod 2: o, *Balsscallichirus balssi*; p, *Laticallichirus grandis*.

Original illustrations: a, *Mocallichirus mocambiquensis*, UF 13986; j, *Neocallichirus vigilax* MNHN-IU-2015-7072.

with setae irregularly spaced along all margins. Cheliped merus lower margin smooth or spinose; major cheliped with distinctively flattened palm, sometimes with strong crest above and below. Pereopod 3 propodus broad, with proximal lobe on lower margin, without distal spiniform setae on lateral face (often with 1 distal spiniform seta on lower margin). Pereopod 5 minutely chelate or subchelate. Female pleopod 2 rami narrower and with more reduced setation than pleopods 3–5; ***endopod flattened and 2–5 times as long as wide***. Pleopods 3–5 with oblique peduncles meeting mesially, endopods triangular, with straight mesial margin, exopods attached laterally, proximally lobed, longer than and enclosing endopods; appendices internae reduced and almost embedded in mesial margin of endopod. Uropodal exopod with elevated dorsal plate.

Remarks. In callichirids, the endopod of the female pleopod 2 is flattened, variously broadened and more or less parallel-sided, unlike in callianassids where it is narrow. The anterior branchiostegal margin is interrupted by an oblique sclerotised ridge, sometimes almost articulating on the margin, unlike in callianassids where this margin is uninterrupted. Pleopod 1 is always present in the male, often substantial with a distolateral sharp curved lobe (fig. 15d–j) or variously reduced (fig. 15a–c), whereas in callianassids it is small and simple or absent. The epipod of maxilliped 1 takes the plesiomorphic form with a triangular lobe overlapping the exopod; this lobe does not exist in callianassids.

The use of the name as a family, rather than subfamily, has not been previously argued.

Key to genera of Callichiridae

1. Eyestalk cylindrical, separate, with terminal spherical cornea, without terminal lobe (fig. 13a); maxilliped 3 merus with 3 spines along distal margin (fig. 13n) ..... *Calliapagurops*

– Eyestalk flattened, contiguous, about twice as long as wide, with cornea subterminal and more or less elevated, with terminal lobe (figs 13b–g); maxilliped 3 merus without spines along distal margin (figs 13j–m) 2

2. Rostrum spine-like, anteriorly or upwardly directed; anterolateral margins of carapace with conical curved spine, sometimes weakly calcified at base (fig. 13g) 3

– Rostrum obsolete or triangular, flat even if sharp; anterolateral margins of carapace not produced (figs 13b–f) or rarely sharp (in *Neocallichirus vigilax*, *Lepidophthalmus tridentatus*) 4

3. Major chelipeds with 3 spines on upper inner margin of merus and propodus, and 4–6 on lower margin of carpus (fig. 13o); rostrum with midventral ridge (fig. 13h); scaphocerite small, discoid; male pleopod 2 with partially articulating appendix masculina (fig. 15k) ..... *Glypturus*

– Major chelipeds without spines on upper margin of merus and propodus or lower margin of carpus (fig. 13q); rostrum without midventral ridge (fig. 13i); scaphocerite absent; male pleopod 2 with appendix masculina fused to endopod (fig. 15l) ..... *Corallianassa*

4. Maxilliped 3 exopod present, minute (figs 13k, l) 5

– Maxilliped 3 exopod absent 8

5. Antennular peduncle much longer than antennal peduncle (fig. 13b); telson posterior margin with medial lobe (fig. 14m, o) 6

– Antennular peduncle shorter than antennal peduncle (fig. 13e); telson posterior margin convex or concave 7

6. Male major cheliped merus with sinuous lower margin, widest proximally and excavate beyond, *or* with proximal tubercle bearing spine(s) with or without more distal teeth along lower margin; pereopod 3 propodus lower margin with obtuse notch between distal lobe and heel (fig. 14d); ..... *Lepidophthalmus*

– Male major cheliped merus with denticulate blade, more prominent over proximal half of lower margin; pereopod 3 propodus lower margin simply concave ..... *Kraussillichirus*

7. Male major cheliped fingers longer than square palm (fig. 13s); telson widest proximally or at midpoint, with convex posterior margin (fig. 14l) ..... *Karumballichirus*

– Male major cheliped fingers shorter than rectangular palm (fig. 13t); telson widest at midpoint, posterior margin concave (fig. 14k) ..... *Glypturoides*

8. Antennular peduncle shorter or as long as antennal peduncle (figs 13c, d, f) 9

– Antennular peduncle significantly longer than antennal peduncle (fig. 13b) 13

9. Major cheliped merus lower margin with simple proximal hook, dactylus massive (fig. 13p); maxilliped 3 dactylus with expanded setose apex (fig. 13m) ..... *Thailandcallichirus*

– Major cheliped merus lower margin denticulate or with toothed blade, dactylus not significantly broadened (figs 13q, r); maxilliped 3 dactylus tapering 10

10. Rostrum spine-like, thickened; cornea subdistal, hemispherical, elevated, with minute mesiodistal plate; female pleopod 2 endopod 3 times as long as wide ..... *Mucrollichirus*

– Rostrum flat, triangular; reaching cornea mid-distal, scarcely elevated, with obvious mesiodistal plate; female pleopod 2 endopod 4 times as long as wide 11

11. Telson parallel-sided over most of length, with obtuse angled apex, domed dorsally (fig. 14n); maxilliped 3 propodus longer than wide, free distal margin oblique; male pleopod 1 consisting of 1 slender article (fig. 15a) ..... *Mocallichirus*

– Telson widest proximally or at midpoint; maxilliped 3 propodus as long as wide, free distal margin nearly transverse; male pleopod 1 consisting of 2 articles 12

12. Telson converging over most of length from subproximal width to about half maximum width, with rounded posterolateral corners, narrow posterior margin (fig. 14p); pereopod 3 propodus with proximal lobe on lower margin slightly overlapping carpus (fig. 14c) ..... *Neocallichirus*

– Telson converging from subproximal width to about three-quarters maximum width, with strongly convex lateral margins and rounded distolateral corners, wide sinuous posterior margin (fig. 14i); pereopod 3 propodus with prominent proximal lobe on lower margin appearing to overlap carpus (fig. 14a) ..... *Audacallichirus*

13. Uropodal endopod strap-like, curved, longer than exopod; pleomeres 3–5 with dorsal pattern of symmetrical grooves; telson almost semicircular, thickened, with constriction on proximal region, with posterolateral swellings (fig. 14f) ..... *Callichirus*

– Uropodal endopod ovate; pleomeres 3–5 without pattern of symmetrical grooves; telson convex-sided, widest proximally or near midpoint (figs 14g, h) 14

14. Uropodal exopod about as wide as length of anterior margin; distal margin of telson convex, upper surface with long setae only (fig. 14g) ..... *Grynaminna*

– Uropodal exopod much wider than length of anterior margin; distal margin of telson concave, upper surface usually with transverse row of short spiniform setae (figs 14h, j) 15

15. Minor cheliped palm about one third as wide as major cheliped palm, carpus longer than wide, fingers straight, shorter than palm (fig. 13v) ..... *Balsscallichirus*

– Minor cheliped palm at least half as wide as major cheliped palm, carpus as long as wide, fingers curved, pincer-like, much longer than palm (figs 13u, w) 16

16. Pleomeres 3–5 with anteriorly converging longitudinal grooves and oblique–transverse rows of long setae (fig. 14h); male major cheliped merus with lower margin almost straight; female pleopod 2 uniramous (fig. 15o) ..... *Michaelcallianassa*

– Pleomeres 3–5 with prominent lateral tufts of setae; male major cheliped merus with convex denticulate blade (fig. 13u); female pleopod 2 biramous (fig. 15p) ..... *Laticallichirus*

Implicit attributes. Unless indicated otherwise, the following attributes are implicit throughout the generic diagnoses. Rostrum without midventral ridge; anterolateral spines absent, anterolateral angle obsolete. Pleomere 1 tergite and oblique narrow lateral pleura fused into a single sclerifed unit, *or* pleura separated by triangular uncalcified region from tergite; rectangular median lateral sternite plates (pleopod attached) fused to pleuron and median sternite. Pleomeres 3–5 without symmetrical pattern of deep grooves, with narrow transverse rows of setae, pleomere 6 without longitudinal grooves on anterior section, with slight lateral incision. Eyestalk flattened and contiguous. Antennular peduncle length less than 3 times as width of both eyestalks, shorter than antennal peduncle. Antennal scaphocerite vestigial. Maxilliped 3 merus without distal spine on mesial margin; crista dentata a row of numerous denticles; propodus longer than wide, lower margin convex; dactylus tapering, with scattered setae over upper margin, dense brush of short setae distally on lower margin; exopod absent. Male major cheliped carpus shorter than palm; without spines on upper margin of merus and propodus or lower margin of carpus; male major cheliped dactylus typically tapering. Pereopod 3 propodus lower margin straight or weakly concave. Male pleopod 2 biramous. Female pleopod 2 biramous; endopod about 4 times as long as wide. Telson smooth dorsally.

Audacallichirus gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:F54AD76A-8172-4D0F-ADCB-2174D5A3FC6B

Type species. *Callianassa audax* De Man, 1911, by present designation.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse ridge. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation; ***propodus about as wide as long***, free distal margin transverse or nearly so. Male major cheliped merus lower margin convex or blade like, especially proximally, with small denticles. Male minor cheliped much narrower than major, carpus longer than palm, fingers shorter than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave. Pereopod 4 subchelate. Male pleopod 1 consisting of 2 articles, ***article 2 distally expanded, with shallow apical notch between 2 rounded setose distal lobes***. Male pleopod 2 appendix interna absent or reduced to obsolete distomesial lobe. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson convex-sided, widest near midpoint, posterior margin trilobed, excavate each side of medial lobe.

Etymology. An alliteration of the name of the type species and *Callichirus*, type genus of the family.

Remarks. *Audacallichirus audax* differs from members of *Neocallichirus*, the genus in which it was placed by Sakai (1999a, 2011), in having a telson with strongly convex lateral margins, uropodal endopod tapering, the propodus of pereopod 3 usually with a strong proximal lobe on the lower margin, and the male pleopod 1 with a broad second article with an wide apical notch (Ngoc-Ho, 2014; Rao and Kartha, 1967; Tirmizi, 1967). The molecular analysis of Robles et al. (in press) found the species similar to *Neocallichirus mirim*, a species sometimes included in *Sergio*. The two species share a similar male pleopod 1, uropodal endopod, telson and cheliped, but the propodus of pereopod 3 is less expanded in *N. mirim*.

Balsscallichirus Sakai, 2011

Balsscallichirus Sakai, 2011: 414–415.—Hyžný, 2016: 43–46.

Tirmizicallichirus Sakai, 2011: 474–475 (type species, *Callianassa* (*Callichirus*) *masoomi* Tirmizi, 1970, by original designation and monotypy).

Barnardcallichirus Sakai, 2011: 416–417 (type species, *Callichirus tenuimanus* de Saint Laurent and Le Loeuff, 1979, by original designation).

Capecalliax Sakai, 2011: 345 (type species, *Callianassa pixii* Kensley, 1976, by original designation and monotypy) **syn. nov.**

Forestcallichirus Sakai, 2011: 426–427 (type species, *Callichirus foresti* Le Loeuff and Intès, 1974, by original designation and monotypy) **syn. nov.**

Type species. *Callianassa* (*Callichirus*) *balssi* Monod, 1933, by original designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite divided into 2 sections by unsclerified band; tergite weakly sclerotised, if so only posteriorly; pleura oblique thin rods independent of tergite dorsally, separated by extensive flexible region; sternite a thin transverse plate. Antennular peduncle longer than antennal peduncle. ***Maxilliped 3 ischium and merus narrow, at least 3 times as long as wide at their articulation***; crista dentata absent (or few proximal spines only); propodus longer than wide, lower margin convex or about as wide as long, free distal margin clearly oblique or free distal margin transverse or nearly so. Male major cheliped merus with lower margin almost straight or with denticulate blade, more prominent over proximal half of lower margin or with prominent proximal denticulate blade-like tooth on lower margin. Male minor cheliped much narrower than major, carpus longer than palm, fingers shorter than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave, lower margin straight or weakly concave or weakly convex. Pereopod 4 subchelate. Male pleopod 1 of 2 articles, article 2 longer than wide, with or without slight apical notch. Male pleopod 2 biramous or uniramous; ***appendix interna absent***. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson converging to about half basal width from near anterior width over most of length to rounded posterolateral corners or with convex lateral margins and rounded posterolateral corners, posterior margin trilobed, excavate each side of medial lobe or slightly excavate or obscurely excavate between rounded posterolateral corners, with transverse row of robust setae.

Remarks. *Balsscallichirus* is best recognised by its very narrow maxilliped 3. Sakai (2011) distinguished *Balsscallichirus* (*B. balssi*, *B. guineensis*), *Tirmizicallichirus* (*T. masoomi*), *Barnardcallichirus* (*B. tenuimanus, B. gilchristi*) and *Forestcallichirus* (*F. foresti*) from *Podocallichirus* (*P. madagassus*) on the basis of male pleopods 1 and 2. The distinction is valid—*Podocallichirus* is considered here a junior synonym of *Lepidophthalmus*. He did not compare the new genera with each other or with others. Hyžný (2016) synonymised *Tirmizicallichirus* and *Barnardcallichirus* with *Balsscallichirus* and listed five Recent species and four fossils.

Kensley (1976) recognised that his new species *Callianassa pixii* belonged in the "subgenus *Callichirus*", likening it to *Callianassa guineensis*. He was supported by de Saint Laurent and Le Loeuff (1979), who grouped this with four of the species listed above, *B. balssi, B. foresti*, *B. tenuimanus* and *B. guineensis* (as species of *Callianassa*), on the similarity of triangular rostrum, rounded posterior border of the telson, pediform maxilliped 3 and reduced male pleopod 2. Sakai (2011) erected another monotypic genus, *Capecalliax* for *C. pixii*, this time in the family Anacalliacidae, to which it clearly does not belong. *Capecalliax* and *Forestcallichirus*, for *C. foresti* listed in this group correctly characterised by de Saint Laurent and Le Loeuff (1979) are also synonyms of *Balsscallichirus*. The exceptionally narrow maxilliped 3 was treated as a symplesiomorphy by the morphological analysis of Robles et al. (in press).

The seven species are known only from around Africa, as far north as Mauritania in the west and Pakistan in the east.

Calliapagurops de Saint Laurent, 1973

Calliapagurops de Saint Laurent, 1973: 515.—Sakai, 1999a: 8.—Ngoc-Ho, 2002: 540–541.—Sakai, 2005b: 207.—Sakai, 2011: 492.

Type species. *Calliapagurops charcoti* de Saint Laurent, 1973, by original designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum spine-like; anterolateral spines prominent. Pleomere 1 tergite undivided or with weak transverse ridge. ***Eyestalk cylindrical, with subspherical terminal pigmented cornea***. Antennal scaphocerite elongate, longer than wide, with free acute tip. Maxilliped 3 ischium and merus less than twice as long as wide at their articulation; merus with 2 or more distal spines on distal free margin; crista dentata of few separate spines proximally and toothed ridge distally overlapping proximal margin of merus; propodus about as wide as long, free distal margin clearly oblique. Male major cheliped merus with row of sharp oblique spines, usually 2 proximally and 1 or more along length of lower margin. Male minor cheliped half or more as wide as major, carpus as long as or shorter than palm, fingers as long as or longer than palm. Pereopod 3 propodus oval, lower margin convex, not proximally lobed (slightly produced distally), lower margin weakly convex. Pereopod 4 propodus minutely chelate, fixed finger as long as dactylus. Male pleopod 1 consisting of 2 articles, article 2 longer than wide, with or without slight apical notch. Male pleopod 2 appendix interna free, articulating, distal on mesial endopodal margin. Female pleopod 2 endopod 2–3 times as long as wide. Pleopods 3–5 appendices internae barely emerging from endopodal margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson convex-sided, widest near midpoint, posterior

margin concave between rounded posterolateral corners, with transverse row of robust setae.

Remarks. The two species of *Calliapagurops* differ from all other callianassoids in having cylindrical eyestalks with terminal cornea. Ngoc-Ho (2002) pointed out numerous similarities between *Calliapagurops* and *Corallianassa*, similarities borne out in the morphological analysis (Robles et al., in press) but not by the molecular data, where the genus is closer to *Grynaminna*. Sakai (2011) argued that *Calliapagurops* and its subfamily Calliapaguropinae belong in Eucalliacidae because of differences from *Callichirus* and Callichirinae, namely the absence of the dorsal oval, the unique eyestalks and a small appendix interna on the male pleopod 2. He listed no similarities to Eucalliacidae – there are few.

Callichirus Stimpson, 1866

Callichirus Stimpson, 1866: 47.—de Saint Laurent and Le Loeuff, 1979: 55–56.—Manning and Felder, 1991: 775–776.—Sakai, 2011: 418 (abbreviated synonymy).

Callianassa (*Callichirus*).—Borradaile, 1903: 546–547.—De Man, 1928: 28, 96 (partim).

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

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite divided into 2 sections by unsclerified band; tergite weakly sclerotised, if so only posteriorly; pleura oblique thin rods independent of tergite dorsally, separated by extensive flexible region; sternite a thin transverse plate. ***Pleomeres 3–5 with symmetrical pattern of deep curved transverse and longitudinal grooves plus paired tufts of dense setae, pleomere 6 with pair of deep longitudinal grooves on wide swollen anterior section, defined by lateral concavity***. Antennular peduncle length longer than antennal peduncle. Maxilliped 3 ischium and merus less than twice as long as wide at their articulation; crista dentata absent (or few proximal spines only); propodus about as wide as long, free distal margin clearly oblique or free distal margin transverse or nearly so. Male major cheliped merus with denticulate blade, more prominent over proximal half of lower margin or with prominent proximal denticulate blade-like tooth on lower margin; major cheliped carpus much longer than palm, especially in male. Male minor cheliped much narrower than major, carpus longer than palm, fingers shorter than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave. Pereopod 4 subchelate. Male pleopod 1 consisting of 2 articles, article 2 longer than wide, with or without slight apical notch. Male pleopod 2 appendix interna absent or reduced to obsolete distomesial lobe. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod strap-like, posterior margin concave. Telson thickened, with constriction on anterior region, with posterolateral swellings, posterior margin with medial notch at end of longitudinal groove.

Remarks. Species of *Callichirus* are recognised by the symmetrical pattern of deep curved transverse and longitudinal grooves plus paired tufts of dense setae on pleomeres 3–5, deep longitudinal grooves on the wide anterior section of pleomere 6, the long antennular peduncle, the strap-like curved uropodal endopods and the thickened telson, with a proximal constriction. *Callichirus kraussi* is here removed to its own genus, *Kraussillichirus*, on genetic evidence (Robles et al., in press) and uropodal endopods more typical of the family. Species of *Callichirus* may be functional hermaphrodites with some or all females having male gonopores (Souza et al., 2017, 2018)

Corallianassa Manning, 1987

Corallianassa Manning, 1987: 392–394.—Poore, 2004: 184.—Ngoc-Ho, 2005: 71.—Komai et al., 2015: 54–55 (synonymy).

Corallichirus Manning, 1992: 571–574.—Sakai, 2011: 422–423 (type species: *Corallianassa xutha* Manning, 1988, by original designation).

Type species. *Callianassa longiventris* A. Milne-Edwards, 1870, by original designation.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. ***Rostrum spine-like***; ***anterolateral spines prominent***. Pleomere 1 tergite undivided or with weak transverse ridge. Maxilliped 3 ischium and merus linear, around twice as long as wide at their articulation; crista dentata of few separate spines proximally and toothed ridge distally overlapping proximal margin of merus; propodus about as wide as long, free distal margin transverse or nearly so. Male major cheliped merus with row of sharp oblique spines, usually 2 proximally and 1 or more along length of lower margin. Male minor cheliped half or more as wide as major, carpus as long as or shorter than palm, fingers as long as or longer than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave, lower margin straight or weakly concave or weakly convex. Pereopod 4 subchelate. Male pleopod 1 consisting of 2 articles, article 2 ovoid, with shallow apical notch between rounded subdistal lobe and curved acute apex. Male pleopod 2 appendix interna free, articulating, distal on mesial endopod margin. Pleopods 3–5 appendices internae longer than wide, clearly emerging from margin of endopod. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. ***Telson converging to about half basal width from near anterior width over most of length to rounded posterolateral corners***, posterior margin straight or with slight medial lobe.

Remarks. *Corallianassa* is best recognised by the prominent anterolateral spines, the hemispherical, elevated, distal cornea (distinguishing it from *Calliapagurops*) and the absence of marginal teeth on the chelipeds (distinguishing it from *Glypturus*; see Komai et al., 2015). Komai et al. (2015) reviewed the complex taxonomic history of *Corallianassa*, *Corallichirus* and *Glypturus*, and the unjustified confusion introduced by Sakai's (2011) revival of *Corallichirus*, regarded as a synonym of *Corallianassa* since this was first proposed by Ngoc-Ho (2005).

Glypturoides Sakai, 2011

Glypturoides Sakai, 2011: 428.

Type species. *Callianassa trilobata* Biffar, 1970, by original designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse ridge. Maxilliped 3 ischium and merus less than twice as long as wide at their articulation; propodus about as wide as long, ***free distal margin transverse or nearly so***; ***exopod present***. Male major cheliped merus lower margin convex or blade like, especially proximally, with small denticles. Male minor cheliped much narrower than major, carpus longer than palm, fingers shorter than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave or weakly convex. Pereopod 4 subchelate. Male pleopod 1 consisting of 2 articles, article 2 ovoid, with shallow apical notch between rounded subdistal lobe and curved acute apex. Male pleopod 2 appendix interna absent or reduced to obsolete distomesial lobe. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson with convex lateral margins and rounded posterolateral corners, ***posterior margin concave between rounded posterolateral corners***.

Remarks. *Glypturoides trilobata*, the only species, is like species of *Neocallichirus* but with an exopod on maxilliped 3. In addition, the maxilliped 3 propodus has the free distal margin more oblique than in typical *Neocallichirus*, and the telson is short with convex lateral margins and concave posterior margin.

Glypturus Stimpson, 1866

Glypturus Stimpson, 1866: 46.—Manning, 1987: 390.—Manning and Felder, 1991: 778.—Sakai, 1999a: 72.—Sakai, 2005b: 130–132.—Sakai, 2011: 429–430 (partim).—Hyžný and Müller, 2012: 969–971.—Hyžný et al., 2013: 133.—Klompmaker et al., 2015: 11.—Komai et al., 2015: 53–54 (complete synonymy).

