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REVISION OF THE AMERICAN CALLIANASSIDAE (CRUSTACEA: DECAPODA: THALASSINIDEA)

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Abstract.—Two families, one new, and seven subfamilies, six new, are recognized for taxa previously assigned to the Callianassidae. The new family, Ctenochelidae, includes those taxa having a cardiac prominence on the carapace and an appendix masculina on male Plp2 and lacking a dorsal plate on the uropodal exopod. Three new ctenochelid subfamilies are recognized: Ctenochelinae, for the genera *Ctenocheles, Gourretia, Paracalliax,* and the new genus *Dawsonius,* all of which lack a dorsal oval on the carapace and have a slender propodus and dactylus on Mxp3, Plp2–5 similar in size and shape, and finger-like appendices internae on Plp3–5; Anacalliinae, containing only *Anacalliax,* which has a dorsal oval, a slender propodus and dactylus on Mxp3, and Plp1–2 different from Plp3–5, with Plp3–5 having stubby appendices internae; and Callianopsinae, containing only *Callianopsis,* which has a dorsal oval, an ovate propodus and dactylus on Mxp3, and Plp2–5 similar, with finger-like appendices internae. The family Callianassidae is restricted to those genera lacking both a cardiac prominence on the carapace and an appendix masculina on male Plp2, and which have a dorsal plate on the uropodal exopod. The nominate subfamily includes six genera with a dorsal oval on the carapace, a slender propodus and dactylus on Mxp3, and stubby appendices internae on Plp3–5: *Callianassa, Trypaea,* and *Calliapagurops,* a genus of uncertain position, and three new genera recognized here for American species: *Biffarius, Neotrypaea,* and *Notiax.* Three new callianassid subfamilies are recognized: Callichirinae, comprising five genera, *Callichirus, Corallianassa, Glypturus, Lepidophthalmus,* and *Neocallichirus,* which have a dorsal oval on the carapace, an ovate propodus and slender dactylus on Mxp3, and stubby appendices internae on Plp3–5; Eucalliinae, for *Calliax* and the new genus *Eucalliax,* which lack a dorsal oval on the carapace and have an ovate propodus and dactylus on Mxp3 and finger-like appendices internae on Plp3–5; and Cheraminae, for *Cheramus* and *Scallasis,* which have a dorsal oval, a slender propodus and dactylus on Mxp3, and slender Plp3–5, each with a finger-like appendix interna.

This study began as an attempt to construct a framework for future studies on American callianassids by examining potential generic characters and defining new genera for a disparate variety of species now placed in *Callianassa* Leach, 1814. Despite the superficial similarity of appearance of callianassids in general, our studies of callianassids in the laboratory and in the field convinced us that this genus comprises a heterogeneous assemblage of taxa that did not reflect major differences in morphology and biology in its members (see also discussions in Borradaile 1903, De Man 1928b, Gurney 1944, Biffar 1971a, De Saint Laurent 1973, De Saint Laurent & LeLoeuff 1979, and De Saint Laurent 1979; for overview see Ferrari 1981). Our analysis of characters of American species led us to conclude that the genus *Callianassa* was a

composite of numerous genera and that the family Callianassidae as currently defined (see De Saint Laurent 1973) also was a composite.

This report includes a redefinition at the family level of all callianassid genera as well as a revision at the generic level of almost all American callianassids. Not included is *Callianassa setimanus* (DeKay, 1844) (=*Callianassa atlantica* Rathbun, 1926), which we are placing in a new genus (Manning & Felder, in preparation; in the key to American genera of Callianassidae given below it would key out to *Neotrypaea,* differing from it in lacking a distally projecting lobe on the merus of Mxp3). Also omitted is *Callianassa minima* Rathbun, 1901, in which the scaphognathite lacks the setose margin characteristic of the callianassids and is ornamented instead by a single seta, characteristic of the axiids. We believe that *C. minima* should be placed in the family Thomassiniidae De Saint Laurent, 1979.

One genus included in the Callianassidae by Borradaile (1903), *Calliactites* Borradaile, 1903, was placed in the family Callianideidae De Man, 1928 as a synonym of *Callianidea* H. Milne Edwards, 1837 by De Saint Laurent (1973). It is not considered further here.

Otherwise, all nominal Recent genera formerly placed in the Callianassidae are diagnosed here and all nominal American species formerly placed in *Callianassa* are assigned to different genera. We have made no attempt to accommodate all extralimital species into the genera recognized here.

Figures are provided for most taxa, and all characters that we consider to be diagnostic are figured; some important diagnostic features are indicated by arrows. In addition to figures showing diagnostic characters of individual genera, we have included comparative figures of important morphological features, including the anterior region of the carapace (Fig. 1), some characters of the carapace (Fig. 2), Mxp3 (Fig. 3), major chelipeds (Fig. 4), abdomens and tail fans (Fig. 5), and appendices internae (Fig. 6). The overall appearance of representatives of four genera is shown in Fig. 7. We provide keys to American subfamilies and genera even though we are aware that several other new genera remain to be characterized for species now undescribed so that a key at this stage is necessarily incomplete. The keys do serve to summarize characters that we consider important at both familial and generic levels.

Abbreviations include: A1 (antennule or first antenna), A2 (antenna or second antenna), cl (postorbital carapace length), fm (fathoms), m (meters), Mxp3 (third maxilliped), P (pereopod), Plp (pleopod), and USNM (National Museum of Natural History).

We use the following terminology in describing the shape of the cornea, Mxp3, and appendices internae on the pleopods, each of which appears to be constant at the generic level:

Cornea.—Embedded and indistinct, as in *Callianassa* (Figs. 1, 8b); dorsal and disk-shaped or flattened, as in *Neocallichirus* (Fig. 1); subglobular, as in *Corallianassa* (Fig. 2); and lacking pigment or absent, as in *Paracalliax* (Fig. 1).

Mxp3 (Fig. 3).—Pediform, as in *Anacalliax* and *Callianassa*: ischium-merus length more than three times merus width; subpediform, as in *Neocallichirus*: ischium-merus length about two times merus width; operculiform, as in *Callichirus* and *Trypaea*: ischium-merus length less than two times merus width. The propodus and dactylus are both ovate in Eucalliinae and Callianopsinae, both slender in the Callianassinae, Cheraminae, Ctenochelinae, and the Anacalliinae, and the propodus is ovate and the dactylus is slender in the Callichirinae. Gurney's (1944) comments on the potential value of the shape of the Mxp3 propodus as an important character were prophetic.

Appendices internae (Fig. 6).—Finger-like or digitiform, as in *Cheramus*; stubby and projecting from margin of endopod, as in

Callianassa; stubby and embedded in margin of endopod, as in *Callichirus*.

In characterizing the carapace (Fig. 2), we refer to the presence or absence of a cardiac prominence, a dorsal oval, a rostral spine, and a rostral carina. When present, the cardiac prominence is most evident in lateral view on the posterior midline of the carapace, where it appears as a tubercle or low keel, as in *Anacalliax* and *Ctenocheles*. The dorsal oval, when present, as in *Anacalliax, Cheramus,* and *Glypturus,* is confined to the anterior two-thirds to three-fourths of the carapace and is defined by a distinct groove or furrow that delimits an oval, anterior portion of the carapace in both dorsal and lateral views; posteriorly the dorsal oval is delimited by a distinctly indented cervical groove. In taxa lacking a dorsal oval, the cervical groove is suture-like, not indented mid-dorsally. All taxa shown in Fig. 2 have a rostral spine, a median projection of the carapace that extends at least to the cornea and may over-reach the eye. Relatively few genera have a rostral carina, but it is distinct in *Anacalliax* (Fig. 17) and *Ctenocheles* (Fig. 2).

Major characters of callianassid and ctenochelid subfamilies are summarized in Table 1.

Key to Callianassid-like Families

Male Plp2 with appendix masculina. Uropodal exopod longitudinally carinate dorsally, lacking dorsal plate. Carapace usually with cardiac prominence ..... Ctenochelidae

Male Plp2 without appendix masculina. Uropodal exopod not longitudinally carinate dorsally, with dorsal plate. Carapace without cardiac prominence ..... Callianassidae

Family Callianassidae Dana, 1852

Callianassidae Dana, 1852:12, 14.

Diagnosis.—Carapace lacking cardiac prominence. Antennal scale, if present, rudimentary. Male Plp2, if present, lacking appendix masculina. Plp1–2 smaller than and different from Plp3–5, latter with stubby appendices internae. Uropodal exopod not carinate dorsally, with dorsal plate, lateral notch or incision usually absent.

Type genus.—*Callianassa* Leach, 1814.

Included genera.—*Biffarius,* new genus, *Callianassa, Calliapagurops, Neotrypaea,* new genus, *Notiax,* new genus, and *Trypaea* in the nominate subfamily; *Callichirus, Corallianassa, Glypturus, Lepidophthalmus,* and *Neocallichirus* in the new subfamily Callichirinae; *Cheramus* and *Scallasis* in the new subfamily Cheraminae; and *Calliax* and *Eucalliax,* new genus, in the new subfamily Eucalliinae.

Key to American Subfamilies and Genera of Callianassidae

1. Mxp3 dactylus ovate. Carapace lacking dorsal oval. (Plp3–5 with finger-like appendices internae) ... . Eucalliinae (single American genus *Eucalliax*)
– Mxp3 dactylus slender, digitiform. Carapace with dorsal oval 2
2. Plp3-5 with finger-like appendices internae ..... Cheraminae (single American genus *Cheramus*)
– Plp3-5 with stubby appendices internae 3
3. Mxp 3 propodus oval, as broad as long, width more than twice dactylus width (Callichirinae) 4
– Mxp3 propodus slender, much longer than broad, width at most slightly greater than that of dactylus (Callianassinae) 8
4. Abdomen with strong pattern formed by symmetrical grooves and integumental glands on somites 3–5. Uropodal endopod strap-shaped ..... *Callichirus*
– Abdomen lacking strong pattern formed by symmetrical grooves and integumental glands on somites 3–

Table 1.—Major characters of the callianassid and ctenochelid subfamilies; + = present, – = absent.

	Callianassidae				Ctenochelidae		
	Callia-nassinae	Calli-chirinae	Chera-minae	Eucal-liinae	Cteno-chelinae	Anacal-linae	Callia-nopsinae
Number of genera	6	5	2	2	4	1	1
Cardiac prominence	–	–	–	–	+	+	+
Appendix masculina	–	–	–	–	+	+	+
Dorsal plate on uropodal exopod	+	+	+	+	–	–	–
Strong antennal scale	–	–	–	–	+	+	+
Dorsal oval	+	+	+	–	–	+	+
Plp2–5 similar	–	–	–	–	+	–	+
Mxp3 propodus and dactylus ovate	–	–	–	+	–	–	+
Mxp3 propodus ovate, dactylus slender	–	+	–	–	–	–	–
Mxp3 propodus and dactylus slender	+	–	+	–	+	+	–
Plp3–5 appendices internae finger-like	–	–	+	+	+	–	+

5. Uropodal endopod not strap-shaped 5
5. Mxp3 with exopod. A1 peduncle longer and stouter than A2 peduncle. (Carapace with distinct, upraised rostral spine) .. *Lepidophthalmus*
– Mxp3 without exopod. A1 peduncle neither longer nor stouter than A2 peduncle 6
6. Plp3–5 with appendices internae embedded in margin of endopod. Rostral spine, if present, small, falling short of cornea. (Cornea dorsal, disk-shaped, subterminal; front sometimes weakly trispinous) .... *Neocallichirus*
– Plp3–5 with appendices internae projecting from margin of endopod. Distinct, upturned rostral spine present, extending to cornea. (Front strongly trispinous) 7
7. Carpus and palm of cheliped with 3 dorsal spines. Cornea disk-shaped, dorsal, narrower than stalk ... *Glypturus*
– Carpus and palm of chelipeds unarmed. Cornea subglobular, appearing distal, as wide as stalk .... *Corallianassa*
8. Plp3–5 with appendices internae embedded in margin of endopod. Mxp3 merus projecting beyond articulation with carpus .... *Neotrypaea,* new genus
– Plp3–5 with appendices internae projecting from margin of endopod. Mxp3 merus not projecting beyond articulation with carpus 9
9. Carapace with rostral spine. Male with both Plp1 and Plp2 present .. .. *Notiax,* new genus
– Carapace without rostral spine. Male with Plp2 vestigial or absent .... *Biffarius,* new genus

Subfamily Callianassinae Dana, 1852

Diagnosis.—Carapace with dorsal oval. Mxp3 pediform, sub-pediform, or operculiform, propodus and dactylus slender. Plp3–5 with stubby appendices internae.

Type genus.—*Callianassa* Leach, 1814.

Callianassa Leach, 1814
Figs. 1, 3, 4, 6, 8

Callianassa Leach, 1814:400. Type species *Cancer Astacus subterraneus* Montagu, 1808, by monotypy. Gender feminine.

