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Gebiidea

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PART R, REVISED, VOLUME 1, CHAPTER 8T24: SYSTEMATIC DESCRIPTIONS: INFRAORDERS AXIIDEA AND GEBIIDEA

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Infraorder AXIIDEA de Saint Laurent, 1979

[Axiidea DE SAINT LAURENT, 1979b, p. 28]

Body form lobster-like, often weakly calcified, adapted to burrowing life habit; carapace usually approximately as wide as high; rostrum dorsoventrally flattened, triangular; *linea thalassinica* complete, partial, or absent; cervical groove usually present; dorsal oval and cardiac prominence sometimes present; pleon usually longer than carapace, first pleonite usually shortest, second pleonite longest; first pleopod sexually dimorphic, absent in some males; third maxilliped usually pediform. Chelipeds weakly or strongly heterochelate, may be sexually dimorphic; pereopods 1 and 2 chelate; pereopod 3 simple. [Emended from DWORSCHAK, FELDER, & TUDGE, 2012, p. 187.] *Upper Devonian (Famennian)–Holocene*.

Classification of genera and families historically referred to Callianassidae *sensu lato* follows POORE and others (2019).

Family ANACALLIACIDAE Manning & Felder, 1991

[*nom. transl.* SAKAI, 2011, p. 341 *ex* Anacalliinae MANNING & FELDER, 1991, p. 786; *nom. correct.* SAKAI & TÜRKAY, 1999, p. 204 *pro* Anacalliinae MANNING & FELDER, 1991, p. 786]

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 sinuoidal 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 one 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 two to five 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

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margin of endopod; uropodal exopod with margin divided by notch. [POORE & others, 2019, p. 81.] *Lower Cretaceous (Aptian)–Holocene*.

Anacalliax DE SAINT LAURENT, 1973, p. 515 [**Callianassa argentinensis* BIFFAR, 1971, p. 229, fig. 2; OD] [= *Anacalliaopsis* SAKAI, 2011, p. 342 (type, *Callianassa agassizi* BIFFAR, 1971, p. 233, fig. 3, OD)]. Rostrum shorter than eyestalks, flat, triangular. *Holocene*: Western Atlantic Ocean.—FIG. 1, 1. **A. argentinensis* (BIFFAR), line drawing of USNM 135055, Holocene, Argentina, scale bar 5 mm (adapted from Biffar, 1971, fig. 2h).

Aptanacalliax FERRATGES, HYŽNÝ, & ZAMORA, 2021, p. 7 [**A. enigma*; OD]. Rostrum short, flat; cervical groove deep; telson rectangular, carpus of pereopod 2 subrectangular. *Lower Cretaceous (Aptian)*: Spain.—FIG. 1, 2. **A. enigma*, MPZ-2020/464, Aptian, Spain, scale bar 1 mm (new).

Turbiocheir SCHWEITZER, FELDMANN, CASADÍO, & RODRÍGUEZ RAISING, 2012, p. 176 [**T. minutospinata*; OD]. Carapace with distinct dorsal oval formed by *linea thalassinica* and cervical groove; rostrum moderately long, strongly axially keeled, keel becoming weaker posteriorly, terminating in strong axial tubercle; carapace with scabrous muscle scars anteriorly and just anterior to cervical groove, with two pairs of rectangular swellings placed on either side of axis between scabrous patches; pereopod 1 heterochelous; merus of larger chela arcuate, with keel paralleling lower margin; carpus approximately as long as high, with arcuate, serrate lower margin; manus with spinose upper and lower margins; fingers long. [SCHWEITZER, HYŽNÝ, & FELDMANN, 2021, p. 246.] *Eocene–Oligocene*. *Eocene*: Chile. *Eocene–Oligocene*: Argentina. *Oligocene*: Venezuela.—FIG. 1, 3. **T. minutospinata*, holotype, MPEF-PI 5401, Eocene, Argentina, scale bar 1 cm (new).

Family AXIIDAE Huxley, 1879

[Axiidae HUXLEY, 1879, p. 785, ICZN Opinion 712, 1964] [= Calocarididae ORTMANN, 1891, p. 47; = Coralaxiinae SAKAI & DE SAINT LAURENT, 1989, p. 10; = Eiconaxiidae SAKAI & OHTA, 2005, p. 69; = Eiconaxiopsididae SAKAI, 2011, p. 289; = Neoxiidae SAKAI, 2017b, p. 504]

Carapace with lateral lobes on posterior margin; rostrum well developed, sharp, often spinose; *linea thalassinica* absent; may have dorsal postrostral keels; cervical groove well-defined; pleurae of pleonal somite 1 produced, somite 1 higher than somite 2; somite 6 with longitudinal row of setae; propodus of pereopods 3 and 4 elongate; pereopods 2–4 without rows of setae; pleopods with appendices internae. [Emended from DWORSCHAK, FELDER, &

TUDGE, 2012, p. 187.] *Upper Devonian (Famennian)–Holocene*.

Axius LEACH, 1815, p. 343 [**A. stirrhynchus*; M] [= *Plioaxius* FRAAIJE, VAN BAKEL, JAGT, & MOLLEN, 2011, p. 158 (type, *P. lineadactylus*, OD)]. Rostrum triangular, laterally armed with spines, extending to gastric region; supraocular spine undifferentiated; anterolateral margin of carapace unarmed; gastric region slightly convex with one short median and two short, unarmed submedian carinae; cervical groove well defined; pleonal pleura ventrally rounded, that of somite 2 broadest; pereopods 1 unequal; major manus longer than high, occlusal margin of fixed finger finely serrated proximally and with a blunt tooth positioned at midlength; minor manus as long as or shorter than fixed finger, occlusal margin of fixed finger armed with teeth; telson longer than wide with dorsal spines; posterior margin convex with median spine; uropodal exopod with transverse suture near posterior margin. [Emended from HYŽNÝ, JAKOBSÉN, & FRAAIJE, 2017, p. 3.] *Lower Cretaceous–Holocene*. *Lower Cretaceous (Albian)*: USA (Texas). *Oligocene (Chatthian)*: Denmark. *Oligocene*: Panama, Japan. *Pliocene*: Germany. *Holocene*: Australia, France, Italy, Morocco, Atlantic coastal USA, UK.—FIG. 2, 1. **A. stirrhynchus*, USNM 262600, Holocene, France, scale bar 1 cm (new).

Acanthaxius SAKAI & DE SAINT LAURENT, 1989, p. 66 [**Axiopsis pilocheira* SAKAI, 1987, p. 296, fig. 1–2; OD]. Rostrum sharp, with lateral spines; carapace smooth or spinose, spines may be situated on keels; cervical groove visible laterally; rostrum narrow, sharp, with small spines laterally, continuous with lateral carinae which are spinose; submedian and median carinae spinose; first pereopods asymmetrical, covered with tubercles laterally, upper margins of carpus–dactylus usually armed with spines. [Emended from POORE & COLLINS, 2009, p. 224.] *Lower Cretaceous–Holocene*. *Lower Cretaceous (Albian)*: USA (Texas). *Holocene*: Australia, Indo-Pacific Ocean.—FIG. 2, 2. *A. miyazakiensis* (YOKOYA, 1933), USNM 266275, Holocene, Philippines, scale bar 1 cm (new).

Aperiopyxis SCHWEIGERT, 2010 (imprint 2009), p. 22 [**A. wulfetzergiebeli*, p. 24, fig. 2–4; OD]. Carapace not preserved; pereopod 1 long, isochelous, manus rectangular, long; fixed finger short, edentulous; movable finger long, strongly downturned; pleon with pleurae with rounded ventral margins; uropodal exopodites with straight diaeresis. [Emended from SCHWEIGERT, 2010 (imprint 2009), p. 22.] *Upper Jurassic (Titthonian)*: Germany.—FIG. 2, 3. **A. wulfetzergiebeli*, SMNS 67907, scale bar 1 cm (new, photo by G. Schweigert, Staatliches Museum für Naturkunde, Stuttgart, Germany).

Aptaxiopsis FERRATGES, HYŽNÝ, & ZAMORA, 2021, p. 4 [**A. longimanus*; OD]. Pereopod 1 long, similar in shape, unequal; merus of pereopod 1 with spines on lower margin; manus of pereopod 2 short, fingers short; cervical groove and postcervical groove present. *Lower Cretaceous (Aptian)*:

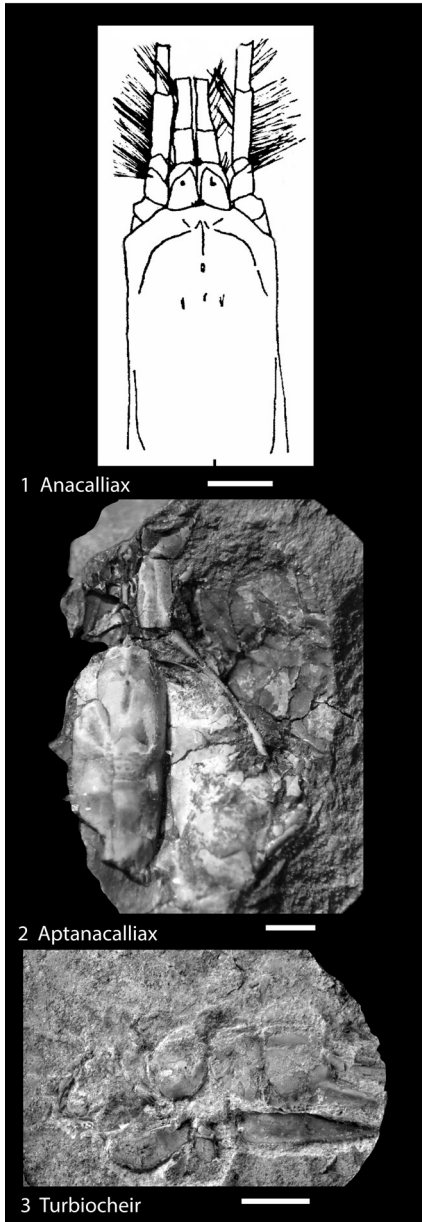


FIG 1. Anacalliidae (p. 2).

Spain.—FIG. 2,4. **A. longimanus*, holotype, MPZ-2020-440, scale bar 1 cm (new).

Axiopsis BORRADAILE, 1903, p. 538 [**Axius affinis* DE MAN, 1887, p. 469, pl. 20,1; OD]. Carapace with flattened area posterior to rostrum, rostrum as long as or longer than eyestalks, laterally serrate, keels may extend from rostral base onto carapace and terminate anterior to cervical groove; cervical

groove well marked, carapace with submedian keels of weak tubercles; major cheliped manus long, granular on upper and lower margins, carpus short, merus with spines on lower margin increasing in size distally, upper margin with one spine. *Lower Cretaceous–Holocene. Lower Cretaceous (Albian)*: USA (Texas). *Eocene*: USA (South Carolina). *Holocene*: Indo-Pacific Ocean, eastern Atlantic Ocean, Australia.—FIG. 2,5. *Axiopsis eximia* KENSLEY & WILLIAMS, 1990, holotype, USNM PAL 219431, Eocene, USA (South Carolina), scale bar 1 cm (new).

Calocarides WOLLEBAEK, 1908, p. 3 [**Eiconaxius coronata* TRYBOM, 1904, p. 384, pl. 20–21; SD SAKAI & DE SAINT LAURENT, 1989, p. 78]. Rostrum narrow, sharp, lateral margins with spines, extending onto gastric region; gastric region with five carinae; cervical groove well developed along entire length; branchiocardiac groove present; pleonal pleurae smooth; telson with posteromedian spine; uropodal exopods with diaeresis. [Emended from SAKAI & DE SAINT LAURENT, 1989, p. 78.] *Eocene–Holocene. Eocene*: Italy. *Holocene*: Atlantic Ocean, Indo-Pacific Ocean.—FIG. 3,1. *Calocarides soyoi* (YOKOYA, 1933), USNM 243563, Holocene, Japan, scale bar 1 cm (new).

Cretaxiopsis CHARBONNIER, AUDE, GARASSINO, & HYŽNÝ, 2017, p. 158 [*C. libanotica*, p. 159, fig. 365–372; OD]. Cervical groove well defined, straight; carapace with two pairs of carinae; pereopods spinose; pereopods 1 subequal, similar; fingers of chelipeds with longitudinal ridges. [Emended from CHARBONNIER & others, 2017, p. 158.] *Upper Cretaceous (Cenomanian)*: Lebanon.—FIG. 3,2. **C. libanotica*, holotype, MNHN.FA51479, scale bar 1 cm (photo by L. Cazes, MNHN).

Devonaxius FELDMANN & SCHWEITZER, 2019, p. 725 [**D. garlandi*, p. 725, fig. 1; OD]. Weakly compressed cephalothorax with short, bifid rostrum lacking spines; dorsal oval extending to nearly mid-length and bearing two subtle ridges converging toward rostrum; branchiostegite apparently thin, flexible; first pleonite well developed, overlapping second pleonite with reduced pleuron; second pleonite approximately same length as first. [FELDMANN & SCHWEITZER, 2019, p. 725.] *Upper Devonian (Famennian)*: USA (Ohio).—FIG. 3,3. **D. garlandi*, holotype USNM PAL 726800, scale bar, 1 cm (new).

Etallonia OPPEL, 1861, p. 361 [**Magila longimana* MÜNSTER, 1839, p. 25, pl. 10,3; OD]. First pereopods subchelate, with sharp spine above position of short spine-like fixed finger; movable finger long, strongly arched; pleonal somites with pleurae ending in sharp terminations. *Upper Jurassic (Oxfordian)*: Poland, Russia. *Upper Jurassic (Oxfordian–Tithonian)*: Germany.—FIG. 3,4. **E. longimana* (MÜNSTER), specimen in private collection of R. Frattigiani, Oxfordian, Germany, scale bar 1 cm (new, photo by G. Schweigert, Staatliches Museum für Naturkunde, Stuttgart, Germany).

Hinecaris KARASAWA, KISHIMOTO, OHARA, & ANDO, 2019, p. 47 [**H. simplex*, p. 47, pl. 9,1–3; OD].

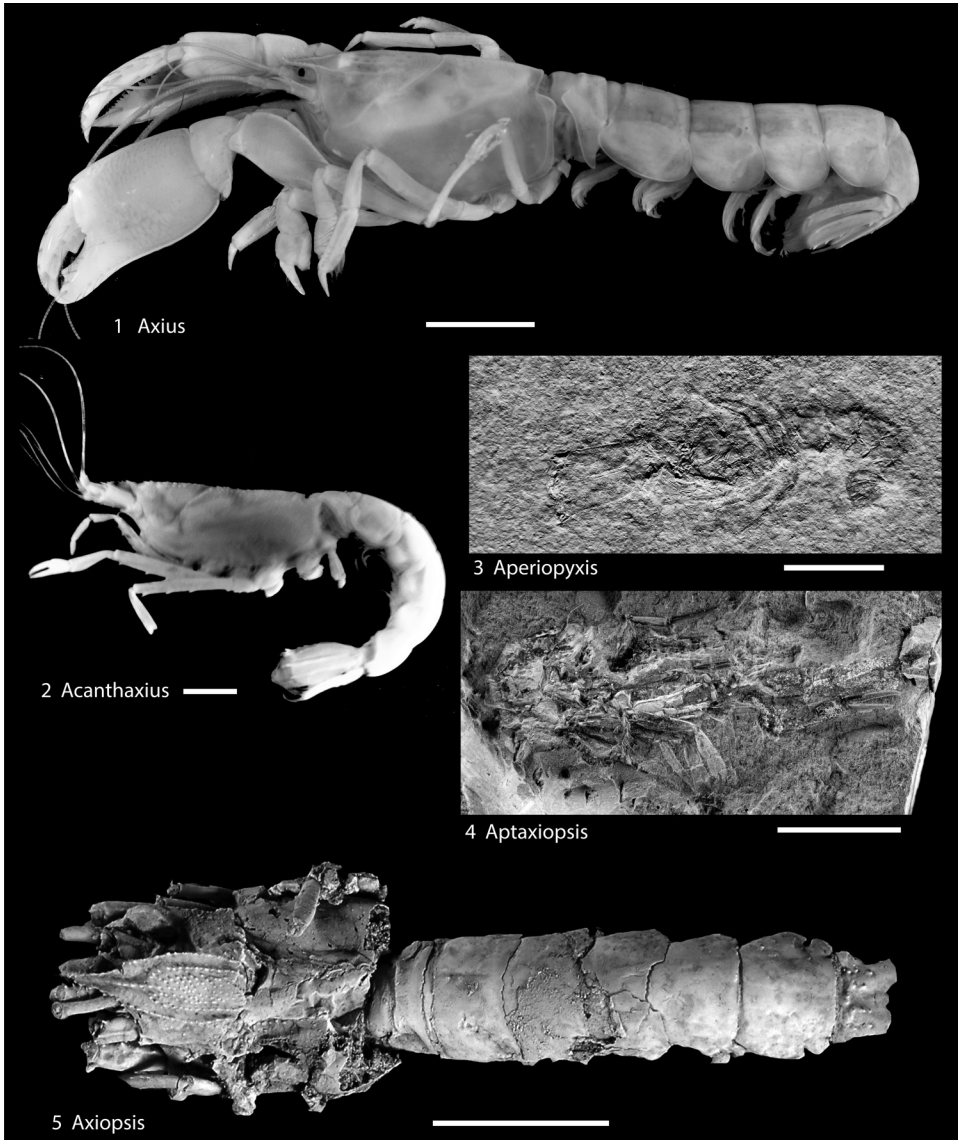


FIG 2. Axiidae (p. 2–3).