Callianassa (*Glypturus*).—Borradaile, 1903: 548.

Type species. *Glypturus acanthochirus* Stimpson, 1866: 46, by original designation.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum spine-like, with midventral ridge; anterolateral spines prominent. Pleomere 1 tergite fused, divided into 2 sections by transverse groove or shoulder. Antennal scaphocerite small, discoid. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation; crista dentata of few separate spines proximally and toothed ridge distally overlapping proximal margin of merus; propodus about as wide as long, free distal margin transverse or nearly so. ***Major cheliped merus with row of sharp oblique spines, usually 2 proximally and 1 or more along length of lower margin***; ***with 3 spines on upper inner margin of merus and propodus, and 4–6 on lower margin of carpus.*** Minor cheliped half or more as wide as major, carpus as long as or shorter than palm, fingers as long as or longer than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave. Pereopod 4 subchelate. Male pleopod 1 consisting of 2 articles, article 2 ovoid, with shallow apical notch between rounded subdistal lobe and curved acute apex. Male pleopod 2 appendix interna free, articulating, distal on mesial endopod margin. Pleopods 3–5 appendices internae longer than wide, clearly emerging from margin of endopod. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. ***Telson strongly diverging to beyond midpoint and semicircular distally***, posterior margin broadly semicircular.

Remarks. *Glypturus* is best recognised by the prominent anterolateral spines and the presence of marginal teeth on the chelipeds (Komai et al., 2015). Komai et al. (2015) clarified the confusion around *Glypturus* introduced by Sakai's (2011) revision.

Grynaminna Poore, 2000

Grynaminna Poore, 2000: 150–151.—Sakai, 2011: 438–439.—Hyžný and Karasawa, 2012: 63–65.

Type species. *Grynaminna tamakii* Poore, 2000, by original designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse ridge. Antennular peduncle length more than 3 times the width of both eyestalks, longer than antennal peduncle. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation; crista dentata consisting of a row of numerous denticles; propodus about as wide as long, free distal margin transverse or nearly so. ***Male major cheliped merus with convex tuberculate blade on most of lower margin***. Male minor cheliped much narrower than major, carpus longer than palm, fingers shorter than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave. Pereopod 4 propodus minutely chelate, fixed finger as long as dactylus. Male pleopod 1 consisting of 2 articles, article 2 ovoid, with shallow apical notch between rounded subdistal lobe and curved acute apex. Male pleopod 2 appendix interna free, articulating, distal on mesial endopod margin (fig. 15m). Pleopods 3–5 appendices internae barely emerging from endopodal margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide.

Telson converging to about half basal width from near anterior width over most of length to rounded posterolateral corners, posterior margin straight or convex between tapering posterolateral margins.

Remarks. Only one Recent species is known. The antennular peduncle is particularly long, the rostrum particularly short and the merus of the major cheliped has a convex tuberculate blade along most of its lower margin.

***Karumballichirus* gen. nov.**

http://zoobank.org/urn:lsid:zoobank.org:act:E21E0313-3989-4E03-BBB6-9F9844028DC0

Type species. *Callianassa karumba* Poore and Griffin, 1979, by present designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum spine-like. Pleomere 1 tergite fused, divided into 2 sections by transverse groove or shoulder. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation; propodus about as wide as long, free distal margin clearly oblique; ***exopod present***. ***Male major cheliped merus lower margin straight, irregularly dentate, usually with 1 more prominent proximal denticulate tooth***. Male minor cheliped much narrower than major, carpus longer than palm, fingers shorter than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave or weakly convex. Pereopod 4 propodus simple, distally rounded on lower margin. Male pleopod 1 consisting of 2 articles, article 2 ovoid, with shallow apical notch between rounded subdistal lobe and curved acute apex. Male pleopod 2 appendix interna free, articulating, distal on mesial endopodal margin. Pleopods 3–5 appendices internae barely emerging from endopodal margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson with convex lateral margins and rounded posterolateral corners, posterior margin straight or convex between tapering posterolateral margins.

Etymology. An alliteration of the name of the type species and *Callichirus*, type genus of the family.

Remarks. Karumballichirus differs from the most similar callichirid genera, *Neocallichirus*, in which it was most recently placed (see Sakai, 1988) and *Corallianassa* (see Komai et al., 2015) in possession of a short maxillipedal 3 exopod, a feature shared with *Lepidophthalmus*, which is its sister taxon on the molecular phylogram (Robles et al., in press). The type species was described in detail by Dworschak (2008). The type species was recognised as the extant representative of a group of similar fossil species by Hyžný et al. (2017).

***Kraussillichirus* gen. nov.**

http://zoobank.org/urn:lsid:zoobank.org:act:07353B50-6C2E-4CD3-A3DF-F37D1497A8C3

Type species. *Callianassa kraussi* Stebbing, 1900, by original designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite divided into 2 sections by unsclerified band; tergite weakly sclerotised, if so only posteriorly; pleura oblique thin rods independent of tergite dorsally, separated by extensive flexible region; sternite a thin transverse plate. ***Antennular peduncle length more than 3 times the width of both eyestalks***, longer than antennal peduncle. Maxilliped 3 ischium and merus less than twice as long as wide at their articulation; crista dentata absent (or few proximal spines only); propodus about as wide as long, free distal margin transverse or nearly so; ***exopod present***. Male major cheliped merus with denticulate blade, more prominent over proximal half of lower margin. Male minor cheliped much narrower than major, carpus longer than palm, fingers shorter than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave or weakly convex. Pereopod 4 subchelate. Male pleopod 1 consisting of 2 articles, article 2 longer than wide, with or without slight apical notch. ***Male pleopod 2 appendix interna absent***. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson with convex lateral margins and rounded posterolateral corners, posterior margin convex, with medial lobe.

Etymology. An alliteration of the name of the type species and *Callichirus*, type genus of the family.

Remarks. Callianassa kraussi was included in the subgenus *Callichirus* by De Man (1928) and the genus *Callichirus* by Sakai (2005b and later). *Kraussillichirus* resembles *Callichirus* but differs in lacking its ornamented pleomeres 3–6 and having an ovoid uropodal endopod (fig. 14o). The only species appears to be estuarine (Hanekom and Russell, 2015; Siebert and Branch, 2005) as are species of *Lepidophthalmus*, which it also somewhat resembles.

***Laticallichirus* Komai, Yokooka, Henmi and Itani, 2019**

Laticallichirus Komai et al., 2019: 463–466.

Type species. *"Neocallichirus" grandis* Karasawa and Goda, 1996, by original designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. ***Rostrum spine-like***. Pleomere 1 tergite divided into 2 sections by unsclerotised band; tergite weakly sclerotised, if so only posteriorly; pleura oblique thin rods independent of tergite

dorsally, separated by extensive flexible region; sternite a thin transverse plate. Antennular peduncle length more than 3 times the width of both eyestalks, longer than antennal peduncle. Maxilliped 3 ischium and merus broad, less than twice as long as wide at their articulation; crista dentata absent; propodus about as wide as long, free distal margin clearly oblique. Male major cheliped merus with convex denticulate blade. Male minor cheliped much narrower than major, carpus longer than palm, fingers shorter than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave. Pereopod 4 subchelate. Male pleopod 1 of 2 articles, article 2 longer than wide, with or without slight apical notch. ***Male pleopod 2 appendix interna absent***. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson with convex lateral margins and rounded posterolateral corners, posterior margin concave between rounded posterolateral corners, with transverse row of robust setae.

Remarks. The type species was described from Japanese Middle Pleistocene fossil chelipeds but extant specimens enabled the species to be described more completely. Komai et al. (2019) compared the new genus with several others. Their phylogram based on the 16S rRNA gene found the species closest to *Callichirus* and more remote from a clade including *Neocallichirus*, *Corallianassa*, *Glypturus*, *Glypturoides* and *Lepidophthalmus*. The genus appears closest to *Michaelcallianassa*, as our key indicates.

Lepidophthalmus Holmes, 1904

Lepidophthalmus Holmes, 1904: 310.—Manning and Felder, 1991: 778–779.—Sakai, 1999a: 64–65.—Sakai and Apel, 2002: 278.—Sakai, 2005b: 143–144.—Felder, 2001: 440.—Sakai, 2011: 446.—Robles and Felder, 2015: 462–464, 467–468, fig. 1.—Komai et al., 2018: 23–24.

Podocallichirus Sakai, 1999a: 53–54.—Sakai, 2005b: 187–189 (partim).—Sakai, 2011: 466–467.—Hyžný and Muñiz, 2012: 619–621.—Hyžný and Karasawa, 2012: 62–63.—Hyžný, 2016: 44–45.—Komai et al., 2018: 24 (type species: *Callianassa madagassa* Lenz and Richters, 1881, by original designation and monotypy) **syn. nov.**

Lepidophthalmoides Sakai, 2011: 440–441 (type species: *Lepidophthalmus eiseni* Holmes, 1904, by original designation) **objective synonym.**

Lepidophthalminus Sakai, 2015: 433 (replacement name for *Lepidophthalmus* sensu Sakai, 2011; type species, *Callianassa bocourti* A. Milne-Edwards, 1870, by original designation) **syn. nov.**

Type species. *Lepidophthalmus eiseni* Holmes, 1904, by monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge which it meets level with linea thalassinica. Rostrum spine-like; anterolateral angles obsolete or spinous. Pleomere 1 tergite undivided or with weak transverse step. Antennular peduncle length less than 3 times as width of both eyestalks or more than 3 times the width of both eyestalks (rare), longer than antennal peduncle. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation, *or* rarely less than twice as long as wide at their articulation; crista dentata absent (or few proximal spines only); propodus about as wide as long, free distal margin clearly oblique, *or* free distal margin transverse or nearly so; ***dactylus curved, 3 times as long as wide, concave below***; ***exopod present***. Male major cheliped merus with sinuous lower margin, widest proximally and excavate beyond, *or* with proximal tubercle bearing spine(s) with or without more distal teeth along lower margin; dactylus typically tapering, *or* massive, upper margin expanded, strongly convex, dentate. Male minor cheliped half or more as wide as major, carpus as long as or shorter than palm, fingers as long as or longer than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave, lower margin with broad deep notch between distal lobe and heel. Pereopod 4 subchelate. Male pleopod 1 consisting of 2 articles, article 2 tapering, with small acute subdistal lobe, acute distal apex. Male pleopod 2 appendix interna absent, *or* reduced to obsolete distomesial lobe, *or* apparent only as field of hooks on side of appendix masculina. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson with convex lateral margins and rounded posterolateral corners, ***posterior margin trilobed, excavate each side of medial lobe, or convex, with medial lobe***.

Remarks. *Lepidophthalmus* differs from other callichirids in the combination of short antennal peduncle, telson with convex lateral margins and quasi-trilobed posterior margin, a series of concavities along the lower margin of the propodus of pereopod 3, and a curved narrow dactylus on maxilliped 3. Some species have particularly setose fingers on the minor cheliped or with long setae on the mesial face of the major cheliped extending into the gape between the fingers. *Lepidophthalmus* shares an exopod on maxilliped 3 with *Karumballichirus*, *Kraussillichirus* and *Glypturoides*.

Sakai (2011) placed eight species in his new genus *Lepidophthalmoides* Sakai, 2011, an objective synonym of *Lepidophthalmus* Holmes, 1904. Both have the same type species. Sakai (2015) realised the error and erected *Lepidophthalminus* Sakai, 2015, to replace *Lepidophthalmus* sensu Sakai, 2011, this time with *Callianassa bocourti* A. Milne-Edwards, 1870, as type species, with only five included species and referring to his 2011 diagnosis of *Lepidophthalmus* to differentiate it from *Lepidophthalmus* Holmes, 1904. Sakai (2011) separated the two "genera" in the male pleopod 1 being "chelate" in the former and simple in the latter. Incidentally, the adjective "chelate" is inappropriate in this context—the second article has a mesiodistal notch, not formed by two distal opposing articles. A review of all 15 known species reveals that one pleopod form grades into the other and may reflect developmental stages. Komai et al. (2018) has already pointed out that the generic division of Sakai (2015) has no merit. *Lepidophthalminus* is here synonymised with *Lepidophthalmus*.

No consistent morphological difference was found between American and Indo-West Pacific species (Komai et al., 2018;

Robles et al., in press; Robles and Felder, 2015). Most species of *Lepidophthalmus* are found in estuarine habitats where their ecology has been studied (Felder, 2001; Filho et al., 2013; Hernáez et al., 2012).

Michaelcallianassa Sakai, 2002

Michaelcallianassa Sakai, 2002: 480–481.—Sakai, 2005b: 156–157.—Sakai, 2011: 450.

Type species. *Michaelcallianassa indica* Sakai, 2002, by original designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse step. ***Pleomeres 3–5 with anteriorly converging longitudinal grooves and oblique-transverse rows of long setae***. Antennular peduncle longer than antennal peduncle. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation; propodus about as wide as long, free distal margin clearly oblique. ***Male major cheliped merus with lower margin almost straight***. Male minor cheliped half or more as wide as major, carpus as long as or shorter than palm, fingers as long as or longer than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave. Pereopod 4 subchelate. Male pleopod 1 of 2 articles, article 2 longer than wide, with or without slight apical notch. ***Male pleopod 2 uniramous***; appendix interna absent or reduced to obsolete distomesial lobe. ***Female pleopod 2 uniramous***. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson converging to about half basal width from near anterior width over most of length to rounded posterolateral corners, posterior margin concave between rounded posterolateral corners, with transverse row of robust setae.

Remarks. The two species of *Michaelcallianassa* have uniramous pleopods 2 in both sexes distinguishing the genus from all other callichirids (fig. 15n). The telson has a transverse row of robust setae. Sakai (2002) noted that the type species was similar to species of *Callichirus* but has a row of setae between the two dorsolateral tufts on pleomeres 4 and 5. This row is not present on the second species, *M. sinica* (see Liu and Liu, 2009).

Mocallichirus gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:8E845452-37C7-4271-B787-E28D6285AE8F

Type species. *Callianassa mocambiquensis* Sakai, 2004, by present designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Pleomere 1 tergite undivided or with weak transverse step. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation; crista dentata a row of numerous denticles; propodus free distal margin clearly oblique. Male major cheliped merus with denticulate blade, more prominent over proximal half of lower margin. Male minor cheliped half or more as wide as major, carpus as long as or shorter than palm, fingers as long as or longer than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave. Pereopod 4 propodus simple, distally rounded on lower margin. ***Male pleopod 1 consisting only of 1 article***. Male pleopod 2 uniramous; appendix interna absent or reduced to obsolete distomesial lobe. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson parallel-sided over most of length, with broadly rounded apex, domed, posterior margin broadly semicircular.

Etymology. An alliteration of the name of the type species and *Callichirus*, type genus of the family.

Remarks. Robles et al.'s (in press) molecular analysis placed *Callianassa mocambiquensis* sister to *Michaelcallianassa* (two species) in Callichiridae. Sakai (2004) thought the species similar to *Callianassa plantei* Sakai, 2004 (also found in Mozambique), *C. joculatrix* and three others, all members of Callianassidae s.s. GCBP was able to examine numerous specimens from Madagascar from the collections of MNHN and FMNH. The broad female pleopod 2 , the attenuated distal lobe on the epipod of maxilliped 1 and the apical notch on the male pleopod 1 confirm the species as a callichirid. The species is recognisable by the unusual shape of the telson; it is domed, longer than in most callichirids with a broadly semicircular posterior half parallel-sided over most of length, with broadly rounded apex. The antennal peduncle is longer than the antennular peduncle, the male pleopod 1 is of one article and the male pleopod 2 uniramous.

Mocallichirus mocambiquensis shares with members of the callianassid genus *Coriollianassa* a proximal neck on the carpus of the chelipeds, a case of remarkable convergence.

Mucrollichirus gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:B57E69B6-D096-459C-B4AF-0D278A73B557

Type species. *Callianassa mucronata* Strahl, 1862, by present designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. ***Rostrum spine-like***. Pleomere 1 tergite undivided or with weak transverse step. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation; propodus about as wide as long, free distal margin

clearly oblique. Male major cheliped merus lower margin convex, *or* blade like, especially proximally, with small denticles. Male minor cheliped half or more as wide as major, carpus as long as or shorter than palm, fingers as long as or longer than palm. ***Pereopod 3 propodus oval, lower margin convex, not proximally lobed***. Pereopod 4 subchelate. Male pleopod 1 consisting of 2 articles, article 2 ovoid, with shallow apical notch between rounded subdistal lobe and curved acute apex. Male pleopod 2 appendix interna absent or reduced to obsolete distomesial lobe. Female pleopod 2 endopod 2–3 times as long as wide. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson converging to about half basal width from near anterior width over most of length to rounded posterolateral corners, posterior margin straight or with slight medial lobe, smooth dorsally.

Etymology. An alliteration of the name of the type species and *Callichirus*, type genus of the family.

Remarks. Mucrollichirus has a more weakly lobed propodus on pereopod 3 than all other genera except *Calliapagurops.* The new genus differs from *Neocallichirus* (see Sakai, 1988), *Corallianassa* (see Komai et al., 2015) and other similar genera in having a shorter telson. Both the morphological and molecular analyses placed *Mucrollichirus mucronatus* on a clade sister to *Corallianassa* (Robles et al., in press). The similarity to *Neocallichirus*, the genus in which the species was most recently placed (Sakai, 2011), is more remote.

The molecular analysis of Robles et al. (in press) found no difference between individuals from Papua New Guinea and the Philippines but illustrations of *Mucrollichirus mucronatus* vary (De Man, 1888, 1928; Dworschak, 1992; Poore and Griffin, 1979; Sakai, 1999a; Sakai et al., 2014; Tirmizi, 1977).

Neocallichirus Sakai, 1988

Neocallichirus Sakai, 1988: 61–62.—Manning and Felder, 1991: 779–780.—Poore, 1994: 102.—Sakai, 1999a: 84–86.—Sakai, 2000: 92.—Davie, 2002: 461.—Poore, 2004: 184.—Sakai, 2005b: 160–162.—Sakai, 2011: 451–452.—Hyžný and Karasawa, 2012: 60–65.

Sergio Manning and Lemaitre, 1994: 40.—Sakai, 2011: 467–468 (type species, *Callianassa guassutinga* Rodrigues, 1971, by original designation).—Hyžný and Karasawa, 2012: 61–62.

Callichiropsis Sakai, 2010: 1453 (type species, *Callichiropsis spiridonovi* Sakai, 2010, by original designation and monotypy) **syn. nov.**

Type species. Neocallichirus horneri Sakai, 1988, by original designation.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge with which it articulates by means of a virtual condyle. Rostrum obsolete or obtusely triangular, flat, not reaching cornea; anterolateral spines absent (rarely with small spines). Pleomere 1 tergite undivided or with weak transverse step. Maxilliped 3 ischium and merus linear; propodus about as wide as long, free distal margin transverse or nearly so. Male major cheliped merus lower margin convex or blade like, especially proximally, with small denticles. Male minor cheliped palm half or more width of major cheliped palm, carpus as long as or shorter than palm, fingers as long as or longer than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave. Pereopod 4 subchelate. Male pleopod 1 consisting of 2 articles, article 2 ovoid, with shallow apical notch between rounded subdistal lobe and curved acute apex. Male pleopod 2 appendix interna reduced to obsolete distomesial lobe, *or* rarely free, articulating, distal on mesial endopod margin, *or* absent. Pleopods 3–5 appendices internae barely emerging from endopod margin. ***Uropodal endopod with straight or slightly convex anterior margin ending in rounded angle, transverse or near-transverse distal margin continuous with curved posterior margin, as wide or wider than long***. Telson converging to about half basal width from near anterior width over most of length to rounded posterolateral corners, posterior margin straight or with slight medial lobe.

Remarks. Neocallichirus is the largest callichirid genus. The uropodal endopod has a straight or slightly convex anterior margin ending in a rounded angle and continuous distal and posterior margins. The endopod is often wider than long. The telson tapers regularly to about half its width. Sakai (2011) provided a key to 28 species, including *N. mucronatus*, herein removed to *Mucrollichirus* gen. nov., and *N. karumba* (=*N. kempi*), herein removed to *Karumballichirus* gen. nov. Sakai (1999a, 2005b) included *Sergio* in the synonymy of *Neocallichirus*, but in 2011 he redefined the former and placed some of its originally included species in a re-diagnosed genus. He differentiated *Sergio* with a notched apex on the male pleopod 1 (adult form) from *Neocallichirus* with only a slight distal indentation (juvenile form), despite most species of *Neocallichirus* being described as having the adult form. The molecular analysis (Robles et al., in press) placed three species of "*Sergio*" within the *Neocallichirus* clade, a result anticipated by Sepahvand et al. (2018).

Sakai (2010) differentiated a new genus *Callichiropsis* from *Lepidophthalmus* on the basis of a different pereopod 3 and from *Podocallichirus* on the shape of the telson. We treat *Podocallichirus* as a synonym of *Lepidophthalmus* (see above). He did not compare *Callichiropsis spiridonovi* Sakai, 2010, with *Neocallichirus*, from which it does not differ. *Callichiropsis* is here synonymised with *Neocallichirus.*

Thailandcallichirus Sakai, 2011

Thailandcallichirus Sakai, 2011: 473–474.—Komai et al., 2018: 23–24.

Type species. Callianassa ranongensis Sakai, 1983, by original designation and monotypy.

Diagnosis. Anterior branchiostegal lobe sclerotised, well produced anteriorly beyond junction with oblique branchiostegal ridge, which it meets level with linea thalassinica. Rostrum spine-like. Pleomere 1 tergite undivided or with weak transverse step. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation; crista dentata absent (or few proximal spines only); propodus about as wide as long, free

distal margin clearly oblique; ***dactylus curved, about twice as long as wide, concave below***. Male major cheliped merus with proximal tubercle bearing spine(s) with or without more distal teeth along lower margin; ***dactylus massive, upper margin expanded, strongly convex, smooth***. Male minor cheliped half or more as wide as major, carpus as long as or shorter than palm, fingers as long as or longer than palm. Pereopod 3 propodus subpentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin straight-concave, lower margin with broad deep notch between distal lobe and heel. Pereopod 4 subchelate. Male pleopod 1 consisting of 2 articles, article 2 tapering, with small acute subdistal lobe and acute distal apex. Male pleopod 2 appendix interna absent or reduced to obsolete distomesial lobe. Pleopods 3–5 appendices internae barely emerging from endopod margin. Uropodal endopod with convex anterior margin, acute-rounded apex, straight-slightly curved posterior margin, longer than wide. Telson tapering from greatest width near base, posterior margin straight or convex between tapering posterolateral margins.