Diagnosis.—Carapace lacking rostral spine. Cornea embedded, subterminal, indistinct. A1 peduncle not longer and stouter than A2 peduncle. Mxp3 without exopod, ischium-merus pediform; merus not projecting beyond articulation with carpus. Chelipeds unequal, major with meral hook. Plp1 uniramous in both sexes; Plp2 bira-

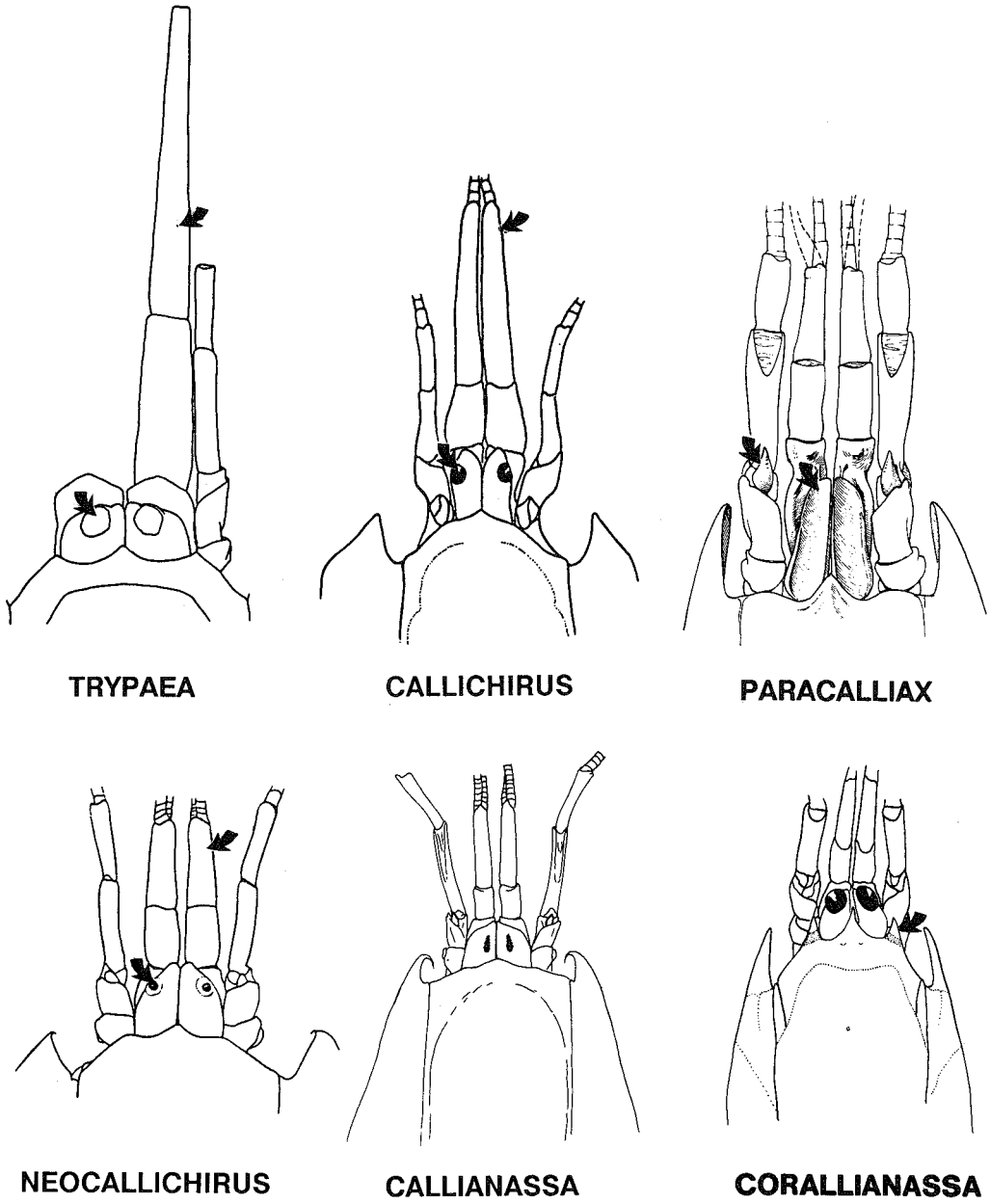

Fig. 1. Anterior region of carapace showing diagnostic features in some callianassid and ctenochelid genera. *Callianassa: C. subterranea* (Montagu), male, cl 12.0 mm, Scotland, USNM 252395; *Callichirus: C. major* (Say) (from Manning & Felder 1986: fig. 1a); *Corallianassa: C. xutha* Manning (from Manning 1988: fig. 3b); *Neocallichirus: N. horneri* Sakai (from Sakai 1988: fig. 7a); *Paracalliax: P. bollorei* De Saint Laurent (from De Saint Laurent & Le Loeuff 1979: fig. 26b); *Trypaea: T. australiensis* Dana (from Poore & Griffin 1979: fig. 2a).

mous in female, vestigial or absent in male; Plp3–5 foliaceous in both sexes, with stubby, projecting appendices internae (Fig. 6).

American species.—None.

Remarks.—*Callianassa* is the only genus in the subfamily with a slender, pediform third maxilliped.

One species, *Callianassa subterranea*

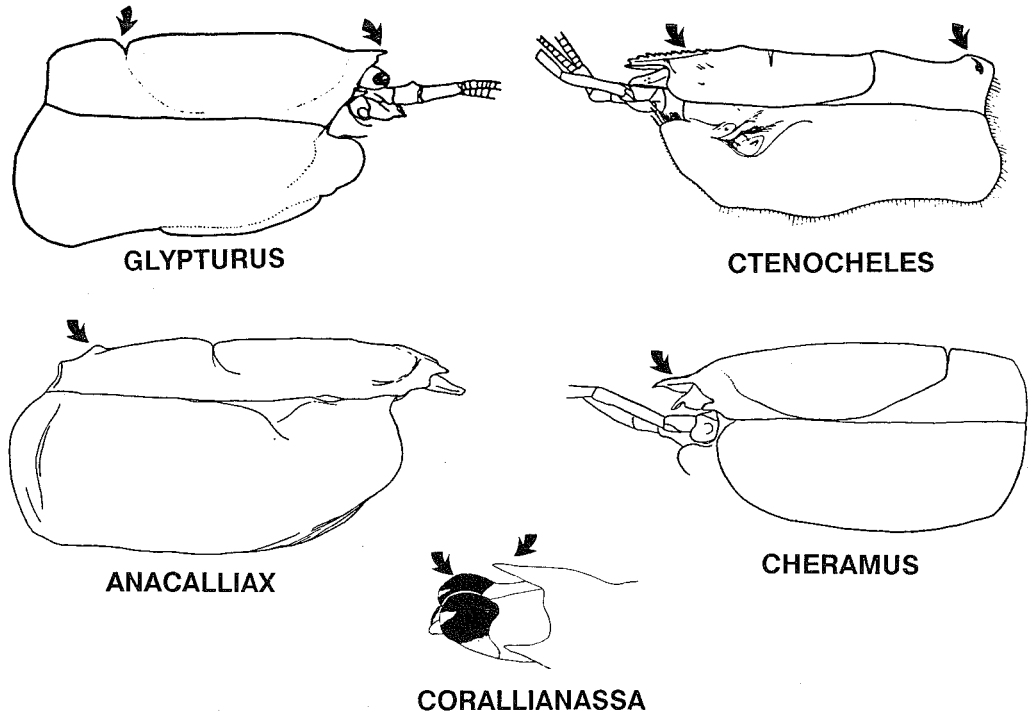

Fig. 2. Features of the carapace in some callianassid and ctenochelid genera. *Anacalliax: A. argentinensis* (Biffar), female holotype, cl 26.5 mm, Argentina, USNM 135055; *Cheramus: C. marginatus* (Rathbun), female syntype, cl 3.4 mm, Puerto Rico, USNM 23778; *Corallianassa: C. xuthua* Manning (from Manning 1988: fig. 2b); *Ctenocheles: Ctenocheles serrifrons* (Le Loeuff & Intès) (from Le Loeuff & Intès 1974: fig. 3b); *Glypturus: G. acanthochirus* (Stimpson) (from Manning 1987: fig. 3b).

(Montagu, 1808) is known from the Mediterranean and the eastern Atlantic (De Saint Laurent & Bozic 1976, De Saint Laurent & Le Loeuff 1979). Kensley (1974) named a subspecies, *C. subterranea australis,* from the west coast of South Africa. All live sublittorally.

Callianassa does not occur in the Americas, and we suspect that most, if not all, other species from outside the eastern Atlantic now placed in it should be referred to other genera.

Biffarius, new genus
Fig. 9

Type species.—*Callianassa biformis* Biffar, 1971b.

Diagnosis.—Carapace lacking rostral spine. Cornea dorsal, subterminal, flattened. A1 peduncle not longer and stouter than A2 peduncle. Mxp3 without exopod, ischium-merus operculiform; merus not projecting beyond articulation with carpus. Chelipeds unequal, major cheliped with meral hook. Plp1 vestigial or absent in male, uniramous in female; Plp2 vestigial or absent in male, biramous in female; Plp3–5 foliaceous, with stubby, projecting appendices internae in both sexes.

American species.—Two, *Biffarius biformis* (Biffar, 1971b) and *Biffarius fragilis* (Biffar, 1970), both from the northwestern Atlantic.

Remarks.—The other genera of the Callianassinae differ from *Biffarius* as follows: *Callianassa* has a pediform Mxp3, *Neotrypaea* and *Trypaea* have the merus of Mxp3 projecting beyond its articulation with the carpus, and *Notiax* has a distinct rostral spine.

Biffarius contains nearshore species of ex-

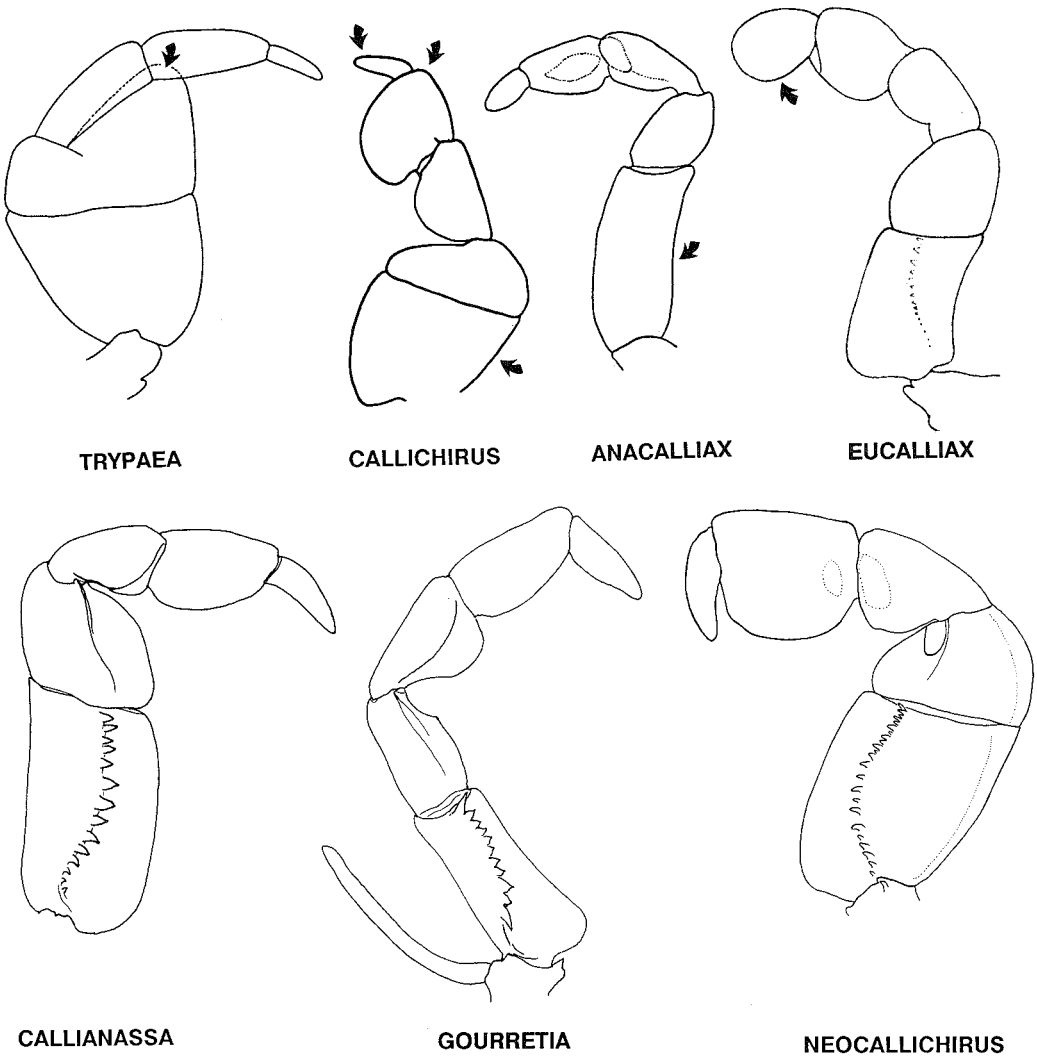

Fig. 3. Third maxillipeds of different callianassid and ctenochelid genera (form of ischium-merus in parentheses after generic name). *Anacalliax* (pediform): *A. argentinensis* (Biffar), female holotype, cl 26.5 mm, Argentina, USNM 135055; *Callianassa* (pediform): *C. subterranea* (Montagu), male, cl 12.0 mm, Scotland, USNM 252395; *Calliax* (subpediform): *C. lobata* (De Gaillande & Lagardère) (from De Saint Laurent & Bozic 1976: fig. 15); *Callichirus* (operculiform): *C. major* (Say) (from Manning & Felder 1986: fig. 1b); *Gourretia* (pediform): *G. denticulata* (Lutze), female, cl 4.5 mm, Israel, USNM 221976; *Neocallichirus* (subpediform): *N. grandimana* (Gibbes), male, cl 11.5 mm, Florida, USNM 252392; *Trypaea* (operculiform): *T. australiensis* Dana (from Poore & Griffin 1979: fig. 20f).

tremely small size, with adults no larger than 50 mm, often as small as 20 mm.