Carapace very weakly rugose; rostrum acutely triangular, continuous with supraorbital carinae; lateral margins unarmed; dorsal surface with narrow median sulcus extending to approximately anterior one-third of gastric region; outer-orbital spine short, directed anterolaterally; gastric region gently convex; median and submedian carinae absent; supraorbital carinae weak with small tubercles; outer-orbital carinae nearly straight, finely tuberculate; antennal region with finely tuberculate, oblique antennal carina; cervical groove deep, well defined; postcervical median carina absent; pleon

elongate, finely punctate; somite 1 much wider than long, trapezoidal in dorsal view, divergent posteriorly, bearing transverse, dorsal groove at anterior fifth, with narrow anterolateral lobes; uropodal diaeresis absent; pereopods long, slender. [Emended from KARASAWA & others, 2019, p. 47.]

Upper Cretaceous (Maastrichtian): Japan.—FIG. 3,5. **H. simplex*, holotype, WMNH-Ge-1141-120001, scale bar 1 cm (new).

Huxleycaris BRAVI & GARASSINO, 1998, p. 157 [**H. beneventana*, p. 157, fig. 26–29; OD]. Carapace with longitudinal rows of spines anterior to cervical

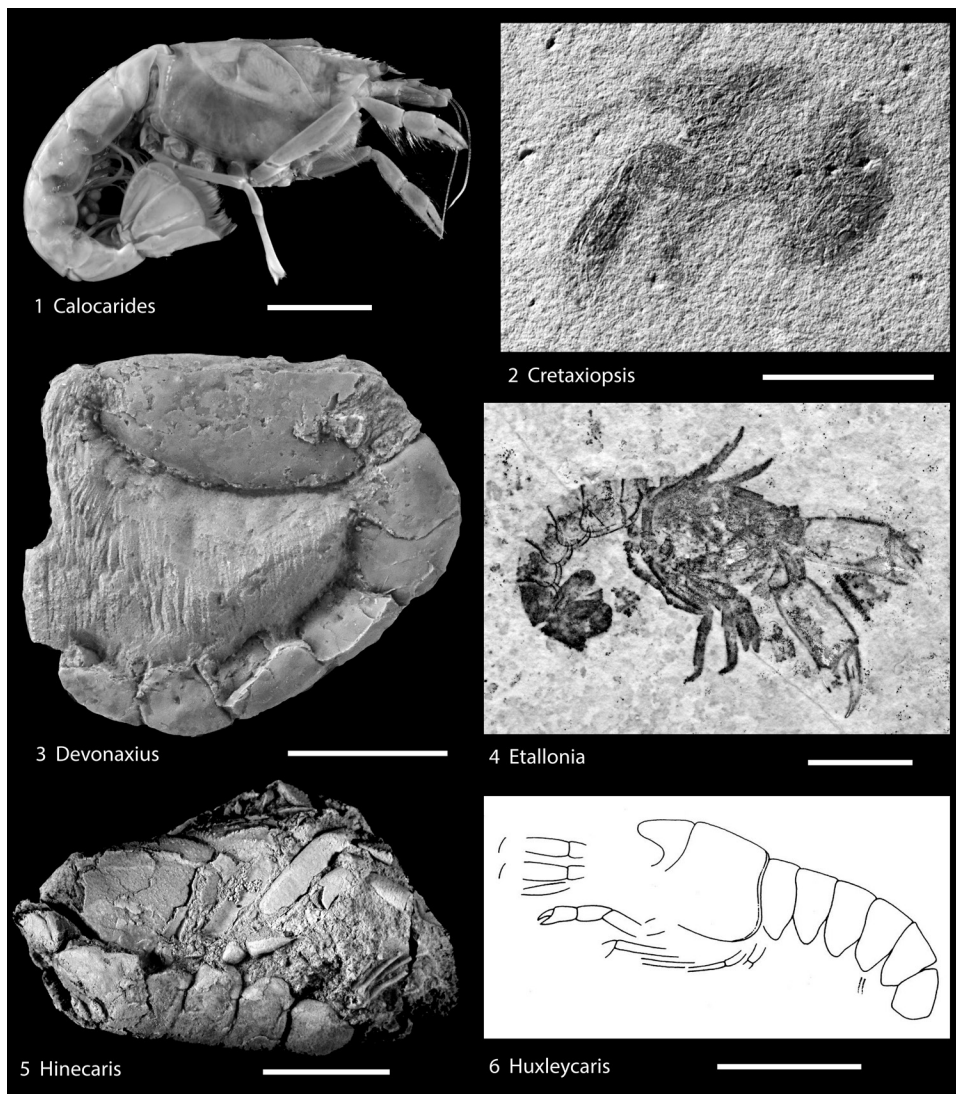


FIG 3. Axiidae (p. 3–5).

groove; cervical groove deep; pereiopod 1 strongly chelate; pereiopod 2 with small chelae; pereiopods 3–5 with terminal dactyli. *Lower Cretaceous (Albian)*: Italy.—FIG. 3, 6. **H. beneventana*, drawing of holotype M 20085, scale bar 1 cm (BRAVI & GARASSINO, 1998, pl. 26, copyright, MSNM).

Libanoaxius CHARBONNIER, AUO, GARASSINO, & HYŽNÝ, 2017, p. 162 [**L. beatae*, p. 162, fig. 373–376; OD]. Carapace and pleon ornamented with evenly spaced tubercles; cervical groove well defined, carapace anteriorly with carinae; pereiopods one subequal and similar, upper margin of merus spinose; uropodal exopod with diarsis. [Emended from CHARBONNIER & others, 2017, p.

16.] *Upper Cretaceous (Cenomanian)*: Lebanon.—FIG. 4, 1. **L. beatae*, holotype, MNHN FA51485, scale bar 1 cm (photo by L. Cazes, MNHN).

Magila MÜNSTER, 1839, p. 25 [**M. latimana*, p. 25, pl. 10, 2; SD GLAESSNER, 1929, p. 245] [= *Palaeoaxius* PATRULIUS, 1959, p. 249 (type, *P. straeleni*; OD)]. Carapace small; rostrum with granular margins; cervical groove deep; gastro-orbital groove weak, short; hepatic and branchiocardiac grooves weak; longitudinal keels anteriorly; manus of first pereiopod rectangular, with well-developed fingers, usually isochelous or weakly heterochelous; pereiopods 1–2 chelate; pleonal pleura large, extending posteroventrally. ?*Lower Jurassic–Upper*

- Cretaceous*. ?*Lower Jurassic* (Toarcian): Switzerland. *Middle Jurassic* (Callovian): Germany. *Upper Jurassic* (Oxfordian–Tithonian): Czech Republic, Germany, Israel, Romania, UK (England). *Upper Cretaceous* (Cenomanian): Lebanon.—FIG. 4.2. **M. latimana*, NHMUK 44788, Kimmeridgian, Germany, scale bar 1 cm (new).
- Megachela** SCHWEIGERT, 2003, p. 3 [**M. frickhingeri*, p. 3, fig. 1–4; OD]. Chelae very large, becoming higher distally; fixed finger much shorter than movable finger, with tiny spines on occlusal surface; movable finger stout, long, with spine at midlength; uropods with well-developed fringe of setae; exopodites of uropods with diaeresis. *Upper Jurassic* (Tithonian): Germany.—FIG. 4.3. **M. frickhingeri*, paratype, SMNS 64933, scale bar 1 cm (new, photo by G. Schweigert, Staatliches Museum für Naturkunde, Stuttgart, Germany).
- Paraxiopsis** DE MAN, 1905, p. 597 [**Axius brocki* DE MAN, 1887, p. 475, pl. 20.3; OD]. Carapace with rostrum lower than anterior-most carapace, lateral margins dentate; postcervical carinae and spines absent; median carina entire; submedian and lateral carinae dentate; cervical groove visible laterally over half distance to anterolateral margin; chelae of pereopods one asymmetrical, carpus-dactylus upper margins smooth; telson with dorsal spines. [Emended from KENSLEY, 1996, p. 709; POORE & COLLINS, 2009, p. 224.] *Lower Cretaceous–Holocene*. *Lower Cretaceous* (Albian): USA (Texas). *Holocene*: tropical Atlantic Ocean, Indo-Pacific Ocean.—FIG. 4.4. **P. brocki* (DE MAN), USNM 95562, Holocene, North Pacific Ocean, scale bar 1 cm (new).
- Protaxius** BEURLEN, 1930, p. 233 [**Callianassa isochela* WOODWARD, 1876, p. 48; OD]. Carapace longer than high, dorsal and ventral surfaces weakly convex; posterior margin convex; cervical groove crosses the dorsal midline at 90° angle, immediately curves anteroventrally in straight line to approximately midheight of carapace, where it curves ventrally at 90° angle to long axis; pleonal somite 1 short, somite 2 poorly preserved, somites 3 and 4 same length as 2, pleuron 3 overlaps pleuron 4 which overlaps pleuron 5, terga smooth, pleura with smoothly rounded margins, slightly elevated centrally; somite 6 shorter than other somites, lacking discrete pleuron; telson narrow and triangular; uropods ovoid, no diaeresis; first pereopods isochelous; ischium short, broadening distally, shorter than merus; merus short, ovoid, convex on upper and lower surfaces, articulating with carpus at upper angle; carpus smooth, higher than long and higher than manus; articulates with chela at approximately 100° angle as measured on carpus; manus of chela much longer than high, upper and lower surfaces slightly convex, outer surface smooth, fixed finger short, stout, appearing to have one conical tooth at midlength on occlusal surface; movable finger longer than fixed finger; pereopods 2 narrow, chelate. *Upper Jurassic–Lower Cretaceous*. *Upper Jurassic* (Kimmeridgian): Germany, UK, Japan. *Lower Cretaceous* (Hauterivian): Argentina, UK (England).—FIG. 4.5. **P. isochela* (WOODWARD), NHMUK In.23742, Kimmeridgian, England, UK, scale bar 1 cm (new).
- Reschia** SCHWEIGERT 2010 [imprint 2009], p. 25 [**R. barbarae*, p. 26, fig. 7; OD]. Pereiopods 1–3 chelate; pereopod 1 with slender, curved fingers; pereopod 2 long, with large chelae. (Note that if pereiopods 1–3 are chelate, this taxon may be referable to a different infraorder). *Upper Jurassic* (Tithonian): Germany.—FIG. 4.6. **R. barbarae*, holotype, SMNS 67608, scale bar 1 cm (new, photo by G. Schweigert, Staatliches Museum für Naturkunde, Stuttgart, Germany).
- Schlueteria** FRITCH & KAFKA, 1887, p. 33 [**S. tetracheles*, p. 33, pl. 6, 1–7, pl. 7, 1–3, text-fig. 53–55; M]. Carapace with longitudinal subparallel keels anteriorly, cervical groove straight, oriented at approximately 60° angle to dorsal surface, crosses dorsal midline, extends to ventral margin; pleonal somites 1–4 with sharp pleurae, somite 5 with rounded pleurae, pleurae of somites 1–5 separated from terga by granular longitudinal ridge; somite 6 smooth; endopod of uropod keeled, slightly longer than telson; exopod of uropod without diaeresis; telson with longitudinal rows of granules; major chelipeds very large, with spines on upper and lower margins of manus, fingers well developed, with spines on occlusal surfaces; second pereopod chelate, much smaller, smooth, manus with rounded upper and lower margins, fingers short, stout. *Lower Cretaceous–Upper Cretaceous*. *Lower Cretaceous* (Berriasian): Antarctic Peninsula. *Upper Cretaceous* (Turonian–Maastrichtian): Czech Republic. *Upper Cretaceous* (Santonian–Campanian): Madagascar.—FIG. 4.7a–b. **S. tetracheles*; a, PKNM 3484, pleon and appendages; b, PKNM 6894, major chela, Turonian–Maastrichtian, Czech Republic, scale bars 1 cm (new, photos by M. Kočová Veselská, Národní Muzeum, Prague, Czech Republic).

Family CALLIANASSIDAE Dana, 1852

[Callianassidae DANA, 1852b, p. 12] [=Cheraminae MANNING & FELDER, 1991, p. 780; =Lipkecallianassinæ SAKAI, 2005, p. 212]

Rostrum flat, sharp; cervical groove and *linea thalassinica* both present and complete; anterior branchiostegal lobe well calcified; posterior margin of carapace without lateral lobes; uropodal exopod with dorsal plate; pereopod 1 chelate, heterochelous or isochelous; merus lower margin with smooth or with large proximal spine; pereopod 2 chelate; pereopod 3 simple; pereopod 5 chelate or subchelate; carapace antenna 1 with article 3 as long as or longer than article 2; pleonal somites 1 and 2 different than 3–5; female pleopod 2 styliform, without appendix interna. [Emended from DAVIE,

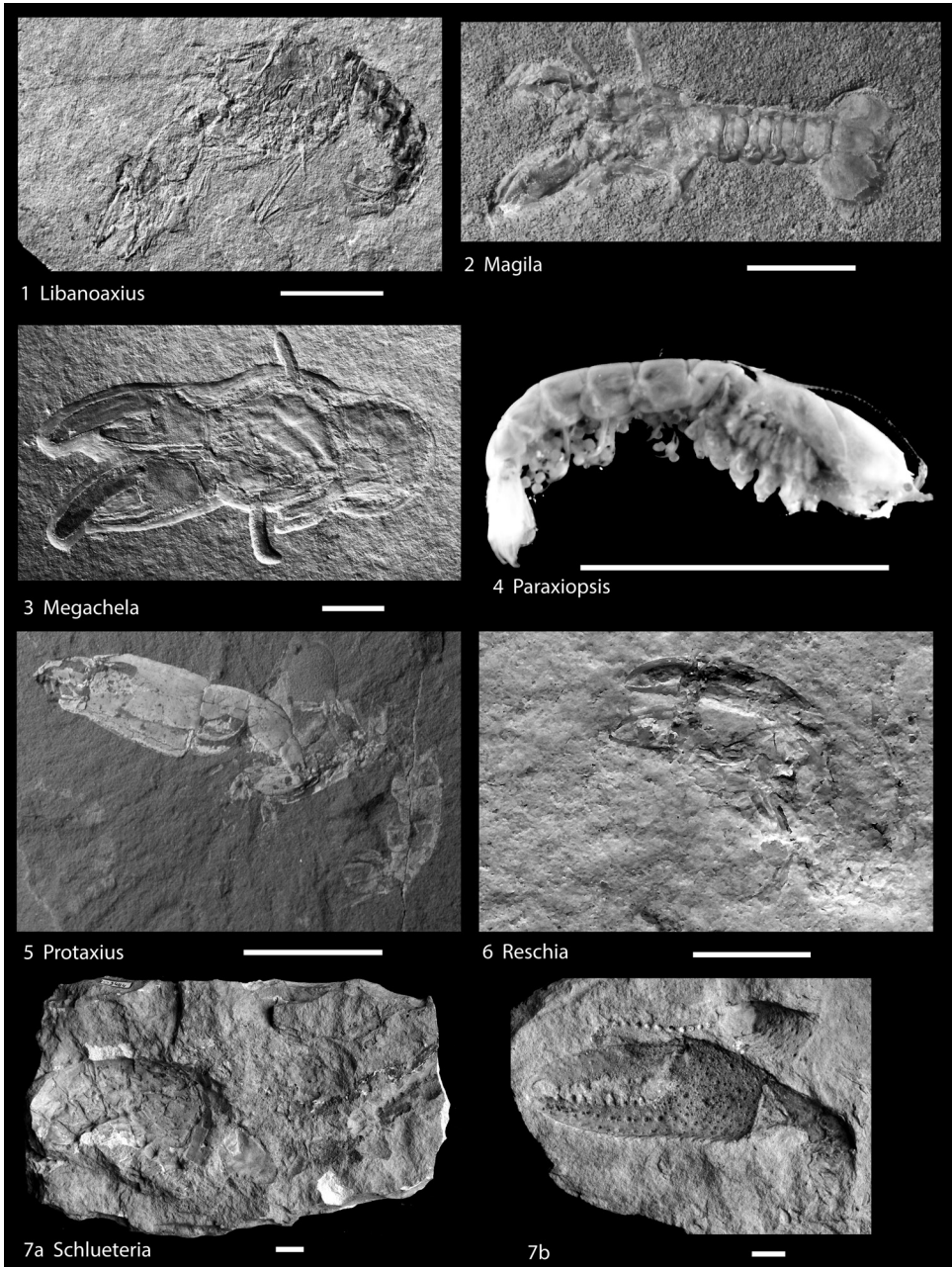


FIG 4. Axiidae (p. 5–6).