Remarks. Thailandcallichirus differs from *Lepidophthalmus*, its closest sibling, in having the antennular peduncle shorter than the antennal, rather than the other way around, a more compact maxilliped 3 dactylus, lacking a maxillipedal 3 exopod, a convex posterior margin on the telson and in having a massive dactylus on the major cheliped (Komai et al., 2018). The minor cheliped is distally setose as in some *Lepidophthalmus* species. Sakai (2011) justified his new genus on differences between the type species and *Neocallichirus*, the genus in which he had previously placed it (Sakai, 1999a, 2005b). Tudge et al. (2000) found it was a sister to other species of *Lepidophthalmus* and treated it as a species of this genus as did Robles and Felder (2015). Robles et al. (in press) found this alliance again but had no molecular data to support it.

Ctenochelidae Manning and Felder, 1991

Figures 16, 17

Ctenochelinae Manning and Felder, 1991: 784.—Poore, 1994: 103.—Sakai, 1999c: 87.—Sakai, 2005b: 235.

Gourretiinae Sakai, 1999c: 95.—Sakai, 2017a: 1124.

Gourretiidae.—Sakai, 2004: 556.—Sakai, 2005b: 217.—Sakai, 2011: 507–508.—Sakai, 2017a: 1124–1125.—Dworschak and Poore, 2018: 68.

Ctenochelidae.—Sakai, 2005b: 235.—Sakai, 2011: 485–486.—Dworschak et al., 2012: 189–190.—Poore and Dworschak, 2017: 122 (synonymy).

Pseudogourretiinae Sakai, 2005b: 230.

Dawsoniinae Sakai, 2006: 1276–1277.—Sakai, 2011: 507.—Sakai, 2017a: 1124.

Ctenocheloidae (pro Ctenocheloididae) Sakai, 2011: 595–596.—Poore, 2015b: 142 **syn. nov.**

Pseudogourretiidae Sakai, 2011: 507–508, 523.

Tosacallianassidae Sakai, 2016: 813.

Diagnosis. Rostrum spike-like, longer than wide; median carina absent, *or* rarely on rostrum only; gastric carinae absent; cervical groove well defined; suture between ocular lobe and end of linea thalassinica horizontal or oblique in lateral view; anterior branchiostegal margin sinusoidal or semicircular, *or* with deep obtuse notch leading to oblique ridge; ***anterior branchiostegal lobe simple, scarcely calcified, merging smoothly with anterodorsal branchiostegal angle and anterolateral margin of carapace***; posterior margin of carapace without lateral lobes. Pleomere 1 without anterolateral lobes, weakly chitinised. Eyestalks flattened, contiguous, with subdistal dorsal cornea. Antennal scaphocerite simple, triangular. Maxilla scaphognathite without long seta on posterior lobe extending into branchial chamber. Maxilliped 1 epipod with acute anterior lobe lying alongside exopod. Maxilliped 3 propodus longer than wide, not prominently lobed on lower margin; dactylus slender, digitiform, with setae irregularly spaced along all margins. Cheliped merus lower margin smooth or with prominent proximal tooth; major cheliped with cylindrical palm, fingers elongate and pectinate, or with distinctively flattened palm, sometimes with strong crest above and below. Pereopod 3 propodus rectangular or oval, up to twice as long as wide, with proximal lobe on lower margin, without distal spiniform setae on lateral face or lower margin. ***Pereopod 5 semichelate (fixed finger closing on proximal part of dactylus), dactylus a twisted plate longer than finger.*** Female pleopod 2 rami narrower and with more reduced setation than pleopods 3–5; endopod flattened and 2–3 times as long as wide. Pleopods 3–5 with oblique peduncles, endopods oval, exopods attached laterally, not proximally lobed, shorter than and barely overlapping endopods, *or* with oblique peduncles meeting mesially, endopods triangular, with straight mesial margin, exopods attached laterally, proximally lobed, longer than and enclosing endopods; appendices internae elongate, much longer than wide. Uropodal exopod without elevated dorsal plate, *or* with margin divided by notch.

Remarks. Robles et al. (in press) found Ctenochelidae to have strong molecular support and two morphological synapomorphies. The character states shared by members of this family are maxilliped 3 with a prominent toothed crista dentata, usually extending beyond the meral distal margin, and a semichelate pereopod 5, its dactylus a twisted plate longer than the finger. Two clades, ctenochelids s.s. and gourretiids, were supported by morphological characters but not by molecular relationships.

Manning and Felder (1991) treated Ctenochelidae as one of two "callianassid-like families", distinguished from Callianassidae by the presence of an appendix masculina on the male pleopod 2, which was incorrect, as realised later by Felder and Manning (1994: 352), a longitudinally carinate uropodal exopod, lacking a dorsal plate and a carapace usually with a cardiac prominence. Their arrangement was followed by Poore (1994). The genera of Ctenochelidae known to these authors are treated in three families here. Sakai (1999c) included only *Paracalliax* beside the type genus and excluded *Dawsonius* and *Gourretia* in a new subfamily Gourretiinae. Sakai (2005b) elevated the taxon to family rank, retaining its single subfamily that he ignored in Sakai (2011), and confined Ctenochelidae to *Ctenocheles*.

As pointed out by Poore (2015b), Sakai's (2011) diagnosis of his new family Ctenocheloididae (as Ctenocheloidae) is virtually the same as Anker's (2010) diagnosis of *Ctenocheloides* and was

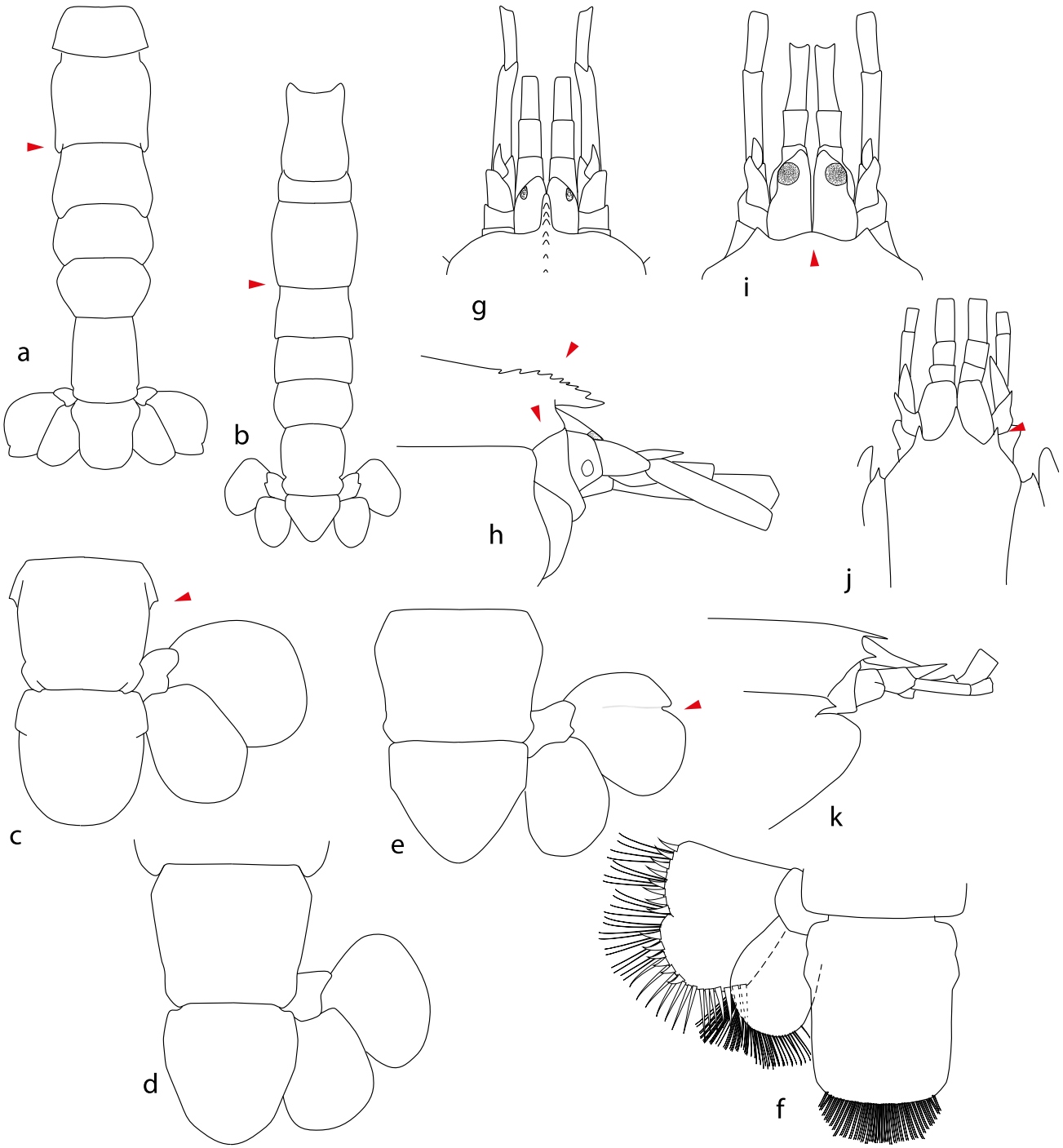

Figure 16. Diagnostic characters for genera of Ctenochelidae. Pleon (suture between pleomeres 2 and 3 indicated): a, *Ctenocheles*; b, *Ctenocheloides*. Pleomere 6, telson, uropod: c, *Dawsonius*; d, *Gourretia*; e, *Paragourretia*; f, *Laurentgourretia*. Rostrum, eyestalks, antennules, antennae: g, h, *Ctenocheles*; i, *Ctenocheloides*; j, k, *Laurentgourretia*.

Original illustrations: f, j, k, *Laurentgourretia rhopalommata*, MNHN-IU-2014-11417.

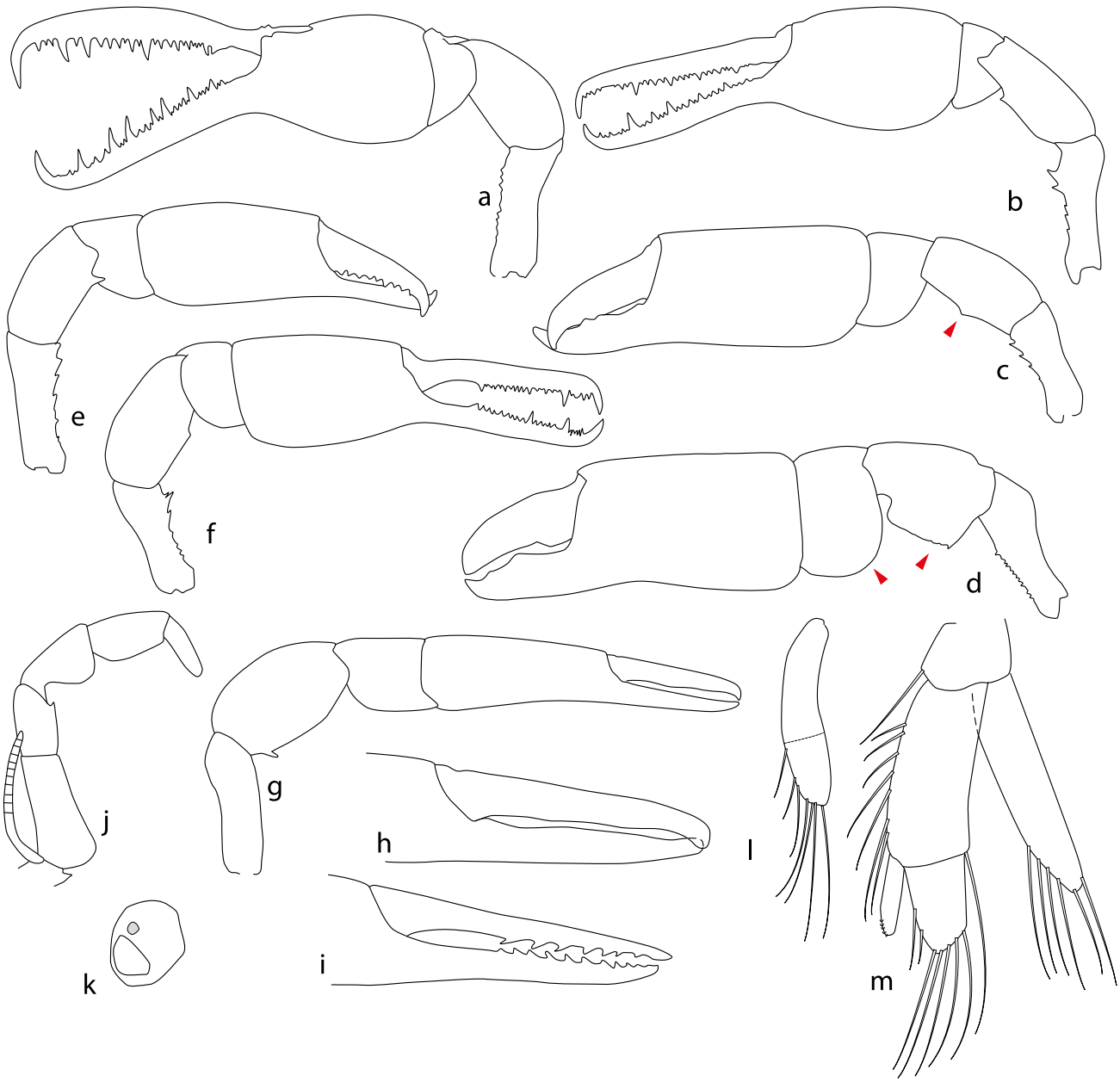

Figure 17. Diagnostic characters for genera of Ctenochelidae. Major cheliped: a, *Ctenocheles*; b, *Ctenocheloides*; c, *Kiictenocheloides*; d, *Gourretia*. Minor cheliped: e, *Ctenocheloides*; f, *Kiictenocheloides*; g, h, *Paragourretia*; i, *Gourretia*. Maxilliped 3: j, *Gourretia*. Male coxa 5: k, *Laurentgourretia*. Male pleopods 1, 2: l, m, *Laurentgourretia*.

Original illustrations: k–m, *Laurentgourretia rhopalommata*, MNHN-IU-2014-11417.

presented without a strong argument for why family status is to be preferred over genus status for its single species. We treat Ctenocheloididae as a junior synonym. Poore and Dworschak (2017) synonymised three taxa erected by Sakai and Türkay (2016), Tosacallianassidae with Ctenochelidae, *Tosacallianassa* with *Ctenocheles*, and *T. hatasagaensis* with *Ctenocheles balssi*.

Gourretiinae was established by Sakai (1999c) as a subfamily of Callianassidae for *Gourretia* de Saint Laurent, 1973, and *Dawsonius* Manning and Felder, 1991. Sakai (2004) elevated the taxon to family level and added *Callianopsis* de Saint Laurent, 1973, and two new genera, *Laurentgourretia* and *Paragourretia*. Pseudogourretiinae was then added for another new genus, *Pseudogourretia* Sakai, 2005b. Sakai (2006) recognised Callianopsinae and Pseudogourretiinae as subfamilies of Gourretiidae and added Dawsoniinae for *Dawsonius*. All subfamilies were ignored in Sakai's (2011) synthesis where four of the genera discussed earlier were included; *Paracalliax* was added although it had earlier been treated as member of its own family (see discussion under Paracalliacidae below), and *Callianopsis* was excluded (see Callianopsidae discussed above).

Sakai (2017b) radically dissected Gourretiidae, introducing five new genera. *Paragourretia* and *Dawsonius* were treated as synonyms of *Gourretia*, *Paracalliax* was retained and his earlier genus *Pseudogourretia* ignored. Justification of the new genera centred on differences between the male pleopods 1 and 2. He stressed the significance of these sexually differentiated structures, citing their importance in the taxonomy of other decapods and their greater significance than the few cheliped characters available to palaeontologists (Hyžný and Klompmaker, 2015). However, he took no account of pleopodal developmental as individuals mature from juveniles to adults. All five of Sakai's (2017b) new genera are herein synonymised with either *Gourretia* or *Paragourretia*.

On strictly cladistic criteria, *Dawsonius* is a senior synonym of *Paragourretia* on molecular evidence (Robles et al., in press). But the genus has unique apomorphies apparent in the morphological treatment, pleomere 6 with triangular lateral projections, maxilliped 3 exopod absent and pereopod 3 with a triangular propodus proximally produced on the lower margin. Otherwise the two genera have the same uropods, male pleopods and chelipeds.

Pseudogourretia, said by Sakai (2005b) to possess pleurobranchs, was found by Dworschak and Poore (2018) to not have pleurobranchs, as all callianassoids, and the genus was synonymised with *Gourretia*. The only character placing the sole species, *P. portsudanensis* in *Gourretia* rather than *Paragourretia* is the oval pereopod 3 propodus; chelipeds and uropods are missing from the only specimen. The family erected for it (Sakai, 2011) likewise is a junior synonym of Ctenochelidae.

Key to genera of Ctenochelidae

1. Major cheliped with palm swollen, with narrow pectinate fingers longer than palm (figs 17a, b) 2
– Major cheliped with palm flattened, upper and lower margins usually ridged, fingers rarely longer than palm (figs 17c, d) 3
2. Rostrum spine-like, dorsally carinate; cornea flat, with weak pigmentation (fig. 16g); pleomeres 1 and 2 together half as long as pleomeres 3–5 (fig. 16a) ..... *Ctenocheles*
– Rostrum obsolete, flat; cornea disc-like, strongly pigmented (fig. 16i); pleomeres 1 and 2 together as long as pleomeres 3–5 (fig. 16b) ..... *Ctenocheloides*
3. Telson longer than wide, parallel-sided over most of length, with curved truncate apex (fig. 16f); carapace with anterolateral spines (figs 16j, k); maxilliped 3 exopod absent ..... *Laurentgourretia*
– Telson shorter or longer than wide, tapering over most of length to rounded apex (figs 16c–e); anterolateral angles of carapace obsolete; maxilliped 3 exopod present (fig. 17j) or absent 4
4. Pleomere 6 with triangular lateral projections (fig. 16c); telson broadly rounded over posterior two-thirds (fig. 16c) ..... *Dawsonius*
– Pleomere 6 without triangular lateral projections (*P. biffari* excepted); telson tapering over posterior half to two-thirds (figs 16d, e) 5
5. Major cheliped merus lower margin with tubercle at midpoint (fig. 17c); minor cheliped palm swollen, fingers pectinate, spines erect (fig. 17f); maxilliped 3 exopod absent ..... *Kiictenocheloides*
– Major cheliped merus lower margin with straight or weakly convex blade on lower margin bearing a short proximal curved spine and 1 or more distal spines (fig. 17d); minor cheliped palm tapering (fig. 17g), fingers with or without teeth; maxilliped 3 exopod present (fig. 17j) 6
6. Minor cheliped with sharp proximally directed teeth along cutting edges of fingers (fig. 17i); major cheliped carpus lower proximal margin swollen (fig. 17d); uropodal exopod without marginal notch (fig. 16d) ..... *Gourretia*
– Minor cheliped without sharp teeth along cutting edges of fingers (figs 17g, h); major cheliped carpus lower proximal margin tapering; uropodal exopod usually with marginal notch, slight dorsal plate (fig. 16e) ..... *Paragourretia*

Implicit attributes. Unless indicated otherwise, the following attributes are implicit throughout the generic diagnoses. Cardiac prominence absent. Anterolateral angle obsolete, unarmed. Pleomere 6 without lateral projections. Maxilliped 3 merus with 1 mesiodistal spine; exopod absent. Major cheliped carpus proximal and lower margins oblique, evenly curved; propodus rectangular, fingers stout, fixed finger with broad tooth. Minor cheliped merus lower margin smooth.

Ctenocheles Kishinouye, 1926

Ctenocheles Kishinouye, 1926: 36.—de Saint Laurent, 1973: 514.—Poore and Griffin, 1979: 277.—de Saint Laurent and Le Loeuff, 1979: 81–83.—Sakai, 1999c: 88.—Sakai, 2005b: 237–238.—Sakai, 2011: 486–487 (key to species).—Hyžný et al., 2014: 249–250.—Poore and Dworschak, 2017: 122 (synonymy).

Tosacallianassa Sakai and Türkay, 2016: 813 (type species,

Tosacallianassa hatasagaensis Sakai and Türkay, 2016, by original designation and monotypy).

Type species. *Ctenocheles balssi* Kishinouye, 1926, by monotypy.

Diagnosis. Cardiac prominence present. ***Rostrum blade-like, produced anteriorly***. Male major cheliped merus with oblique spine near midpoint of lower margin (or absent); propodus swollen, with fine pectinate fingers at least twice as long as palm. Minor cheliped merus lower margin smooth, *or* with spine at or near midpoint; propodus cylindrical, slightly swollen at midpoint, about twice as wide as long. Male pleopod 1 article 2 simple, tapering, without coupling hooks. Telson parallel-sided over anterior half, then tapering to evenly rounded apex.

Remarks. The blade-like rostrum combined with the fine long pectinate fingers of the major cheliped of *Ctenocheles* make its species easily recognisable. In fact, some species are known only from these claws (Holthuis, 1967; de Saint Laurent, 1979a). To the six described species listed by Sakai (2005b, 2011) can be added *C. plantei* (Burukovsky, 2005), described as a member of the lobster genus *Thaumastochelopsis* Bruce, 1988 (Poore and Dworschak, 2017).

Ctenocheloides Anker, 2010

Ctenocheloides Anker, 2010: 1790–1791.—Sakai, 2011: 596.—Poore, 2015b: 142–143.

Type species. *Ctenocheloides attenboroughi* Anker, 2010, by original designation and monotypy.

Diagnosis. ***Cardiac prominence present***. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. ***Maxilliped 3 merus with mesial spine at midpoint***. Male major cheliped merus with oblique spine near midpoint of lower margin; propodus swollen, with fine pectinate fingers about as long as palm. Minor cheliped merus lower margin with spine at or near midpoint; propodus cylindrical, slightly swollen at midpoint, about twice as wide as long. Male pleopod 1 article 2 simple, tapering, without coupling hooks. Telson parallel-sided over anterior half, then tapering to evenly rounded apex.