Etymology.—We dedicate this genus to Thomas A. Biffar, whose studies of the American callianassids have materially aided this review. The gender is masculine.

Calliapagurops De Saint Laurent, 1973

Calliapagurops De Saint Laurent, 1973:515. Type species *Calliapagurops charcoti* De Saint Laurent, 1973, by original designation and monotypy. Gender masculine.

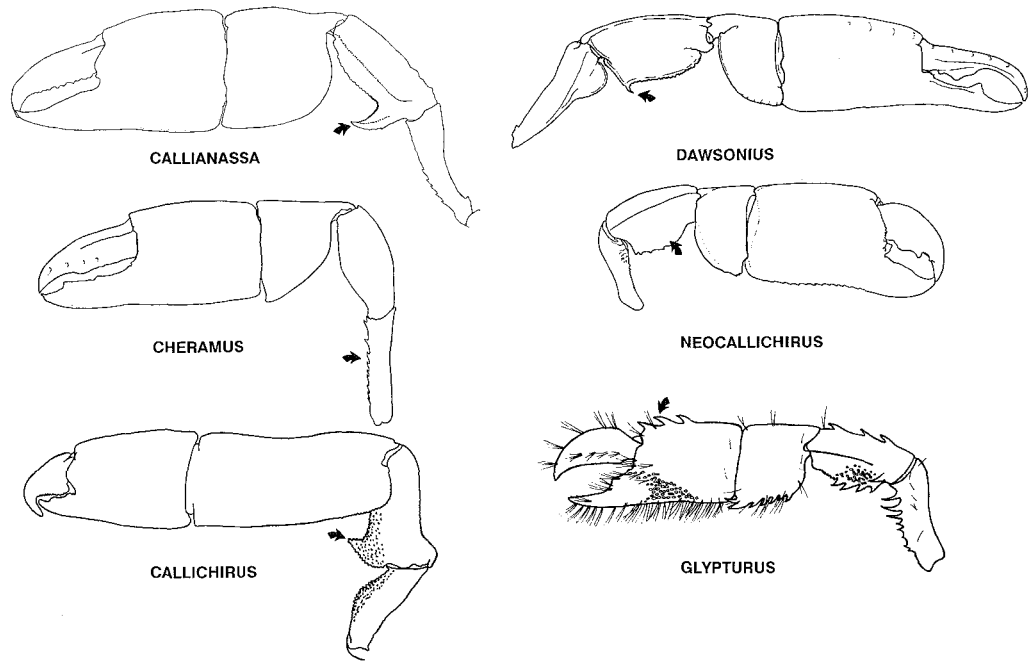

Fig. 4. Representative major chelipeds of some callianassid and ctenochelid genera. *Callianassa: C. subterranea* (Montagu), male, cl 12.0 mm, Scotland, USNM 252395; *Callichirus: C. major* (Say) (from Manning & Felder 1986: fig. 1c); *Cheramus: C. marginatus* (Rathbun), female syntype, cl 3.4 mm, Puerto Rico, USNM 23778; *Dawsonius: D. latispina* (Dawson), male holotype, cl 14.7 mm, Gulf of Mexico, USNM 105398; *Glypturus: G. acanthochirus* (Stimpson) (from Biffar 1971a: fig. 4b); *Neocallichirus: N. grandimana* (Gibbes) (from Manning 1987: fig. 2f).

Diagnosis.—Eye cylindrical, cornea terminal. Mxp3 merus with 3–4 antero-internal spines. P1 carpus as wide as merus.

American species.—None.

Remarks.—Monotypic. The unique holotype of *Calliapagurops charcoti,* known from the Azores in 190–230 m, has not been described in detail or illustrated. *Calliapagurops* apparently resembles *Scallasis* Bate (q.v.) in having a terminal cornea and it may well belong in the Cheraminae with that genus.

Neotrypaea, new genus
Fig. 10

Type species.—*Callianassa californiensis* Dana, 1854.

Diagnosis.—Carapace lacking rostral spine. Cornea dorsal, subterminal, disk-shaped. A1 peduncle longer and stouter than A2 peduncle. Mxp3 without exopod, ischium-merus operculiform; merus projecting beyond articulation with carpus. Chelipeds unequal, major with meral hook. Plp1–2 vestigial or absent in male, Plp1 uniramous and Plp2 biramous in female, lacking appendices internae; Plp3–5 foliaceous with appendices internae stubby, embedded in endopod in both sexes.

American species.—Four, *Neotrypaea uncinata* (H. Milne Edwards, 1837), *Neotrypaea gigas* (Dana, 1852), *Neotrypaea californiensis* (Dana, 1854), and *Neotrypaea affinis* (Holmes, 1900), all from the eastern Pacific.

Remarks.—*Neotrypaea* agrees with the Australian *Trypaea* and differs from the other American genera with operculiform ischium-merus on Mxp3, *Biffarius* and *No-*

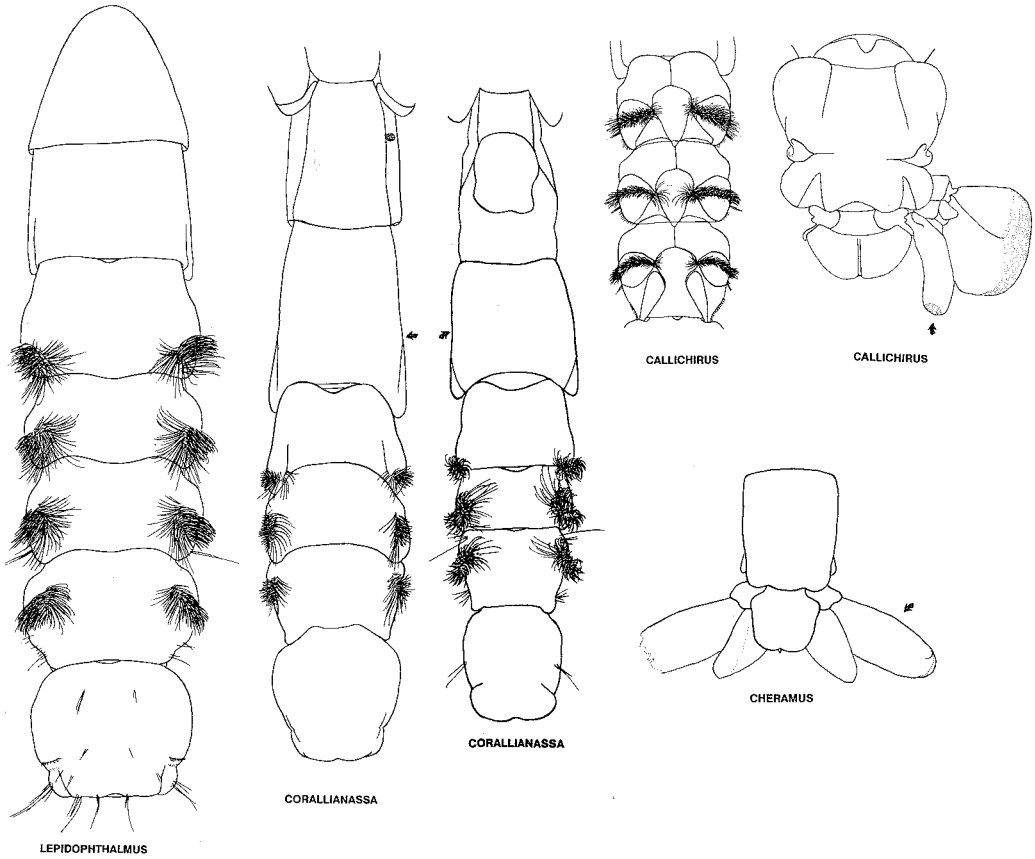

Fig. 5. Diagnostic features of the abdomen and tail fan of some callianassid and ctenochelid genera. *Callichirus: C. major* (Say), third to fifth abdominal somites (from Manning & Felder 1986: fig. 1f) and sixth abdominal somite, telson, and uropod (from Manning & Felder 1986: fig. 1e); *Cheramus: C. marginata* (Rathbun), female syntype, cl 3.4 mm, Puerto Rico, USNM 23778; *Corallianassa: C. borradailei* (De Man) (from Manning 1988: fig. 9g) and *C. xutha* Manning (from Manning 1988: fig. 3h); *Lepidophthalmus: L. jamaicense* (Schmitt), male holotype, cl about 12 mm, Jamaica, USNM 69363.

tiax, in having the A1 peduncle both longer and stouter than the A2 peduncle as well as in having the merus of Mxp3 project beyond its articulation with the carpus. The appendices internae on Plp3–5 are embedded in the margin of the endopod in members of *Neotrypaea,* projecting in members of *Trypaea.*

Known members of the genus prefer substrates ranging from clean quartzite sand beneath intertidal boulders to intertidal and subtidal combinations of mud and sand, in some cases including margins and tidal bars of inlets and sloughs or bay bottoms to depths of about 40 meters.

Etymology.—Formed by the combination of the Greek prefix *neo-*, new, and the generic name *Trypaea.* The gender is feminine.

Notiax, new genus
Figs. 6, 11

Type species.—*Callianassa brachyophthalma* A. Milne Edwards, 1870, by present designation and monotypy.

Diagnosis.—Carapace with rostral spine. Cornea dorsal, subterminal, disk-shaped. A1 peduncle not longer and stouter than A2 peduncle. Mxp3 without exopod, ischium-

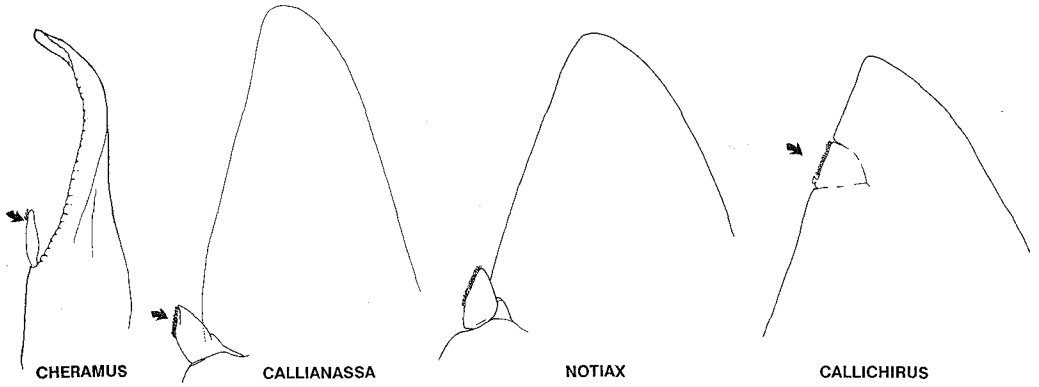

Fig. 6. Form of appendix interna on Plp3 in some genera of callianassids and ctenochelids. *Callianassa* (stubby, projecting): *C. subterranea* (Montagu), male, cl 12.0 mm, Scotland, USNM 252395; *Callichirus* (stubby, embedded): *C. seilacheri* (Bott), male, cl 24.4 mm, Peru, USNM 142540; *Cheramus* (finger-like): *C. marginatus* (Rathbun), male, cl 4.7 mm, Caribbean Sea, USNM 252397; *Notiax* (stubby, projecting): *N. brachyophthalma* (A. Milne Edwards), male, cl 16.8 mm, Chile, USNM 252309.

merus operculiform; merus not projecting beyond articulation with carpus. Chelipeds unequal, major with meral hook. Plp1 slender and uniramous, Plp2 slender and biramous, lacking an appendix interna, Plp3–5 foliaceous with stubby, projecting appendices internae in both sexes (Fig. 6).

American species.—One, *Notiax brachyophthalma* (A. Milne Edwards, 1870), from Chile and Argentina.