2002, p. 455; POORE & others, 2019, p. 82.]
Miocene–Holocene.

Callianassa LEACH, 1814 in 1813–1814, p. 400
[**Cancer (Astacus) subterraneus* MONTAGU, 1808,
p. 88, pl. 3, 1–2; M]. Carapace lacking rostrum or

with a short triangular rostrum; dorsal oval present;
merus of maxilliped 3 distally oblique, longer than
wide; chelipeds heterochelous, carpus short, male
major with meral hook on lower margin, lower
margin weakly serrate; pleopod 1 uniramous in
males and females, pleopod 2 biramous in females,

- reduced or absent in males. [Emended from POORE & others, 2019, p. 92.] *Miocene–Holocene. Miocene (Langhian–Serravallian)*: Hungary, Poland, Slovakia. *Holocene*: Mediterranean Sea, Eastern Atlantic Ocean.—FIG. 5, 1a–b. **C. subterranea* (MONTAGU), USNM 256538, Holocene, Irish Sea; *a*, right lateral view; *b*, male right major cheliped; scale bars 1 cm (new).
- Gilvossius** MANNING & FELDER, 1992, p. 558 [**Gonodactylus setimanus* DE KAY, 1844, p. 34, pl. 8, 23; OD, M] [= *Gebios* RISSO, 1822, p. 243 (type, *Gebios davianus* RISSO, 1822, junior subjective synonym of *Cancer candidus* OLIVI, 1792, M, *Gebios* designated as a *nomen oblitum* by POORE & others, 2019); = *Gebios* AGASSIZ, 1846, p. 160, unjustified emendation of *Gebios*; = *Pestarella* NGOC-HO, 2003, p. 475 (type, *Astacus tyrrhenus* PETAGNA, 1792, OD)]. Rostrum reduced or triangular, flat; carapace with dorsal oval, cardiac prominence absent; chelipeds heterochelous, male major cheliped with carpus longer than high, strong meral hook and serrated lower margin, lower margin of ischium serrate; telson wider than long, ovate. [Emended from MANNING & FELDER, 1992, p. 558.] *Miocene–Holocene. Miocene (Burdigalian)*: Switzerland. *Miocene (Serravallian)*: Hungary, Poland. *Holocene*: eastern USA, Gulf of Mexico, Mediterranean Sea.—FIG. 5, 2. **G. setimanus* (DE KAY), USNM 1499075, Holocene, Chesapeake Bay, USA, scale bar 1 cm (photo by G. Paulay, University of Florida).
- Neotrypaea** MANNING & FELDER, 1991, p. 771 [**Callianassa californiensis* DANA, 1854, p. 175; OD] [= *Nihonotrypaea* MANNING & TAMAKI, 1998, p. 889 (type, *Callianassa japonica* ORTMANN, 1891, p. 56, OD); = *Pseudobiffarius* HEARD & MANNING, 2000, p. 70 (type, *P. caesari*, OD)]. Rostrum obsolete, obtusely triangular, flattened; dorsal oval well defined; hepatic boss ventral to *linea thalassinica*; chelipeds heterochelous, carpus very long, longer than manus; male with serrate meral hook; manus short, with pronounced indentation in distal margin above fixed finger; male pleopod 2 absent; endopod of uropod asymmetrical. [Emended from POORE & others, 2019, p. 96.] *Pleistocene–Holocene. Pleistocene*: Japan, USA (California). *Holocene*: Japan, USA (California), eastern Pacific Ocean.—FIG. 5, 3a–b. **N. californiensis* (DANA), USNM 266224, Holocene, California, USA; *a*, left lateral view; *b*, male left major cheliped; scale bars 1 cm (new).
- Trypaea** DANA, 1852b, p. 14 [**T. australiensis* DANA, 1852a, p. 513; M]. Rostrum obsolete or obtusely triangular, flat; cervical groove, dorsal oval, *linea thalassinica* all well developed; hepatic boss ventral to *linea thalassinica*; cornea dorsal, subterminal, disk-shaped; antennular peduncles very large; merus of maxilliped 3 very wide; chelipeds unequal, major with serrate, truncated meral hook, manus with very large indentation above fixed finger; movable finger with broad triangular tooth; pleopod 2 absent in male. *Miocene–Holocene. Miocene*: Japan. *Holocene*: Australia.—FIG. 5, 4a–b. **T. australiensis*, Holocene, USNM 105368, Queensland, Australia; *a*, lateral view; *b*, male major cheliped; scale bars 1 cm (new).

Family CALLIANIDEIDAE Kossmann, 1880

[Callianideidae KOSSMANN, 1880, p. 80] [=Thomassiniinae DE SAINT LAURENT, 1979a, p. 1396]

Cephalothorax, rostrum, pleon, telson unarmed, uropod sometimes with few small spines; rostrum reduced or small spine; *linea thalassinica* lateral to eyestalks, ranging from absent to complete; posterior margin of carapace evenly curved, without lobes interacting with pleomere 1; setal rows present at least on anterolateral carapace, often on propodi of pereopods and some pleomeres; eyestalks flattened, contiguous; antenna with small articulating scaphocerite; maxilliped 3 pediform; cheliped merus convex on lower margin; pereopod 3 propodus ovate or subrectangular; pereopod 3 (sometimes 4 and/or 5) propodus with distal spiniform seta; pleopods 2–5 similar, with elongate rami, each with elongate appendix interna, with or without marginal filaments; uropodal endopod ovate, exopod without dorsal plate (sometimes notched). [Emended from POORE, 2015, p. 231.] *Lower Cretaceous (Aptian)–Holocene*.

Callianidea H. MILNE EDWARDS, 1837 in 1834–1840, p. 319 [**C. typa*, p. 320, pl. 25, 8–14; OD]. Rostrum reduced, bounded on either side by shallow convexity and sinuous anterolateral margin; *linea thalassinica* absent; first pereopods heterochelous, minor cheliped cylindrical; pereopod 5 subchelate. [Emended from POORE, 1997, p. 352; POORE, 2015, p. 232.] *Holocene*: Indo-Pacific Ocean.—FIG. 6, 1. **C. typa*, SMF 24918, Holocene, Indo-Pacific Ocean, scale bar 1 cm (new).

Crosniera KENSLEY & HEARD, 1991, p. 500 [**Callianassa minima* RATHBUN, 1901, p. 92, fig. 16; OD]. Rostrum spine-like, *linea thalassinica* incomplete, visible anteriorly, not reaching posterior margin; exopod of third maxilliped as long as merus, ischium and merus without stiff setae; heterochelous first pereopods, manus of major cheliped with blade-like lower margin; first pleonite usually with setal rows; sixth pleonite with three setal rows; endopod of uropod without transverse row of setae, exopod ovate; male first gonopod absent. [Emended from POORE, 2015, p. 232.] *Lower Cretaceous (Aptian)*: Spain. *Miocene (Burdigalian)*: Slovakia. *Holocene*: Indo-Pacific Ocean.—FIG.

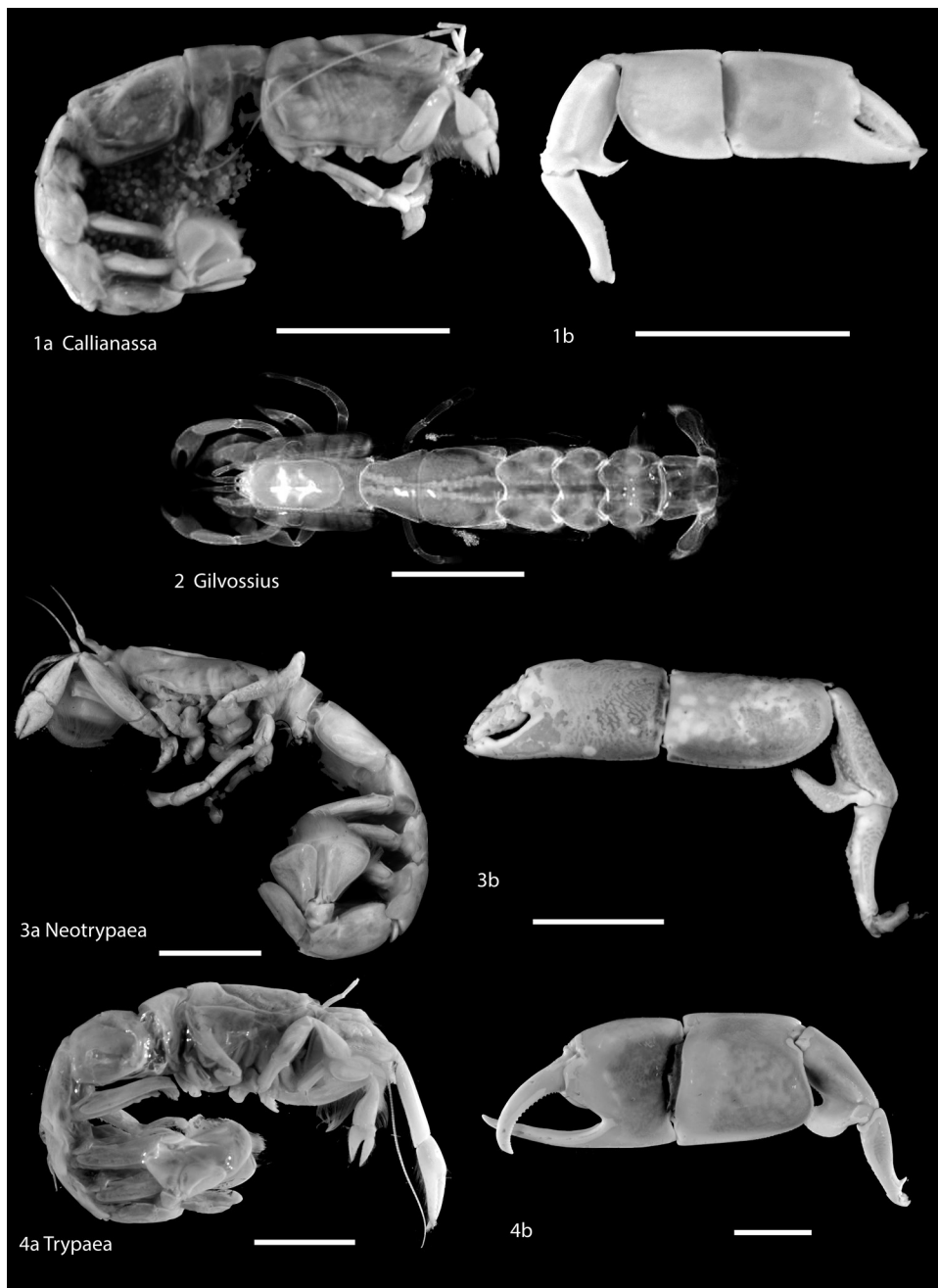


FIG 5. Callianassidae (p. 7–8).

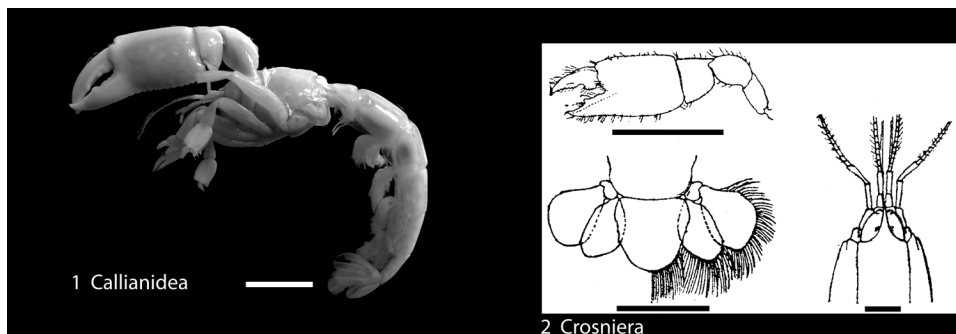


FIG 6. Callianideidae (p. 8–10).

6,2. **C. minima* (RATHBUN), line drawing of USNM 23779, Holocene, Gulf of Mexico, scale bars 5 mm (RATHBUN, 1901, fig. 16).

Family CALLIANOPSIDAE Manning & Felder, 1991

[*nom. transl.* SAKAI, 2011, p. 477, ex Callianopsinae MANNING & FELDER, 1991, p. 787] [=Neocallianopsinae SAKAI, 2011, p. 482; =Bathycalliacinae SAKAI & TÜRKAY, 1999, p. 204; =Vulcanocallicinae DWORSCHAK & CUNHA, 2007, p. 37]

Rostrum flat and triangular or spine-like; median carina absent or only on rostrum; gastric carinae absent, cervical groove strong; may have dorsal oval; anterior branchiostegal margin convex, anterior branchiostegal lobe simple, merging into anterolateral margin of carapace; uropodal exopod without dorsal plate; dactylus of maxilliped 3 wide; merus of cheliped with spinose lower margin or proximal tooth; pereopod 5 with tiny chelae; sixth pleonal somites may have lateral spines; chelipeds markedly sexually dimorphic and heterochelous in males and females. [Emended from POORE & others, 2019, p. 101.] *Upper Cretaceous (Cenomanian)–Holocene.*

Callianopsis DE SAINT LAURENT, 1973, p. 515 [**Callianassa goniophthalma* RATHBUN, 1902, p. 886; OD] [=*Pleurocalliax* SAKAI, 2011, p. 480 (type, *Callianassa caecigena* ALCOCK & ANDERSON, 1894, p. 163, OD); =*Neocallianopsis* SAKAI, 2011, p. 482 (type, *Callianopsis anovalis* LIN, KOMAI, & CHAN, 2007, p. 1195, fig. 1–2, OD); =*Phaetoncalliax* SAKAI, TÜRKAY, BEUCK, & FREIWALD, 2015, p. 124 (type, *P. mauritana*, OD)]. Rostrum short, sharp, with dorsal carinae; dorsal oval present; pleonite 6 with lateral spines; male major cheliped with blade on lower margin and spines; major chelae markedly sexually dimorphic; minor chela much smaller, with long

slender fingers. [Emended from POORE & others, 2019, p. 102.] *Eocene–Holocene.* *Eocene*: ?Italy, Japan, USA (Washington). *Oligocene*: Japan, USA (Washington), Argentina. *Miocene (Burdigalian)*: Austria, Slovakia. *Miocene*: Japan. *Holocene*: Pacific coastal USA, Mexico.—FIG. 7,1*a–b*. *Callianopsis clallamensis* (WITHERS, 1924); *a*, USNM 490197, male right major cheliped; *b*, female right major cheliped and left minor chela, Oligocene, Washington, USA; scale bars 1 cm (new).

Bathycalliax SAKAI & TÜRKAY, 1999, p. 204 [**B. geomar*, p. 204, fig. 1–3; OD]. Rostrum small or triangular; carapace lacking median carina; cardiac sulci present; pleonal somite 6 without lateral projections; male major cheliped with merus with straight lower margin and proximal row of spines. [Emended from POORE & others, 2019, p. 102.] *Eocene–Holocene.* *Eocene (Bartonian–Priabonian)*: Japan. *Pleistocene*: Italy. *Holocene*: USA (Oregon).—FIG. 7,2*a–b*. **B. geomar*, holotype, SMF-23866; *a*, major cheliped; *b*, minor cheliped, Holocene, Oregon, USA; scale bars 1 cm (new).

Cretacalliax PASINI, POORE, & GARASSINO, 2020, p. 218 [**C. levantina*, p. 218, fig. 1–3; OD]. Rostrum broadly triangular, rounded, without postrostral median ridge; cardiac sulci absent; pleonite 6 wider than long, without lateral projections; major cheliped merus broad (~1.3 times as long as wide), upper margin convex, lower margin smooth; uropodal exopod with medial longitudinal ridge, not reaching distal margin; telson with anterolateral lobes, parallel-sided, with three chevron-shaped transverse ridges on anterior half, median ridge on posterior half. [PASINI, POORE, & GARASSINO, 2020, p. 218.] *Upper Cretaceous (Cenomanian)*: Lebanon.—FIG. 7,3. **C. levantina*, holotype, MSNM i29336, scale bar 1 cm (PASINI, POORE, & GARASSINO, 2020, fig. 1A).