Remarks. The pectinate fingers on the major cheliped are a little longer than the palm, whereas in *Ctenocheles* the fingers are at least twice as long as the palm, and the spikes more pronounced. Three species are known (Poore, 2015b). *Ctenocheloides boucheti* is a sister taxon to two species of *Ctenocheles* in the molecular analysis (Robles et al., in press).

Dawsonius Manning and Felder, 1991

Dawsonius Manning and Felder, 1991: 785.—Sakai, 2005b: 245.—Sakai, 2011: 508.

Gourretia.—Sakai, 2017a: 1128–1129 (partim).

Type species. *Callianassa latispina* Dawson, 1967, by original designation and monotypy.

Diagnosis. Cardiac prominence present. Rostrum sharply triangular, produced to near apex of ocular lobes. ***Pleomere 6 with lateral projections***. Male major cheliped merus with straight or weakly convex blade on lower margin bearing a short proximal curved spine and 1 or more distal spines; propodus rectangular, fingers fine, fixed finger smooth. Minor cheliped merus lower margin with erect proximal spine (as in major cheliped); propodus tapering, about 3 times as long as wide, with long narrow fingers. Pereopod 3 propodus triangular, with straight upper margin, expanded proximally on lower margin. Male pleopod 1 article 2 with lobed distomesial margin, distal notch, sharp curved distolateral apex. Telson parallel-sided over anterior half, then tapering to evenly rounded apex.

Remarks. *Dawsonius latispina* differs from other ctenochelids (except *Paragourretia biffari* Blanco Rambla and Liñero Arana, 1994) in having lateral projections on pleomere 6.

Manning and Felder (1991) differentiated *Dawsonius* from *Gourretia* on the absence of an exopod on maxilliped 3 and the sharp lateral projections on pleomere 6. We (DLF) can confirm that maxillipedal 3 exopod is absent (Dawson, 1967; Manning and Felder, 1991) and that Biffar's (1971a) figure and Sakai's (2011) observation of an exopod are in error. Biffar's figures are a composite from types and Honduran material but the latter is *P. biffari*.

Sakai (2005b) treated the genus first as a synonym of *Callianopsis* and in an addendum as a separate genus that he differentiated from *Callianopsis*. *Callianopsis* is a member of another family. He did not explain what he meant by "sensu Sakai (not Manning and Felder, 1991)" before his new diagnosis. Sakai (2011) included *Dawsonius* in Gourretiidae. Sakai's (2011) observations of a "paratype" and a "lectotype" (USNM 103755, 172310) were not made on the holotype and paratype designated by Dawson (1967); these specimens may well have been misidentified. Sakai's (2011: fig. 69E) figure of the apex of the male pleopod 2 is impossible to reconcile with Manning and Felder (1991: fig. 16i), which is typical of the family, nor with any ctenochelid.

Sakai (2017a) synonymised *Dawsonius* with *Gourretia* on the basis of the same male pleopods 1 and 2. In fact, *Dawsonius* is unique in pleopod 1 possessing a distomesial rounded blade and acute apex, whereas in *Gourretia* and *Paragourretia* the distomesial lobed is acute and smaller than the apical lobe.

Gourretia de Saint Laurent, 1973

Gourretia de Saint Laurent, 1973: 514.—Le Loeuff and Intès, 1974: 26.—Poore and Griffin, 1979: 278.—Manning and Felder, 1991: 785.—Sakai, 2002: 468–469.—Ngoc-Ho, 2003: 498–499.—Sakai, 2005b: 218–219 (partim).—Sakai, 2011: 510–511 (partim).

Pseudogourretia Sakai, 2005b: 230–231.—Dworschak and Poore, 2018: 68–70 (type species, *Pseudogourretia portsudanensis* Sakai, 2005, by original designation and monotypy).

Ivorygourretia Sakai, 2017a: 1126, 1130 (type species, *Gourretia barracuda* Le Loeuff & Intès, 1974, by original designation and monotypy) **syn. nov.**

Plantesgourretia Sakai, 2017a: 1126, 1131 (type species, *Gourretia nosybeensis* Sakai, 2004, by original designation and monotypy) **syn. nov.**

Ruiyuliugourretia Sakai, 2017a: 1126, 1131–1133 (type species, *Gourretia sinica* Liu and Liu, 2010, by original designation and monotypy) **syn. nov.**

Type species. *Callianassa subterranea* var. *minor* Gourret, 1887, by original designation and monotypy (now *Gourretia denticulata* Lutze, 1937 [Lewinsohn and Holthuis, 1986]).

Diagnosis. Rostrum sharply triangular, produced to near apex of ocular lobes, *or* obsolete, *or* obtusely triangular, flat, not reaching cornea (rarely). ***Maxilliped 3 with exopod***. Male major cheliped merus with straight or weakly convex blade on lower margin bearing a short proximal curved spine and 1 or more distal spines; ***carpus proximal and lower margins convex, swollen; propodus broad, with short fingers***. Minor cheliped merus lower margin with erect proximal spine (as in major cheliped); propodus tapering, about 3 times as long as wide; fingers ***evenly tapering, straight, dactylus longer, with sharp spines along opposing edges***. Pereopod 3 propodus oval, little longer than wide, with short rounded proximal lobe on lower margin, lower margin straight, upper margin strongly convex. Male pleopod 1 article 2 with sharp distomesial apex, distal notch, sharp curved distolateral apex. Telson parallel-sided over anterior half, then tapering to evenly rounded apex.

Remarks. In species of *Gourretia* the minor cheliped propodus tapers evenly, the fingers are straight, the dactylus being slightly longer, and both fingers have sharp spines, almost hook-like in some, along their opposing edges. The fixed finger of the major cheliped is stout, as is the dactylus, and blade-like with a broad tooth. The fused appendices on the male pleopod 2 reach or overlap the end of the endopod. This contrasts with the minor chelipeds of species of *Paragourretia* whose fingers lack the sharp spines and curve distally, the fixed finger of the major cheliped evenly tapers and curves, and the appendices on the male pleopod 2 are midmesial, far from the apex of the endopod.

Sakai (2004) separated *Paragourretia* from *Gourretia* for two species (see discussion below). In Sakai (2011), the two genera were redefined and four additional species were reallocated to *Paragourretia* from *Gourretia*. The key character indicated then to separate the two genera was said to be the absence in *Gourretia* and presence in *Paragourretia* of a "lateral notch" on the uropodal exopod. A cardiac prominence is absent in the former but present in the latter according to their diagnoses. The presence or absence of a distal notch is sometimes difficult to judge—it is not a black and white character (see comments below under *Paragourretia*). Our morphological analysis separates *Paragourretia* from *Gourretia* on the structure of the major and minor chelipeds, the shape of the propodus of pereopod 3 and the position of the appendices on the male pleopod 2, the notch being of lesser importance. None of these characters was included in the generic diagnoses by Sakai (2005b, 2011). The allocation of known species between the two genera is the same as that of Sakai (2011).

Pseudogourretia was synonymised with *Gourretia* by Dworschak and Poore (2018).

The male pleopod 1 of *G. barracuda* (Le Loeuff and Intès, 1974), said by Sakai (2017a) to be "hooked distally", ends in a simple apex, a more subdued form of the bifid apex usual in this genus. The pleopod may be a subadult form. The appendix masculina of the male pleopod 2 is more adpressed to the endopod apex than typical but the basic structure is the same. *Ivorygourretia*, erected for only this species, is here synonymised with *Gourretia*.

Plantesgourretia Sakai, 2017, erected for only *G. nosybeensis*, was said to have the male pleopod 2 "biramous; exopod shorter than endopod; endopod bilobed distally, and inner lobe bearing distally appendix masculina with setae, but no appendix interna". The exopod is shorter in most species; the appendix masculina is more dominant than in other species but is otherwise similar; we give no importance to the absence of the appendix interna. *G. nosybeensis* is otherwise similar to all species of *Gourretia*; *Plantesgourretia* is here synonymised.

Ruiyuliugourretia Sakai, 2017, again erected for a single species, was said to have special male pleopods 1 and 2. The outline of pleopod 1 is typical of species of *Gourretia* and its supposed four articles are probable artefacts. Pleopod 2 is typical, except for the absence of an appendix interna, as in the previous species. *Ruiyuliugourretia* is here synonymised with *Gourretia*.

Gourretia loeuffintesi Sakai, 2005, is a nomen nudum (no holotype designated).

Kiictenocheloides Sakai, 2013

Kiictenocheloides Sakai, 2013: 1693.

Type species. *Ctenocheloides nomurai* Komai, 2013, by original designation and monotypy.

Diagnosis. Rostrum obsolete or obtusely triangular, flat, not reaching cornea. Male major cheliped merus with oblique spine near midpoint of lower margin; ***propodus broad, with short fingers***. Minor cheliped merus lower margin with spine at or near midpoint; propodus cylindrical, slightly swollen at midpoint, about twice as wide as long, ***with long narrow fingers***. Male pleopod 1 article 2 simple, tapering, without coupling hooks. Telson parallel-sided over anterior half, then tapering to evenly rounded apex.

Remarks. The swollen propodus and thin pectinate fingers, typical of *Ctenocheles* and *Ctenocheloides* (fig. 17a, b), are not found in *Kiictenocheloides* where the major cheliped has a propodus and fingers (fig. 17c) typical of callianassoids generally. The female pleopods are unknown.

Laurentgourretia Sakai, 2004

Laurentgourretia Sakai, 2004: 557.—Sakai, 2005b: 224.—Sakai, 2011: 515.—Sakai, 2017a: 1126, 1130.

Type species. *Laurentgourretia rhopalommata* Sakai, 2004, by original designation and monotypy.

Diagnosis. Rostrum sharply triangular, produced to near apex of ocular lobes; ***anterolateral spines prominent***. Maxilliped 3 merus with 2 or more mesiodistal spines; exopod absent. Minor cheliped merus lower margin smooth; propodus cylindrical, slightly swollen at midpoint, about twice as wide as long. Male pleopod 1 article 2 simple, tapering, without coupling hooks. Telson mostly parallel-sided, with rounded posterolateral corners.

Remarks. The only species differs from other ctenochelids in the parallel-sided telson (fig. 18h) and having three meral spines on the maxilliped 3. Its chelipeds are unknown.

The only specimen (MNHN-IU-2014-11417) of the type species is a male with male-like pleopods and a gonopore on the coxa of pereopod 5 (figs 17k–m; GCBP observations), not a female as stated by Sakai (2004). The male pleopod 1 has only one weak suture, the second article half as long as the first and with eight marginal setae; the male pleopod 2 is essentially as in other ctenochelids. Its major cheliped is missing. Sakai (2004) diagnosed *Laurentgourretia*, distinguishing it from *Gourretia*, as having a "stick-like" eyestalk, a remarkably sharp scaphocerite, and maxilliped 3 lacking an exopod. The eyestalks are more wedge-shaped in our view (figs 16j, k), contiguous as in other ctenochelids but not as tapering in dorsal view. The scaphocerite is similar to that of *Dawsonius*, which also lacks an exopod on maxilliped 3. The anterolateral angles of the dorsal carapace are sharp, as is the anterodorsal angle of the branchiostegite (fig. 16k). The uropodal exopod has a distal notch as in *Paragourretia* but its margin has stronger marginal spiniform setae (fig. 16f).

The genus is sister to *Dawsonius* in the morphology phylogram; no molecular data are available.

Paragourretia Sakai, 2004

Paragourretia Sakai, 2004: 568–569.—Sakai, 2005b: 225.—Sakai, 2011: 516.

Heterogourretia Sakai, 2017a: 1126, 1129–1130 (type species, *Gourretia aungtonyae* Sakai, 2002, by original designation and monotypy) **syn. nov.**

Tuerkaygourretia Sakai, 2017a: 1126, 1133 (type species, *Tuerkaygourretia galathea* Sakai, 2017, by original designation and monotypy) **syn. nov.**

Type species. *Gourretia phuketensis* Sakai, 2002, by original designation and monotypy.

Diagnosis. Cardiac prominence absent (rarely), *or* present. Rostrum sharply triangular, produced to near apex of ocular lobes, *or* obsolete, *or* obtusely triangular, flat, not reaching cornea. Pleomere 6 without or with (*P. biffari* only) lateral projections. ***Maxilliped 3 with exopod***. Male major cheliped merus with straight or weakly convex blade on lower margin bearing a short proximal curved spine and 1 or more distal spines; propodus rectangular, ***fingers tapering, fine, fixed finger smooth***. Minor cheliped merus lower margin with erect proximal spine (as in major cheliped); propodus tapering, about 3 times as long as wide; fingers ***evenly tapering, curved distally, of equal lengths, smooth or with obscure denticles along opposing edges***. Pereopod 3 propodus linear, longer than wide, without proximal lobe on lower margin, lower margin straight, upper margin moderately convex. Male pleopod 1 article 2 with sharp distomesial apex, distal notch, and sharp curved distolateral apex. Telson parallel-sided over anterior half, then tapering to evenly rounded apex.

Remarks. *Paragourretia* differs from *Gourretia* in having fingers lacking the sharp spines seen in *Gourretia* and curving distally, the fixed finger of the major cheliped evenly tapering and curving, and the appendices on the male pleopod 2 being midmesial, far from the apex of the endopod rather than distal. None of these characters was mentioned by Sakai (2011) although his allocation of species between the two genera is identical to ours. None of the specific diagnoses of members of this genus and of *Gourretia* in Sakai (2011) includes other than an idiosyncratic assemblage of family and generic features and none that tell one species from another. *Paragourretia biffari* shares with *Dawsonius latispina* lateral projections on pleomere 6.

Sakai (2004) likened *Paragourretia* to *Dawsonius*, not *Gourretia*, because of a thick carapace and a cardiac prominence. Re-examination of the type species failed to convince GCBP that the carapace differed from other species of *Gourretia* in this regard. A transverse cardiac sulcus was difficult to decipher, and a transverse row of setae on the anterior branchial region said to also characterise the genus is found in all ctenochelid species examined. Sakai (2011) changed the emphasis of his re-diagnosis, this time relying on the presence of a notch on the uropodal exopod and on simple versus subchelate pereopod 4 (it is simple in both genera). This notch might be a precursor to a "dorsal plate", or as in some species, an elevated anterior margin over the posterior part of the exopod, the two separated by transverse furrow. While the notch is clear and unmissable in some species, in others it is more ambiguous. The notch is a vague concavity in the type species *P. phuketensis* and absent in *P. lahouensis* (which Sakai curiously included in his key to species, identifiable as "without lateral notch"). The notch is absent in all species of *Gourretia*. *Paragourretia* was synonymised with *Gourretia* by Sakai (2017b) because they have similar male pleopods 1 and 2. In fact, in species of *Paragourretia* the appendices on the midmesial margin do not reach the end of the endopod whereas in *Gourretia* s.s. they do, as far as is known.

Gourretia aungtonyae was provisionally included in *Paragourretia* by Sakai (2005b) and made type species of a new genus *Heterogourretia* (Sakai, 2017a) because of the absence of male pleopod 1 and a distal "segmented" appendix interna on pleopod 2. The holotype male has carapace length of 2.9 mm and an ovigerous female 3.6 mm. The small size of the male suggests it is immature and lacks male pleopod 1 for this reason. The figured appendix interna is atypical of axiideans and possibly an artefact. In all other features, the species is typical of *Paragourretia*. For these reasons, *Heterogourretia* is synonymised with *Paragourretia*.

The type species of *Tuerkaygourretia*, *T. galathea* Sakai, 2017, was based on a holotype female from Tranquebar, SE India (*Galathea* stn 290), two paratypes from the same station, two females from the Bay of Bengal, India (*Galathea* stn 304), and one male from Singapore (*Galathea* stn 357). The figures of the holotype (Sakai, 2017a: figs 4A, B, C, E, F, 5A–C, E, G) are of a species of *Paragourretia* showing the minor cheliped without teeth, uropodal exopod with a notch and pereopod 3 with a narrow propodus having the lower margin straight. Other figures are problematic, somewhat undermining Sakai's (2011) argument for new genera based on differences in male pleopods. Fig. 5I of pleopod 2 (said to be from the type locality) and fig. 5D of a broad pereopod 3 (from the Thai-Danish Expedition stn 1160 but not otherwise listed) are of a species of *Gourretia*. Other figures

from the Thai-Danish Expedition stn 1160 are fig. 5H of pleopod 2 of a species of *Gourretia* (appendices terminal) and figs 5J, K of a species of *Paragourretia* (appendices mesial). Sakai (2017a) attributed differences between these two forms to size. It is apparent that more than one species, from both *Gourretia* and *Paragourretia*, have been confounded in this description. Sakai (2017a) did not explain how these pleopodal forms differed from those of other genera. To add further confusion, the species' distribution is given as "Off Tranquebar, India (type locality); W. of Subitana, Port Moresby, Papua New Guinea; West Malay Peninsula; Singapore Island" but material is listed for only the first and last of these four; the Thai-Danish Expedition stn 1160 would appear to be on the West Malay Peninsula. *Tuerkaygourretia* is synonymised with *Paragourretia* on the basis of probable illustrations of the holotype and paratype.

Eucalliacidae Manning and Felder, 1991

Figures 18, 19

Eucalliinae Manning and Felder, 1991: 781 (misspelling).

Eucalliacinae Sakai, 1999a: 108–109.—Ngoc-Ho, 2003: 487–489 (partim).—Sakai, 2005b: 195–196 (partim).—Sakai, 2011: 493–494.—Hyžný, 2012: 51–52.—Sakai, 2017a: 1122.—Sakai, 2018: 734–738.

Eucalliacidae.—Sakai, 2011: 491.—Sakai and Türkay, 2014: 190 (outdated key to genera).—Sakai, 2017a: 1122.—Dworschak, 2018: 17.—Sakai, 2018: 734–738.

Diagnosis. Rostrum flat, short, triangular, shorter than eyestalks; median carina absent; gastric carinae absent; cervical groove well defined; suture between ocular lobe and end of linea thalassinica horizontal in lateral view; anterior branchiostegal margin sinusoidal or semicircular; anterior branchiostegal lobe simple, scarcely calcified, merging smoothly with anterodorsal branchiostegal angle and anterolateral margin of carapace; posterior margin of carapace without lateral lobes. Pleomere 1 without anterolateral lobes, weakly chitinised. Eyestalks flattened, contiguous, with subdistal dorsal cornea. Antennal scaphocerite rudimentary. Maxilla scaphognathite without long seta on posterior lobe extending into branchial chamber. Maxilliped 1 epipod with acute anterior lobe lying alongside exopod. ***Maxilliped 3 propodus about as wide as long; dactylus dilating, truncate, with dense field of setae on distal margin. Cheliped merus lower margin smooth***; major cheliped with distinctively flattened palm, sometimes with strong crest above and below. Pereopod 3 propodus broad, with proximal lobe on lower margin, without distal spiniform setae on lateral face (often with 1 distal spiniform seta on lower margin). Pereopod 5 minutely chelate or subchelate. Female pleopod 2 rami narrower, with more reduced setation than pleopods 3–5; endopod flattened and 2–5 times as long as wide. Pleopods 3–5 with oblique peduncles meeting mesially, endopods triangular, with straight mesial margin, exopods attached laterally, proximally lobed, longer than and enclosing endopods; appendices internae reduced and almost embedded in mesial margin of endopod. Uropodal exopod with elevated dorsal plate.

Remarks. Eucalliacidae differ from Callianopsidae, the only other family with a dense field of setae on the distal margin of a truncate maxilliped 3 dactylus, in the propodus of maxilliped 3 being wider than long (rectangular in callianopsids), lacking a lateral longitudinal ridge on the eyestalk (present in callianopsids) and the uropodal exopod having a dorsal plate (absent in callianopsids).

The family and generic concepts used in redefining Eucalliacidae with the support of molecular data, morphological data or both (Robles et al., in press), differ markedly from those tabulated by previous authors including Sakai and Türkay (2014) and Sakai (2018 and his earlier works). Some characters used by previous authors are too variable or not able to be easily categorised for generic diagnosis: anterolateral projections on the carapace, structure of the male pleopod 1, size of appendices internae on pleopods 3–5, relative length of the uropodal endopod, and concavity or convexity of the telson margin. Several of the characters used in this work to separate genera were not considered by these authors.

The family Eucalliacidae has a complex taxonomic history. Manning and Felder (1991) erected the subfamily for two genera, *Eucalliax* and *Calliax*. Ngoc-Ho (2003) erected a new genus *Calliaxina* and differentiated these three genera from *Paraglypturus* Türkay and Sakai, 1995. Sakai (1999a, 2005b) recognised only *Calliax* and *Paraglypturus*, synonymising *Eucalliax* and *Calliaxina* with *Calliax*.

Sakai (2011) divided Eucalliacidae into two subfamilies, Eucalliacinae and Calliapaguropinae, the latter for a single genus, *Calliapagurops* de Saint Laurent, 1973. Sakai's remarks on the new subfamily pointed out differences between *Calliapagurops* and *Callichirus* (a member of another subfamily) but nothing on why the genus was similar to remaining eucalliacids. It is not at all similar. As stated much earlier by Ngoc-Ho (2003), *Calliapagurops* is clearly a member of Callichirinae, here treated as Callichiridae, with which it shares many features. As a result, Sakai's diagnosis of the family comprised only characters true for all or most callianassoids (scaphognathite without long distal seta; pereopod 1 chelate, unequal, dissimilar; uropodal exopod with dorsal plate but without notch) or ambiguous (carapace with or without dorsal oval, maxilliped 3 dactylus "subtriangular" or digitiform). Sakai's (2011) Eucalliacinae revived the genera he had earlier dismissed and added three to bring the total to seven. He re-diagnosed *Calliaxina* using one character alone, not one of those proposed by Ngoc-Ho (2003), but his arguments were not supported by recent molecular or morphological analysis (Robles et al., in press). In this same paper, Sakai corrected his earlier statement (2005) that *Calliax* was the type genus but his reasoning was false. Sakai and Türkay (2014) added an eighth genus and tabulated characters that they believed distinguished them.