Remarks.—Monotypic. *Notiax* is the only American genus in which the ischium-merus of Mxp3 is operculiform which also has a rostral spine. *Trypaea* also has a rostral spine, but differs in having a much heavier A1 peduncle and in having the merus of

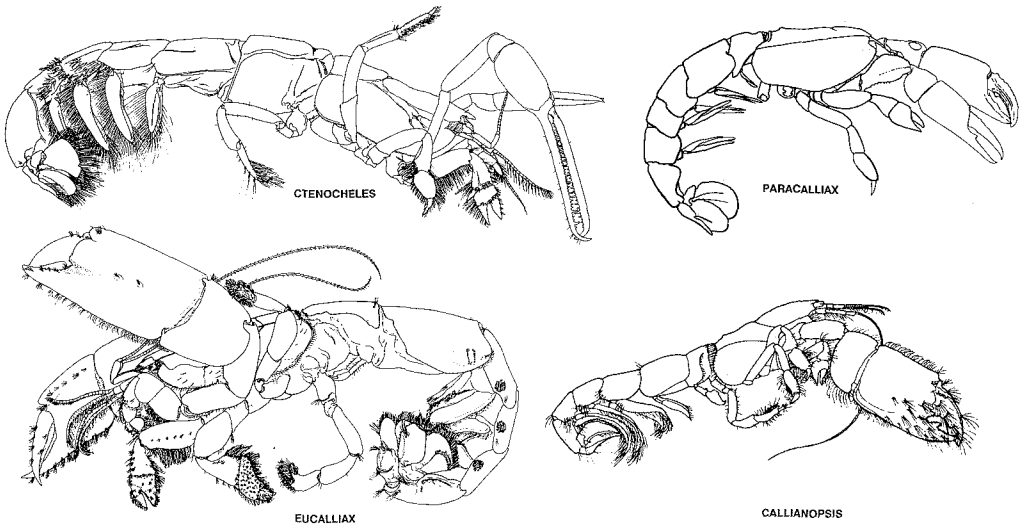

Fig. 7. Habitus of some callianassid and ctenochelid genera. *Callianopsis: C. goniophthalma* (Rathbun) (modified from Hart 1982: fig. 13a); *Ctenocheles: C. leviceps* Rabalais (from Rabalais 1979: fig. 2); *Eucalliax: E. jonesi* (Heard) (from Heard 1989: fig. 1); *Paracalliax: P. bollorei* De Saint Laurent (from De Saint Laurent & Le Loeuff 1979: fig. 26a).

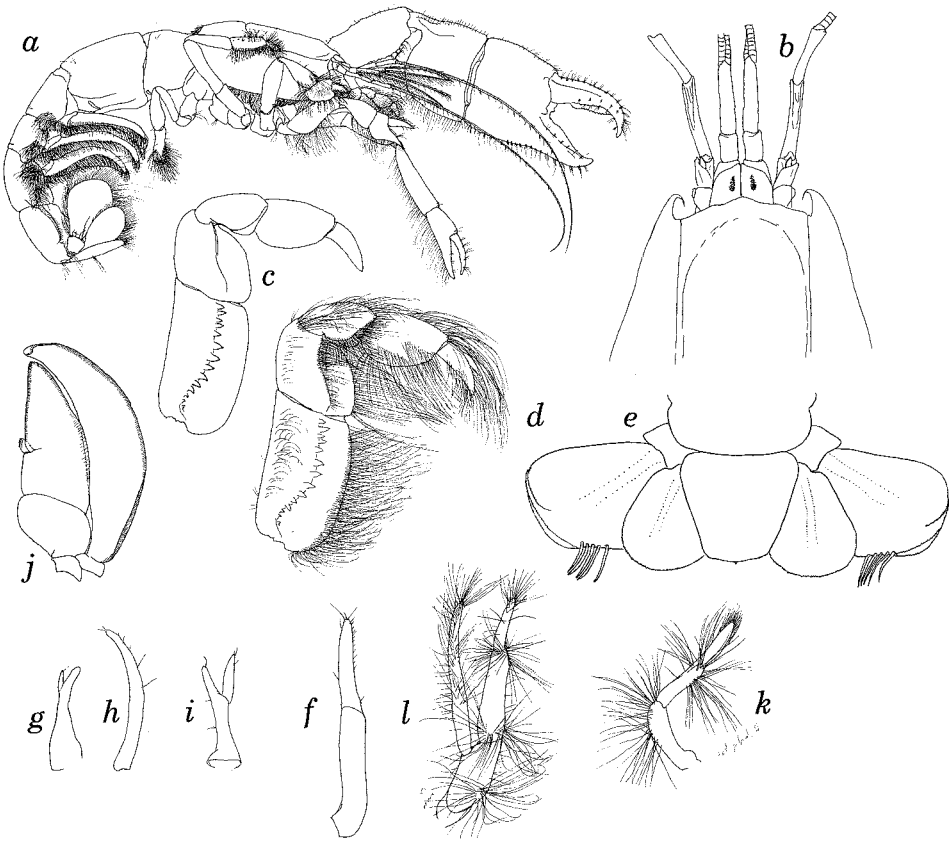

Fig. 8. *Callianassa subterranea* (Montagu). a, Lateral view; b, Anterior region of carapace and cephalic appendages, dorsal view; c, Mxp3, inner surface (setae omitted); d, Mxp3, inner surface (with setae); e, Telson and uropods; f, Male Plp1; g, Male Plp2; h, Female Plp1; i, Female Plp2; j, Female Plp3; k, Female Plp1; l, Female Plp2. a–d, f,g, male, cl 12.0 mm, Scotland, USNM 252395; e, male, cl 4.3 mm, Adriatic Sea, USNM 252396; h–j, intersex, cl 9.5 mm, Irish Sea, USNM 252394; k,l, female, cl 9.6 mm, Irish Sea, USNM 252394.

Mxp3 project beyond its articulation with the carpus.

The single known American species appears to occur subtidally in fine sand with organic debris or in mud.

Holthuis (1952) and Ferrari (1981) provided accounts of *N. brachyophthalma.*

Etymology.—From the Greek, *notios,* southern and the suffix *–ax.* The gender is feminine.

Trypaea Dana, 1852
Figs. 1, 3, 12

Trypaea Dana, 1852:14. Type species *Trypaea australiensis* Dana, 1852, by original designation and monotypy. Gender feminine.

Diagnosis.—Carapace with rostral spine. Cornea dorsal, subterminal, disk-shaped. A1 peduncle longer and stouter than A2 peduncle. Mxp3 without exopod; ischium-merus operculiform; merus projecting beyond articulation with carpus. Chelipeds unequal, major with meral hook. Plp1 uniramous and slender in both sexes; Plp2 lacking appendix interna, biramous and slender in female, absent in male; Plp3–5 foliaceous and biramous in both sexes, with stubby, projecting appendices internae.

American species.—None.

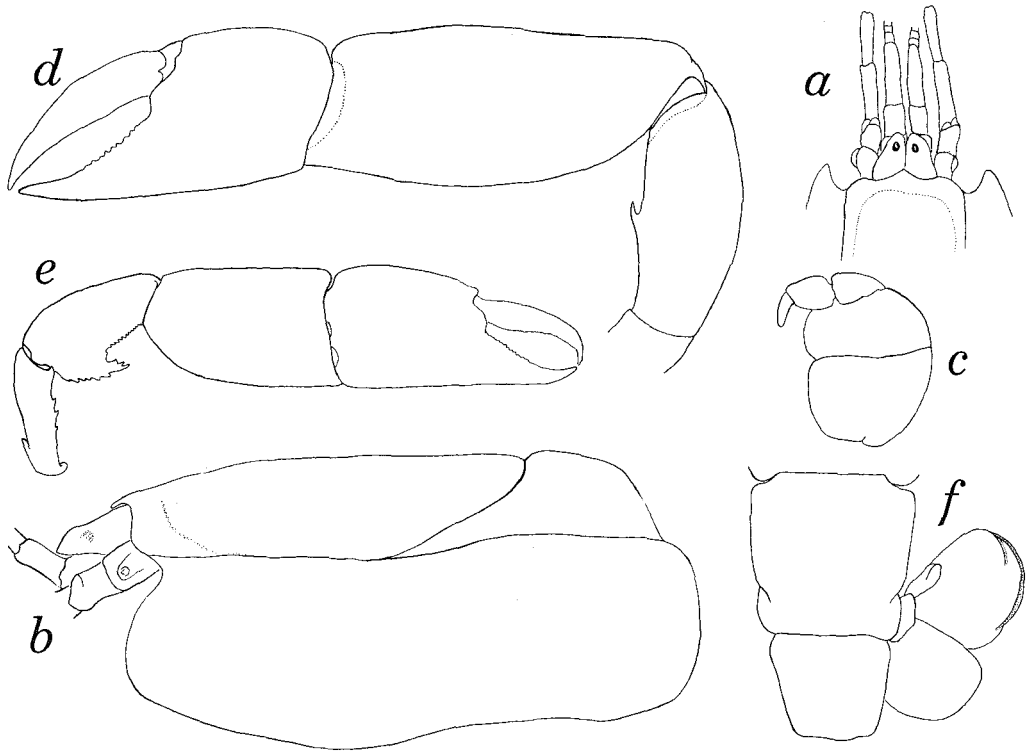

Fig. 9. *Biffarius biformis* (Biffar). a, Anterior region of carapace and cephalic appendages, dorsal view; b, Carapace and cephalic appendages, lateral view; c, Mxp3, inner surface; d, Major cheliped; e, Minor cheliped (loose in vial); f, Sixth abdominal somite, telson, and right uropod. Male, cl 3.4 mm, Florida, USNM 252391.

Remarks.—Monotypic.

Known populations prefer intertidal sand bars and mudflats, including those in estuarine settings.

Callichirinae, new subfamily

Diagnosis.—Carapace with dorsal oval. Mxp3 subpediform or operculiform, propodus ovate, dactylus slender. Plp3–5 with stubby appendices internae.

Type genus.—*Callichirus* Stimpson, 1866.

Callichirus Stimpson, 1866
Figs. 1, 3–6

Callichirus Stimpson, 1866:47. Type species *Callianassa major* Say, 1818, by original designation and monotypy. Gender masculine.

Diagnosis.—Carapace lacking rostral spine. Cornea dorsal, subterminal, disk-shaped. A1 peduncle longer and stouter than A2 peduncle. Mxp3 without exopod, ischium-merus operculiform; merus not projecting beyond articulation with carpus. Chelipeds unequal (in adult males), major with meral hook. Strong pattern of grooves and integumental glands visible dorsally on abdominal somites 3–5. Plp1 slender and uniramous, Plp2 slender and biramous, Plp3–5 foliaceous in both sexes; Plp2 with appendix interna in female embedded and distal; appendices internae stubby, embedded in margin of endopod on Plp3–5 in both sexes (Fig. 6). Uropodal endopod strap-shaped, much longer than wide.

American species.—Four, *Callichirus islagrande* (Schmitt, 1935) and *Callichirus major* (Say, 1818), from the western Atlantic and *Callichirus seilacheri* (Bott, 1955)

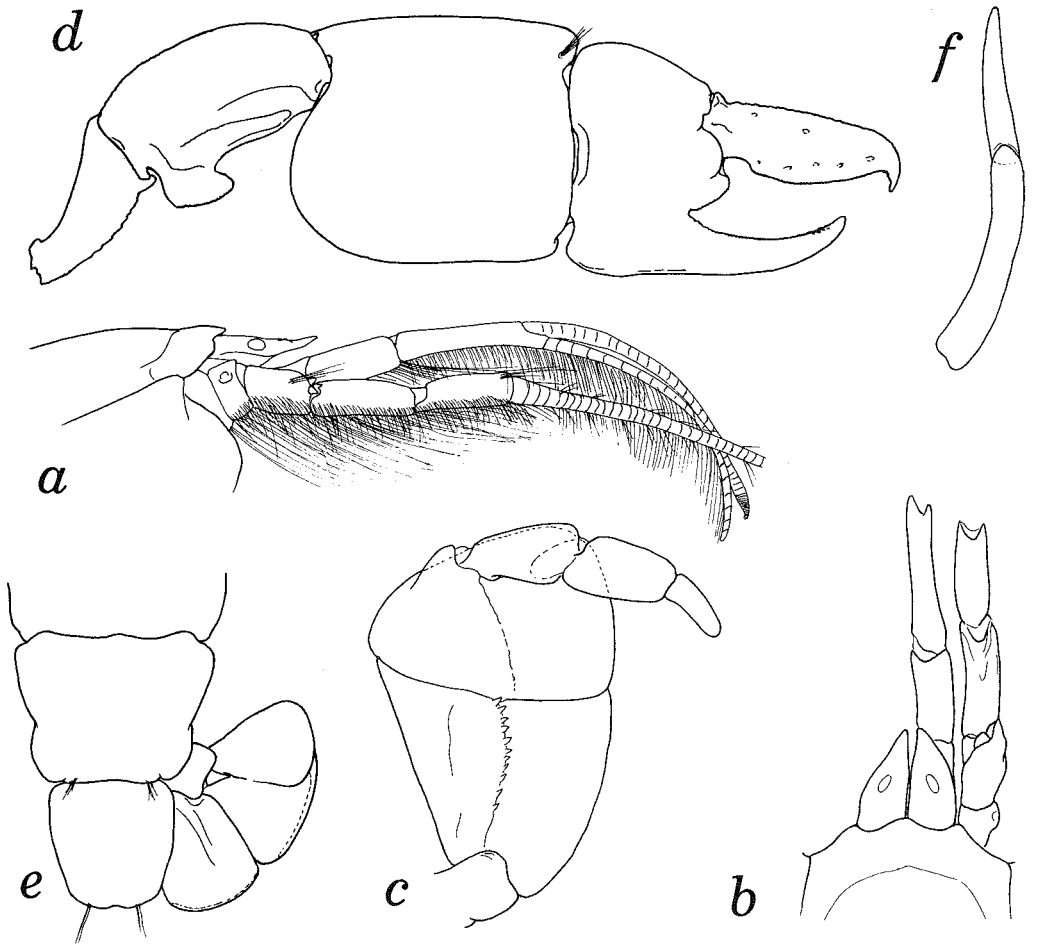

Fig. 10. *Neotrypaea californiensis* (Dana). a, Anterior region of carapace and right cephalic appendages, lateral view; b, Anterior region of carapace and cephalic appendages, dorsal view; c, Mxp3, inner surface; d, Major cheliped; e, Sixth abdominal somite, telson, and right uropod; f, Male Plp1. Male, cl 20.8 mm, California, USNM 53577.

and *Callichirus garthi* (Retamal, 1975) from the eastern Pacific.