Family CALLICHIRIDAE Manning & Felder, 1991

[*nom. transl.* DWORSCHAK, 2018, p. 21, ex Callichirinae MANNING & FELDER, 1991, p. 775] [=Calliapaguropinae SAKAI, 1999a, p. 7]

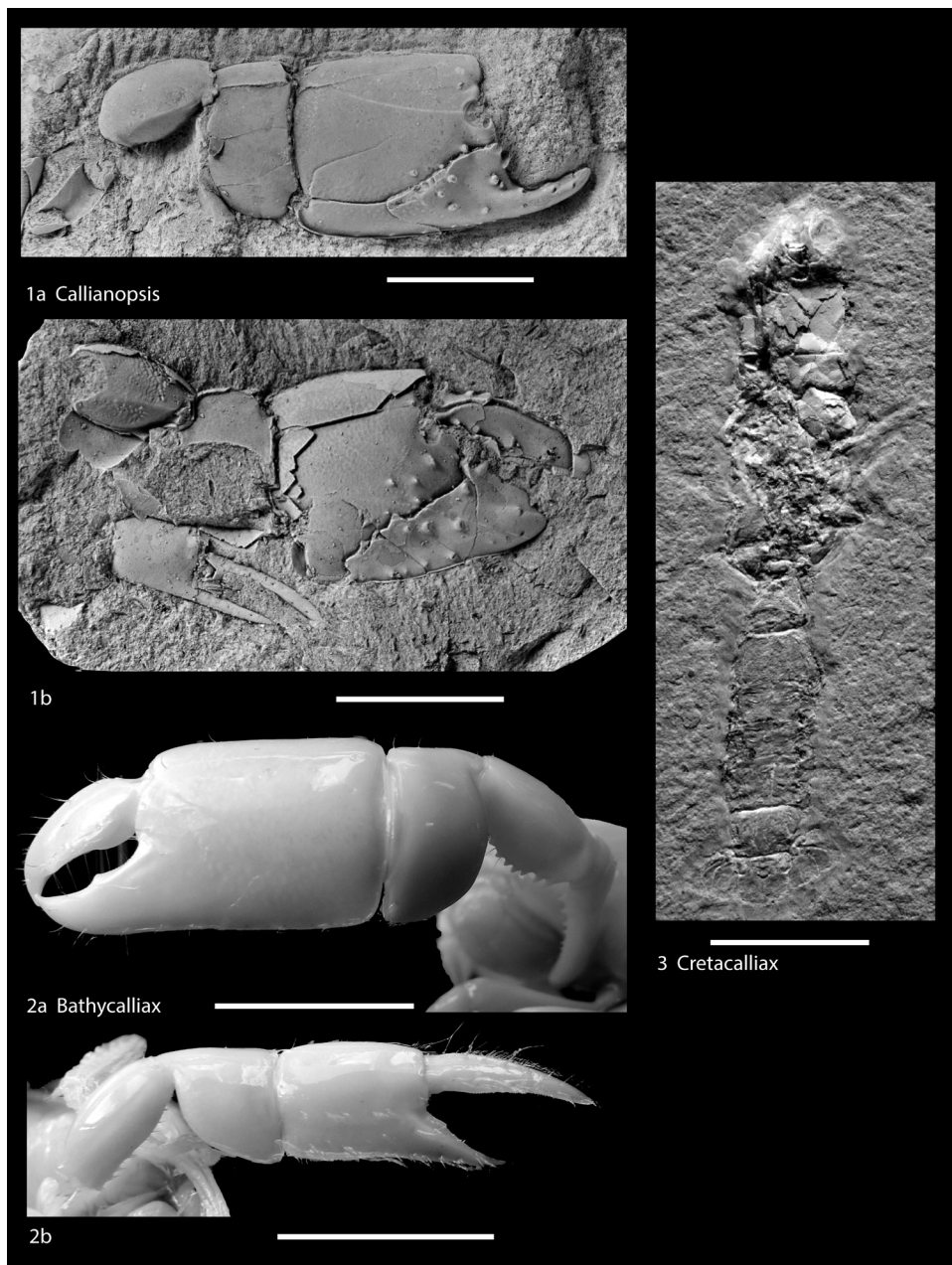


FIG 7. Callianopsidae (p. 10).

Rostrum flat, triangular, short or spin-like; median carina and gastric carinae absent; cervical groove well developed; with dorsal oval; anterior branchiostegal lobe well calcified and articulating by means of a condyle

with branchiostegal ridge; merus of cheliped with smooth or spinose lower margin; major cheliped with flattened palm, sometimes with upper and lower crests; pereiopod 5 chelate or subchelate; endopod of female

pleopod 2 flattened and broad; pleopods 3–5 with short appendices internae. [Emended from POORE & others, 2019, p. 106.] *Lower Cretaceous (Aptian)–Holocene*.

Callichirus STIMPSON, 1866, p. 47 [**Callianassa major* SAY, 1818, p. 238; OD]. Rostrum obsolete or obtusely triangular; dorsal oval well defined; terga of pleura 1 divided into two sections; pleonites 3–5 with symmetrical pattern of transverse and longitudinal grooves; pleonite 6 with deep longitudinal grooves; telson thick, constricted anteriorly; chelipeds heterochelous in adult males, merus of cheliped with denticulate blade on lower margin; major cheliped carpus much longer than manus; with meral hook; carpus very long, longer than high; articulation of merus and ischium with a projection along proximal upper margin; movable finger often hooked at distal end; pleonal somites 3–6 lobate, with ovate membranous structure dorsally; somite 6 with very large bulbous swellings anteriorly and laterally, narrow notch extending transversely at approximately midlength along margin; telson with rounded tip, axially grooved. [Emended from POORE & others, 2019, p. 109.] *Upper Cretaceous–Holocene*. *Upper Cretaceous (Maastrichtian)*: USA (South Dakota). *Eocene*: eastern Antarctica. *Eocene (Priabonian)*: Italy. *Eocene–Oligocene*: Caribbean Sea. *Miocene (Langhian–Serravallian)*: Hungary. *Pleistocene*: USA (Florida). *Holocene*: Atlantic Ocean.—FIG. 8,1. **C. major* (SAY), NHMW 19354, male major cheliped, Holocene, North Carolina, USA, scale bar 1 cm (new).

Balsscallichirus SAKAI, 2011, p. 414 [**Callianassa (Callichirus) balssi* MONOD, 1933, p. 468; OD] [= *Tirmizicallichirus* SAKAI, 2011, p. 474 (type, *Callianassa (Callichirus) masoomi* TIRMIZI, 1970, p. 245, fig. 1–3; OD); = *Barnardcallichirus* SAKAI, 2011, p. 416 (type, *Callichirus tenuimanus* DE SAINT LAURENT & LE LOEUFF, 1979, p. 61, OD); = *Capecalliax* SAKAI, 2011, p. 345 (type, *Callianassa pixii* KENSLEY, 1975, p. 53, fig. 4A–H, 5A–K; OD); = *Forestcallichirus* SAKAI, 2011, p. 426 (type, *Callichirus foresti* LE LOEUFF & INTES, 1974, p. 46, fig. 14a–x, OD)]. Rostrum obsolete or obtusely triangular; tergite of pleonite 1 divided into two sections by unslcerified band; ischium and merus of maxilliped 3 narrow, long; merus of male cheliped with straight or blade-like lower margin; male minor cheliped much narrower than major; pereopod 4 subchelate; male pleopod 2 with appendix interna absent. [Emended from POORE & others, 2019, p. 108.] *Eocene–Holocene*. *Eocene (Priabonian)*: Italy, Pakistan. *Miocene (Burdigalian)*: Austria, Italy. *Miocene (Tortonian–Messinian)*: Spain. *Pliocene*: Spain. *Holocene*: Indian Ocean.—FIG. 8,2. *B. florianus* (GLAESSNER, 1928), NHMW 1846/0049/0008, Miocene, Austria, scale bar 1 cm (new).

Corallianassa MANNING, 1987, p. 392 [**Callianassa longiventris* A. MILNE-EDWARDS, 1870, p. 92; OD] [= *Corallichirus* MANNING, 1992, p. 571 (type,

Corallianassa xutha MANNING, 1988, p. 885, fig. 3, OD)]. Rostrum spine-like, anterolateral spines well developed; tergite of first pleonite not divided or with a weak ridge; pleonal somites 3–6 lobate, with ovate membranous structure dorsally; somite 6 with very large bulbous swellings anteriorly and laterally, narrow notch extending transversely at approximately midlength along margin; telson with rounded tip, axially grooved; uropodal exopod with dorsal plate; male major cheliped with merus with row of sharp spines on lower margin, ischium with ventral spines; male minor cheliped much smaller than major; pereopod 4 subchelate; telson very short, posterior margin straight or with a slight medial projection. [Emended from POORE & others, 2019, p. 109.] *Cretaceous–Holocene*. ?*Lower–Upper Cretaceous (Aptian–Cenomanian)*: Italy. *Upper Cretaceous (Maastrichtian)*: The Netherlands. *Holocene*: Caribbean Sea, Ascension Island, eastern Pacific Ocean, Indo-Pacific Ocean.—FIG. 8,3. **C. longiventris* (A. MILNE-EDWARDS), USNM 205699, Holocene, Caribbean, scale bar 1 cm (new).

Eoglypturus BESCHIN, DE ANGELI, CHECCHI, & ZARANTELO, 2005, p. 9 [**E. grolensis*, p. 10, fig. 5, pl. 1,6; OD]. Manus of major cheliped approximately as high as long, upper margin with five forward-directed spines at distal end; fixed finger with spines on occlusal surface. *Eocene*: Italy.—FIG. 8,4. **E. grolensis*, MCZ-3108, scale bar 1 cm (new).

Glypturoides SAKAI, 2011, p. 428 [**Callianassa trilobata* BIFFAR, 1970, p. 36, fig. 1; OD]. Rostrum small or flat, triangular; pleonite 1 tergum undivided or with weak ridge; maxilliped 3 with exopod; merus of male major cheliped convex or blade-like, with small spines; minor major cheliped much smaller than major; pereopod 4 subchelate; telson with concave posterior margin. [Emended from POORE & others, 2019, p. 110.] *Pliocene–Holocene*. *Pliocene–Pleistocene*: USA (Florida). *Holocene*: Caribbean Sea.—FIG. 8,5. **G. trilobata* (BIFFAR), Holocene, Caribbean Sea (BIFFAR, 1970, fig. 1).

Glypturus STIMPSON, 1866, p. 46 [**G. acanthochirus*; M]. Rostrum spine-like, directed upwards; anterolateral margins with well-developed spines; hepatic boss ventral to *linea thalassinica*; tergum of pleomere 1 divided into two sections by transverse groove; major cheliped with merus with sharp spines on lower margin, three spines on upper margin of merus and propodus, and four to six spines on lower margin of carpus; minor cheliped much smaller than major; pereopod 4 subchelate; somite 6 with bilobed lateral margins, short groove extends axially and obliquely anteriorly from margin at approximately three-fourths the distance posteriorly, a groove then extends anteriorly and parallel to axis at position not quite at end of the short oblique groove, somite 6 posterior margin with axial groove extending approximately one-third the distance anteriorly, with short groove parallel to it on either side just axial to the lateral margin, telson is short, much shorter than somite 6, with spatulate inflated area anteriorly

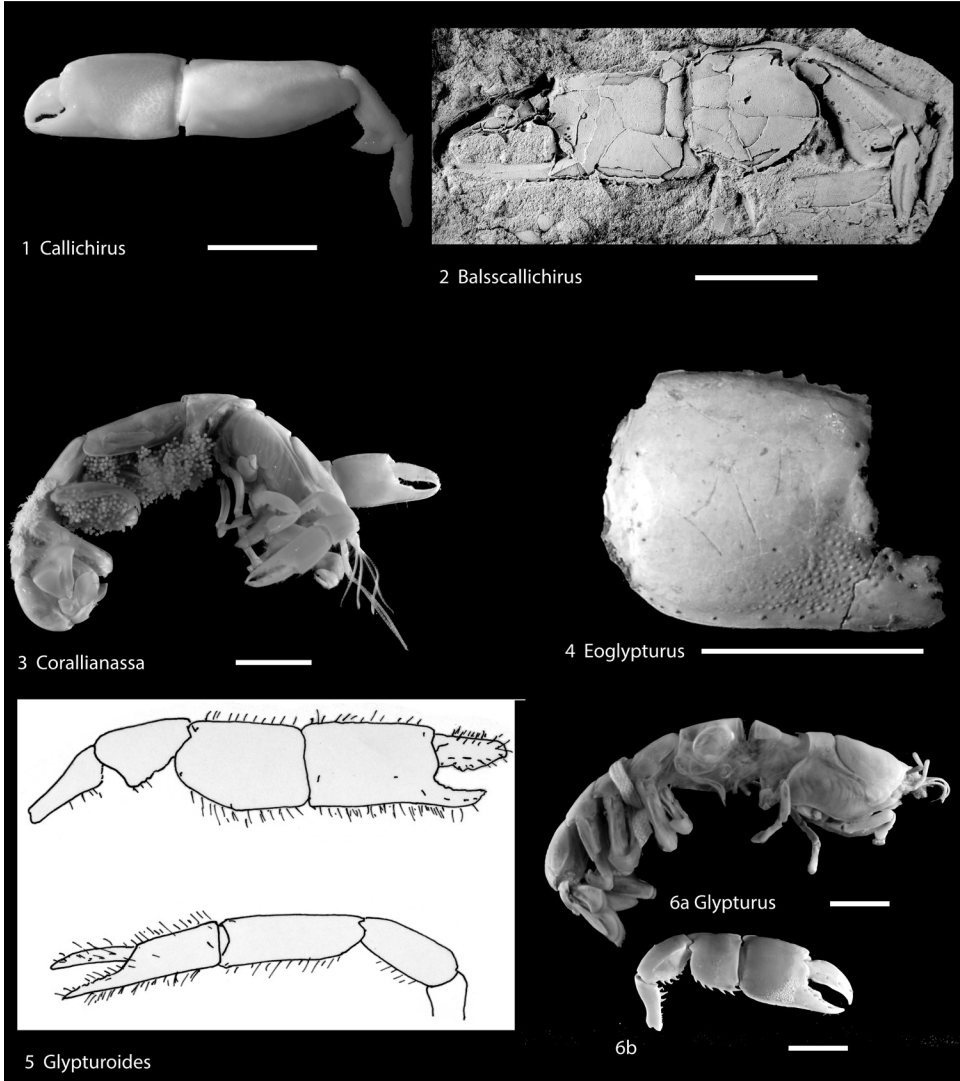


FIG 8. Callichiridae (p. 12–13).

and axially. [Emended from POORE & others, 2019, p. 110.] *Eocene–Holocene*. *Eocene*: Egypt, Hungary, Italy, Spain. *Oligocene*: USA (Mississippi). *Miocene* (*Serravallian–Tortonian*): Panama. *Miocene*: Austria, Hungary, Indonesia, Iran, Malta, Marshall Islands, Panama, USA (Florida). *Pliocene*: Colombia, Vanuatu. *Pliocene–Pleistocene*: USA (Florida). *Pleistocene*: Cuba, Jamaica, Panama, USA (Florida). *Holocene*: western Atlantic Ocean, Indo-Pacific Ocean.—FIG. 8,6a–b. **G. acanthochirus*, USNM 023009, Holocene, Caribbean Sea; a, lateral view; b, male major cheliped; scale bars 1 cm (new). **Karumballichirus** POORE, DWORSCHAK, ROBLES, MANTELATTO, & FELDER, 2019, p. 111 [**Callia-*

nassa karumba POORE & GRIFFIN, 1979, p. 266, fig. 30–31; OD]. Branchiostegal lobe well-calcified; rostrum sharp; male major cheliped with lower margin of merus spinose, proximal meral hook large; male minor cheliped much smaller; shallow notch and small spine above fixed finger on distal margin; manus of major cheliped with serrate lower margin. [Emended from POORE & others, 2016, p. 111.] *Paleocene–Holocene*. *Paleocene*: Pakistan. *Eocene* (*Ypresian*): Pakistan. *Eocene* (*Priabonian*): Hungary, Italy. *Eocene*: Austria, Italy. *Miocene*: Java, Myanmar, Philippines. *Holocene* (subfossil): Thailand. *Holocene*: Australia, India, Indonesia, Singapore.—FIG. 9,1. **K. karumba* (POORE &