Sakai (2018) re-diagnosed Eucalliacinae without emphasising the unifying propodus and dactylus of maxilliped 3. He erected three new genera, *Bakercalliax*, *Heardcalliax* and *Manningcalliax*, here treated as junior synonyms of *Eucalliaxiopsis*. He argued heavily on separation of the genera based on "organs involved in reproduction", especially male pleopods, whether pleopod 1 was "simple" or "subchelate", and on differences in the degree of fusion of the appendices masculina and interna. Pleopod 1 of the male varies considerably and erratically among species of Eucalliacidae

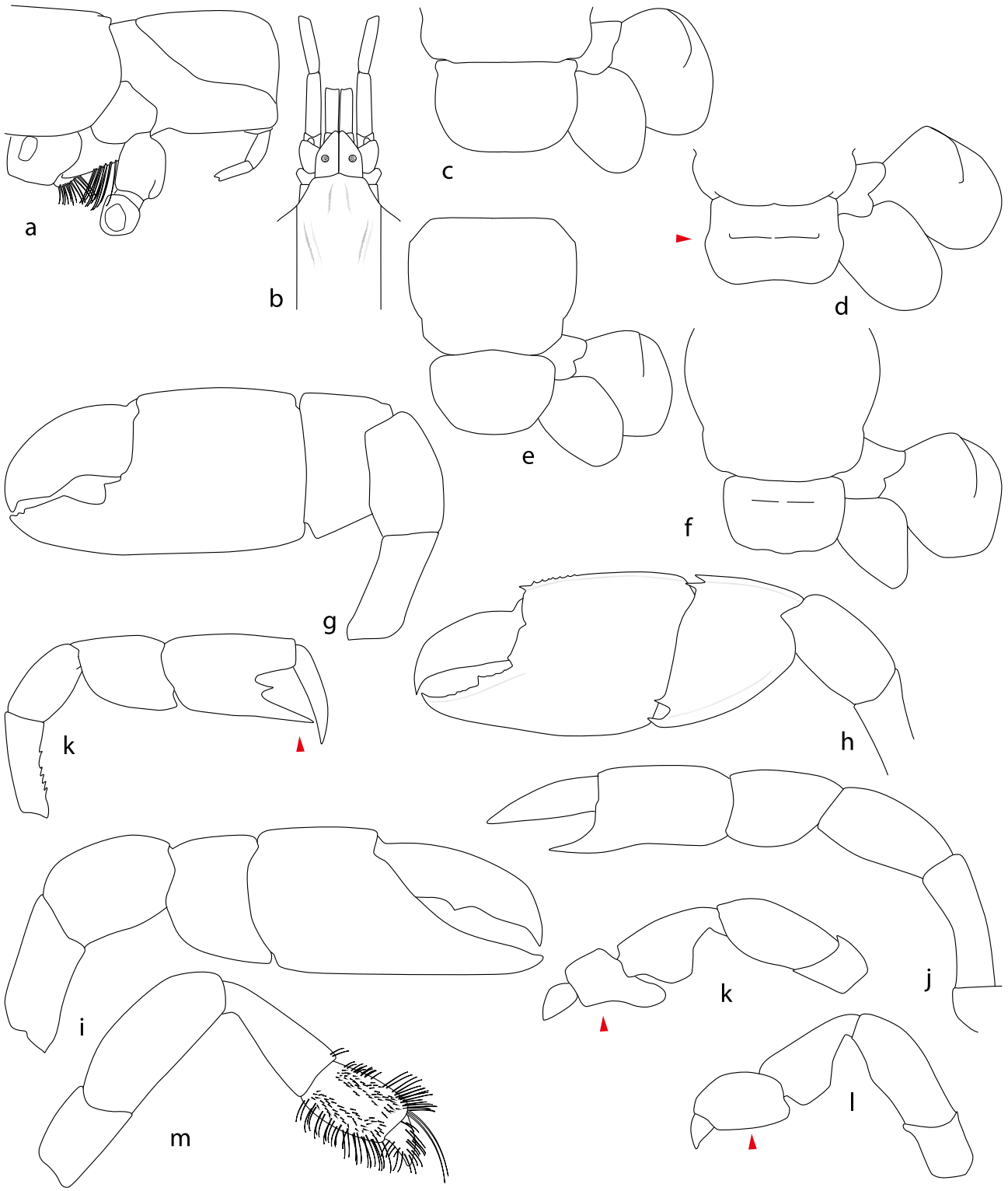

Figure 18. Diagnostic characters for genera of Eucalliacidae. Posterior carapace, sternite 7, pleopod1, coxa 4, basis of pereopod 5: a, *Pseudocalliax*. Carapace, eyestalks, antennules, antennae: b, *Eucalliax*. Telson, uropod: c, *Calliaxina*; d, *Eucalliaxiopsis*. Pleomere 6, telson, uropod: e, *Paraglypturus*; f, *Eucalliax*. Major cheliped: g, *Paraglypturus*; h, *Eucalliax*. Minor cheliped: i, *Paraglypturus*; j, *Calliax*; k, *Pseudocalliax*. Pereopod 3: k, *Calliaxina*; l, *Calliax*. Pereopod 4: m, *Paraglypturus*.

Original illustrations: a, *Pseudocalliax tooradin* NMV J303; e, *Calliaxina* SA-01, UF 36699; h, *Eucalliax quadracuta*, Panama, NHMW 25916.

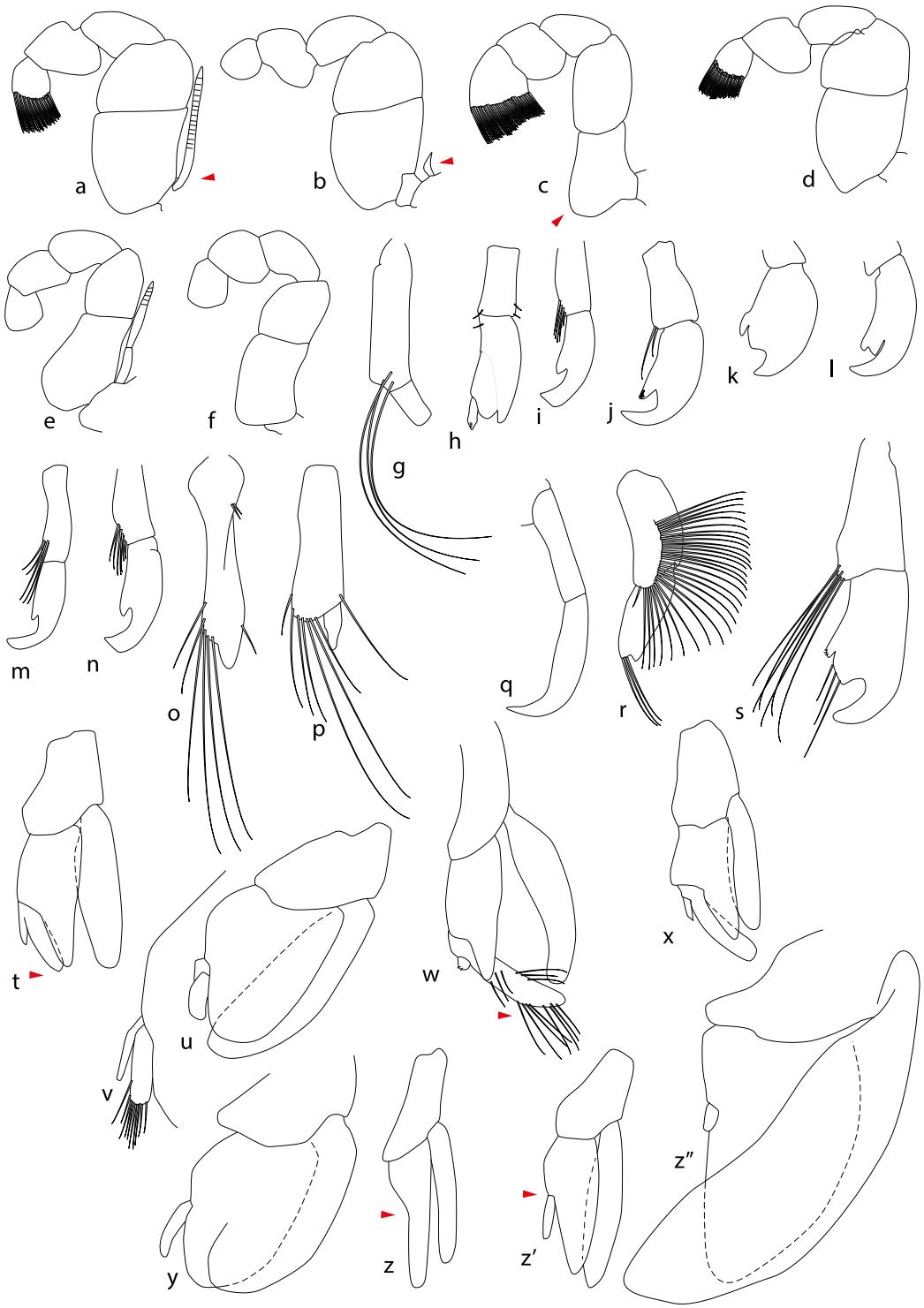

Figure 19. Diagnostic characters for genera of Eucalliacidae. Maxilliped 3: a, *Calliaxina punica*; b, *C*. SA-01; c, *Andamancalliax*; d, *Eucalliaxiopsis*; e, *Pseudocalliax*; f, *Calliax*. Male pleopod 1: g, h, *Calliaxina bulimba*; i, *C. kensleyi*; j, *C*. SA-01; k, *C. punica*; l, *C. sakaii*; m, *Eucalliaxiopsis panglaoensis*; n, *E. mcilhennyi*; o, p, *E. inaequimana*; q, *Calliax*; r, *Pseudocalliax*; s, *Paraglypturus*. Male pleopod 2: t, *Calliaxina*; u, v, *Paraglypturus*; w, *Eucalliax*; x, *Eucalliaxiopsis*. Female pleopod 2, y, *Paraglypturus*: z, *Calliax*; z', *Calliaxina*. Female pleopod 3: z'', *Paraglypturus*.

Original illustrations: b, i, *Calliaxina* SA-01, UF 36699; g, *C. bulimba*, MNHN-IU-2013-7097; h, *C. bulimba*, NMV J71686; w, *Eucalliax quadracuta*, NHMW 25916; o, *Eucalliaxiopsis inaequimana*, MNHN-IU-2013-10008; p, *E. inaequimana*, UF 16512; e, r, *Pseudocalliax tooradin* NMV J303; u, v, *Paraglypturus calderus*, MNHN Th1416.

and appears to have little generic value, contrary to Sakai's (2018) view (figs 19g–s).

Eucalliaxiopsis was differentiated from *Eucalliax* on account of its unusual pleopods 1 and 2. The male pleopod 1 of the type species, *Eucalliax cearaensis*, bears long setae on article 2 (Rodrigues and Manning, 1992), whereas in the type species of *Eucalliax* this article is simple. We were unable to confirm the structure of the male pleopod 1 of *Eucalliax cearaensis* (type mislaid) but Rodrigues and Manning (1992b: fig. 2s) can be variously interpreted. Apart from the long setae, article 2 is similar to that of, for example, *C. jonesi* and *E. panglaoensis* (cf. Dworschak, 2006). In most species of *Calliaxina* and *Eucalliaxiopsis*, the male pleopod 1 has long distal setae on article 1 and a broad article 2 and a curved apex, sometimes with an intermediate lobe. This is seen in *C. novaebritanniae*, *C. kensleyi*, *C. punica*, *C. sakaii*, *E. jonesi*, *E. mcilhennyi* and *E. panglaoensis* (figs 19i–n; see also figures in Dworschak, 2006, 2014; Heard, 1989; Felder and Manning, 1994; Manning and Lemaitre, 1994; Ngoc-Ho, 2003; de Saint Laurent and Manning, 1982). In contrast, the illustrated male pleopod 1 of *C. bulimba* (fig. 19g; Dworschak, 2005: figs 5c, d; Poore and Griffin, 1979: fig. 21g), *E. inaequimana* (fig. 19o, p; Dworschak, 2014: figs 4j–l) and *E. madagassa* (Ngoc-Ho, 2014: fig. 2S, as *C. thomassini*) has article 1 with distal long setae and a short oblique article 2. However, a newly discovered male of *C. bulimba* differs in having a bilobed article 2 with a separate appendix interna (fig. 19h). This would appear to be a precursor of the more typical eucalliacid form (figs 19i–n). A third form of male pleopod 1 is seen in *E. aequimana* where article 2 is longer than article 1, parallel-sided and setose (Dworschak, 2014: figs 9h, i). These forms appear to cross generic lines. The role of ontogeny in the morphology of pleopod 1 is poorly understood but it is evident from some studies that the male pleopod 1 does not appear fully formed in juveniles (Dworschak, 2005, 2006, 2014). Development of the male pleopod 1 with age seems probable.

This throws considerable doubt on the validity of three recently erected genera *Bakercalliax* Sakai, 2018, *Heardcalliax* Sakai, 2018 and *Manningcalliax* Sakai, 2018, all differentiated largely on the basis of the male pleopod 1. Sakai (2018) also noted differences between the relative sizes of the appendices interna and masculina of pleopod 2 but this would scarcely seem of generic value. The type species of all three genera have a transverse ridge on the telson and lack an exopod on maxilliped 3. As a consequence, all are synonymised with *Eucalliaxiopsis*. Sakai (2011) did not compare *Eucalliaxiopsis* with *Calliaxina*, which it resembles more closely, especially in the male pleopod 2. *Calliaxiopsis* Sakai and Türkay, 2014, was synonymised with *Calliaxina* by Poore and Dworschak (2017). Sakai's shuffling of species in his three papers has resulted in some species being listed as members of as many as five genera at different times during their history.

Our morphological analysis (Robles et al., in press) recognised a single clade containing all eleven of the genera included by Sakai (2018) in Eucalliacinae. This monophyly was not supported by the molecular phylogram (Robles et al., in press) where three sequential paraphyletic clades are evident, equivalent to *Eucalliaxiopsis*+*Calliaxina*, *Calliax* and *Eucalliax*.

Key to genera of Eucalliacidae

1. Major chela massive; minor chela with fixed finger acute, shorter than dactylus (fig. 18j); pereopod 3 propodus oval, little longer than wide, with short rounded proximal lobe on lower margin, lower margin straight, upper margin strongly convex (fig. 18l); female pleopod 2 without appendix interna (fig. 19z); scaphocerite small, discoid 2

– Both chelipeds swollen and similar, minor slightly smaller if at all (figs 18g, h); pereopod 3 propodus pentagonal, with strong broadly rounded proximal lobe on lower margin, lower margin concave (fig. 18k); female pleopod 2 with (fig.18z) or without appendix interna; scaphocerite absent or vestigial 3

2. Sternite 7 and pereopod 5 coxa-ischium glabrous; maxilliped 3 ischium linear, exopod absent (fig. 19f); minor cheliped with tooth in gape between fingers (fig. 18k); male pleopod 1 article 2 sickle-shaped (fig. 19q) ..... *Calliax*

– Sternite 7 and pereopod 5 coxa-ischium densely setose (fig. 18a); maxilliped 3 ischium with strong proximal lobe on lower margin, wider proximally than distally, exopod present (fig. 19e); minor cheliped with fixed finger shorter than dactylus (fig. 18j); male pleopod 1 stout, with apical notch (fig. 19r) ..... *Pseudocalliax* (1 species, *P. tooradin*)

3. Uropodal endopod triangular, anterior margin strongly convex, posterior margin straight (fig. 18f); cheliped carpus upper margin with 2 distal sharp spines (fig. 18h); male pleopod 2 appendix masculina 4 times as long as wide, attached near apex of endopod, appendix interna minute (fig. 19w) ..... *Eucalliax* (1 species, *E. quadracuta*)

– Uropodal endopod more or less ovate (figs 18c–e); cheliped carpus upper margin without 2 distal sharp spines; male pleopod 2 appendix masculina longer than wide, attached mesially to endopod with appendix interna, up to twice as long as endopod apex (figs 19t, x) 4

4. Male pleopod 2 appendix masculina a lobe fused with appendix interna, subdistal on endopod margin, endopod broadly triangular (fig. 19u) ..... *Paraglypturus*

– Male pleopod 2 appendix masculina a lobe fused with appendix interna, attached midway on endopod margin, endopod longer than wide (figs 19t, x) 5

5. Telson with transverse ridge, lateral margins convex (fig. 18d) ..... *Eucalliaxiopsis*

– Telson without transverse ridge; lateral margins tapering (fig. 18c) 6

6. Maxilliped 3 ischium and merus length less than twice as long as wide at their articulation, without proximal lobe, with exopod (figs 19a, b) ..... *Calliaxina*

– Maxilliped 3 ischium and merus length twice as long as wide at their articulation; ischium with strong proximal lobe on lower margin, wider proximally than distally (fig. 19c) ..... *Andamancalliax* (1 species, *A. andamanica*)

Implicit attributes. Unless indicated otherwise, the following attributes are implicit throughout the generic diagnoses. Anterior dorsal carapace smooth; cardiac sulci absent. Sternite 7 and pereopod 5, coxa-ischium glabrous. Pleomere 1 without sternal plates. Maxilliped 3 ischium linear or wider distally than proximally. Major cheliped broad, minor cheliped narrower, with long fingers. Major cheliped carpus upper margin apex rounded or square. Minor cheliped fingers closing along length. Male pleopod 2 appendix masculina not reaching tip of endopod. Uropodal endopod ovate, almost symmetrical, anterior margin more convex than posterior margin. Telson smooth dorsally.

Andamancalliax Sakai, 2011

Andamancalliax Sakai, 2011: 494–495.—Sakai, 2018: 738.

Type species. Calliax andamanica Sakai, 2002, by original designation and monotypy.

Diagnosis. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation; ischium with strong proximal lobe on lower margin, wider proximally than distally. ***Major cheliped broad, minor cheliped narrower, with long fingers***. Male pleopod 1 article 1 with distal long setae, article 2 blade like; without appendix interna. Male pleopod 2 appendix interna digitiform; appendix masculina a lobe fused to appendix interna attached midway on endopod margin. Telson widest anteriorly, more or less semicircular.

Remarks. Andamancalliax was erected for a single species, sharing with species of *Calliaxina* similar pereopod 3, pleopod 3, telson, uropod, and male and female pleopods 2. We have assumed that Sakai's (2002) figure 2B, labelled as from a female, is of the simple male pleopod 1; Sakai (2002) reported it absent but later (Sakai, 2005b, 2011) said it was present, uniramous and with an emarginate tip. It would appear to be a juvenile form. Sakai's (2011) generic diagnosis contains nothing that would distinguish the new genus from any other eucalliacid—in fact it is wrong in stating that the male pleopod 2 lacks an appendix interna—it is clearly figured in Sakai's (2002) mislabelled figure 2A. He provided no justification for the new genus; his key separated *Andamancalliax* with emarginate distal male pleopod 1 article from *Eucalliaxiopsis* where this article was said to incurve distally but the male pleopod 1 of members of the latter varies markedly. *Calliax andamanica* has a more acute rostrum than most species of *Calliaxina* but among its members the rostrum ranges from almost non-existent to sharply triangular (in *C. sakaii*, for example). However, *A. andamanica* has a narrow maxilliped 3 with a proximal lobe (similar to that in *Paraglypturus* spp. and *Pseudocalliax tooradin*) and asymmetrical chelipeds, quite unlike other eucalliacids and the genus is justified. A new species of this genus possesses a small exopod on maxilliped 3, not reported for *A. andamanica* (Poore, in press).

Calliax de Saint Laurent, 1973

Calliax de Saint Laurent, 1973: 514.—Manning, 1987: 397.—Sakai, 1988: 61.—Manning and Felder, 1991: 783.—Sakai, 1999a: 109–110.—Ngoc-Ho, 2003: 489–490.—Sakai, 2005b: 196–197.—Sakai, 2011: 495–496.—Hyžný and Gasparic, 2014: 42–45.—Sakai, 2018: 738.

Type species. Callianassa (*Callichirus*) *lobata* de Gaillande and Lagardère, 1966, by original designation and monotypy.

Diagnosis. Maxilliped 3 ischium and merus narrow, more than twice as long as wide at their articulation. Male major chela with palm about twice as long as carpus, 1.5 times as long as wide, minor chela half as wide, with short fingers. ***Minor cheliped fingers with wide gape, with tooth at base of fingers, fingers not closing along length***. Male pleopod 1 article 2 curved, simply curving to sharp apex; without appendix interna. Male pleopod 2 appendix interna absent; appendix masculina a lobe fused to appendix interna attached midway on endopod margin, reaching or exceeding tip of endopod. Telson widest anteriorly, more or less semicircular.

Remarks. The wide gape between the fingers of the minor cheliped, with an intermediate tooth, immediately defines species of *Calliax*.

Sakai (1999a) treated *Eucalliax* as a junior synonym of *Calliax* and later (2005b) added *Calliaxina* to this synonymy. Ngoc-Ho (2003) clearly differentiated these three genera and *Paraglypturus*. Sakai (2011) appears to have accepted Ngoc-Ho's arguments and he confined *Calliax* to just two species; one has been added since (Ngoc-Ho, 2014). Sakai's (2011) generic diagnosis contained several generalities referrable to many callianassoids but apart from mention of "P1 unequal in size and dissimilar in shape" acknowledges none of the defining generic characters. His key would fail to discriminate the genus as presently diagnosed. Sakai's (2011) "diagnoses" of the two species are largely replications of his inadequate generic diagnosis, apart from subtle differences in the description of the shapes of their telsons. The type species has been illustrated most recently by Sakai (2017b) and García Raso et al. (2019). Their records are from 622 m and 457–548 m depth respectively in the Mediterranean; previous records are from only a few metres depth.

Calliaxina Ngoc-Ho, 2003

Calliaxina Ngoc-Ho, 2003: 493–494.—Sakai, 2011: 497–498.—Hyžný, 2012: 55–56.—Sakai and Türkay, 2014: 191.—Ngoc-Ho, 2014: 549.—Poore and Dworschak, 2017: 120 (partim).—Sakai, 2018: 739–741.

Calliax.—Sakai, 2005b: 196 (partim, not *Calliax* de Saint Laurent, 1973).

Calliamina Sakai and Türkay, 2014: 190 (misspelling).

Type species. Calliax punica de Saint Laurent and Manning, 1982, by original designation.