Remarks.—As we have pointed out (Manning & Felder 1986), the dorsal cuticular pattern on the abdomen (Fig. 5) and the strap-shaped uropodal endopods (Fig. 5) are diagnostic for this genus.

Chelipeds of adult males are very unequal, whereas those of females and immatures are nearly equal. In addition, sexually mature males have a very elongate carpus on the major cheliped.

The genus includes an extralimital species, *Callichirus adamas* (Kensley, 1974), from West Africa and the west coast of South Africa.

Callichirus contains intertidal and shallow sublittoral species, most of which prefer fine, siliceous sand substrates of beaches and shallow bars. However, *C. adamas* has been reported from depths exceeding 10 meters in fine mud and silt substrates.

Corallianassa Manning, 1987
Figs. 1, 2, 5

Corallianassa Manning, 1987:392. Type species *Callianassa longiventris* A. Milne

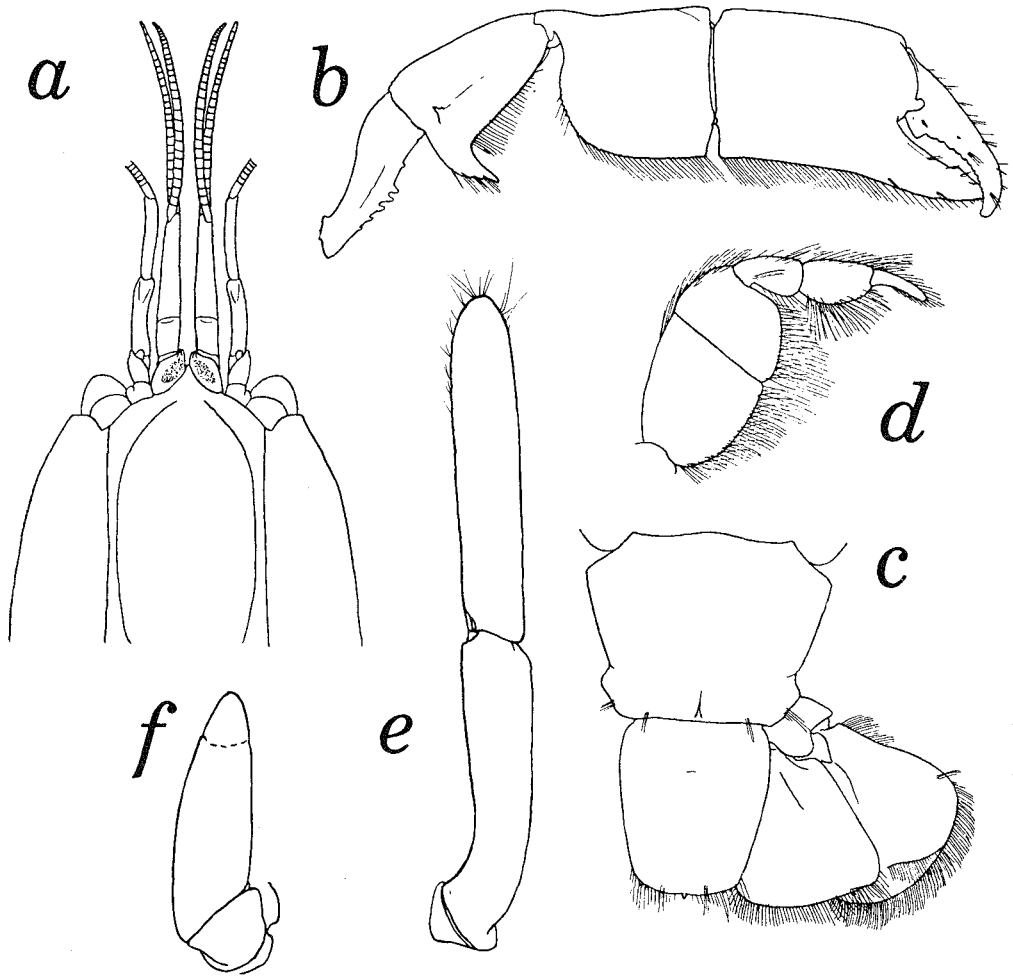

Fig. 11. *Notiax brachyophthalma* (A. Milne Edwards). a, Anterior region of carapace and cephalic appendages, dorsal view; b, Major cheliped; c, Sixth abdominal somite, telson, and right uropod; d, Mxp3, outer surface; e, Male Plp1; f, Male Plp2. a–d from Holthuis (1952: fig. 19a, b, e, f); e, f, male, cl 16.8 mm, Chile, USNM 252309.

Edwards, 1870, by original designation. Gender feminine.

Diagnosis.—Carapace with rostral spine (anterior margin of carapace with 3 spines, median extending to cornea). Cornea subglobular, appearing terminal. A1 peduncle not longer and stouter than A2 peduncle. Mxp3 without exopod, ischium-merus subpediform; merus not projecting beyond articulation with carpus. Chelipeds unequal, major lacking meral hook. Plp1 slender and uniramous, Plp2 slender and biramous, Plp3–5 foliaceous and biramous in both sexes; appendices internae finger-like and distal on Plp2, stubby, projecting on Plp3–5 in both sexes.

American species.—Three, *Corallianassa longiventris* (A. Milne Edwards, 1870), *C. hartmeyeri* (Schmitt, 1935), from Jamaica and Ascension Island (Manning & Chace 1990) and *C. xutha* Manning, 1988, from the eastern Pacific.

Remarks.—*Corallianassa* resembles *Glypturus* in having three strong anterior spines on the carapace. It differs from *Glypturus* in having a much larger, subglobular

cornea and in lacking dorsal spines on the propodus of the cheliped.

Corallianassa is represented in the Indo-West Pacific by *C. placida* (De Man, 1905) and *C. borradailei* (De Man, 1928a).

Whereas the well-formed cornea appears to be situated terminally in members of this genus, it falls short of a flange-like ventral extension of the stalk.

Species appear to prefer carbonate muds or coralline sands and may burrow in fragments of coral rubble, from the lower intertidal to a depth of several meters.

Glypturus Stimpson, 1866
Figs. 2, 4

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

Diagnosis.—Carapace with rostral spine (anterior margin of carapace with 3 spines, median extending to cornea). Cornea dorsal, subterminal, disk-shaped. A1 peduncle not longer and stouter than A2 peduncle. Mxp3 without exopod, ischium-merus subpediform; merus not projecting beyond articulation with carpus. Chelipeds unequal, major without meral hook; palm with 3 spines on upper margin. Plp1 slender and uniramous, Plp2 slender and biramous, Plp3–5 foliaceous and biramous in both sexes; appendices internae finger-like on Plp2 in both sexes, stubby, projecting from endopod of Plp3–5 in both sexes.

American species.—One, *Glypturus acanthochirus* Stimpson, 1866, from the western Atlantic.

Remarks.—The trispinous front, well-formed cornea, and palm of the cheliped with 3 dorsal spines are diagnostic for the genus.

We follow Poore & Suchanek (1988) in recognizing three species in the Indo-West Pacific: *G. armatus* (A. Milne Edwards, 1870), *G. laurae* (De Saint Laurent, 1984) (in De Vaugelas & De Saint Laurent 1984), and *G. motupore* Poore & Suchanek, 1988.

Known members of the genus prefer carbonate substrates of lagoons and leeward sand flats adjacent to coral reefs, often including intertidal and subtidal areas occupied by seagrass, from shore to depths of about 30 meters.

Lepidophthalmus Holmes, 1904
Figs. 5, 13

Lepidophthalmus Holmes, 1904:310. Type species *Lepidophthalmus eiseni* Holmes, 1904, a subjective junior synonym of *Callianassa bocourti* A. Milne Edwards, 1870, by monotypy. Gender masculine.

Diagnosis.—Carapace with rostral spine. Cornea dorsal, subterminal, disk-shaped. A1 peduncle longer and stouter than A2 peduncle. Mxp3 with minute exopod, ischium-merus subpediform; merus not projecting beyond articulation with carpus. Chelipeds unequal, major with meral hook. Plp1 slender and uniramous, Plp2 slender and biramous, Plp3–5 foliaceous and biramous in both sexes; appendices internae digitiform and distal on Plp2, stubby, embedded in margin of endopod on Plp3–5 in both sexes.

American species.—Four, of which three, *Lepidophthalmus jamaicense* (Schmitt, 1935), *Lepidophthalmus louisianensis* (Schmitt, 1935), and *L. sinuensis* Lemaitre & Rodrigues, 1991 are from the western Atlantic and one, *Lepidophthalmus bocourti* (A. Milne Edwards, 1870), is known from the eastern Pacific.

Remarks.—*Lepidophthalmus* is the only member of the Callichirinae with an exopod on Mxp3; the exopod is so small that it can easily be overlooked, as it was by us initially.

Lepidophthalmus and *Callichirus* are the only two genera of the Callichirinae that also share an A1 peduncle that is both longer and stouter than the A2 peduncle. *Lepidophthalmus* has a rostral spine and lacks both the dorsal cuticular pattern on the abdomen and the strap-shaped uropodal endopods of *Callichirus*.

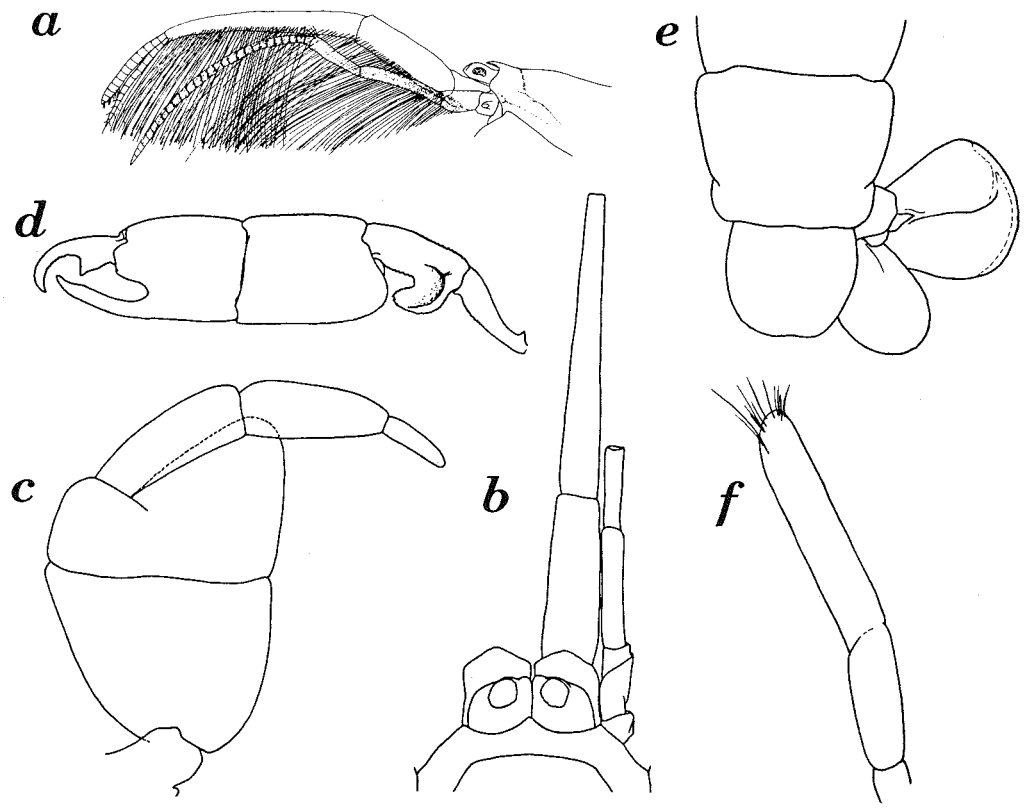

Fig. 12. *Trypaea australiensis* Dana. a, Anterior region of carapace and right cephalic appendages, lateral view; b, Anterior region of carapace and cephalic appendages, dorsal view; c, Mxp3, inner surface; d, Major cheliped; e, Sixth abdominal somite, telson, and right uropod; f, Male Plp1. a–d from Poore & Griffin (1979: figs. 18a, f, 19a, 20f); e, f male, cl 11.9 mm, Queensland, USNM 105368.

Known members of *Lepidophthalmus* all appear to be estuarine-adapted with a well developed ability for osmoregulation and an abbreviated larval life history involving two or fewer zoeal stages.

Neocallichirus Sakai, 1988
Figs. 1, 3, 4

Neocallichirus Sakai, 1988:61. Type species *Neocallichirus horneri* Sakai, 1988, by original designation. Gender masculine.

Diagnosis.—Carapace lacking rostral carina. Cornea dorsal, subterminal, disk-shaped. A1 peduncle not longer and stouter than A2 peduncle. Mxp3 without exopod, ischium-merus subpediform; merus not projecting beyond articulation with carpus. Chelipeds unequal, major without meral hook. Plp1 slender and uniramous, Plp2 slender and biramous, Plp3–5 foliaceous and biramous in both sexes; appendices internae present on Plp2 in female only, on Plp3–5 in both sexes: finger-like on Plp2, stubby, embedded in margin of endopod in Plp3–5.