- GRIFFIN), NHMW 21937, male major cheliped, Holocene, North Pacific Ocean, scale bar 1 cm (new).
- Laticallichirus** KOMAI, YOKOOKA, HENMI, & ITANI, 2019, p. 463 [*“Neocallichirus” grandis* KARASAWA & GODA, 1996, p. 1, fig. 1.1–1.8; OD]. Rostrum spine-like; dorsal oval well defined; pleonal somite 2 as long as somite 6; pleonal somites 3–5 without patterns of dorsal grooves; pereopods 1 greatly unequal; major cheliped merus with convex, denticulate blade on lower margin; minor cheliped much narrower than major; male pleopod 2 appendix interna absent. [Emended from KOMAI & others, 2019, p. 463; POORE & others, 2019, p. 111.] *Pleistocene–Holocene*: Japan.—FIG. 9,2a–b. **L. grandis*, holotype, TMNH02502; *a*, right major chela; *b*, left minor chela, Pleistocene, Japan, scale bars 1 cm (new).
- Lepidophthalmus** HOLMES, 1904, p. 310 [**L. eiseni* p. 311, pl. 35,6–13; M] [= *Podocallichirus* SAKAI, 1999a, p. 53 (type, *Callianassa madagassa* LENZ & RICHTERS, 1881, p. 427, fig. 20–23, OD); = *Lepidophthalmoides* SAKAI, 2011, p. 440 (type, *Lepidophthalmus eiseni* HOLMES, 1904, OD); = *Lepidophthalminus* SAKAI, 2015, p. 433 (type, *Callianassa bocourti* A. MILNE-EDWARDS, 1870, p. 95, OD)]. Rostrum spine-like, directed upwards; anterolateral angles poorly developed or spinose; tergum of pleonite 1 undivided; dactyl of maxilliped 3 curved, much longer than wide, exopod present; major cheliped with upper edge of fixed finger with ridgelike structure extending a short distance onto manus and above it there is a triangular region of tubercles and seta; merus of male major cheliped with sinuous lower margin, widest proximally and concave distally or with proximal spinose tubercle; dactylus of major cheliped narrowing or massive; male minor cheliped much smaller than major cheliped; pereopod 4 subchelate; telson with convex lateral margins; somite 6 with bilobed lateral margins, short groove extends axially and obliquely anteriorly from margin at approximately three-fourths the distance posteriorly, a groove then extends anteriorly and parallel to axis at position not quite at end of the short oblique groove, somite 6 posterior margin with axial groove extending approximately one-third the distance anteriorly, with short groove parallel to it on either side just axial to the lateral margin, telson short, much shorter than somite 6, with spatulate inflated area anteriorly and axially. [Emended from POORE & others, 2019, p. 112.] *Oligocene–Holocene*. *Oligocene* (*Chattian*): Hungary. *Miocene* (*Burdigalian*): Slovenia. *Pleistocene*: Jamaica. *Holocene*: West Africa, South Africa, Madagascar, Pakistan, India.—FIG. 9,3a. **L. eiseni*, USNM 91736, lateral view, Holocene, Guatemala, scale bar 1 cm (new).—FIG. 9,3b. *L. richardi* FELDER & MANNING, 1997, NHMW 25292, male major cheliped, Holocene, Belize, scale unknown (new).
- Neocallichirus** SAKAI, 1988, p. 61 [**N. horneri*, p. 65, fig. 7–8; OD] [= *Sergio* MANNING & LEMAITRE, 1994, p. 40 (type, *Callianassa guasut- inga* RODRIGUES, 1971, p. 204, fig. 41–60, OD); = *Callichiropsis* SAKAI, 2010, p. 1453 (type, *C. spiridonovi*, p. 1454, fig. 7, OD)]. Rostrum obsolete or obtusely triangular; anterolateral spine absent or rarely, small; dorsal oval well defined, hepatic boss present ventral to *linea thalassinica*; tergum of pleonite 1 undivided; male cheliped merus with convex or blade-like lower margin bearing small spines proximally; carpus of major cheliped higher than long, with serrate lower margin; proximal and lower margins of manus may be serrated; pereopod 4 subchelate; uropodal endopod with straight or convex anterior margin; telson narrowing distally. [Emended from POORE & others, 2019, p. 114.] *Upper Cretaceous–Holocene*. *Upper Cretaceous* (*Cenomanian*): Morocco. *Upper Cretaceous* (*Campanian*): British Columbia, Canada. *Eocene* (*Priabonian*): Italy, Pakistan. *Eocene*: Italy; USA (California). *Oligocene* (*Rupelian*): USA (Mississippi). *Oligocene*: Japan, Panama, Puerto Rico, USA (Oregon, Washington). *Miocene* (*Serravallian*): Hungary, Slovakia. *Miocene*: Japan, Philippines, Java, Mexico, Dominican Republic, Panama, USA (Florida). *Pliocene*: Colombia, Japan. *Pleistocene*: Jamaica, Japan, Guam, Philippines. *Holocene*: Indo-West Pacific Ocean, western Atlantic Ocean.—FIG. 9,4a–b. *N. grandimana* (GIBBS, 1850); *a*, lateral view, USNM 205641; *b*, male major cheliped, NHMW 19826, Holocene, Caribbean Sea; scale bars 1 cm (new).
- Vecticallichirus** QUAYLE & COLLINS, 2012, p. 38 [*V. abditus*, p. 38, pl. 1–2; OD; = *Callianassa batei* WOODWARD, 1869, p. 75, pl. 2,4]. Carapace with dorsal oval; rostrum short, triangular; major cheliped with lower margin of ischium serrate; lower margin of merus with up to 13 spines; occlusal surface of dactylus with large molariform teeth followed by several small teeth or blade; minor chelipeds with elongated, finely denticulate fingers. [Emended from HYZNÝ, 2020.] *Eocene* (*Priabonian*): UK (England), Japan.—FIG. 9,5a–b. *V. bateia* (WOODWARD); *a*, NHMUK IC 585, major chela; *b*, NHMUK IC 599, cephalothorax and pleon; scale bars 1 cm (new).

Family CTENOCHELIDAE Manning & Felder, 1991

[*nom. transl.* SAKAI 2005, p. 235, ex Ctenochelinae MANNING & FELDER, 1991, p. 784] [=Gourretiinae SAKAI, 1999b, p. 95; =Pseudogourretiinae SAKAI, 2005, p. 230; =Dawsoniinae SAKAI, 2006, p. 1276; =Ctenocheloidae SAKAI, 2011, p. 595; =Tosacallianassidae SAKAI, 2016, p. 813]

Rostrum spine-like, longer than wide; median carina absent or rarely only on rostrum; gastric carinae absent; cervical groove well defined; anterior branchiostegal lobe simple, poorly calcified, merging into anterolateral margin of carapace; cardiac prominence may be present; pleonite 1 without anterolateral lobes; uropodal exopod

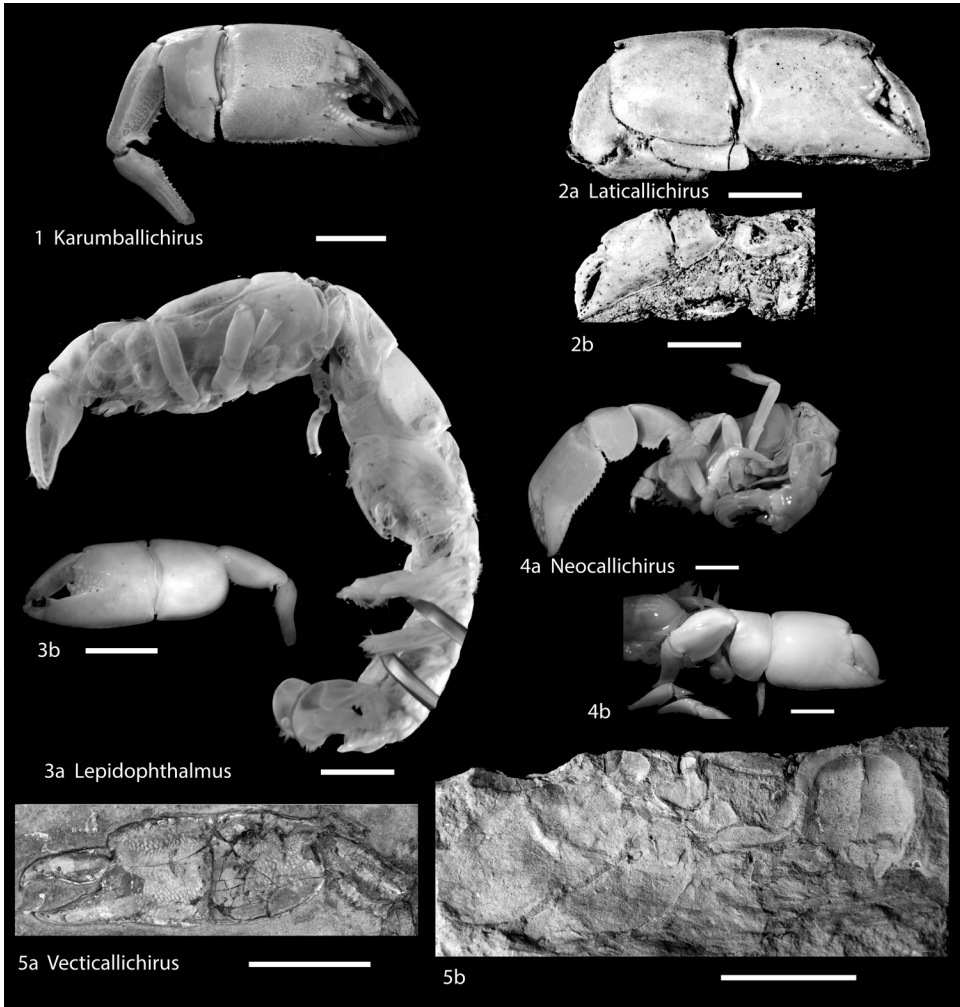


FIG 9. Callichiridae (p. 13–14).

without dorsal plate; merus of cheliped with smooth lower margin or with proximal tooth; major cheliped with cylindrical manus, fingers elongate and pectinate or with a flattened manus with strong crests; pereopod 5 subchelate, dactylus a twisted plate longer than fixed finger. [Emended from POORE & others, 2019, p. 115.] *Lower Cretaceous (Albian)–Holocene.*

Ctenocheles KISHINOUE, 1926, p. 63 [**C. balsi*, p. 63, fig. 1; M] [= *Pelseneerdactylus*, new replacement name for *Ischnodactylus* PELSENEER, 1886, p. 162 (type, *I. inaequidens*, p. 162, fig. 1, *non Ischnodactylus* CHEVROLAT, 1877, p. 173 (Coleoptera);

non Ischnodactylus COSSMANN, 1889 (Mollusca); = *Tosacallianassa* SAKAI, 2016, p. 813 (type, *T. hatasagaensis*, p. 814, fig. 1–3, OD)]. Rostrum spine-like, carinated dorsally; dorsal oval, *linea thalassinica*, and cardiac prominence present; hepatic prominence ventral to *linea thalassinica*; merus of male major cheliped with spine on lower margin or spine absent; manus bulbous, with very long, spinose fingers. [Emended from POORE & others, 2019, p. 118.] *Lower Cretaceous–Holocene. Lower Cretaceous (Albian):* Madagascar. *Upper Cretaceous (Cenomanian–Maastrichtian):* Madagascar. *Upper Cretaceous (Coniacian):* Czech Republic. *Upper Cretaceous (Maastrichtian):* Belgium. *Paleocene:* USA (Alabama). *Eocene:* Australia, Denmark, Germany, Italy, Spain, USA (Alabama, California, Mississippi, Oregon, Washington). *Oligocene:*

Germany, Hungary, Japan. *Miocene*: Japan. *Pliocene*: Chile, Japan. *Pliocene–Pleistocene*: Costa Rica, Panama, Japan. *Pleistocene*: New Zealand. *Holocene*: western Atlantic Ocean, Australia, Japan, New Zealand, West Africa.—FIG. 10.1. *Ctenocheles maorianus* POWELL, 1949, USNM 277645, Holocene, New Zealand, scale bar, 1 cm (new).

Ahazianassa KARASAWA, KISHIMOTO, OHARA, & ANDO, 2019, p. 49 [**Callianassa* (s. l.) *masanorii* KARASAWA, 1998, p. 220, fig. 3; OD]. Downturned rostral spine and without lateral spines; *linea thalassinica* well defined; dorsal oval convex, approximately half of dorsal length; cervical groove deep, joining *linea thalassinica* at posterior third of oval; hepatic boss well defined; cardiac prominence absent; pleon sclerotized, elongate, with smooth surface; telson approximately as long as wide, rectangular, with weak longitudinal median groove; uropodal endopod oval with median longitudinal carina dorsally; distal margin convex; uropodal exopod much larger than endopod, bearing two longitudinal carinae medially, lacking dorsal plate and diaeresis, distal margin convex without notch; pereopods 1 chelate, subequal, dissimilar in shape, with unarmed dorsal and ventral margins; merus without meral hook. [Emended from KARASAWA & others, 2019, p. 49.] *Upper Cretaceous (Maastriichtian)*: Japan.—FIG. 10.2. **A. masanorii* (KARASAWA), holotype, MNHAH D000495, scale bar 1 cm (new).

Dawsonius MANNING & FELDER, 1991, p. 785 [**Callianassa latispina* DAWSON, 1967, p. 190, fig. 1; OD]. Rostrum sharp, cardiac prominence present, hepatic boss ventral to *linea thalassinica*; pleonite 6 with lateral projections; merus of male major cheliped with straight or blade-like lower margin, with one proximal spine and one or more distal spines; manus of cheliped rectangular, fingers long; minor cheliped manus much longer than high; coxae of pereopods 4 expanded, large. [Emended from POORE & others, 2019, p. 119.] *Lower Cretaceous–Holocene. Lower Cretaceous (Albian)*: USA (Texas). *Holocene*: Gulf of Mexico.—FIG. 10.3. **D. latispinus* (DAWSON), USNM 252398, Holocene, Gulf of Mexico, scale bar 1 cm (new).

Gourretia DE SAINT LAURENT, 1973, p. 514 [**Callianassa subterranea* var. *minor* GOURRET, 1887, p. 1034; OD; = *Callianassa denticulata* LUTZE, 1937, p. 6, fig. 1–7, see LEWINSOHN & HOLTHUIS, 1986, p. 24] [= *Pseudogourretia* SAKAI, 2005, p. 230 (type, *P. portsudanensis*, p. 231, fig. 3, OD); = *Ivorygourretia* SAKAI, 2017a, p. 1130 (type, *Gourretia barracuda* LE LOEUFF & INTÈS, 1974, p. 30, fig. 6a–t, OD); = *Plantesgourretia* SAKAI, 2017a, p. 1130 (type, *Gourretia nosybeensis* SAKAI, 2004, p. 563, fig. 4–6, OD); = *Ruiyuliugourretia* SAKAI, 2017a, p. 1131 (type, *Gourretia sinica* LIU & LIU, 2010, p. 750, fig. 5–10, OD)]. Rostrum sharply triangular or reduced; dorsal oval absent; *linea thalassinica* present; maxilliped 3 with exopod; merus of male major cheliped straight or weakly convex, with proximal spine and one or more distal spines or serrate; carpus with convex proximal and

lower margins, inflated; manus wide, with short fingers; minor cheliped with straight fingers and longer dactylus bearing sharp hooklike spines on occlusal margins. [Emended from POORE & others, 2019, p. 119.] *Miocene*: Austria. *Holocene*: eastern Atlantic Ocean, Mediterranean Sea, Indo-West Pacific Ocean.—FIG. 10.4. **G. minor* (GOURRET), USNM 257694, Holocene, Mediterranean Sea, scale bar 1 cm (new).

Family EUCALLIACIDAE Manning & Felder, 1991

[*nom. transl.* SAKAI, 2011, p. 491, ex Eucalliinae MANNING & FELDER, 1991, p. 781; *nom. correct.* SAKAI, 1999a, p. 108, *pro* Eucalliinae MANNING & FELDER, 1991, p. 781]

Rostrum short, flat, triangular; median carina and gastric carinae absent; cervical groove well developed; propodus of maxilliped 3 wider than long, dactylus with dense setae on distal margin; merus of major cheliped with smooth lower margin; manus of major cheliped flattened, sometimes with crests; pereopod 5 chelate or subchelate; uropodal exopod with dorsal plate. [Emended from POORE & others, 2019, p. 122] *Upper Cretaceous (Cenomanian)–Holocene*.