Diagnosis. ***Cardiac sulci present***. Pleomere 1 with pair of sternal plates anterior to pleopods 1. Maxilliped 3 ischium and merus broad, less than twice as long as wide at their articulation. Both chelipeds with palms as long as wide in both sexes, minor slightly smaller if at all. ***Male pleopod 1*** article 1 with distal long setae; article 2 blade-like with bifid apex (sometimes obscure), *or* article 2 much shorter, digitiform (sometimes fused); ***with appendix interna (present at least as hooks on***

endopod). Male pleopod 2 appendix interna digitiform; appendix masculina a lobe fused to appendix interna attached midway on endopod margin. Telson widest anteriorly, more or less semicircular, curving to broad convex apex.

Remarks. *Calliaxina* differs from *Eucalliaxiopsis* in having a tapering telson without a transverse ridge, and at least a vestige of an appendix interna on pleopod 1 of the male. All species have an exopod on maxilliped 3, sometimes vestigial, whereas only one species of *Eucalliaxiopsis* does.

Calliaxina was erected by Ngoc-Ho (2003) for three species previously included by Sakai (1999a) in *Paraglypturus* Türkay and Sakai, 1995 and later (Sakai, 2005) in *Calliax*. Ngoc-Ho (2003) tabulated differences between these genera but did not include *Eucalliax* Manning and Felder, 1991, which she diagnosed separately in her table. Her diagnosis relied importantly on the presence of an exopod on maxilliped 3, equal and similar chelipeds, appendix interna on pleopods 1 and 2 of the male. Some of her key features are difficult to quantify, notably the shape of the front and anterolateral projections of the carapace, and length of the appendix interna on pleopods 3–5. Sakai (2005) synonymised *Calliaxina* with *Calliax* without discussing any morphological similarities or differences. Later, Sakai (2011) revived *Calliaxina* which he had earlier synonymised in new sense (sensu nov.) by including other species with similar maxillipeds 3 and with one or two cardiac sulci, although some lack maxillipedal 3 exopods. At the same time, he erected a monotypic genus *Eucalliaxiopsis* Sakai, 2011, relying on the possession of unique male pleopods (see below).

As already explained, Robles et al. (in press) divided the species allocated by Sakai (2011) to *Calliaxina* and *Eucalliaxiopsis* into two groups. Their molecular analysis grouped *C. bulimba, C. kensleyi*, *C. novaebritanniae* and *C. sakaii* into a one clade, and *C. aequimana*, *C. inaequimana*, *C. panglaoensis*, *C. jonesi* and three others into a second clade. The morphological treatment includes *C. punica*, type species of *Calliaxina* in the first and *C. cearaensis*, type species of *Eucalliaxiopsis* in the second. These two names are applied to these clades.

Eucalliax Manning and Felder, 1991

Eucalliax Manning and Felder, 1991: 781–783 (partim).—Ngoc-Ho, 2003: 489–490 (partim).—Sakai, 2011: 502–503 (partim).—Hyžný and Hudáčková, 2012: 12–14 (partim).—Sakai, 2017a: 1122 (partim).—Sakai, 2018: 742.

Type species. *Callianassa quadracuta* Biffar, 1970, by original designation.

Diagnosis. Anterior dorsal carapace with median ridge posterior to rostrum and submedian pair of oblique ridges. Maxilliped 3 ischium and merus less than twice as long as wide at their articulation. Male major cheliped with palm about twice as long as carpus, 1.5 times as long as wide; minor chela slightly smaller, with elongate fingers; ***major cheliped carpus upper margin with 2 distal sharp spines in both sexes***. Male pleopod 1 article 1 with distal long setae; article 2 blade like, with bifid apex, sometimes obscure; without appendix interna. Male pleopod 2 appendix interna minute; appendix masculina 4 times as long as wide, attached near apex of endopod reaching, *or* exceeding tip of endopod. ***Uropodal endopod triangular, anterior margin strongly convex, posterior margin straight***. Telson convex-sided, widest near midpoint, posterior margin slightly excavate; with transverse crest.

Remarks. The most obvious characters distinguishing the only species, *Eucalliax quadracuta*, from other eucalliacids is the triangular uropodal endopod and the male pleopod 2 with its appendix masculina well exceeding the endopod. Re-examination by us (PCD) showed the presence of a minute appendix interna (fig. 19w); Sakai's figure (1999a; fig. 30c) is misleading.

Eucalliax was differentiated initially from *Calliax* simply "in having the chelipeds equal and similar", the two genera being placed in the same new subfamily (Manning and Felder, 1991). The genus was treated as a synonym of *Calliax* by Sakai (1999a, 2005b) without justification but revived later (Sakai, 2011). Sakai (2017a) differentiated *Eucalliax* from *Eucalliaxiopsis* Sakai, 2011 on differences in male pleopods 1 and 2 but not from other genera.

Eucalliaxiopsis Sakai, 2011

Calliaxina.—Ngoc-Ho, 2003: 493–494 (partim).—Sakai, 2011: 497–498 (partim).—Sakai and Türkay, 2014: 191 (partim).—Ngoc-Ho, 2014: 549 (partim).—Poore and Dworschak, 2017: 120 (partim).

Eucalliaxiopsis Sakai, 2011: 503–504.—Sakai, 2018: 742–743.

Calliaxiopsis Sakai and Türkay, 2014: 192.—Sakai, 2018: 741–742 (type species, *Calliaxiopsis madagassa* Sakai and Türkay, 2014, by original designation and monotypy) **syn. nov**.

Bakercalliax Sakai, 2018: 738 (type species, *Callianassa aequimana* Baker, 1907, by original designation) **syn. nov**.

Heardcalliax Sakai, 2018: 743 (type species, *Calliax jonesi* Heard, 1989, by original designation and monotypy) **syn. nov**.

Manningcalliax Sakai, 2018: 743 (type species, *Eucalliax mcilhennyi* Felder and Manning, 1994, by original designation) **syn. nov**.

Type species. *Eucalliax cearaensis* Rodrigues and Manning, 1992, by original designation and monotypy.

Diagnosis. Anterior dorsal carapace smooth, *or* with median ridge posterior to rostrum and submedian pair of oblique ridges; ***cardiac sulci present***. Pleomere 1 without sternal plates, *or* with pair of sternal plates anterior to pleopods 1. Maxilliped 3 ischium and merus less than twice as long as wide at their articulation. Male major cheliped with palm about twice as long as carpus, 1.5 times as long as wide; minor chela slightly smaller, with elongate fingers or both chelipeds with palms as long as wide in both sexes, minor slightly smaller if at all (rarely). ***Male pleopod 1*** article 2 longer than article 1, parallel-sided, setose, *or* article 1 with distal long setae, article 2 blade like, with bifid apex (sometimes obscure), *or* article 1 with distal long setae, article 2 much shorter, digitiform (sometimes fused); ***without appendix interna***. Male pleopod 2 appendix interna digitiform; appendix masculina a lobe fused to appendix interna attached midway on endopodal margin, reaching or exceeding tip of endopod. Telson convex-sided, widest near midpoint; posterior margin slightly excavate or obscurely excavate between rounded posterolateral corners; ***with transverse crest on dorsal surface***.

Remarks. *Eucalliaxiopsis* is most easily recognised by the telson having a transverse ridge and convex lateral margins. The male pleopod 1 lacks an appendix interna. The appendix masculina reaches or exceeds the tip of the endopod of pleopod 2. *Eucalliaxiopsis* shares with *Eucalliax* absence of a maxilliped 3 exopod (with one exception, *E. madagassa*) and a telson widest near its midpoint and having a sharp transverse crest. *Eucalliaxiopsis* differs in having an oval rather than rhomboid uropodal endopod. The presence of cardiac sulci is assumed for the type species; it is present in all others illustrated. The generic synonymy is discussed above under the family heading.

Paraglypturus Türkay and Sakai, 1995

Paraglypturus Türkay and Sakai, 1995: 26–27.—Sakai, 1999a: 122.—Sakai, 2005b: 204–205.—Sakai, 2011: 504–505.—Sakai, 2018: 744.

Type species. *Paraglypturus calderus* Türkay and Sakai, 1995, by original designation and monotypy.

Diagnosis. Maxilliped 3 ischium and merus more than twice as long as wide at their articulation; ischium with strong proximal lobe on lower margin, wider proximally than distally. ***Male major cheliped with palm about twice as long as carpus, 1.5 times as long as wide, minor chela slightly smaller, with elongate fingers***. Male pleopod 1 article 1 with distal long setae, article 2 blade like, with bifid apex, sometimes obscure; with appendix interna (at least with hooks). Male pleopod 2 appendix interna digitiform; ***appendix masculina a lobe fused with appendix interna, subdistal on endopodal margin***. Telson widest anteriorly, more or less semicircular.

Remarks. *Paraglypturus* differs from other Eucalliacidae in having the pleopod 2 endopod almost as wide as that of pleopod 3 (cf. figs 19u, z''). The second article of the pleopod 1 of the male has a minute appendix interna with hooks (fig. 19s). The species share with many eucalliacids two long setae distally on the upper margin of the propodus of pereopod 4 (fig. 18m) but differ in the arrangement of the appendices on the male pleopod 2. The chelipeds are swollen and similar, the minor slightly smaller (figs 18g, i).

Robles et al. (in press) found weak molecular support for one of its two species to be more closely related to Callianopsidae than to any other callianassoids despite the morphological evidence supporting eucalliacid affinities (Sakai (2005b, 2011, 2018). *Paraglypturus* was said by Türkay and Sakai (1995) to be close to *Glypturus* but this was realised to be wrong when Sakai (1999a) noted its similarity to *Calliax* and placed both genera in Eucalliacinae. He differentiated the two on the possession in *Paraglypturus* (in which he included five species) and absence in *Calliax* (seven species) of an exopod on maxilliped 3. Later, Sakai (2005b, 2011) restricted the genus to its type species because it alone possesses the "yellow transparent circular structure on the uropodal endopod". Türkay and Sakai (1995) described and figured a "rounded yellow-transparent circular structure centrally" on the upper surface of the uropodal exopod of *P. calderus*. This was confirmed by PCD on a paratype (SMF 22951) but subsequent examination by GCBP in 2008 and in 2018 of another specimen (MNHN Th1416) failed to distinguish the structure. Ahn et al. (2017) figured in colour a yellow patch on the upper surface of the uropodal *endopod* of *P. tonganus*.

Pseudocalliax Sakai, 2011

Paraglypturus.—Poore, 2004: 184.
Pseudocalliax Sakai, 2011: 505–506.—Sakai, 2018: 744.

Type species. *Callianassa tooradin* Poore and Griffin, 1979, by original designation and monotypy.

Diagnosis. ***Sternite 7 and pereopod 5 coxa-ischium densely setose***. Maxilliped 3 ischium and merus more than twice as long as wide at their articulation; ischium with strong proximal lobe on lower margin, wider proximally than distally. Male major cheliped with palm about twice as long as carpus, 1.5 times as long as wide, minor chela half as wide, with short fingers. Minor cheliped fingers with wide gape, without tooth at base of fingers, fingers not closing along length. Male pleopod 1 stout, article 1 setose, article 2 with shallow apical notch; without appendix interna. Male pleopod 2 appendix interna digitiform; appendix masculina not differentiated from endopod apex. Telson widest anteriorly, more or less semicircular.

Remarks. The densely setose sternite 7 and coxa-ischium of pereopod 5 and the stout male pleopod 1 diagnose the only species, *P. tooradin* Poore and Griffin, 1979.

Following "examination of the male specimen [of *C. tooradin*] preserved in the USNM", Sakai (2011) diagnosed *Pseudocalliax* as a genus of Eucalliacidae possessing a dorsal oval and cardiac sulcus but we found no material in the USNM. We have confirmed by examining types and other specimens (NMV J301–J303, J59670–J59672) that the species has neither feature, as was confirmed by Sakai earlier (1999a: figs 33a–c). None of his other generic characters is useful. The male pleopod 1 of *P. tooradin* is not "small and simple" as stated by Sakai (2011) but stout, with article 1 setose and article 2 with shallow apical notch (fig. 19r). The species was inadequately described by Poore and Griffin (1979).

Paracalliacidae Sakai, 2005

Figure 20

Paracalliacinae Sakai, 2005b: 215.
Paracalliacidae.—Dworschak and Poore, 2018: 70.

Diagnosis. Rostrum flat, short, triangular, shorter than eyestalks; ***median carina on rostrum only***; submedian gastric carinae absent; cervical groove well defined; suture between ocular lobe and end of linea thalassinica horizontal in lateral view; anterior branchiostegal margin sinusoidal or semicircular; anterior branchiostegal lobe simple, scarcely calcified, merging smoothly with anterodorsal branchiostegal angle and anterolateral margin of carapace; posterior margin of carapace ***with lateral lobes interacting with anterolateral lobes on pleomere 1***. Eyestalks flattened, contiguous, with subdistal dorsal cornea. Antennal scaphocerite simple, triangular. Maxilla scaphognathite without long seta on posterior lobe

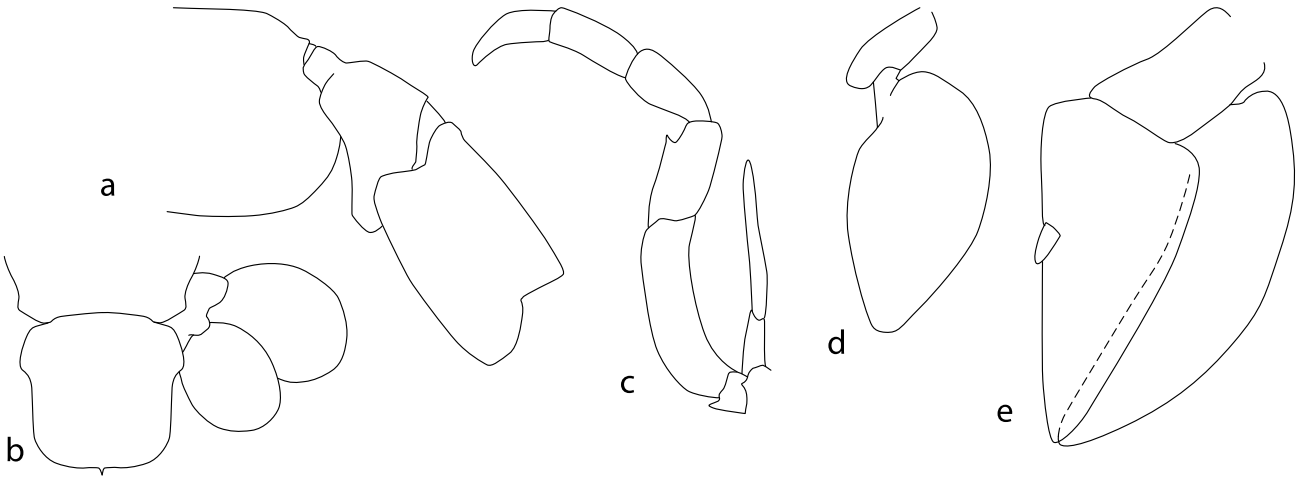

Figure 20. Diagnostic characters for Paracalliacidae, *Paracalliax bollorei*: a, posterior carapace, pleomeres 1, 2; b, telson, uropod; c, maxilliped 3; d, e, female pleopods 1, 2.

extending into branchial chamber. Maxilliped 1 epipod with acute anterior lobe lying alongside exopod. Maxilliped 3 propodus longer than wide, not prominently lobed on lower margin; dactylus slender, digitiform, with setae irregularly spaced along all margins. Cheliped merus lower margin spinose; major cheliped palm oval in cross-section, barely crested above or below. Pereopod 3 propodus elongate-oval, tapering, without proximal lobe on lower margin, without distal spiniform setae on lateral face (often with 1 distal spiniform seta on lower margin). Pereopod 5 minutely chelate or subchelate. Female pleopod 2 rami similar to following pleopods, with regularly setose margins. Pleopods 3–5 with oblique peduncles meeting mesially, endopods triangular, with straight mesial margin, exopods attached laterally, proximally lobed, longer than and enclosing endopods; appendices internae elongate, much longer than wide. Uropodal exopod without elevated dorsal plate.

Remarks. The only species differs from all other callianassoids in having pleomere 1 with dorsolateral lobes interacting and overlapping the posterolateral margin of the carapace (fig. 20a; Dworschak and Poore, 2018; Robles et al., in press). Pleopod 2 is similar to pleopods 3–5 (figs 20d, e). The uropodal exopod lacks a dorsal plate (fig. 20b) and maxilliped 3 is exceptionally narrow (fig. 20c). The male is not known.

Manning and Felder (1991) included the only genus *Paracalliax* in Ctenochelidae. The subfamily was erected as member of Callianassidae by Sakai (2005b) who was uncertain about its affinities (not in Gourretiidae as he asserted later [Sakai, 2011]). The family was ignored by Sakai (2011) and Sakai et al. (2015) who treated the genus as part of Gourretiidae despite treating most other basal groups as distinct families. Sakai (2017a) also included the genus in Gourretiidae but considered it a possible synonym of one of three new gourretiid genera erected at the time.

Paracalliax de Saint Laurent, 1979

Paracalliax de Saint Laurent, 1979a: 1396.—de Saint Laurent and Le Loeuff, 1979: 84–86.—Manning and Felder, 1991: 785.—Sakai, 2005b: 215.—Sakai, 2011: 515.—Sakai et al., 2015: 134.—Sakai, 2017a: 1126, 1131.

Type species. Paracalliax bollorei de Saint Laurent, 1979, by original designation and monotypy.

Diagnosis. With characters of the family.

Remarks. Sakai et al. (2015) described a second species, *Paracalliax stenophthalma*, from the southern Banc d'Arguin, the same locality as the holotype of the type species. They are synonymous (Dworschak and Poore, 2018).

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Table 1. Accepted names of 265 species of callianassoids listed alphabetically by species name, with family allocation and accepted generic and species combination. 87 are in new combinations. Commonly accepted junior synonyms are not included (see WoRMS Editorial Board 2018). Eleven species of Callianassidae inadequately described or figured are placed Incertae sedis. See Table 2 for a list of the same accepted species arranged by family and genus and comments on those Incertae sedis.

Species, Genus	Family allocation	Current combination, authority
abyssa, Lipkecallianassa	Callianassidae	*Lipkecallianassa abyssa* Sakai, 2002
acanthochirus, Glypturus	Callichiridae	*Glypturus acanthochirus* Stimpson, 1866
acanthura, Callianassa	Callianassidae	*Necallianassa acanthura* (Caroli, 1946)
acutirostella, Callianassa	Callianassidae	*Spinicallianassa acutirostella* (Sakai, 1988) **comb. nov.**
adamas, Callianassa	Callichiridae	*Callichirus adamas* (Kensley, 1974)
aequimana, Callianassa (Callichirus)	Eucalliacidae	*Eucalliaxiopsis aequimana* (Baker, 1907) **comb. nov.**
agassizi, Callianassa	Anacalliacidae	*Anacalliax agassizi* (Biffar, 1971)
almeidai, Ctenocheloides	Ctenochelidae	*Ctenocheloides almeidai* Anker & Pachelle, 2013
amboinae, Scallasis	Callianassidae	*Scallasis amboinae* Bate, 1888
amboinensis, Callianassa	Callianassidae	*Rayllianassa amboinensis* (De Man, 1888)
amplimaxilla, Callianassa	Callianassidae	*Aqaballianassa amplimaxilla* (Sakai, 2002) **comb. nov.**
andamanica, Calliax	Eucalliacidae	*Andamancalliax andamanica* (Sakai, 2002)
andamaniensis, Trypaea	Callianassidae	*Scallasis andamaniensis* (Sakai, 2010) **comb. nov.**
angelikae, Neocallichirus	Callichiridae	*Neocallichirus angelikae* Sakai, 2000
anoploura, Callianassa	Callianassidae	Incertae sedis *anoploura* Sakai, 2002
anovalis, Callianopsis	Callianopsidae	*Callianopsis anovalis* Lin, Komai & Chan, 2007
aqabaensis, Callianassa	Callianassidae	*Aqaballianassa aqabaensis* (Dworschak, 2003) **comb. nov.**
arenosa, Callianassa	Callianassidae	*Arenallianassa arenosa* (Poore, 1975) **comb. nov.**
argentinensis, Callianassa	Anacalliacidae	*Anacalliax argentinensis* (Biffar, 1971)
arguinensis, Gilvossius	Callianassidae	*Gilvossius arguinensis* Sakai, Türkay, Beuck & Freiwald, 2015
armata, Callianassa	Callichiridae	*Glypturus armatus* (A.Milne-Edwards, 1870)
articulata, Callianassa	Callichiridae	*Corallianassa articulata* (Rathbun, 1906)
arutyunovi, Vulcanocalliax	Callianopsidae	*Vulcanocalliax arutyunovi* Dworschak & Cunha, 2007
assimilis, Callianassa (Callichirus)	Callichiridae	*Corallianassa assimilis* (De Man, 1928)
attenboroughi, Ctenocheloides	Ctenochelidae	*Ctenocheloides attenboroughi* Anker, 2010
auchenorhynchus, Neocallichirus	Callichiridae	*Neocallichirus auchenorhynchus* Sakai, 2005
audax, Callianassa	Callichiridae	*Audacallichirus audax* (De Man, 1911) **comb. nov.**
aungtonyae, Gourretia	Ctenochelidae	*Paragourretia aungtonyae* (Sakai, 2002)
australiensis, Trypaea	Callianassidae	*Trypaea australiensis* Dana, 1852
australis, subterranea, Callianassa	Callianassidae	*Callianassa australis* Kensley, 1974
Balssi, Callianassa (Callichirus)	Callichiridae	*Balsscallichirus balssi* (Monod, 1933)
balssi, Ctenocheles	Ctenochelidae	*Ctenocheles balssi* Kishinouye, 1926
bangensis, Callianassa	Callianassidae	*Rayllianassa bangensis* (Sakai, 2005) **comb. nov.**
barracuda, Gourretia	Ctenochelidae	*Gourretia barracuda* LeLoeuff & Intès, 1974
berylae, Necallianassa	Callianassidae	*Necallianassa berylae* Heard & Manning, 1998
bicauda, Notiax	Callianassidae	*Pugnatrypaea bicauda* (Sakai, 2010) **comb. nov.**
biffari, Callianassa	Callianassidae	*Neotrypaea biffari* (Holthuis, 1991)
biffari, Gourretia	Ctenochelidae	*Paragourretia biffari* (Blanco-Rambla & Liñero-Arana, 1994)
biformis, Callianassa	Callianassidae	*Biffarius biformis* (Biffar, 1971)
bocourti, Callianassa	Callichiridae	*Lepidophthalmus bocourti* (A. Milne-Edwards, 1870)
bollorei, Paracalliax	Paracalliacidae	*Paracalliax bollorei* de Saint Laurent, 1979
borradailei, longiventris, Callianassa	Callichiridae	*Corallianassa borradailei* (De Man, 1928)
boucheti, Ctenocheloides	Ctenochelidae	*Ctenocheloides boucheti* Poore, 2015
Bouvieri, Callianassa	Callianassidae	*Paratrypaea bouvieri* (Nobili, 1904)
brachyophthalma, Callianassa	Callianassidae	*Notiax brachyophthalma* (A.Milne-Edwards, 1870)
brachytelson, Callianassa	Callianassidae	*Cheramoides brachytelson* (Sakai, 2002) **comb. nov.**
brevirostris, Callianassa	Callianassidae	*Aqaballianassa brevirostris* (Sakai, 2002) **comb. nov.**