American species.—Six, *Neocallichirus grandimana* (Gibbes, 1850) (=*Glypturus branneri* Rathbun, 1900), *Neocallichirus guara* (Rodrigues, 1971), *Neocallichirus guassutinga* (Rodrigues, 1971), *Neocallichirus mirim* (Rodrigues, 1971), *Neocallichirus rathbunae* (Schmitt, 1935), and *Neocallichirus trilobata* (Biffar, 1970), all western Atlantic.

Remarks.—*Neocallichirus* agrees with *Callichirus* and differs from the other four

genera of the Callichirinae in lacking a well developed rostral spine; it differs from *Callichirus* in lacking the dorsal cuticular pattern on abdominal somites 3–5 as well as the strap-shaped uropodal endopods. Two species, *N. guassutinga* and *N. rathbunae,* have three small spinules on the front of the carapace, but these spinules are much smaller than the three frontal spines found in members of *Corallianassa* and *Glypturus.*

Sakai (1988) assigned several Indo-West Pacific species to this genus.

All American species occur in intertidal or shallow subtidal nearshore habitats.

Cheraminae, new subfamily

Diagnosis.—Carapace with dorsal oval. Mxp3 pediform, propodus and dactylus slender. Plp3–5 with finger-like appendices internae.

Type genus.—*Cheramus* Bate, 1888.

Cheramus Bate, 1888
Figs. 2, 4–6, 14

Cheramus Bate, 1888:30.

Type species.—*Cheramus batei* Borradaile, 1903, a replacement name for the preoccupied *Cheramus occidentalis* Bate, 1888, by present designation. Gender masculine.

Diagnosis.—Carapace with rostral spine. Cornea subterminal, lateral. Mxp3 without exopod. Chelipeds unequal, major without meral hook. Plp1 slender and uniramous in both sexes; Plp2 slender and biramous in female, absent in male; Plp3–5 elongate and slender in both sexes, with finger-like appendices internae (Fig. 6). Uropodal exopod elongate, length more than twice width.

American species.—Two, *Cheramus batei* Borradaile, 1903 and *Cheramus marginatus* (Rathbun, 1901).

Remarks.—The long slender body with a relatively small thoracic region, strong rostral spine, pediform Mxp3, and extremely elongate uropods are characteristic of members of this genus.

In 1888 Bate named two separate taxa from parts of callianassids taken at the same station. One, which he named *Cheramus occidentalis,* was based on the body; the second, which he named *Callianassa occidentalis,* was based on a loose cheliped. Borradaile (1903) synonymized *Cheramus* with *Callianassa,* thus making *Cheramus occidentalis* a homonym of *Callianassa occidentalis* Stimpson, 1856 (a subjective junior synonym of *C. californiensis* Dana, 1854). Borradaile proposed *Callianassa batei* as a replacement name for *Cheramus occidentalis* Bate. We believe that Bate's *Callianassa occidentalis* and *Cheramus occidentalis* actually are based on the same species.

This genus contains species that live on the continental shelf and slope. Bate's type specimen of *Cheramus batei* was taken in a depth of 450 fm (823.5 m) in the West Indies.

The genus also includes *Cheramus orientalis* Bate, 1888 from the Arafura Sea and *Cheramus oblongus* (Le Loeuff & Intès, 1974) from West Africa.

Scallasis Bate, 1888

Scallasis Bate, 1888:34. Type species *Scallasis amboinae* Bate, 1888, by monotypy. Gender feminine.

Diagnosis.—Carapace with rostral spine, apparently lacking orbit. Cornea well-formed, terminal, subglobular. Mxp3 with exopod. Plp elongate and slender, with finger-like appendices internae.

American species.—None.

Remarks.—Monotypic, containing only *Scallasis amboinae* Bate, 1888, from Ambon, Indonesia. *Scallasis* apparently agrees with *Calliapagurops* in having a subglobular, terminal cornea, differing from all other callianassid genera.

The type of *S. amboinae,* in The Natural History Museum, London, was examined by one of us (R.B.M.) who verified that it is a member of the Cheraminae.

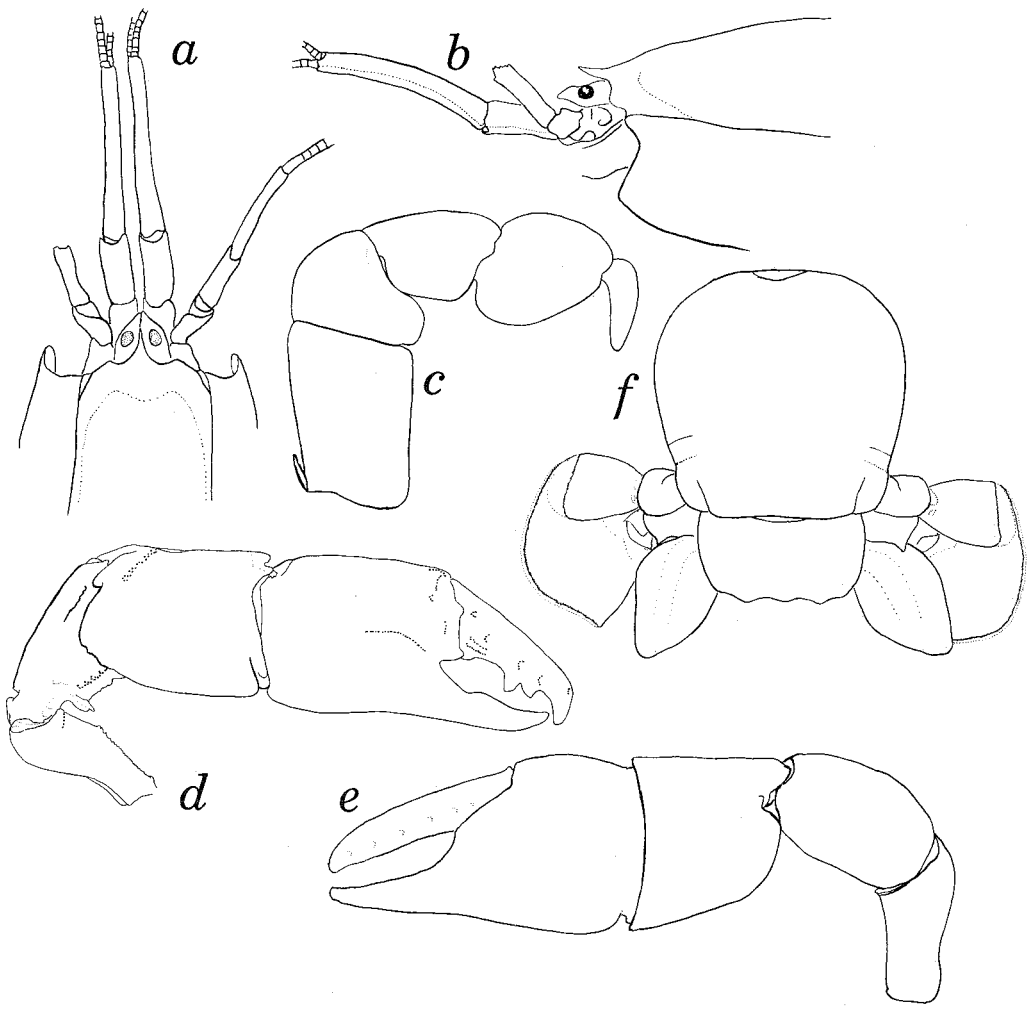

Fig. 13. *Lepidophthalmus jamaicense* (Schmitt). a, Anterior region of carapace and cephalic appendages, dorsal view; b, Anterior region of carapace and cephalic appendages, lateral view; c, Mxp3, outer surface; d, Major cheliped; e, Minor cheliped; f, Sixth abdominal somite, telson, and uropods, dorsal view. Male holotype, cl about 12 mm, Jamaica, USNM 69363.

Eucalliinae, new subfamily

Diagnosis.—Carapace lacking dorsal oval. Mxp3 propodus and dactylus ovate. Plp3–5 with finger-like appendices internae.

Type genus.—*Eucalliax,* new genus.

Eucalliax, new genus
Figs. 7, 15a–e

Type species.—*Callianassa quadracuta* Biffar, 1970.

Diagnosis.—Cornea flattened, almost terminal. Mxp3 without exopod, ischium-merus subpediform. Chelipeds equal and similar, major without meral hook. Plp1 slender and uniramous, Plp2 slender and biramous, Plp3–5 foliaceous and biramous in both Al sexes; finger-like appendices internae present on Plp2–5 in both sexes. Uropodal exopod lacking lateral notch or incision.

American species.—Two, *Eucalliax jonesi* (Heard, 1989) and *Eucalliax quadra-*

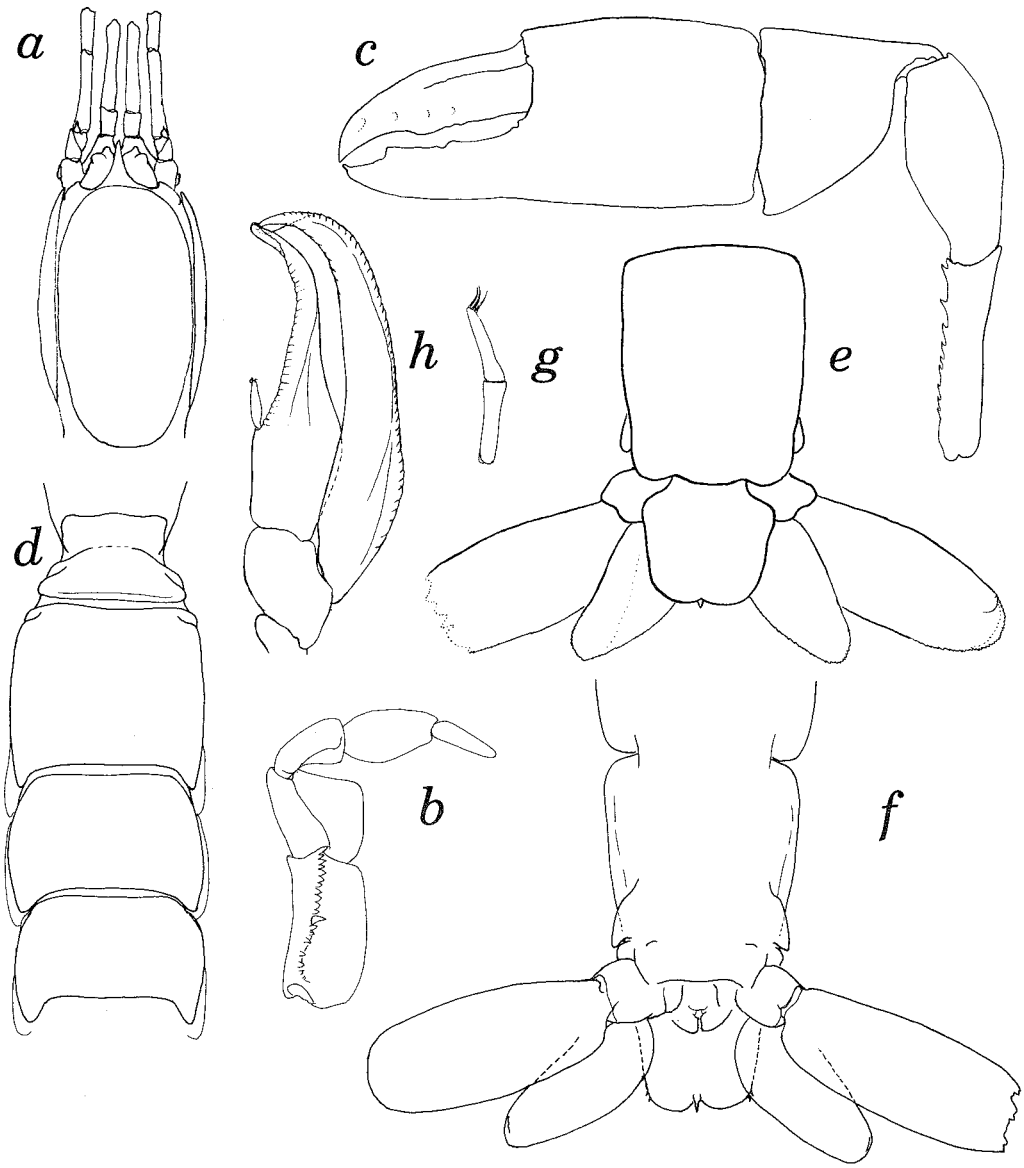

Fig. 14. *Cheramus marginatus* (Rathbun). a, Anterior two-thirds of carapace and cephalic appendages, dorsal view; b, Mxp3, inner surface; c, Major cheliped; d, Anterior 3 abdominal somites; e, Sixth abdominal somite, telson, and uropods, dorsal view; f, Sixth abdominal somite, telson, and uropods, ventral view; g, Male Plp1; h, Male Plp3. a–c, e,f, female syntype, cl 3.4 mm, Puerto Rico, USNM 23778; d, male syntype, cl 2.7 mm, Puerto Rico, USNM 24667; g,h, male, cl 4.7 mm, Caribbean Sea, USNM 252397.

cuta (Biffar, 1970), both from the northwestern Atlantic.