Eucalliix MANNING & FELDER, 1991, p. 781 [**Callianassa quadracuta* BIFFAR, 1970, p. 40, fig. 2; OD]. Dorsal carapace with median ridge posterior to rostrum and pair of oblique submedian ridges, *linea thalassinica* well defined, cervical groove weak; manus of male major cheliped twice as long as carpus, with keel on lower surface, keel on fixed finger extending obliquely onto manus; minor chela only slightly smaller, with elongate fingers; carpus of major cheliped with two sharp distal spines on upper margin; male pleopod 2 with long appendix masculine; uropodal endopod triangular. [Emended from POORE & others, 2019, p. 127.] *Holocene*: western Atlantic Ocean.—FIG. 11.1. **E. quadracuta* (BIFFAR), minor and major chelipeds, scale bar 1 cm (Biffar, 1970, fig. 2h–i).

Bolcacalliix HYZNÝ IN PASINI & others, 2019, p. 242 [**Protaxius eocenicus* SECRETAN, 1975, p. 343, pl. 16, 1, 2, 5; OD]. Carapace without dorsal oval; chelipeds subchelate, unequal, similar in shape; merus of cheliped with serrate lower margin; fixed finger short; dactylus approximately three times as long as fixed finger. *Eocene (Ypresian)*: Italy.—FIG. 11.2. **B. eocenica* (SECRETAN), holotype, MCSNV-B5, scale bar 1 cm (new).

Calliix DE SAINT LAURENT, 1973, p. 514 [**Callianassa lobata* DE GAILLANDE & LAGARDÈRE, 1966, p. 259, fig. 1–4; OD]. Male major chela with manus approximately twice as long as carpus; minor chela narrower; minor cheliped fingers with wide gape, tooth at base of fingers, fingers not

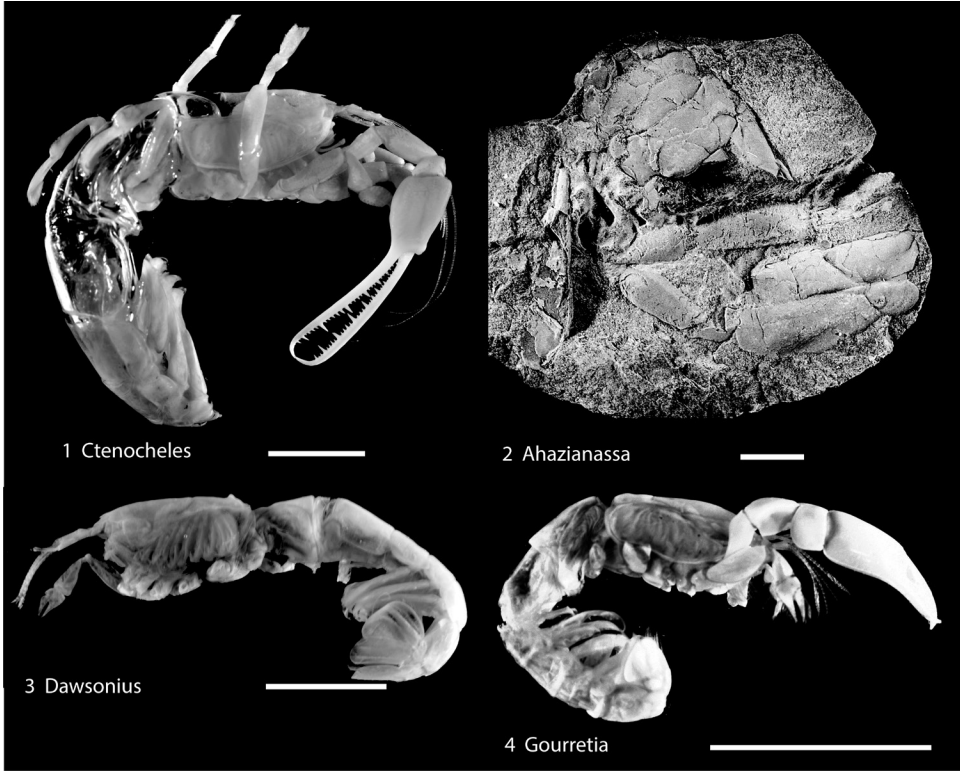


FIG 10. Ctenochelidae (p. 15–16).

closing along length; male pleopod 2 appendix internae absent. [Emended from POORE & others, 2019, p. 126.] *Oligocene–Holocene*. *Oligocene*: Germany. *Miocene (Burdigalian)*: Austria, Germany, Italy, Slovenia. *Miocene (Langhian–Serravallian)*: Hungary, Slovakia, Slovenia. *Holocene*: Mediterranean Sea, USA (Florida).—FIG. 11,3. *Calliax tulearensis* NGOC-HO, 2014, holotype, MNHN-IU-2014-18278, Holocene, Mediterranean Sea, scale bar 1 cm (photo by N. MOLLARET, Project Reclonat, MNHN).

Calliaxina NGOC-HO, 2003, p. 493 [**Calliax punica* DE SAINT LAURENT & MANNING, 1982, p. 212, fig. 1–5; OD]. Rostrum tiny, with a tiny orbital spine on either side; *Linea thalassinica* and cervical groove present; both chelipeds with mani as long as high, major and minor similar in size; male pleopod 1 with appendix interna; telson narrowing posteriorly, without transverse ridge. [Emended from POORE & others, 2019, p. 126.] *Upper Cretaceous–Holocene*. *Upper Cretaceous (Cenomanian)*: Lebanon. *Eocene (Priabonian)*: Italy. *Miocene (Langhian)*: Austria, Portugal. *Miocene (Serravallian)*: Austria, Hungary, Slovakia. *Miocene (Messinian)*: Greece. *Pliocene (Zanclean)*: Italy. *Holocene*: Mediterranean Sea, Australia, Indo-Pacific Ocean.—FIG. 11,4. **C. punica* (DE SAINT LAURENT & MANNING), USNM

205773, Holocene, Mediterranean, scale bar 1 cm (new).

Eucalliaxiopsis SAKAI, 2011, p. 503 [**Eucalliax cearaensis* RODRIGUES & MANNING, 1992, p. 327, fig. 2; OD] [= *Calliaxiopsis* SAKAI & TÜRKAY, 2014, p. 192 (type, *Calliaxiopsis madagassa* SAKAI & TÜRKAY, 2014, OD, M); = *Bakercalliax* SAKAI, 2018, p. 738 (type, *Callianassa aequimana* BAKER, 1907, OD); = *Heardcalliax* SAKAI, 2018, p. 743 (type, *Calliax jonesi* HEARD, 1989, OD, M); = *Manningcalliax* SAKAI, 2018, p. 743 (type, *Eucalliax mcilhennyi* FELDER & MANNING, 1994, OD)]. Carapace with or without axial ridge posterior to rostrum, may have ridges parallel on either side; cervical groove present; male major cheliped with manus much longer than carpus; minor cheliped not much smaller than major cheliped. *Upper Cretaceous–Holocene*. *Upper Cretaceous (Maastrichtian)*: Argentina, Mexico. *Paleocene (Danian)*: Argentina. *Eocene (Priabonian)*: Italy. *Eocene–Pliocene*: Japan. *Miocene (Langhian–Serravallian)*: Slovakia. *Miocene (Serravallian)*: Hungary. *Miocene (Serravallian–Tortonian)*: Austria. *Holocene*: eastern USA, Indian Ocean, Australia, Philippines, Japan.—FIG. 11,5. *E. pseudorakosiensis* (LÖRENTHEY in LÖRENTHEY & BEURLEN, 1929), SNM Z21373, Miocene, Slovakia, scale bar 1 cm (new).

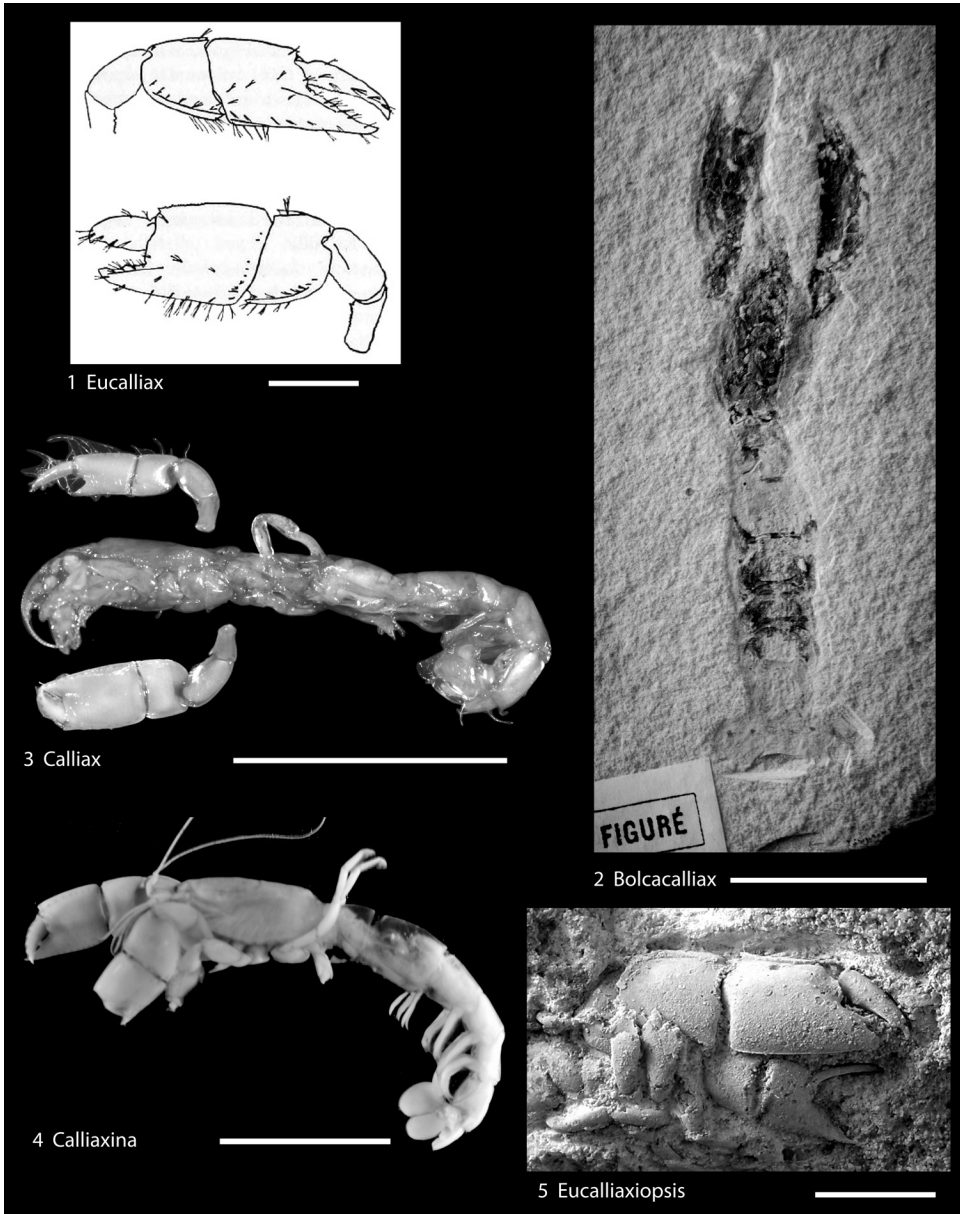


FIG 11. Eucalliidae (p. 16–17).

Family MICHELEIDAE Sakai, 1992

[*nom. transl.* POORE, 1994, p. 99, *ex* Micheleinae SAKAI, 1992, p. 18] [=Meticonaxiinae SAKAI, 1992, p. 19]

Carapace without *linea thalassinica*, laterally compressed; rostrum flat or poorly developed, usually with lateral carina; pleuron of pleonal somite 1 poorly devel-

oped; pleonal somite 2 twice as long as 3; chelipeds unequal, merus with straight lower margin, may have spines, much longer than carpus; fingers of chela may have spines; pereiopod 2 chelate; propodi of pereiopods 3 and 4 more or less broadened; coxa of pereiopod 4 flattened; uropodal endopod

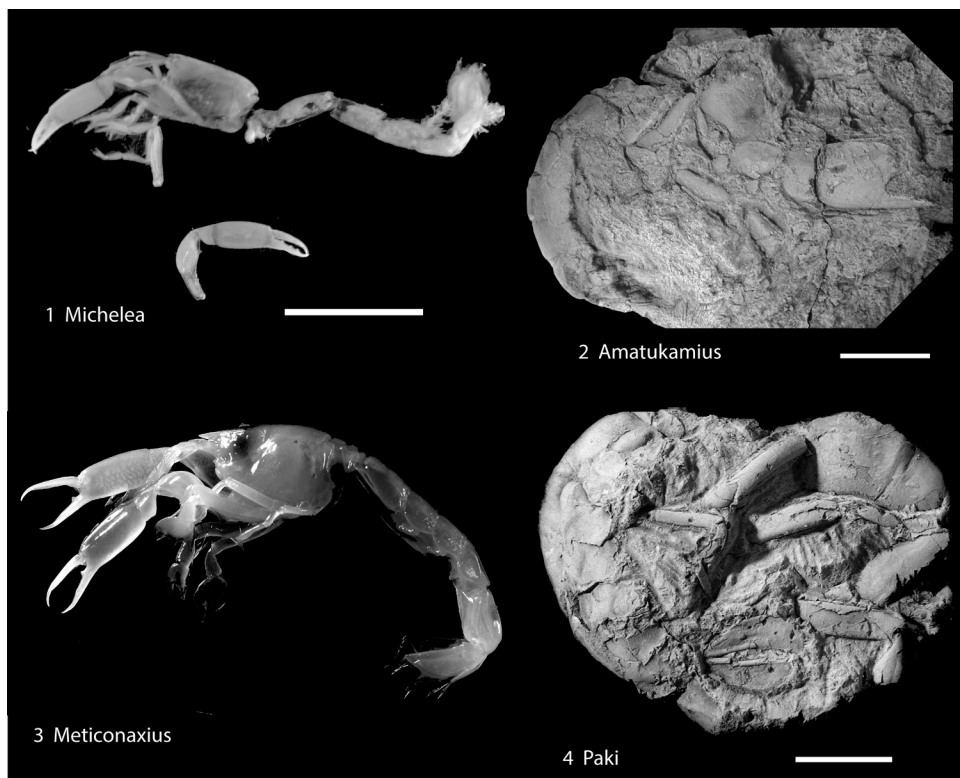


FIG 12. Micheleidae (p. 19–20).

ovate; carapace, pereopods 2–4 and pleonal somites with some setal rows. [Emended from POORE, 1994, p. 99.] *Lower Cretaceous–Holocene*.

Michelea KENSLEY & HEARD, 1991, p. 519 [**Callianidea vandoverae* GORE, 1987, p. 186, fig. 1–4; OD] [= *Micheleopsis* SAKAI, 2010, p. 1462, type, *M. orlik*, OD]. Rostrum short, blunt, bounded by concavities; Cervical groove weak, extending from ventral to dorsal margin; anterior and lateral margins sinuous; major cheliped with short carpus, long slender manus and fingers; merus long, with ventral spine. — FIG. 12, 1. **M. vandoverae* (SAKAI), USNM 211492, Holocene, North Atlantic Ocean, scale bar 1 cm (new).

Amatukamius KARASAWA & OHARA, 2019, p. 33 [**Callianassa* (s.l.) *sakakuraorum* KARASAWA, 2000, p. 236, fig. 1.3–1.5; OD]. Rostrum spine short; cervical groove shallow, weakly developed; pleonal somite 1 with anterolateral lobes; pereopods 1 chelate, subequal, different in shape; merus longer than carpus, subrectangular, inflated laterally, with gently convex, unarmed dorsal and nearly straight, unarmed ventral margins. [Emended from KARASAWA & OHARA, 2019, p. 33.] *Lower Cretaceous (Barremian)*: Japan. — FIG. 12, 2.

**A. sakakuraorum* (KARASAWA), holotype, MFM 247015, scale bar 1 cm (new).

Meticonaxius DE MAN, 1905, p. 592 [**M. monodon*; M]. Rostrum acutely triangular, axially carinate, axial carina continues onto carapace; cervical groove weak; telson rectangular; pereopods 1 equal; fixed finger with tooth at approximately two-thirds of the length; pereopod 5 subchelate in males. [Emended from POORE, 1994, p. 97.] *Lower Cretaceous–Holocene*. *Lower Cretaceous (Aptian)*: Spain. *Lower Cretaceous (Albian)*: USA (Texas). *Upper Cretaceous (Cenomanian–Turonian)*: USA (Texas). *Eocene*: USA (Alabama). *Holocene*: Atlantic Ocean, Indo-Pacific Ocean. — FIG. 12, 3. *Meticonaxius microps* (BOUVIER, 1905), MNHN-IU-2013-18955, scale unknown (photo by L. CORBARI, MNHN).