Species, Genus	Family allocation	Current combination, authority
bulimba, Callianassa	Eucalliacidae	*Calliaxina bulimba* (Poore & Griffin, 1979)
cacahuate, Neocallichirus	Callichiridae	*Neocallichirus cacahuate* Felder & Manning, 1995
caechabitator, Neocallichirus	Callichiridae	*Neocallichirus caechabitator* Sakai, 1988
caecigena, Callianassa	Callianopsidae	*Callianopsis caecigena* (Alcock & Anderson, 1894)
caesari, Pseudobiffarius	Callianassidae	*Neotrypaea ca*esari (Heard & Manning, 2000) **comb. nov.**
calderus, Paraglypturus	Eucalliacidae	*Paraglypturus calderus* Türkay & Sakai, 1995
caledonica, Callianassa	Callianassidae	*Scallasis caledonica* (Ngoc-Ho, 1991) **comb. nov.**
californiensis, Callianassa	Callianassidae	*Neotrypaea californiensis* (Dana, 1854)
Calmani, Callianassa	Callichiridae	*Neocallichirus calmani* (Nobili, 1904)
candidus, Cancer	Callianassidae	*Gilvossius candidus* (Olivi, 1792)
cavifrons, Cheramus	Callianassidae	*Caviallianassa cavifrons* (Komai & Fujiwara, 2012) **comb. nov.**
cearaensis, Eucalliax	Eucalliacidae	*Eucalliaxiopsis cearaensis* (Rodrigues & Manning, 1992)
ceramica, Callianassa	Callianassidae	*Filhollianassa ceramica* (Fulton & Grant, 1906) **comb. nov.**
chakratongae, Callianassa	Callianassidae	Incertae sedis *chakratongae* Sakai, 2002
charcoti, Calliapagurops	Callichiridae	*Calliapagurops charcoti* de Saint Laurent, 1973
collaroy, Callianassa	Callichiridae	*Corallianassa collaroy* (Poore & Griffin, 1979)
collini, Ctenocheles	Ctenochelidae	*Ctenocheles collini* Ward, 1945
contipes, Callianassa	Callianassidae	*Scallasis contipes* (Sakai, 2002) **comb. nov.**
convexa, Callianassa	Callianassidae	*Gilvossius convexus* (de Saint Laurent & LeLoeuff, 1979)
coolibah, Gourretia	Ctenochelidae	*Paragourretia coolibah* (Poore & Griffin, 1979)
coriolisae, Callianassa	Callianassidae	*Coriollianassa coriolisae* (Ngoc-Ho, 2014) **comb. nov.**
costaricensis, Callianassa	Callianassidae	*Neotrypaea costaricensis* (Sakai, 2005) **comb. nov.**
Coutierei, Callianassa	Callichiridae	*Corallianassa coutierei* (Nobili, 1904)
crosnieri, Gourretia	Ctenochelidae	*Paragourretia crosnieri* (Ngoc-Ho, 1991)
darwinensis, Neocallichirus	Callichiridae	*Neocallichirus darwinensis* Sakai, 1988
darvishi, Neocallichirus	Callichiridae	*Neocallichirus darvishi* Sepahvand, Komai, Momtazi & Shahabi, 2018
debilis, Biffarius	Callianassidae	*Fragillianassa debilis* (Hernandez-Aguilera, 1998) **comb. nov.**
delicatulus, Biffarius	Callianassidae	*Biffarius delicatulus* Rodrigues & Manning, 1992
denticulata, Callianassa	Ctenochelidae	*Gourretia denticulata* (Lutze, 1937)
diaphora, Callianassa	Callianassidae	*Callianassa diaphora* LeLoeuff & Intes, 1974
doerjesti, Calliax	Eucalliacidae	*Calliax doerjesti* Sakai, 1999
ehsani, Callianassa	Callianassidae	*Aqaballianassa ehsani* (Sepahvand, Tudge & Momtazi, 2018) **comb. nov.**
Eiseni, Lepidophthalmus	Callichiridae	*Lepidophthalmus eiseni* Holmes, 1904
exilimaxilla, Callianassa	Callianassidae	Incertae sedis *exilimaxilla* Sakai, 2005
filholi, Callianassa	Callianassidae	*Filhollianassa filholi* (A.Milne-Edwards, 1878) **comb. nov.**
foresti, Callichirus	Callichiridae	*Balsscallichirus foresti* (LeLoeuff & Intès, 1974) **comb. nov.**
foresti, Calliapagurops	Callichiridae	*Calliapagurops foresti* Ngoc-Ho, 2002
fragilis, Callianassa	Callianassidae	*Fragillianassa fragilis* (Biffar, 1970) **comb. nov.**
frouini, Neocallichirus	Callichiridae	*Neocallichirus frouini* Ngoc-Ho, 2005
galathea, Tuerkaygourretia	Ctenochelidae	*Paragourretia galathea* (Sakai, 2017) **comb. nov.**
garthi, Callianassa	Callichiridae	*Callichirus garthi* (Retamal, 1975)
gaucho, Poti	Callianassidae	*Poti gaucho* Rodrigues & Manning, 1992
geomar, Bathycalliax	Callianopsidae	*Bathycalliax geomar* Sakai & Türkay, 1999
gigas, Callianassa	Callianassidae	*Neotrypaea gigas* (Dana, 1852)
gilchristi, Callianassa	Callichiridae	*Balsscallichirus gilchristi* (Barnard, 1947)
goniophthalma, Callianassa	Callianopsidae	*Callianopsis goniophthalma* (Rathbun, 1902)
grandidieri, Callianassa	Callichiridae	*Lepidophthalmus grandidieri* (Coutière, 1899)
grandimana, Callianassa	Callichiridae	*Neocallichirus grandimana* (Gibbes, 1850)
grandis, Neocallichirus	Callichiridae	*Laticallichirus grandis* (Karasawa & Goda, 1996)
gruneri, Callianassa	Callianassidae	Incertae sedis *gruneri* Sakai, 1999
guaiqueri, Sergio	Callichiridae	*Neocallichirus guaiqueri* (Blanco-Rambla, Liñero-Arana & Beltràn Lares, 1995)

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guara, Callianassa	Callichiridae	*Neocallichirus guara* (Rodrigues, 1971)
guassutinga, Callianassa	Callichiridae	*Neocallichirus guassutinga* (Rodrigues, 1971)
guineensis, Callianassa	Callichiridae	*Balsscallichirus guineensis* (De Man, 1928)
hainanensis, Nihonotrypaea	Callianassidae	*Neotrypaea hainanensis* (Liu & Liu, 2014) **comb. nov.**
harmandi, Callianassa	Callianassidae	*Neotrypaea harmandi* (Bouvier, 1901) **comb. nov.**
hartmeyeri, Callianassa	Callichiridae	*Corallianassa hartmeyeri* (Schmitt, 1935)
haswelli, Callianassa	Callichiridae	*Corallianassa haswelli* (Poore & Griffin, 1979)
holthuisi, Ctenocheles	Ctenochelidae	*Ctenocheles holthuisi* Rodrigues, 1978
horneri, Neocallichirus	Callichiridae	*Neocallichirus horneri* Sakai, 1988
inaequimana, Eucalliax	Eucalliacidae	*Eucalliaxiopsis inaequimana* (Dworschak, 2014) **comb. nov.**
indica, Michaelcallianassa	Callichiridae	*Michaelcallianassa indica* Sakai, 2002
intermedia, Callianassa	Callianassidae	*Pugnatrypaea intermedia* (De Man, 1905) **comb. nov.**
intesi, Callichirus	Callichiridae	*Corallianassa intesi* (de Saint Laurent & LeLoeuff, 1979)
iranicus, Cheramus	Callianassidae	*Pugnatrypaea iranica* (Sepahvand, Momtazi & Tudge, 2015) **comb. nov.**
islagrande, Callianassa	Callichiridae	*Callichirus islagrande* (Schmitt, 1935)
jamaicense, Callianassa	Callichiridae	*Lepidophthalmus jamaicense* (Schmitt, 1935)
japonica, subterranea, Callianassa	Callianassidae	*Neotrypaea japonica* (Ortmann, 1891) **comb. nov.**
joculatrix, Callianassa	Callianassidae	*Jocullianassa joculatrix* (De Man, 1905) **comb. nov.**
jonesi, Calliax	Eucalliacidae	*Eucalliaxiopsis jonesi* (Heard, 1989) **comb. nov.**
Jousseaumei, Callianassa	Callichiridae	*Neocallichirus jousseaumei* (Nobili, 1904)
karumba, Callianassa	Callichiridae	*Karumballichirus karumba* (Poore & Griffin, 1979) **comb. nov.**
kensleyi, Eucalliax	Eucalliacidae	*Calliaxina kensleyi* (Dworschak, 2005)
kowalevski, Trypaea	Callianassidae	*Jocullianassa kowalevski* (Sakai, 2010) **comb. nov.**
kraussi, Callianassa	Callichiridae	*Kraussillichirus kraussi* (Stebbing, 1900) **comb. nov.**
laevidactyla, Gourretia	Ctenochelidae	*Paragourretia laevidactyla* (Liu & Liu, 2010) **comb. nov.**
lahouensis, Gourretia	Ctenochelidae	*Paragourretia lahouensis* (LeLoeuff & Intes, 1974)
lanceolata, Callianassa (Callichirus)	Callichiridae	*Corallianassa lanceolata* (Edmondson, 1944)
laresi, Gourretia	Ctenochelidae	*Gourretia laresi* Blanco-Rambla & Liñero-Arana, 1994
latispina, Callianassa	Ctenochelidae	*Dawsonius latispina* (Dawson, 1967)
laurae, Callichirus	Callichiridae	*Glypturus laurae* (de Saint Laurent, 1984)
loeuffintesi, Gourretia	Ctenochelidae	*Gourretia loeuffintesi* Sakai, 2011
lemaitrei, Neocallichirus	Callichiridae	*Neocallichirus lemaitrei* Manning, 1993
leviceps, Ctenocheles	Ctenochelidae	*Ctenocheles leviceps* Rabalais, 1979
lewtonae, Callianassa	Callianassidae	*Aqaballianassa lewtonae* (Ngoc-Ho, 1994) **comb. nov.**
lignicola, Callianassa	Callianassidae	*Raylianassa lignicola* (Alcock & Anderson, 1899) **comb. nov.**
limosa, Callianassa	Callianassidae	*Biffarius limosus* (Poore, 1975)
lobata, Callianassa	Eucalliacidae	*Calliax lobata* (de Gaillande & Lagardere, 1966)
lobetobensis, Callianassa	Callianassidae	*Pugnatrypaea lobetobensis* (De Man, 1905) **comb. nov.**
longicauda, Callianassa	Callianassidae	*Praedatrypaea longicauda* (Sakai, 1967) **comb. nov.**
longiventris, Callianassa	Callichiridae	*Corallianassa longiventris* (A.Milne-Edwards, 1870)
louisianensis, jamaicense, Callianassa	Callichiridae	*Lepidophthalmus louisianensis* (Schmitt, 1935)
madagassa, Calliaxiopsis	Eucalliacidae	*Eucalliaxiopsis madagassa* (Sakai & Türkay, 2014) **comb. nov.**
madagassa, Callianassa	Callichiridae	*Lepidophthalmus madagassus* (Lenz & Richters, 1881) **comb. nov.**
major, Callianassa	Callichiridae	*Callichirus major* (Say, 1818)
makarovi, Nihonotrypaea	Callianassidae	*Neotrypaea makarovi* (Marin, 2013) **comb. nov.**
malaccaensis, Callianassa	Callianassidae	*Coriollianassa malaccaensis* (Sakai, 2002) **comb. nov.**
maldivensis, Callianassa	Callianassidae	*Paratrypaea maldivensis* (Borradaile, 1904)
manihinae, Gourretia	Ctenochelidae	*Gourretia manihinae* Sakai, 1984
manningi, Lepidophthalmus	Callichiridae	*Lepidophthalmus manningi* Felder & Staton, 2000
manningi, Neocallichirus	Callichiridae	*Neocallichirus manningi* Kazmi & Kazmi, 1992
maorianus, Ctenocheles	Ctenochelidae	*Ctenocheles maorianus* Powell, 1949

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marchali, Callianassa	Callianassidae	*Callianassa marchali* LeLoeuff & Intes, 1974
marginata, Callianassa	Callianassidae	*Cheramoides marginata* (Rathbun, 1901)
martensi, Callianassa	Callichiridae	*Corallianassa martensi* (Miers, 1884)
maryae, Neocallichirus	Callichiridae	*Neocallichirus maryae* Karasawa, 2004
masoomi, Callianassa	Callichiridae	*Balsscallichirus masoomi* (Tirmizi, 1970)
matzi, Callianassa	Callianassidae	*Jocullianassa matzi* (Sakai, 2002) **comb. nov.**
mauritana, Phaetoncalliax	Callianopsidae	*Callianopsis mauritana* (Sakai, Türkay, Beuck & Freiwald, 2015)
mauritiana, Callianassa	Callichiridae	*Neocallichirus mauritianus* (Miers, 1882)
mcilhennyi, Eucalliax	Eucalliacidae	*Eucalliaxiopsis mcilhennyi* (Felder & Manning, 1994) **comb. nov.**
melissae, Biffarius	Callianassidae	*Neotrypaea melissae* (Poore, 2008) **comb. nov.**
mericeae, Sergio	Callichiridae	*Neocallichirus mericeae* (Manning & Felder, 1995) **comb. nov.**
mirim, Callianassa	Callichiridae	*Audacallichirus mirim* (Rodrigues, 1971) **comb. nov.**
mocambiquensis, Callianassa	Callichiridae	*Mocallichirus mocambiquensis* (Sakai, 2004) **comb. nov.**
modesta, Callianassa (Calliactites)	Callianassidae	*Praedatrypaea modesta* (De Man, 1905) **comb. nov.**
moluccensis, Callianassa (Cheramus)	Callichiridae	*Neocallichirus moluccensis* (De Man, 1905)
monodi, Callichirus	Callichiridae	*Audacallichirus monodi* (de Saint Laurent & LeLoeuff, 1979) **comb. nov.**
mortenseni, Neocallichirus	Callichiridae	*Neocallichirus mortenseni* Sakai, 2005
mucronata, Callianassa	Callichiridae	*Mucrollichirus mucronatus* (Strahl, 1862) **comb. nov.**
natalensis, Callianassa	Callichiridae	*Neocallichirus natalensis* (Barnard, 1947)
natesi, Lepidophthalmus	Callichiridae	*Lepidophthalmus natesi* Felder & Robles, 2015
ngochoae, Callianassa	Callianassidae	Incertae sedis *ngochoae* Sakai, 1999
nickellae, Neocallichirus	Callichiridae	*Neocallichirus nickellae* Manning, 1993
nieli, Callianassa	Callianassidae	*Aqaballianassa nieli* (Sakai, 2002) **comb. nov.**
nigroculata, Callianassa	Callianassidae	Incertae sedis *nigroculata* Sakai, 200
nomurai, Ctenocheloides	Ctenochelidae	*Kiictenochelodes nomurai* (Komai, 2013)
nosybeensis, Gourretia	Ctenochelidae	*Gourretia nosybeensis* Sakai, 2004
novae-britanniae, Callianassa	Eucalliacidae	*Calliaxina novaebritanniae* (Borradaile, 1900) **comb. nov.**
oblonga, Callianassa	Callianassidae	*Cheramoides oblonga* (LeLoeuff & Intes, 1974) **comb. nov.**
ohuranus, Cheramus	Callianassidae	*Spinicallianassa ohurana* (Komai, Maenosono & Fujita, 2014) **comb. nov.**
orientalis, Cheramus	Callianassidae	*Pugnatrypaea orientalis* (Bate, 1888) **comb. nov.**
pachydactyla, Callianassa	Callichiridae	*Neocallichirus pachydactyla* (A. Milne-Edwards, 1870)
pacificus, Biffarius	Callianassidae	*Neotrypaea pacifica* (Guzmán &Thatje, 2003) **comb. nov.**
panamensis, Lepidophthalmus	Callichiridae	*Lepidophthalmus panamensis* Felder & Robles, 2015
panglaoensis, Eucalliax	Eucalliacidae	*Eucalliaxiopsis panglaoensis* (Dworschak, 2006) **comb. nov.**
parva, Callianassa (Calliactites)	Callianassidae	*Raylianassa parva* (Edmondson, 1944) **comb. nov.**
parvula, Callianassa	Callianassidae	*Spinicallianassa parvula* (Sakai, 1988) **comb. nov.**
pentagonocephala, Callianassa	Callichiridae	*Audacallichirus pentagonocephala* (Rossignol, 1962) **comb. nov.**
persica, Callianassa	Callianassidae	*Callianassa persica* Sakai, 2005
petalura, Callianassa	Callianassidae	*Neotrypaea petalura* (Stimpson, 1860) **comb. nov.**
phuketensis, Gourretia	Ctenochelidae	*Paragourretia phuketensis* (Sakai, 2002)
pixii, Callianassa	Callichiridae	*Balsscallichirus pixii* (Kensley, 1976) **comb. nov.**
plantei, Callianassa	Callianassidae	Incertae sedis *plantei* Sakai, 2004
plantei, Thaumastochelopsis	Ctenochelidae	*Ctenocheles plantei* (Burukovsky, 2005)
pola, Neocallichirus	Callichiridae	*Neocallichirus pola* Sakai & Türkay, 2014
poorei, Callianassa	Callianassidae	*Tastrypaea poorei* (Sakai, 1999) **comb. nov.**
portsudanensis, Pseudogourretia	Ctenochelidae	*Paragourretia portsudanensis* (Sakai, 2005) **comb. nov.**
praedatrix, Callianassa	Callianassidae	*Praedatrypaea praedatrix* (De Man, 1905) **comb. nov.**
profunda, Callianassa	Callianassidae	*Cheramus profundus* (Biffar, 1973)
propinqua, Callianassa	Callianassidae	*Praedatrypaea propinqua* (De Man, 1905) **comb. nov.**
propriopedis, Callianassa	Callianassidae	Incertae sedis *propriopedis* Sakai, 2002
pugnatrix, Callianassa	Callianassidae	*Pugnatrypaea pugnatrix* (De Man, 1905) **comb. nov.**

Species, Genus	Family allocation	Current combination, authority
punica, Calliax	Eucalliacidae	*Calliaxina punica* (de Saint Laurent & Manning, 1982)
pygmaea, Callianassa	Callianassidae	*Scallasis pygmaea* (De Man, 1928) **comb. nov.**
qeshmensis, Gourretia	Ctenochelidae	*Gourretia qeshmensis* Sepahvand, Pouyani & Momtazi, 2016
quadracuta, Callianassa	Eucalliacidae	*Eucalliax quadracuta* (Biffar, 1970)
rabalaisae, Glypturus	Callichiridae	*Glypturus rabalaisae* Sakai, 2011
rafai, Lepidophthalmus	Callichiridae	*Lepidophthalmus rafai* Felder & Manning, 1998
ranongensis, Callianassa (*Callichirus*)	Callichiridae	*Thailandcallichirus ranongensis* (Sakai, 1983)
raymanningi, Neocallichirus	Callichiridae	*Neocallichirus raymanningi* Blanco-Rambla & Lemaitre, 1999
rhopalommata, Laurentgourretia	Ctenochelidae	*Laurentgourretia rhopalommata* Sakai, 2004
richardi, Lepidophthalmus	Callichiridae	*Lepidophthalmus richardi* Felder & Manning, 1997
Rochei, Callianassa	Callianassidae	*Neotrypaea rochei* (Bouvier, 1895)
Rosae, Callianassa (Callichirus)	Callichiridae	*Lepidophthalmus rosae* (Nobili, 1904)
rotundicaudata, Callianassa	Callianassidae	*Gilvossius rotundicaudatus* (Stebbing, 1902)
rotundocula, Trypaea	Callianassidae	Incertae sedis *rotundocula* Sakai & Türkay, 2014
rudisulcus, Rayllianassa	Callianassidae	*Rudisullianassa rudisulcus* (Komai, Fujita & Maenosono, 2014) **comb. nov.**
sahul, Callianassa	Callianassidae	*Rayllianassa sahul* (Poore, 2008) **comb. nov.**
sakaii, Calliax	Eucalliacidae	*Calliaxina sakaii* (de Saint Laurent, 1979)
santarita, Notiax	Callianassidae	*Notiax santarita* Thatje, 2000
santarosaensis, Callichirus	Callichiridae	*Callichirus santarosaensis* Sakai & Türkay, 2012
sassandrensis, Callichirus	Callichiridae	*Neocallichirus sassandrensis* (LeLoeuff & Intès, 1974)
seilacheri, Callianassa	Callichiridae	*Callichirus seilacheri* (Bott, 1955)
serrifrons, Ctenocheles	Ctenochelidae	*Ctenocheles serrifrons* LeLoeuff & Intès, 1974
setimanus, Gonodactylus	Callianassidae	*Gilvossius setimanus* (DeKay, 1844)
Sibogae, Callianassa	Callianassidae	*Coriollianassa sibogae* (De Man, 1905) **comb. nov.**
sinica, Michaelcallianassa	Callichiridae	*Michaelcallianassa sinica* Liu & Liu, 2009
sinica, Gourretia	Ctenochelidae	*Gourretia sinica* Liu & Liu, 2010
sinuensis, Lepidophthalmus	Callichiridae	*Lepidophthalmus sinuensis* Lemaitre & Rodrigues, 1991
siriboia, Lepidophthalmus	Callichiridae	*Lepidophthalmus siriboia* Felder & Rodrigues, 1993
spinicauda, Cheramus	Callianassidae	*Spinicallianassa spinicauda* (Komai, Maenosono & Fujita, 2014) **comb. nov.**
spinoculata, Callianassa	Callianassidae	*Aqaballianassa spinoculata* (Sakai, 2005) **comb. nov.**
spinophthalma, Callianassa	Callianassidae	*Scallasis spinophthalma* (Sakai, 1970) **comb. nov.**
spinorostra, Trypaea	Callianassidae	*Jocullianassa spinorostra* (Sakai, 2010) **comb. nov.**
spiridonovi, Callichiropsis	Callichiridae	*Neocallichirus spiridonovi* (Sakai, 2010) **comb. nov.**
statoni, Lepidophthalmus	Callichiridae	*Lepidophthalmus statoni* Felder, 2015
stenomastaxa, Callianassa	Callianassidae	Incertae sedis *stenomastaxa* Sakai, 2002
subterraneus, Cancer (Astacus)	Callianassidae	*Callianassa subterranea* (Montagu, 1808)
sulfureus, Sergio	Callichiridae	*Neocallichirus sulfureus* (Lemaitre & Felder, 1996)
tabogensis, Callianassa	Callianassidae	*Neotrypaea tabogensis* (Sakai, 2005)
tamakii, Grynaminna	Callichiridae	*Grynaminna tamakii* Poore, 2000
tenuimanus, Callichirus	Callichiridae	*Balsscallichirus tenuimanus* (de Saint Laurent & LeLoeuff, 1979)
tenuipes, Callianassa	Callianassidae	Incertae sedis *tenuipes* Sakai, 2002
thailandica, Callianassa	Callianassidae	*Caviallianassa thailandica* (Sakai, 2005) **comb. nov.**
thalesapensis, Neocallichirus	Callichiridae	*Karumballichirus thalesapensis* (Sakai & Lheknim, 2014) **comb. nov.**
thermophila, Nihonotrypaea	Callianassidae	*Neotrypaea thermophila* (Lin, Komai & Chan, 2007) **comb. nov.**
thorsoni, Callianassa	Callianassidae	*Aqaballianassa thorsoni* (Sakai, 2005) **comb. nov.**
timiris, Neocallichirus	Callianassidae	*Callianassa timiris* (Sakai, Türkay, Beuck & Freiwald, 2015) **comb. nov.**
tonganus, Paraglypturus	Eucalliacidae	*Paraglypturus tonganus* Ahn, Kim, Ju & Min, 2017
tonkinae, Callianassa (Scallasis)	Callianassidae	*Scallasis tonkinae* (Grebenjuk, 1975) **comb. nov.**
tooradin, Callianassa	Eucalliacidae	*Pseudocalliax tooradin* (Poore & Griffin, 1979)
tridentata, Callianassa	Callichiridae	*Lepidophthalmus tridentatus* (von Martens, 1868)
trilobata, Callianassa	Callichiridae	*Glypturoides trilobata* (Biffar, 1970)