Remarks.—Members of *Eucalliax* differ from *Calliax* in having the chelipeds equal and similar.

Members of the genus occur in carbonate sand-silt substrates, from the intertidal to shallow subtidal depths.

Etymology.—The name is a combination of the Greek prefix *eu-*, true, and the generic name *Calliax,* selected because members of the genus agree with the original generic di-

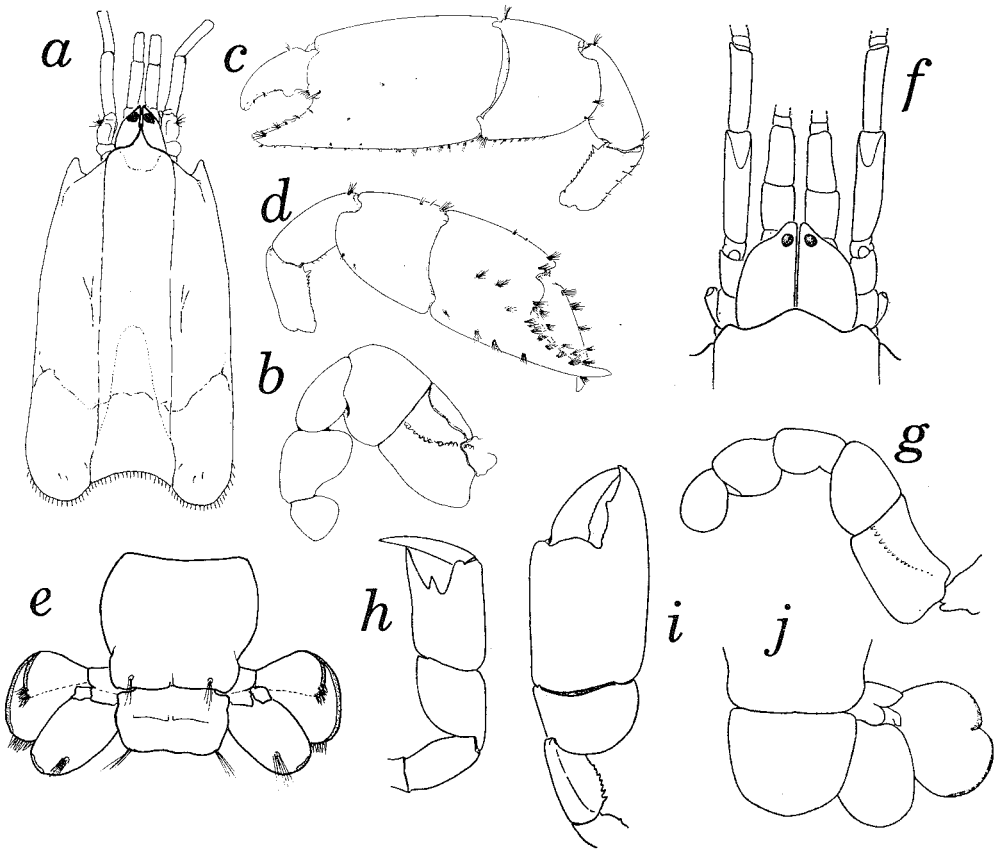

Fig. 15. Features of *Eucalliax jonesi* (Heard) (a–e) and *Calliax lobata* (De Gaillande & Lagardère) (f–j). a, Carapace and anterior cephalic appendages, dorsal view; b, Mxp3, inner surface; c, Left cheliped; d, Right cheliped; e, Sixth abdominal somite, telson, and uropods; f, Anterior region of carapace and cephalic appendages; g, Mxp3, inner surface; h, Minor cheliped; i, Major cheliped; j, Sixth abdominal, telson, and right uropod. a–e from Heard (1989: figs. 3a, 4a–c); f–j from De Saint Laurent & Bozic (1976: figs. 7, 15, 23, 34).

agnosis of equal chelae given for *Calliax*. The gender is feminine, as in *Calliax*.

Calliax De Saint Laurent, 1973
Figs. 3, 15f–j

Calliax De Saint Laurent, 1973:514. Type species *Callianassa lobata* De Gaillande & Lagardère, 1966, by original designation and monotypy. Gender feminine.

Diagnosis.—Cornea terminal, elongate. Mxp3 without exopod, ischium-merus subpediform. Chelipeds unequal, major without meral hook. Plp1 uniramous and Plp2 biramous in both sexes; Plp3–5 biramous in both sexes, type of appendices internae unknown. Uropodal exopod apparently with lateral notch or incision.

American species.—None.

Remarks.—The type species *Calliax lobata* (De Gaillande & Lagardère, 1966) is known only from the Mediterranean. In the original diagnosis of the genus the chelipeds were characterized as "habituellement subégaux" (De Saint Laurent 1973:514) in spite of the fact that they are clearly unequal and dissimilar in *C. lobata* (see De Gaillande & Lagardère 1966: fig. 2a, b and De Saint Laurent & Bozic 1976: fig. 23).

The type species lacks an exopod on

Mxp3. We believe that species with equal chelipeds and an exopod on Mxp3 assigned to *Calliax* by De Saint Laurent & Manning (1982) should be assigned to a separate new genus, an action that is beyond the scope of this study.

Members of the genus occur in a variety of shallow-water habitats.

Ctenochelidae, new family

Diagnosis.—Carapace usually with cardiac prominence. A2 with strong antennal scale. Mxp3 pediform, merus usually with distal spine. Male Plp2 with appendix masculina. Uropodal exopod longitudinally carinate dorsally, lacking dorsal plate, lateral notch or incision usually present.

Type genus.—*Ctenocheles* Kishinouye, 1926.

Included genera.—*Ctenocheles, Dawsonius,* new genus, *Gourretia,* and *Paracalliax* in the nominate subfamily, *Anacalliax* in the new subfamily Anacalliinae, and *Callianopsis* in the new subfamily Callianopsinae.

Key to American Subfamilies and Genera of Ctenochelidae

1. Carapace with dorsal oval 2
   Carapace lacking dorsal oval (Ctenochelinae) 3
2. Mxp3 dactylus ovate. Plp2–5 similar. Plp3–5 with finger-like appendices internae ..... Callianopsinae (single genus *Callianopsis*)
   – Mxp3 dactylus slender, digitiform. Plp3–5 similar, with stubby appendices internae ..... Anacalliinae (single genus *Anacalliax*)
3. Cheliped with cylindrical palm, fingers much longer than palm, pectinate. Sixth abdominal somite lacking lateral projections .... *Ctenocheles*
   – Cheliped with flattened palm, fingers neither elongate nor pectinate. Sixth abdominal somite with lateral projections .... *Dawsonius,* new genus

Ctenochelinae, new subfamily

Diagnosis.—Carapace lacking dorsal oval. Mxp3 propodus and dactylus slender. Plp2–5 similar, different from and larger than Plp1, with finger-like appendices internae.

Ctenocheles Kishinouye, 1926
Figs. 2, 7

Ctenocheles Kishinouye, 1926:63. Type species *Ctenocheles balssi* Kishinouye, 1926, by monotypy. Gender masculine.

Diagnosis.—Rostral carina and rostral spine present. Dorsal surface of eye flattened. Mxp3 with or without exopod, distal margin of merus usually with spine. Major cheliped with or without proximal meral hook, palm subglobular, fingers elongate, pectinate. Uropodal exopod with lateral incision.

American species.—Four, all from the western Atlantic, including two named species, *Ctenocheles holthuisi* Rodrigues, 1978, *Ctenocheles leviceps* Rabalais, 1979, and two unnamed species (*Ctenocheles* A and B) reported by Holthuis (1967).

Remarks.—Extralimital species include the type species, *C. balssi* from Japan, *C. collini* Ward, 1945 from Australia (see Poore & Griffin 1979), *C. maorianus* Powell, 1949 from New Zealand, and *C. serrifrons* Le Loeuff & Intès, 1974, and an unnamed species from West Africa (De Saint Laurent & Le Loeuff 1979).

Whereas several species, e.g., *C. serrifrons, C. holthuisi,* and *C. leviceps* have at least a vestige of an exopod on Mxp3, *C. collini* apparently lacks the exopod (see De Saint Laurent & Le Loeuff 1979:83), suggesting to us that *Ctenocheles* is a heterogeneous assemblage, including members of more than one genus. Further, *C. holthuisi,* the only member of the family that lacks a cardiac prominence on the carapace, also

differs from other species of the genus in several features, as pointed out by Rodrigues (1978).

Members of this genus are all strictly sublittoral and are found primarily from middle shelf and slope environments.

Dawsonius, new genus
Figs. 4, 16

Type species.—*Callianassa latispina* Dawson, 1967.

Diagnosis.—Carapace with rostral carina and rostral spine. Dorsal suface of eye slightly concave. Mxp3 without exopod, distal margin of merus with spine. Major cheliped with proximal meral hook. Uropodal exopod lacking lateral notch or incision.

American species.—One, *Dawsonius latispina* (Dawson, 1967), from the western Atlantic.

Remarks.—Monotypic. *Dawsonius* resembles *Gourretia* in basic facies, but differs from it in lacking an exopod on Mxp3 and in having sharp lateral projections on the sixth abdominal somite.

In his account of *D. latispina,* Biffar (1971a: fig. 11b) showed an exopod on the Mxp3 of a distinctly different species. It may prove to be a member of *Gourretia,* a genus not now known from the Americas.

Known populations occur over the continental shelf, in depths of about 10 to near 150 meters, in substrates ranging from muddy sands to soft silty clays.

Etymology.—We dedicate this genus to C. E. Dawson, who recognized the distinctness of the type species. The gender is masculine.

Gourretia De Saint Laurent, 1973
Fig. 3

Gourretia De Saint Laurent, 1973:514. Type species *Callianassa denticulata* Lutze, 1937, a junior synonym of the preoccupied *Callianassa subterranea* var. *minor* Gourret, 1887 (see Lewinsohn & Holthuis 1986), by original designation and monotypy. Gender feminine.

Diagnosis.—Carapace lacking dorsal oval and rostral carina; rostral spine usually present. Dorsal surface of eye flattened. Mxp3 with exopod; distal margin of merus usually with spine. Major cheliped with proximal meral hook. Sixth abdominal somite lacking acute lateral projections. Uropodal exopod usually lacking lateral notch or incision.

American species.—None.

Remarks.—This genus includes *G. denticulata* (Lutze) from the Mediterranean and eastern Atlantic (Le Loeuff & Intès 1974; De Saint Laurent & Bozic 1976, as *G. minor*), *G. lahouensis* Le Loeuff & Intès, 1974 and *G. barracuda* Le Loeuff & Intès, 1974, both from West Africa, an unnamed species from West Africa (De Saint Laurent & Le Loeuff 1979), and *G. coolibah* Poore & Griffin, 1979, from Australia.

Gourretia minor, G. lahouensis, and *G. barracuda* lack a lateral notch or incision on the uropodal exopod, but it is present in *G. coolibah* which, like *G. lahouensis,* also lacks the distal spine on the merus of Mxp3. Like *Ctenocheles, Gourretia* may well include representatives of more than one genus.

Members of the genus occur in shelf and slope habitats to depths of about 250 m.

Paracalliax De Saint Laurent, 1979
Figs. 1, 7

Paracalliax De Saint Laurent, 1979:1396. Type species *Paracalliax bollorei* De Saint Laurent, 1979, by original designation and monotypy.