Paki KARASAWA & HAYAKAWA, 2000, p. 141 [**P. rurkonsimpu*; M]. Rostrum of carapace with rounded tip; lateral carina well developed; cervical groove distinct; *linea thalassinica* absent; anterolateral region with two vertical rows of setal pits anterior to cervical groove; terga and pleura of pleonal somites 2–5 bounded by weak ridge; pleuron of somite 2 with two vertical rows of setal pits posteriorly and with marginal row of setal pits anteriorly; pleura of somites 3–6 with single vertical row of setal pits anteriorly; pleuron of somite 6 with two vertical

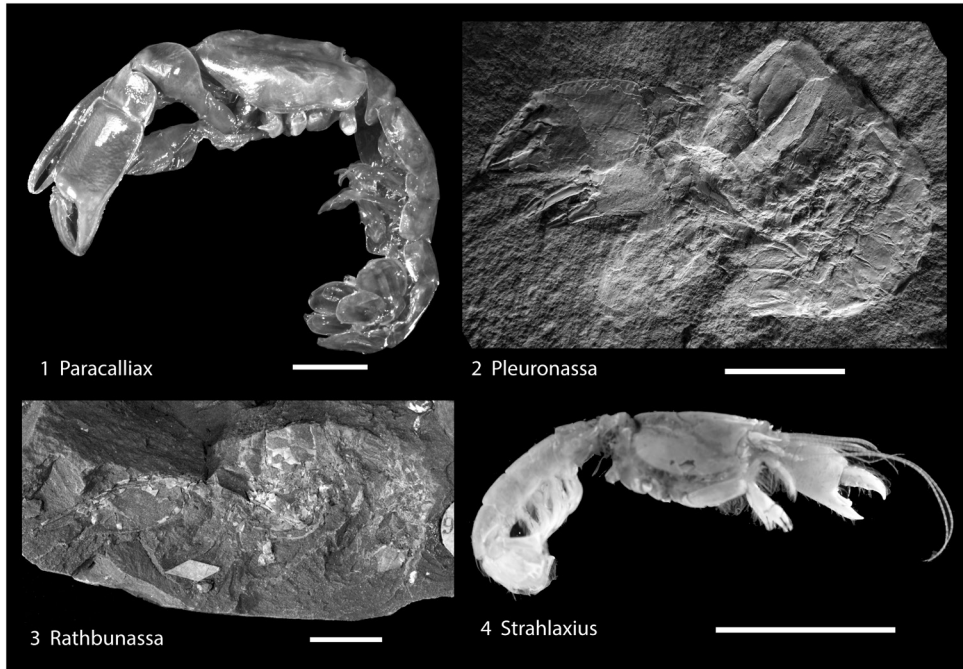


FIG 13. Paracalliidae, Strahlaxiidae (p. 20–21).

rows of setal pits anteriorly and single vertical row of setal pits posteriorly; telson rectangular with two longitudinal carina; uropodal exopod and endopod with median dorsal ridge and with convex margins. [Emended from KARASAWA & HAYAKAWA, 2000, p. 141.] *Upper Cretaceous (Campanian)*: Japan.—FIG. 12,4. **P. rurkonsimpu*, holotype, MCM.A539, scale bar 1 cm (new).

Family PARACALLIACIDAE Sakai, 2005

[*nom. transl.* DWORSCHAK & POORE, 2018, p. 70, ex Paracalliinae SAKAI, 2005, p. 215]

Rostrum flat, short, triangular; median carina only present on rostrum; submedian gastric carinae absent; cervical groove well developed; posterior margin of carapace with lateral lobes articulating with anterolateral lobes of pleonite 1; merus of cheliped with spinose lower margin; manus of major cheliped oval in cross section, with weak crests; pereiopod 5 subchelate or chelate; uropodal exopod without dorsal plate. [Emended from POORE & others, 2019, p. 128.] *Lower Cretaceous (Albian)–Holocene*.

Paracalliax DE SAINT LAURENT, 1979a, p. 1396 [**P. bollorei*; OD]. Rostrum flat, short, triangular;

median carina only present on rostrum; submedian gastric carinae absent; cervical groove well developed; posterior margin of carapace with lateral lobes articulating with anterolateral lobes of pleonite 1; merus of cheliped with spinose lower margin; manus of major cheliped oval in cross section, with weak crests; pereiopod 5 subchelate or chelate; uropodal exopod without dorsal plate. *Holocene*: Mauritania.—FIG. 13,1. **P. bollorei*, MNHN-IU-2014-22948, scale bar 1 cm (photo by N. MOLLARET, Project Recolnat, MNHN).

Pleuronassa OSSÓ-MORALES, GARASSINO, VEGA, & ARTAL, 2011, p. 168 [**P. timerchidouensis*, p. 170, fig. 3–8; OD]. Carapace apparently ovate; major chelipeds stout, unequal; carpus of both major and minor cheliped higher than long; manus of major cheliped rectangular, with a notch above fixed finger, fingers equal in length; fingers of minor cheliped longer and more slender; pleurae of pleonal somites sharp. *Upper Cretaceous (Campanian)*: Morocco.—FIG. 13,2. **P. timerchidouensis*, holotype, MGSB 77720, scale bar 1 cm (new).

Rathbunassa HYŽNÝ in BERMÚDEZ & others, 2013, p. 261 [**Callianassa aquilae* RATHBUN, 1935, p. 31, pl. 7, 1–5; OD]. Carapace with dorsal oval and cardiac prominence; pleonal somite 1 with well-developed pleura; pleonal somite 2 longest; telson subquadrate with three longitudinal carinae; pereiopod 1 chelate, unequal in size, similar in shape; major merus ovate with lower and upper margins convex, without meral hook; propodus bulbous in outline, tapering

distally, upper and lower margins convex, lower margin concave at the base of fixed finger; fixed finger distinctly shorter than manus, with sharp tooth on occlusal margin positioned proximally; dactylus slender, longer than fixed finger. [Emended from BERMÚDEZ & others, 2013, p. 261.] *Lower Cretaceous (Albian)*: Colombia. *Upper Cretaceous (Turonian)*: Mexico, USA (Texas, Louisiana).—FIG. 13.3. **R. aquilae* (RATHBUN), holotype, USNM PAL 73786, Turonian, Texas, USA, scale bar 1 cm (new).

Family STRAHLAXIIDAE Poore, 1994

[Strahlaxiidae POORE, 1994, p. 100]

Rostrum spinose, with bifid tip; gastric regions rugose; pleuron of pleonal somite 1 not produced; pleonal somite 2 twice as long as somite 3; uropodal endopod with acute outer angle; some pereopods and pleonal somites with setal rows. [Emended from POORE, 1994, p. 100.] *Holocene*.

Strahlaxius SAKAI & DE SAINT LAURENT, 1989, p. 24 [**Axius plectorhynchus* STRAHL, 1862, p. 1060; OD]. Rostrum triangular, strong, bifid; cervical groove distinct, unarmed; telson not sculptured dorsally with posteromedian tooth; uropodal endopod without transverse suture dorsally. [Emended from SAKAI & DE SAINT LAURENT, 1989, p. 24; SAKAI, 2011, p. 332.] *Holocene*: western Pacific Ocean.—FIG. 13.4. **S. plectorhynchus* (STRAHL), USNM 243464, Holocene, Papua New Guinea, scale bar 1 cm (new).

FAMILY UNPLACED (as of August 2022)

Brecanclawu SCHWEITZER & FELDMANN, 2001, p. 185 [**B. rathbunae*, p. 185, fig. 9.1; OD]. Carpus of major cheliped longest along upper margin, shorter along lower margin; manus rectangular; fixed finger short; movable finger very stout, strongly arched, with broad flange along occlusal surface; minor chela much more slender. *Eocene*: USA (Washington).—FIG. 14.1. **B. rathbunae*, holotype, USNM PAL 512170, scale bar 1 cm (new).

Comoxianassa SCHWEITZER, FELDMANN, ČOSOVIĆ, ROSS, & WAUGH, 2009, p. 413 [**C. haggarti*, p. 413, fig. 3C, E, G–J; OD, M]. Major cheliped with merus with longitudinal keel and entire lower margin; carpus narrow; manus with large spine on distal margin; minor chela smaller than major but relatively large in both males and females; pleonal somites with rounded projections on lower distal margins that overlap and articulate with following somite. *Upper Cretaceous (Campanian)*: Canada (British Columbia).—FIG. 14.2. **C. haggarti*, paratype, GSC 27157, scale bar 1 cm (new).

Cowichianassa SCHWEITZER, FELDMANN, ČOSOVIĆ, ROSS, & WAUGH, 2009, p. 409 [**C. meckerti*,

p. 409, fig. 3A, B, D, F, fig. 4; OD, M]. Major cheliped with ischium longer than high, with longitudinal groove and bulbous distal end; merus with tiny spines on lower margin; manus with proximal margin at 105° angle to lower margin; first pereopods markedly heterochelous and sexually dimorphic; manus of male major chela stout, very convex; manus of female major chela flattened, more slender; minor chelae in males and females much smaller than major chelae, fingers very long and slender. *Upper Cretaceous (Campanian)*: Canada (British Columbia).—FIG. 14.3. **C. meckerti*, paratype, GSC 27162, scale bar 1 cm (new).

Melipal SCHWEITZER, FELDMANN, ENCINAS, & SUÁREZ, 2006, p. 76 [**M. chilensis*, p. 78, fig. 4A–K, M; OD]. Merus of female cheliped with serrate lower margin, merus of males and females keeled; carpus of males and females considerably longer than high, becoming markedly higher distally, lower margin of males serrate in larger specimens; manus of males robust, with bulbous swelling and indentation above fixed finger on distal margin, movable finger robust along entire length, with hooked tip; manus of females much like that of males except more gracile, movable finger slender along length, without hooked tip; minor chela smaller, with edentulous fingers. *Eocene*: Chile.—FIG. 14.4. **M. chilensis*, holotype, SGO.PI.6385, scale bar 1 cm (new).

Mesostylus BRONN & VON ROEMER, 1852, p. 353 [**Pagurus faujasi*; M]. Merus of major cheliped longer than high, upper margin convex, lined with large granules; large knob on distal margin articulation with carpus; carpus longer than high, distal margin concave, serrate, lower distal margin with flange extending onto outer surface in weak rim separated from distal margin by prominent sulcus, distal margin of flange serrate; proximal margin of manus at 100°–110° angle to lower margin; upper and lower margins finely serrate; fingers with stout teeth on occlusal surfaces; major chela exhibiting notable dimorphism; chelae stouter and more rectangular in presumed males, chelae more slender and higher proximally in presumed females; minor chela longer than high, highest proximally; fingers with parallel ridges; pleonal somites apparently smooth. [SCHWEITZER & FELDMANN, 2012, p. 17.] *Upper Cretaceous–Eocene. Upper Cretaceous (Coniacian–Maastrichtian)*: Austria, Azerbaijan, Czech Republic. *Upper Cretaceous (Campanian)*: Sweden. *Upper Cretaceous (Maastrichtian)*: Belgium, Germany, Netherlands, USA (Alabama, Arkansas, Delaware, Maryland, Mississippi, New Jersey, North Carolina, Tennessee, Texas). *Paleocene*: USA (Alabama). *Eocene*: western Antarctica.—FIG. 14.5. **M. faujasi*, cast of RGM ST 72724 numbered KSU D 430, Maastrichtian, Belgium, scale bar 1 cm (new).

Protocallianassa BEURLEN, 1930, p. 370 [**Callianassa archiaci* A. MILNE-EDWARDS, 1860, p. 201, pl. 14, I; OD]. Carapace long in lateral view, more than twice as long as high; *linea thalassinica* approximately one-third the distance up from the lower

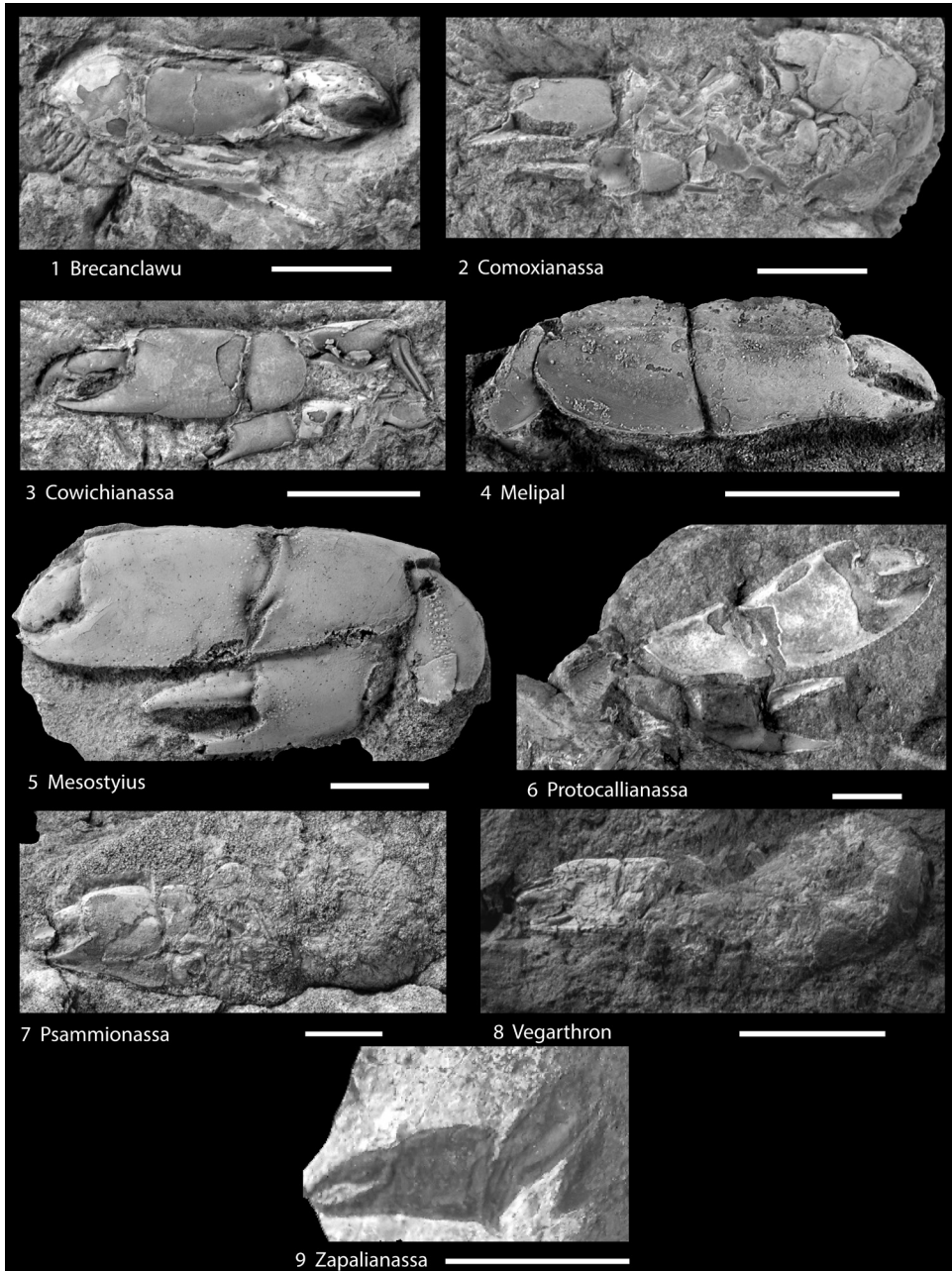


FIG 14. Unplaced families (p. 21–23).

margin, nearly straight; upper surface of carapace with notch corresponding to cervical groove, anterior grooves suggest that it may be a dorsal oval but this is not known with certainty; pleonites 5 and 6 with grooves parallel to lateral margins, epimeres of somites 3–5 rounded; chelipeds heterochelous,

manus of major chela with proximal margin at 90° angle to upper and lower margins, fingers apparently edentulous. [SCHWEITZER & FELDMANN, 2012, p. 15.] *Lower Cretaceous (Barremian)*: Argentina. *Albian*: USA (Texas). *Upper Cretaceous*: Russia, USA (Alabama, Arkansas, California, Delaware,

Maryland, Mississippi, New Jersey, Tennessee, Texas). *Upper Cretaceous (Cenomanian)*: Czech Republic, France. *Cenomanian–Maastrichtian*: Germany. *Turonian*: Czech Republic, France. *Coniacian–Maastrichtian*: Western Europe. *Campanian*: USA (South Dakota). *Maastrichtian*: Chile, USA (Mississippi).—FIG. 14.6. **P. archiaci*, syntype, MNHN A33499, Cenomanian, France, scale bar 1 cm (new).