Species, Genus	Family allocation	Current combination, authority
truncata, Callianassa	Callianassidae	*Necallianassa truncata* (Giard & Bonnier, 1890)
tulearensis, Calliax	Eucalliacidae	*Calliax tulearensis* Ngoc-Ho, 2014
turnerana, Callianassa	Callichiridae	*Lepidophthalmus turneranus* (White, 1861)
tyrrhenus, Astacus	Callianassidae	*Gilvossius tyrrhenus* (Petagna, 1792)
uncinata, Callianassa	Callianassidae	*Neotrypaea uncinata* (H.Milne Edwards, 1837)
variabilis, Callianassa (Cheramus)	Callichiridae	*Neocallichirus variabilis* (Edmondson, 1944)
vaugelasi, Neocallichirus	Callichiridae	*Neocallichirus vaugelasi* Dworschak, 2011
vietnamensis, Trypaea	Callianassidae	*Jocullianassa vietnamensis* (Sakai, 2010) **comb. nov.**
vigilax, Callianassa (Callichirus)	Callichiridae	*Neocallichirus vigilax* (De Man, 1916)
whitei, Callianassa	Callianassidae	*Gilvossius whitei* (Sakai, 1999)
winslowi, Callianassa (Callichirus)	Callichiridae	*Corallianassa winslowi* (Edmondson, 1944)
xishaensis, Calliaxina	Eucalliacidae	*Calliaxina xishaensis* Liu & Liang, 2016
xutha, Corallianassa	Callichiridae	*Corallianassa xutha* Manning, 1988
zarenkovi, Paragourretia	Ctenochelidae	*Gourretia zarenkovi* (Sakai, 2010) **comb. nov.**

Table 2. Accepted names of 265 species of callianassoids listed alphabetically by family and genus. 87 are in new combinations. Commonly accepted junior synonyms are not included (see WoRMS Editorial Board 2018). Eleven species of Callianassidae inadequately described or figured are placed incertae sedis at the end of the table.

Anacalliacidae
Anacalliax agassizi (Biffar, 1971)
Anacalliax argentinensis (Biffar, 1971)

Callianassidae
Aqaballianassa amplimaxilla (Sakai, 2002) **comb. nov.**
Aqaballianassa aqabaensis (Dworschak, 2003) **comb. nov.**
Aqaballianassa brevirostris (Sakai, 2002) **comb. nov.**
Aqaballianassa ehsani (Sepahvand, Tudge & Momtazi, 2018) **comb. nov.**
Aqaballianassa lewtonae (Ngoc-Ho, 1994) **comb. nov.**
Aqaballianassa nieli (Sakai, 2002) **comb. nov.**
Aqaballianassa spinoculata (Sakai, 2005) **comb. nov.**
Aqaballianassa thorsoni (Sakai, 2005) **comb. nov.**
Arenallianassa arenosa (Poore, 1975) **comb. nov.**
Biffarius biformis (Biffar, 1971)
Biffarius delicatulus Rodrigues & Manning, 1992
Biffarius limosus (Poore, 1975)
Callianassa australis Kensley, 1974
Callianassa diaphora LeLoeuff & Intès, 1974
Callianassa marchali LeLoeuff & Intès, 1974
Callianassa persica Sakai, 2005
Callianassa subterranea (Montagu, 1808)
Callianassa timiris (Sakai, Türkay, Beuck & Freiwald, 2015) **comb. nov.**
Caviallianassa cavifrons (Komai & Fujiwara, 2012) **comb. nov.**
Caviallianassa thailandica (Sakai, 2005) **comb. nov.**
Cheramoides brachytelson (Sakai, 2002) **comb. nov.**
Cheramoides marginata (Rathbun, 1901)
Cheramoides oblonga (LeLoeuff & Intes, 1974) **comb. nov.**
Cheramus profundus (Biffar, 1973)
Coriollianassa coriolisae (Ngoc-Ho, 2014) **comb. nov.**
Coriollianassa malaccaensis (Sakai, 2002) **comb. nov.**
Coriollianassa sibogae (De Man, 1905) **comb. nov.**
Filhollianassa ceramica (Fulton & Grant, 1906) **comb. nov.**
Filhollianassa filholi (A.Milne-Edwards, 1878) **comb. nov.**
Fragillianassa debilis (Hernandez-Aguilera, 1998) **comb. nov.**
Fragillianassa fragilis (Biffar, 1970) **comb. nov.**
Gilvossius arguinensis Sakai, Türkay, Beuck & Freiwald, 2015
Gilvossius candidus (Olivi, 1792)
Gilvossius convexus (de Saint Laurent & LeLoeuff, 1979)
Gilvossius rotundicaudatus (Stebbing, 1902)
Gilvossius setimanus (DeKay, 1844)
Gilvossius tyrrhenus (Petagna, 1792)
Gilvossius whitei (Sakai, 1999)
Jocullianassa joculatrix (De Man, 1905) **comb. nov.**
Jocullianassa matzi (Sakai, 2002) **comb. nov.**
Jocullianassa spinorostra (Sakai, 2010) **comb. nov.**
Jocullianassa vietnamensis (Sakai, 2010) **comb. nov.**
Jocullianassa kowalevski (Sakai, 2010) **comb. nov.**
Lipkecallianassa abyssa Sakai, 2002
Necallianassa acanthura (Caroli, 1946)
Necallianassa berylae Heard & Manning, 1998
Necallianassa truncata (Giard & Bonnier, 1890)
Neotrypaea biffari (Holthuis, 1991)
Neotrypaea caesari (Heard & Manning, 2000) **comb. nov.**
Neotrypaea californiensis (Dana, 1854)

Neotrypaea costaricensis (Sakai, 2005) **comb. nov.**
Neotrypaea gigas (Dana, 1852)
Neotrypaea hainanensis (Liu & Liu, 2014) **comb. nov.**
Neotrypaea harmandi (Bouvier, 1901) **comb. nov.**
Neotrypaea japonica (Ortmann, 1891) **comb. nov.**
Neotrypaea makarovi (Marin, 2013) **comb. nov.**
Neotrypaea melissae (Poore, 2008) **comb. nov.**
Neotrypaea pacifica (Guzmán &Thatje, 2003) **comb. nov.**
Neotrypaea petalura (Stimpson, 1860) **comb. nov.**
Neotrypaea rochei (Bouvier, 1895)
Neotrypaea tabogensis (Sakai, 2005)
Neotrypaea thermophila (Lin, Komai & Chan, 2007) **comb. nov.**
Neotrypaea uncinata (H.Milne Edwards, 1837)
Notiax brachyophthalma (A.Milne-Edwards, 1870)
Notiax santarita Thatje, 2000
Paratrypaea bouvieri (Nobili, 1904)
Paratrypaea maldivensis (Borradaile, 1904)
Poti gaucho Rodrigues & Manning, 1992
Praedatrypaea longicauda (Sakai, 1967) **comb. nov.**
Praedatrypaea modesta (De Man, 1905) **comb. nov.**
Praedatrypaea praedatrix (De Man, 1905) **comb. nov.**
Praedatrypaea propinqua (De Man, 1905) **comb. nov.**
Pugnatrypaea bicauda (Sakai, 2010) **comb. nov.**
Pugnatrypaea intermedia (De Man, 1905) **comb. nov.**
Pugnatrypaea iranica (Sepahvand, Momtazi & Tudge, 2015) **comb. nov.**
Pugnatrypaea lobetobensis (De Man, 1905) **comb. nov.**
Pugnatrypaea orientalis (Bate, 1888) **comb. nov.**
Pugnatrypaea pugnatrix (De Man, 1905) **comb. nov.**
Rayllianassa amboinensis (De Man, 1888)
Rayllianassa bangensis (Sakai, 2005) **comb. nov.**
Rayllianassa lignicola (Alcock & Anderson, 1899) **comb. nov.**
Rayllianassa parva (Edmondson, 1944) **comb. nov.**
Rayllianassa sahul (Poore, 2008) **comb. nov.**
Rudisullianassa rudisulcus (Komai, Fujita & Maenosono, 2014) **comb. nov.**
Scallasis amboinae Bate, 1888
Scallasis andamaniensis (Sakai, 2010) **comb. nov.**
Scallasis caledonica (Ngoc-Ho, 1991) **comb. nov.**
Scallasis contipes (Sakai, 2002) **comb. nov.**
Scallasis pygmaea (De Man, 1928) **comb. nov.**
Scallasis spinophthalma (Sakai, 1970) **comb. nov.**
Scallasis tonkinae (Grebenjuk, 1975) **comb. nov.**
Spinicallianassa acutirostella (Sakai, 1988) **comb. nov.**
Spinicallianassa ohurana (Komai, Maenosono & Fujita, 2014) **comb. nov.**
Spinicallianassa parvula (Sakai, 1988) **comb. nov.**
Spinicallianassa spinicauda (Komai, Maenosono & Fujita, 2014) **comb. nov.**
Tastrypaea poorei (Sakai, 1999) **comb. nov.**
Trypaea australiensis Dana, 1852

Callianopsidae
Bathycalliax geomar Sakai & Türkay, 1999
Callianopsis anovalis Lin, Komai & Chan, 2007
Callianopsis caecigena (Alcock & Anderson, 1894)
Callianopsis goniophthalma (Rathbun, 1902)
Callianopsis mauritana (Sakai, Türkay, Beuck & Freiwald, 2015)
Vulcanocalliax arutyunovi Dworschak & Cunha, 2007

Callichiridae
Audacallichirus audax (De Man, 1911) **comb. nov.**
Audacallichirus mirim (Rodrigues, 1971) **comb. nov.**

Audacallichirus monodi (de Saint Laurent & LeLoeuff, 1979) **comb. nov.**
Audacallichirus pentagonocephala (Rossignol, 1962) **comb. nov.**
Balsscallichirus balssi (Monod, 1933)
Balsscallichirus foresti (LeLoeuff & Intes, 1974) **comb. nov.**
Balsscallichirus gilchristi (Barnard, 1947)
Balsscallichirus guineensis (De Man, 1928)
Balsscallichirus masoomi (Tirmizi, 1970)
Balsscallichirus pixii (Kensley, 1976) **comb. nov.**
Balsscallichirus tenuimanus (de Saint Laurent & LeLoeuff, 1979)
Calliapagurops charcoti de Saint Laurent, 1973
Calliapagurops foresti Ngoc-Ho, 2002
Callichirus adamas (Kensley, 1974)
Callichirus garthi (Retamal, 1975)
Callichirus islagrande (Schmitt, 1935)
Callichirus major (Say, 1818)
Callichirus santarosaensis Sakai & Türkay, 2012
Callichirus seilacheri (Bott, 1955)
Corallianassa articulata (Rathbun, 1906)
Corallianassa assimilis (De Man, 1928)
Corallianassa borradailei (De Man, 1928)
Corallianassa collaroy (Poore & Griffin, 1979)
Corallianassa coutierei (Nobili, 1904)
Corallianassa hartmeyeri (Schmitt, 1935)
Corallianassa haswelli (Poore & Griffin, 1979)
Corallianassa intesi (de Saint Laurent & LeLoeuff, 1979)
Corallianassa lanceolata (Edmondson, 1944)
Corallianassa longiventris (A.Milne-Edwards, 1870)
Corallianassa martensi (Miers, 1884)
Corallianassa winslowi (Edmondson, 1944)
Corallianassa xutha Manning, 1988
Glypturoides trilobata (Biffar, 1970)
Glypturus acanthochirus Stimpson, 1866
Glypturus armatus (A.Milne-Edwards, 1870)
Glypturus laurae (de Saint Laurent, 1984)
Glypturus rabalaisae Sakai, 2011
Grynaminna tamakii Poore, 2000
Karumballichirus karumba (Poore & Griffin, 1979) **comb. nov.**
Karumballichirus thalesapensis (Sakai & Lheknim, 2014) **comb. nov.**
Kraussillichirus kraussi (Stebbing, 1900) **comb. nov.**
Laticallichirus grandis (Karasawa & Goda, 1996)
Lepidophthalmus bocourti (A. Milne-Edwards, 1870)
Lepidophthalmus eiseni Holmes, 1904
Lepidophthalmus grandidieri (Coutière, 1899)
Lepidophthalmus jamaicense (Schmitt, 1935)
Lepidophthalmus louisianensis (Schmitt, 1935)
Lepidophthalmus madagassus (Lenz & Richters, 1881) **comb. nov.**
Lepidophthalmus manningi Felder & Staton, 2000
Lepidophthalmus natesi Felder & Robles, 2015
Lepidophthalmus panamensis Felder & Robles, 2015
Lepidophthalmus rafai Felder & Manning, 1998
Lepidophthalmus richardi Felder & Manning, 1997
Lepidophthalmus rosae (Nobili, 1904)
Lepidophthalmus sinuensis Lemaitre & Rodrigues, 1991
Lepidophthalmus siriboia Felder & Rodrigues, 1993
Lepidophthalmus statoni Felder, 2015
Lepidophthalmus tridentatus (von Martens, 1868)
Lepidophthalmus turneranus (White, 1861)
Michaelcallianassa indica Sakai, 2002

Michaelcallianassa sinica Liu & Liu, 2009
Mocallichirus mocambiquensis (Sakai, 2004) **comb. nov.**
Mucrollichirus mucronatus (Strahl, 1862) **comb. nov.**
Neocallichirus angelikae Sakai, 2000
Neocallichirus auchenorhynchus Sakai, 2005
Neocallichirus cacahuate Felder & Manning, 1995
Neocallichirus caechabitator Sakai, 1988
Neocallichirus calmani (Nobili, 1904)
Neocallichirus darwinensis Sakai, 1988
Neocallichirus darvishi Sepahvand, Komai, Momtazi & Shahabi, 2018
Neocallichirus frouini Ngoc-Ho, 2005
Neocallichirus grandimana (Gibbes, 1850)
Neocallichirus guaiqueri (Blanco-Rambla, Liñero-Arana & Beltràn Lares, 1995)
Neocallichirus guara (Rodrigues, 1971)
Neocallichirus guassutinga (Rodrigues, 1971)
Neocallichirus horneri Sakai, 1988
Neocallichirus jousseaumei (Nobili, 1904)
Neocallichirus lemaitrei Manning, 1993
Neocallichirus manningi Kazmi & Kazmi, 1992
Neocallichirus maryae Karasawa, 2004
Neocallichirus mauritianus (Miers, 1882)
Neocallichirus mericeae (Manning & Felder, 1995) **comb. nov.**
Neocallichirus moluccensis (De Man, 1905)
Neocallichirus mortenseni Sakai, 2005
Neocallichirus natalensis (Barnard, 1947)
Neocallichirus nickellae Manning, 1993
Neocallichirus pachydactyla (A. Milne-Edwards, 1870)
Neocallichirus pola Sakai & Türkay, 2014
Neocallichirus raymanningi Blanco-Rambla & Lemaitre, 1999
Neocallichirus sassandrensis (LeLoeuff & Intes, 1974)
Neocallichirus spiridonovi (Sakai, 2010) **comb. nov.**
Neocallichirus sulfureus (Lemaitre & Felder, 1996)
Neocallichirus variabilis (Edmondson, 1944)
Neocallichirus vaugelasi Dworschak, 2011
Neocallichirus vigilax (De Man, 1916)
Thailandcallichirus ranongensis (Sakai, 1983)

Ctenochelidae
Ctenocheles balssi Kishinouye, 1926
Ctenocheles collini Ward, 1945
Ctenocheles holthuisi Rodrigues, 1978
Ctenocheles leviceps Rabalais, 1979
Ctenocheles maorianus Powell, 1949
Ctenocheles plantei (Burukovsky, 2005)
Ctenocheles serrifrons LeLoeuff & Intes, 1974
Ctenocheloides almeidai Anker & Pachelle, 2013
Ctenocheloides attenboroughi Anker, 2010
Ctenocheloides boucheti Poore, 2015)
Dawsonius latispina (Dawson, 1967)
Gourretia barracuda LeLoeuff & Intes, 1974
Gourretia denticulata (Lutze, 1937)
Gourretia laresi Blanco-Rambla & Linero-Arana, 1994
Gourretia loeuffintesi Sakai, 2011
Gourretia manihinae Sakai, 1984
Gourretia nosybeensis Sakai, 2004
Gourretia qeshmensis Sepahvand, Pouyani & Momtazi, 2016
Gourretia sinica Liu & Liu, 2010
Gourretia zarenkovi (Sakai, 2010) **comb. nov.**

Kiictenochelodes nomurai (Komai, 2013)
Laurentgourretia rhopalommata Sakai, 2004
Paragourretia aungtonyae (Sakai, 2002)
Paragourretia biffari (Blanco-Rambla & Liñero-Arana, 1994)
Paragourretia coolibah (Poore & Griffin, 1979)
Paragourretia crosnieri (Ngoc-Ho, 1991)
Paragourretia galathea (Sakai, 2017) **comb. nov.**
Paragourretia laevidactyla (Liu & Liu, 2010) **comb. nov.**
Paragourretia lahouensis (LeLoeuff & Intès, 1974)
Paragourretia phuketensis (Sakai, 2002)
Paragourretia portsudanensis (Sakai, 2005) **comb. nov.**

Eucalliacidae
Andamancalliax andamanica (Sakai, 2002)
Calliax doerjesti Sakai, 1999
Calliax lobata (de Gaillande & Lagardère, 1966)
Calliax tulearensis Ngoc-Ho, 2014
Calliaxina bulimba (Poore & Griffin, 1979)
Calliaxina kensleyi (Dworschak, 2005)
Calliaxina novaebritanniae (Borradaile, 1900) **comb. nov.**
Calliaxina punica (de Saint Laurent & Manning, 1982)
Calliaxina sakaii (de Saint Laurent, 1979)
Calliaxina xishaensis Liu & Liang, 2016
Eucalliax quadracuta (Biffar, 1970)
Eucalliaxiopsis aequimana (Baker, 1907) **comb. nov.**
Eucalliaxiopsis cearaensis (Rodrigues & Manning, 1992)
Eucalliaxiopsis inaequimana (Dworschak, 2014) **comb. nov.**
Eucalliaxiopsis jonesi (Heard, 1989) **comb. nov.**
Eucalliaxiopsis madagassa (Sakai & Türkay, 2014) **comb. nov.**
Eucalliaxiopsis mcilhennyi (Felder & Manning, 1994) **comb. nov.**
Eucalliaxiopsis panglaoensis (Dworschak, 2006) **comb. nov.**
Paraglypturus calderus Türkay & Sakai, 1995
Paraglypturus tonganus Ahn, Kim, Ju & Min, 2017
Pseudocalliax tooradin (Poore & Griffin, 1979)

Paracalliacidae
Paracalliax bollorei de Saint Laurent, 1979

Callianassidae incertae sedis
Callianassa tenuipes Sakai, 2002 – few illustrations, possibly *Jocullianassa*
Callianassa anoploura Sakai, 2002 – few illustrations
Callianassa chakratongae Sakai, 2002 – female only described
Callianassa exilimaxilla Sakai, 2005 – female only illustrated, possibly *Jocullianassa*
Callianassa gruneri Sakai, 1999 – few illustrations
Callianassa nigroculata Sakai, 2002 – female only illustrated, possibly *Scallasis*
Callianassa ngochoae Sakai, 1999 – female only described
Callianassa plantei Sakai, 2004 – possibly two species in illustrated material; chelipeds from holotype typical of *Paratrypaea* but maxilliped 3 from another specimen of narrow form
Callianassa propriopedis Sakai, 2002 – female only described
Callianassa stenomastaxa Sakai, 2002 – female only described (possibly same species as *C. propriopedis*)
Trypaea rotundocula Sakai & Türkay, 2014 – female only described