Diagnosis.—Carapace with low rostral carina; lacking dorsal oval and rostral spine. Dorsal surface of eye concave. Mxp3 with exopod; merus with distal spine. Major cheliped lacking proximal meral hook. Sixth abdominal somite with rounded lateral pro-

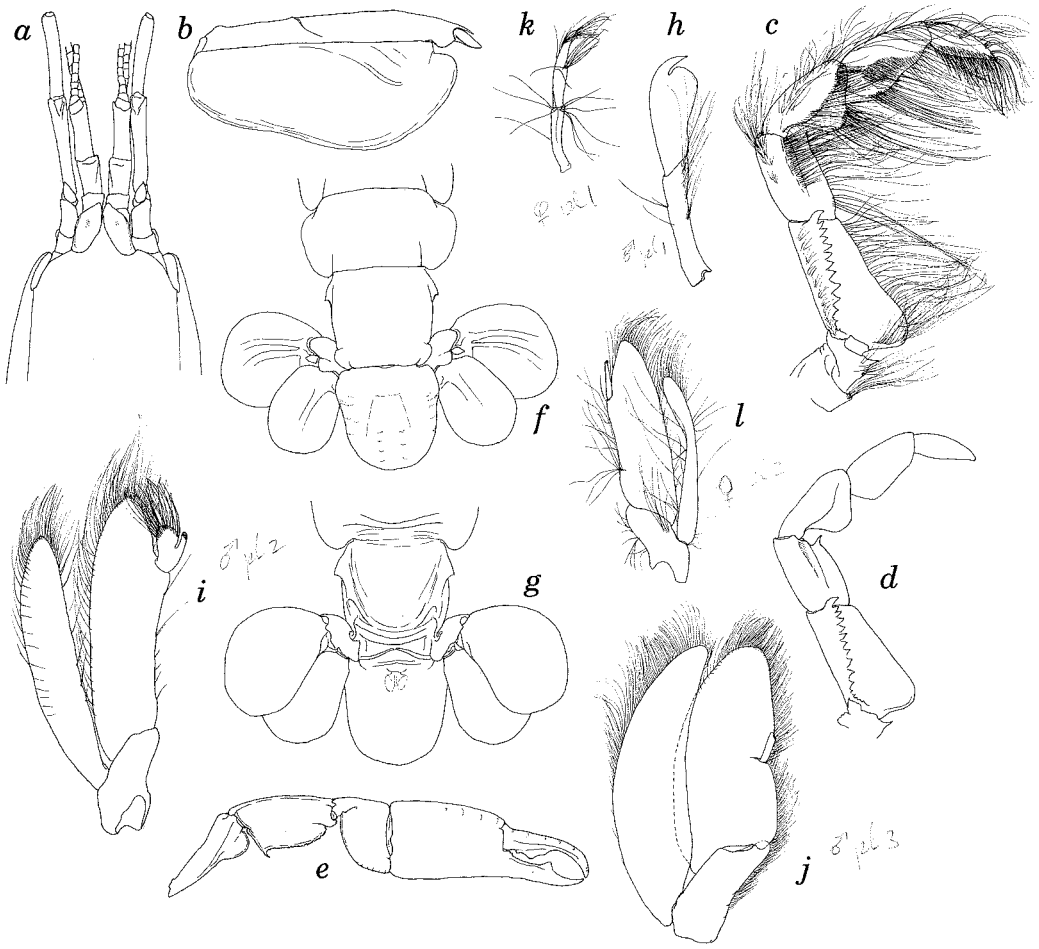

Fig. 16. *Dawsonius latispina* (Dawson). a, Anterior region of carapace and cephalic appendages, dorsal view; b, Carapace, lateral view; c, Mxp3, inner surface (with setae); d, Mxp3, inner surface (setae omitted); e, Major cheliped; f, Posterior two abdominal somites, telson, and uropods, dorsal view; g, Sixth abdominal somite, telson, and uropods, ventral view; h, Male Plp1; i, Male Plp2; j, Male Plp3; k, Female Plp1; l, Female Plp2. a–i, male holotype, cl 14.7 mm, Gulf of Mexico, USNM 105398; j, male, cl 7.9 mm, Gulf of Mexico, USNM 103755; k,l, female, cl 10.0 mm, Gulf of Mexico, USNM 252398.

jection. Uropodal exopod lacking lateral notch or incision.

American species.—None.

Remarks.—Monotypic. The unique holotype from Mauritania was described and figured by De Saint Laurent & Le Loeuff (1979).

Anacalliinae, new subfamily

Diagnosis.—Carapace with dorsal oval. Mxp3 propodus and dactylus slender. Plp3–5 similar, different from and larger than Plp1–2; Plp3–5 with appendices internae stubby, embedded in margin of endopod.

Type genus.—*Anacalliax* De Saint Laurent, 1973.

Anacalliax De Saint Laurent, 1973
Figs. 2, 3, 17

Anacalliax De Saint Laurent, 1973:515. Type species *Callianassa argentinensis* Biffar, 1971b, by original designation and monotypy.

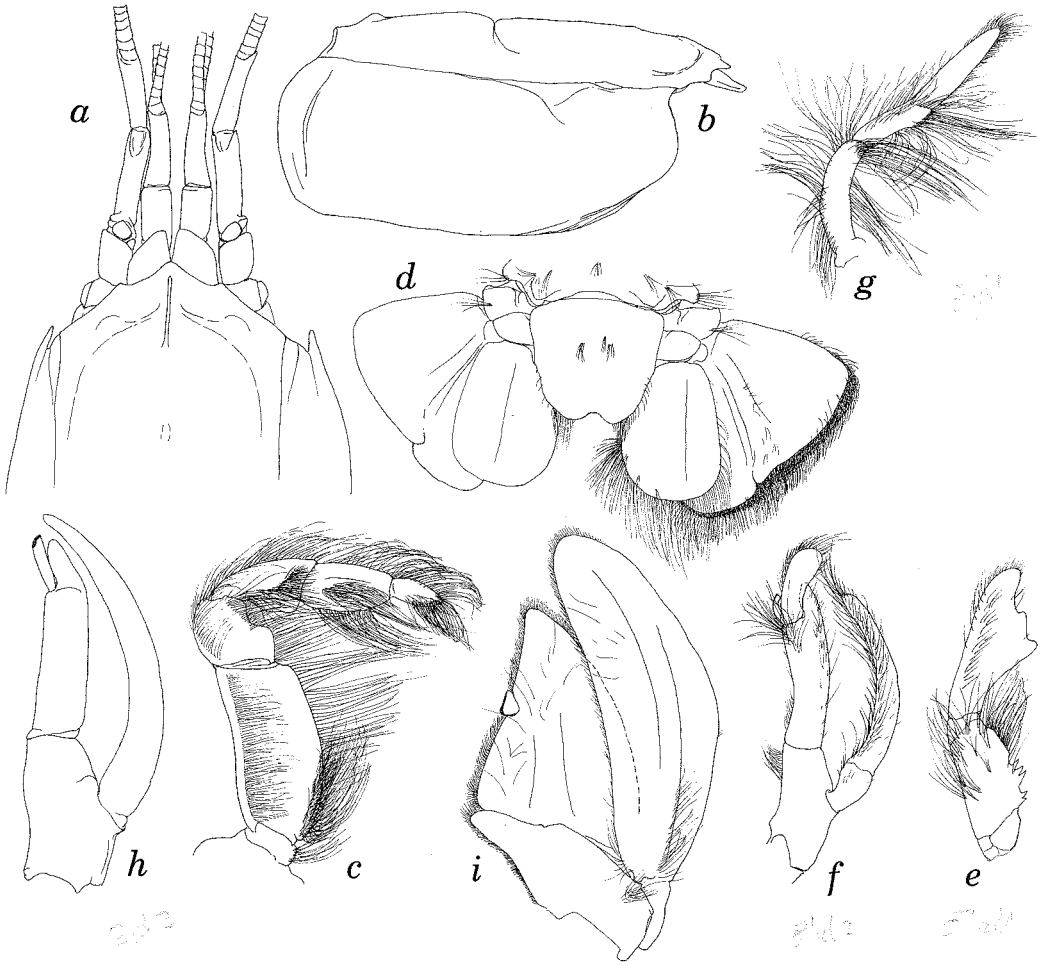

Fig. 17. *Anacalliax argentinensis* (Biffar). a, Anterior region of carapace and cephalic appendages, dorsal view; b, Carapace, lateral view; c, Mxp3, outer surface; d, Telson and uropods, dorsal view; e, Male Plp1; f, Male Plp2; g, Female Plp1; h, Female Plp2; i, Female Plp3. a–d, g–i, female holotype, cl 26.5 mm, Argentina, USNM 135055; f, g, male paratype, cl 40.9 mm, Argentina, USNM 135056.

Diagnosis.—Carapace with dorsal oval, rostral carina, and rostral spine. Cornea subterminal, indistinct. Mxp3 without exopod, ischium-merus pediform. Chelipeds unequal, major without meral hook. Plp1 slender, uniramous, Plp2 slender, biramous, Plp3–5 foliaceous in both sexes; Plp2–5 with appendices internae finger-like on Plp2, embedded in margin of endopod on Plp3–5. Uropodal exopod with lateral notch or incision.

American species.—Two, *Anacalliax agassizi* (Biffar, 1971b) and *Anacalliax argentinensis* (Biffar, 1971b), both from the Atlantic coast of South America.

Remarks.—*Anacalliax argentinensis* is known from the shallow subtidal, under stones, to the deeper sublittoral in depths of about 50 meters, in sandy mud (Biffar 1971b).

Callianopsinae, new subfamily

Diagnosis.—Carapace with dorsal oval. Mxp3 propodus and dactylus ovate. Plp2–5 similar, different from and larger than Plp1, with finger-like appendices internae.

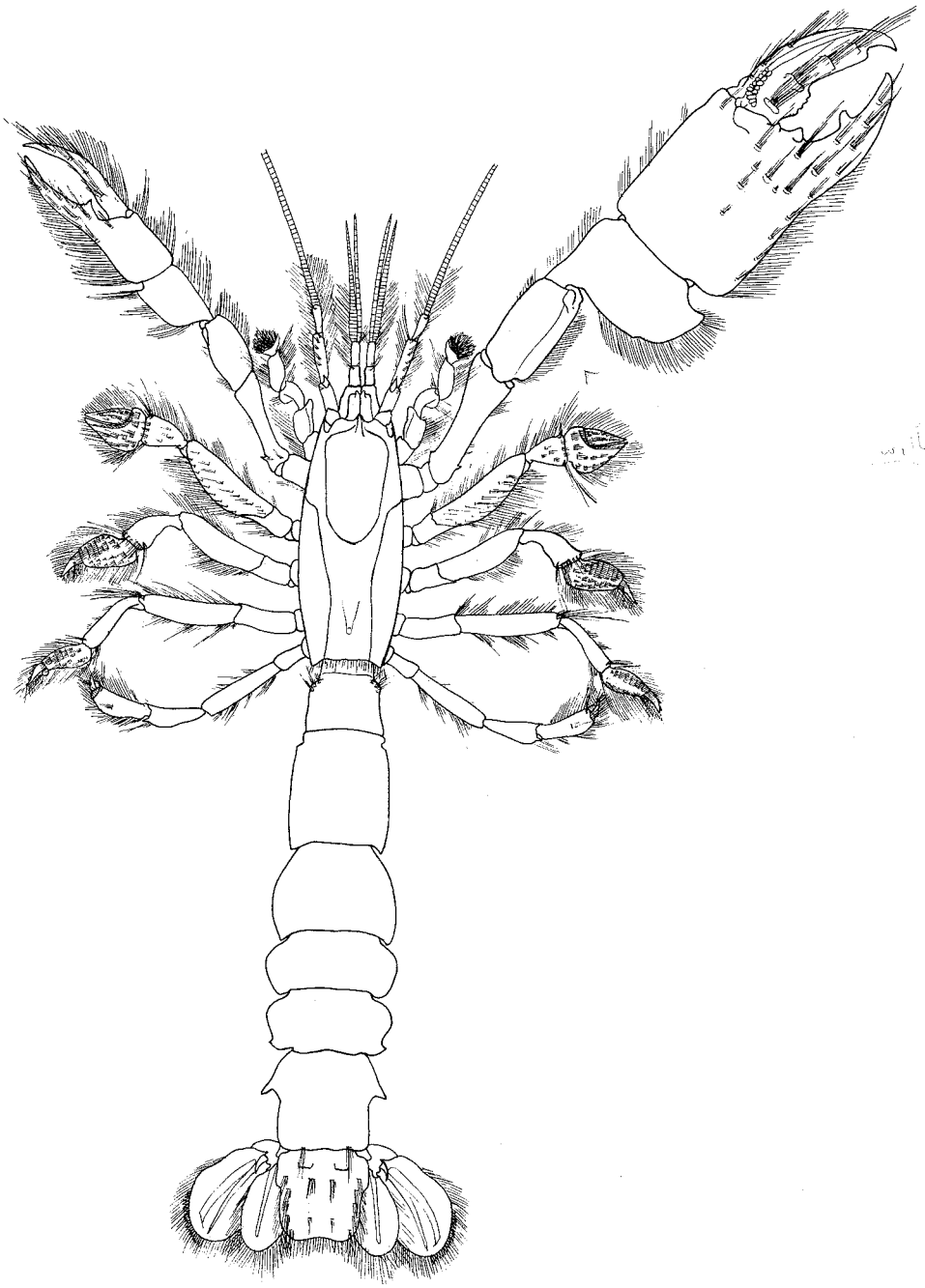

Fig. 18. *Callianopsis goniophthalma* (Rathbun) (from Rathbun 1904: pl. 8).

Type genus.—*Callianopsis* De Saint Laurent, 1973.

Callianopsis De Saint Laurent, 1973
Figs. 7, 18

Callianopsis De Saint Laurent, 1973:515. Type species *Callianassa goniophthalma* Rathbun, 1902, by original designation and monotypy.

Diagnosis.—Carapace with dorsal oval, low rostral carina, and rostral spine. Dorsal surface of eye concave. Mxp3 without exopod; merus unarmed distally; propodus and dactylus ovate. Major cheliped with proximal meral hook. Sixth abdominal somite with acute lateral projections. Uropodal exopod lacking lateral notch or incision.

American species.—One, *Callianopsis goniophthalma* (Rathbun, 1902).

Remarks.—Monotypic. Members of this genus are known from slope depths (480–650 meters) in the northeastern Pacific.

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ADDENDUM

Callianassa rochei Bouvier (1895:7), originally described from Baja California, Mexico, is a species of uncertain position that should have been mentioned in the Introduction. Whereas it cannot be assigned to any of the genera recognized here and it cannot be identified with any of the species known from Baja California from information in the original description, it probably can be considered to be a species of *Neotrypaea,* as Bouvier noted that it presented most of the features of *N. californiensis, N. uncinata,* and *N. gigas.* The original citation is:

Bouvier, E.-L. 1895. Sur une collection de Crustacés Décapodes recueillis en Basse-Californie par M. Diguet.—Bulletin du Muséum d'Histoire Naturelle, Paris 1:6–8.