Psammionassa SCHWEITZER, FELDMANN, KUES, & BRIDGE, 2017, p. 91 [**P. paromola*, p. 92, fig. 2; OD]. Merus of major chelipeds convex, apparently unornamented; carpus higher than merus is long, higher than long, slightly lower than manus at articulation, with arcuate proximal margin; manus of male longer than high, with setal pits along upper margin, lower margin with an acute flange; movable finger with stout triangular spine and stout keel with setal pits. Female manus of major chelipeds with more slender fixed finger with smaller triangular spine. Minor chela slightly smaller than major, with much longer fixed finger compared to overall length of propodus, fixed finger edentulous. [SCHWEITZER & others, 2017, p. 92.] *Upper Cretaceous (Turonian)*: USA (New Mexico).—FIG. 14.7. **P. paromola*, USNM PAL 639960, scale bar 1 cm (new).

Vegarthron SCHWEITZER & FELDMANN, 2002, p. 940 [**V. santiago*, p. 941, fig. 1–2; OD]. Chelipeds heterochelous; major cheliped large, merus lacking hook; carpus triangular; articulation between carpus and manus at oblique angle manus approximately as long as high; pleonal somites smooth. *Upper Cretaceous–Eocene. Upper Cretaceous (Maastrichtian)*: Mexico. *Eocene*: USA (California).—FIG. 14.8. **V. santiago*, holotype, SDSNH 81078, scale bar 1 cm (new).

Zapalianassa SCHWEITZER, FELDMANN, & CASADÓ, 2022, p. 300 [**Pebuenchia magna* RUSCONI, 1948, p. 7, fig. 3–4; OD]. Chelipeds weakly heterochelous, carpus with weak ventro-distal flange, merus without obvious ornamentation; manus with proximal margin at acute angle to lower margin, movable finger with strongly hooked tip, apparently with well-developed or calcified tendon of dactylus flexor muscle; pleonite 2 longer than others, overlapping pleonites 1 and 3; pleonites 3–5 overlapping succeeding pleonite; uropods with cuneate exopods. *Upper Jurassic (Tithonian)–Lower Cretaceous (Berriasian)*: Argentina.—FIG. 14.9. **Z. magna* (RUSCONI), holotype, Mendoza 3584, scale bar 1 cm (new).

Infraorder GEBIIDEA de Saint Laurent, 1979

[Gebiidea DE SAINT LAURENT, 1979b, p. 28]

Body form lobster-like; *linea thalassinica* present, cervical groove usually distinct; pereopod 1 chelate or subchelate; pereopod 2 subchelate or simple; pereopod 5 usually

subchelate or chelate. [Emended from DWORSCHAK, FELDER, & TUDGE, 2012, p. 186.] *Triassic–Holocene*.

Family AXIANASSIDAE Schmitt, 1924

[Axianassidae SCHMITT, 1924, p. 76]

Rostrum moderate in size; *linea thalassinica* and cervical groove; first pereopods large, heterochelate, dissimilar; merus of major chela with or without spine on lower margin; pereopods 2–4 simple, achelate; pereopods 5 subchelate; pleurae of pleonal somites poorly developed; uropodal, exopods with or without diaeresis. [Emended from DWORSCHAK, FELDER, & TUDGE, 2012, p. 186.] *Eocene (Priabonian)–Holocene*.

Axianassa SCHMITT, 1924, p. 76 [**A. intermedia*, p. 77, pl. 8, 4–5; M] [= *Anomalaxius* SAKAI & TÜRKAY, 2012, p. 725 (type, *A. floridanus*, OD)]. Rostrum smooth or obscurely crenulated on lateral margins; uropodal exopods without diaeresis. [Emended from KOMAI & others, 2020, p. 472.] *Miocene–Holocene. Miocene–Pliocene*: Chile. *Holocene*: Caribbean Sea, western Atlantic Ocean, western Pacific Ocean, eastern Pacific Ocean.—FIG. 15, 1a–b. *Axianassa* sp., USNM 110451; a, lateral view; b, major and minor chelae, Holocene, Puerto Rico, scale bars 1 cm (new).

Family LAOMEDIIDAE Borradaile, 1903

[Laomediidae BORRADAILE, 1903, p. 540]

Posterior margin of carapace with lateral lobes; rostrum minute; cervical groove and *linea thalassinica* present; pleonal somite 1 with anterolateral lobes; thoracic sternite 7 narrow; pereopods 2–4 and pleonal somites without setal rows; pereopods 1 usually equal; pereopods 2 simple; propodus of pereopods 3 linear; pereopods 4 simple or subchelate; coxa of pereopods 4 cylindrical; pleopods 2–5 similar and without appendices interna; pereopods 5 simple. [Emended from POORE, 1994, p. 103; NGOC-HO, 1997, p. 730.] *Miocene–Holocene*.

Jaxea NARDO, 1847, p. 4 [**J. nocturna*, p. 4; M; = *Calliaxis adriatica* HELLER, 1862, p. 440, pl. 3, 22–30] [= *Calliaxis* HELLER, 1862, p. 436 (type, *C. adriatica*, M)]. *Linea thalassinica* well developed, straight anteroposteriorly; cervical groove well defined; pleonites approximately same length, pleurae 2–6 with minute serrations; telson longer than wide, with longitudinal dorsal ridges; uropodal exopod with diaeresis; pereopods 1 equal,

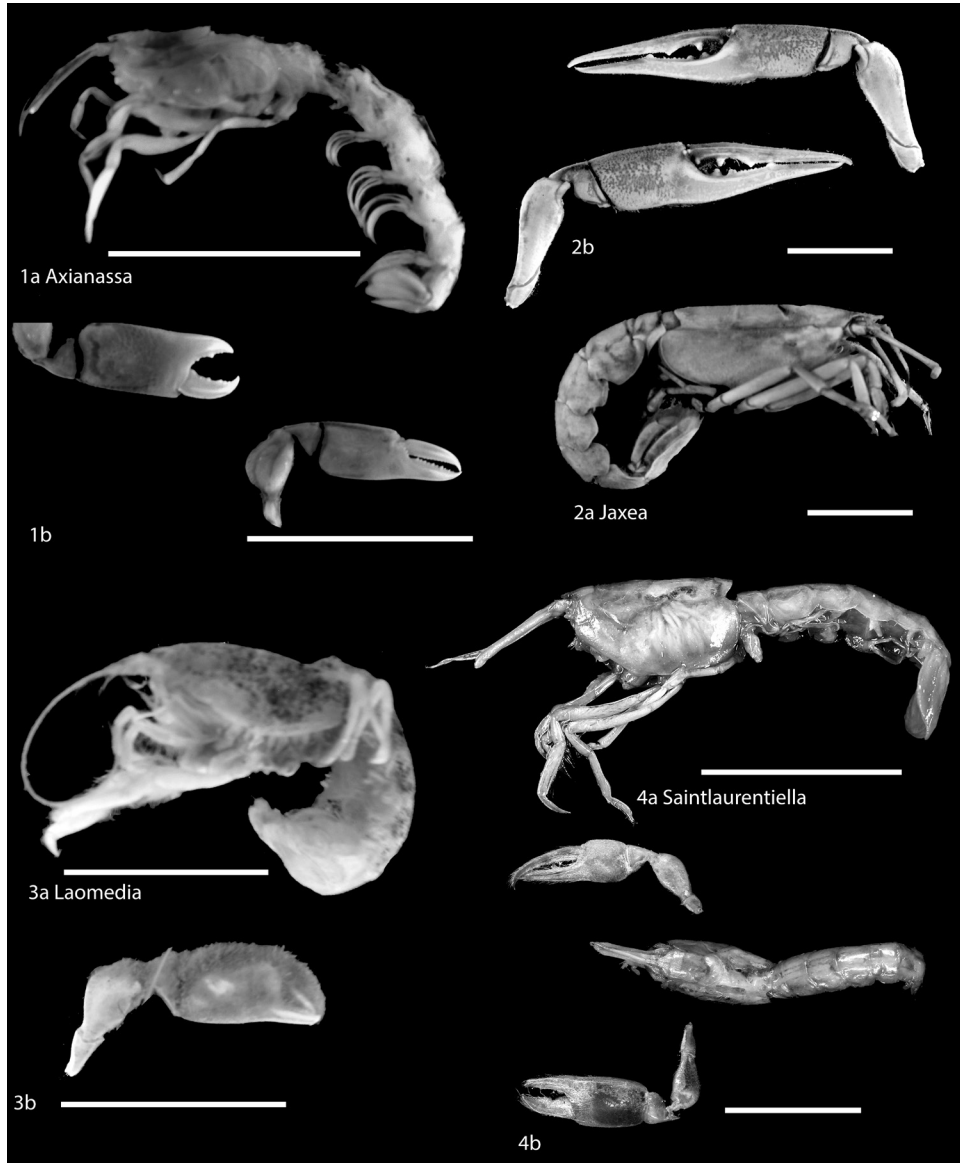


FIG 15. Axianassidae, Laomediidae (p. 23–25).

well developed, slender, fingers long and slender; carpus of pereiopod 1 very small, short; pereiopod 2 subchelate or simple, pereiopods 3–5 simple. [Emended from NGOC-HO, 2003, p. 501.] *Miocene–Holocene*. *Miocene* (Burdigalian–Langhian): Austria, Slovenia. *Pliocene*: Germany, Hungary, Italy, Spain. *Pleistocene*: Italy. *Holocene*: France, Greece, Israel, Italy, Morocco, Spain, UK.—FIG. 15,2a–b. **J. nocturna*, USNM 257632; a, lateral view; b, major and minor chelae; Holocene, Adriatic Sea, scale bars 1 cm (new).

Laomedia DE HAAN, 1841 in 1833–1850, p. 164 [*L. astacina*, p. 165, pl. 35,8; M]. Rostrum triangular, with one or two spines distally; pereiopod 1 chelate, subequal, similar; pereiopods 2–5 simple; uropodal exopod and endopod with diaeresis. [Emended from NGOC-HO, 1997, p. 731.] *Miocene–Holocene*. *Miocene* (Aquitanian): Japan. *Holocene*: Indo-West Pacific Ocean.—FIG. 15,3a–b. **L. astacina*, USNM 257634; a, lateral view; b, major chela; Holocene, South China Sea, scale bars 1 cm (new).

Saintlaurentiella PAIVA, TAVARES, & SILVA-NETO, 2010, p. 768 [**Laurentiella heterocheir* LE LOEUFF & INTES, 1974, p. 22, fig. 2; M; replacement name *pro Laurentiella* LE LOEUFF & INTES, 1974, p. 20 (type, *Laurentiella heterocheir* LE LOEUFF & INTES, 1974, M, non *Laurentiella* DRAGESCO & NJINÉ, 1971, p. 125 [Ciliophora])]. Rostrum quadrate; cervical groove and *linea thalassinica* well marked; pereopods 1 strongly heterochelate; pereopods 2–4 simple, pereopod 5 subchelate, uropodal exopods with diarsis. [Emended from LE LOEUFF & INTES, 1974, p. 20.] *Miocene–Holocene*. *Miocene* (*Aquitania–Langbian*): Japan; *Holocene*: tropical East Atlantic Ocean.—FIG. 15, 4a–b. **S. heterocheir*, holotype, MNHN IU 2020-1970; *a*, lateral view; *b*, minor chela, dorsal view, major chela, Holocene, Ivory Coast, scale bars 1 cm (photos courtesy of S. Soubzmaigne, MNHN).

Family THALASSINIDAE

Latreille, 1831

[*nom. correct.* WHITE, 1847, p. 70 *pro* Thalassinides LATREILLE, 1831, p. 377]

Posterior margin of carapace with lateral lobes; carapace with anterior carinae; cervical groove, second-cervical groove and *linea thalassinica* present; carapace ventral to *linea* very well calcified; axial spine on posterior margin of carapace; pleuron of pleonal somite 1 produced; pereopods 1 and 2 subchelate, pereopod 2 with dense row of long setae on lower margin; pereopods 2–4 and pleonal somites without setal rows; uropodal rami linear; telson very long. [Emended from POORE, 1994, p. 105.] *Oligocene–Holocene*.

Thalassinia LATREILLE, 1806, p. 51 [**T. scorpionides* LATREILLE, 1806, p. 52; M; =*Cancer (Astacus) anomalus* HERBST, 1804 in 1782–1804, p. 45; ICZN opinion 434, 1956, p. 411]. As for family. *Oligocene–Holocene*. *Oligocene*: Italy. *Miocene* (*Serravallian*): Japan. *Miocene*: Japan, Sabah. *Pleistocene?*: Japan, New Guinea, Australia. *Holocene*: tropical Indo-West Pacific Ocean.—FIG. 16, 1a–b. *T. anomala* (HERBST), USNM 81938; *a*, lateral view; *b*, dorsal view, Holocene, Philippines, scale bar 1 cm (new).

Family UPOGEBIIDAE Borradaile, 1903

[*nom. transl.* BARNARD, 1950, p. 497 *ex* Upegibiinae BORRADAILE, 1903, p. 542; ICZN Opinion 434, 1956] [=Gebiidae HAWORTH, 1825, p. 184; =Gebiidae DANA, 1852b, p. 17; =Kuwaitupogebiidae SAKAI, TÜRKAY, & AL AIDAROOS, 2015, p. 1223; =Neogebiculinae SAKAI, 1982, p. 72]

Rostrum broad, spinose, setose; carapace with *linea thalassinica* and cervical groove; antenna 1 with article 3 as long or longer than article 2; rostrum well devel-

oped, with spines and usually with setae; basis and ischium of pereopods fused; first pereopods isochelous, chelate or subchelate; pereopods 2 and 3 simple; pereopod 4 simple or subchelate; pereopod 5 subchelate or chelate; pleonal somite 1 sclerotized; pleopods 2–5 similar, without appendices interna. [Emended from POORE, 1994, p. 104.] *Triassic–Holocene*.

Upogebia LEACH, 1814 in 1813–1814, p. 400 [**Cancer (Astacus) stellatus* MONTAGU, 1808, p. 89, pl. 3, 5; M] [=*Gerbios* BOSCH, 1813, p. 233 (type, *Thalassinia littoralis* RISSO, 1816, p. 76, pl. 3.2; SD HOLTHUIS, 1954, p. 335; =*Gebia* LEACH, 1815, p. 335, 342 (type, *C. (A.) stellatus*; SD LUCAS, 1835, p. 353); =*Bigea* NARDO, 1847, p. 8 (type, *B. tipica*; M; =*Calliadne* STRAHL, 1862, p. 1064 (type, *C. savignii*, M); =*Gebiopsis* A. MILNE-EDWARDS, 1867, p. 63 (type, *G. nitidus*, M)]. Rostrum usually with spines; gastric region with carinae; *linea thalassinica* extending to posterior margin or nearly so; cervical groove well defined; dorsal surface anterior to cervical groove scabrous; anterolateral margin with one spine or entire; telson sometimes with U-shaped ridge, posterior margin straight or convex; antenna 1 with article 3 as long as article 2. [Emended from NGOC-HO, 2003, p. 508.] ?*Lower Triassic–Holocene*. ?*Lower Triassic*: Germany. *Middle Jurassic* (*Bathonian*): UK (England). *Lower Cretaceous* (*Berriasian–Hauterivian*): Germany. *Upper Cretaceous*: Poland, USA (Texas). *Eocene*: Belgium, USA (Alabama, California, Washington). *Oligocene*: Italy, Japan, USA (Washington). *Miocene* (*Langbian–Serravallian*): Japan. *Miocene*: Hungary, Italy, Japan, Spain. *Pliocene*: Azores, Italy, New Zealand. *Pleistocene*: Japan. *Holocene*: Australia, Indo-Pacific Ocean, Mediterranean Sea.—FIG. 16, 2. *U. pugetensis* (DANA, 1852b), USNM 105366, Holocene, Oregon, scale bar 1 cm (new).

Gebiacantha NGOC-HO, 1989, p. 118 [**Upogebia talismani* BOUVIER, 1915, p. 184; OD]. Rostrum ovoid, laterally serrate, margins of rostrum extend onto carapace into keels, with infrarostral spines; anterolateral margin with two or more spines; posterior margin of telson medially concave; pereopod 1 subchelate, carpus and propodus spinose, lower margin of propodus bearing one to two spines posterior to fixed finger. [Emended from NGOC-HO, 2003, p. 505.] *Miocene* (*Langbian*): Austria. *Pliocene* (*Zanclean*): Italy. *Holocene*: Indo-Pacific Ocean, Mediterranean Sea, eastern Atlantic Ocean.—FIG. 16, 3. *G. richeri* NGOC-HO, 1989, MNHN-IU-2014-18273, Holocene, New Caledonia, scale bar 1 cm (photo by N. Mollaret, MNHN).

INCERTAE SEDIS

“*Callianassa*” *sensu lato*. Peculiar to the record of axiideans and gebiideans is a large number of chelae, fingers, and mani of the major chelipeds

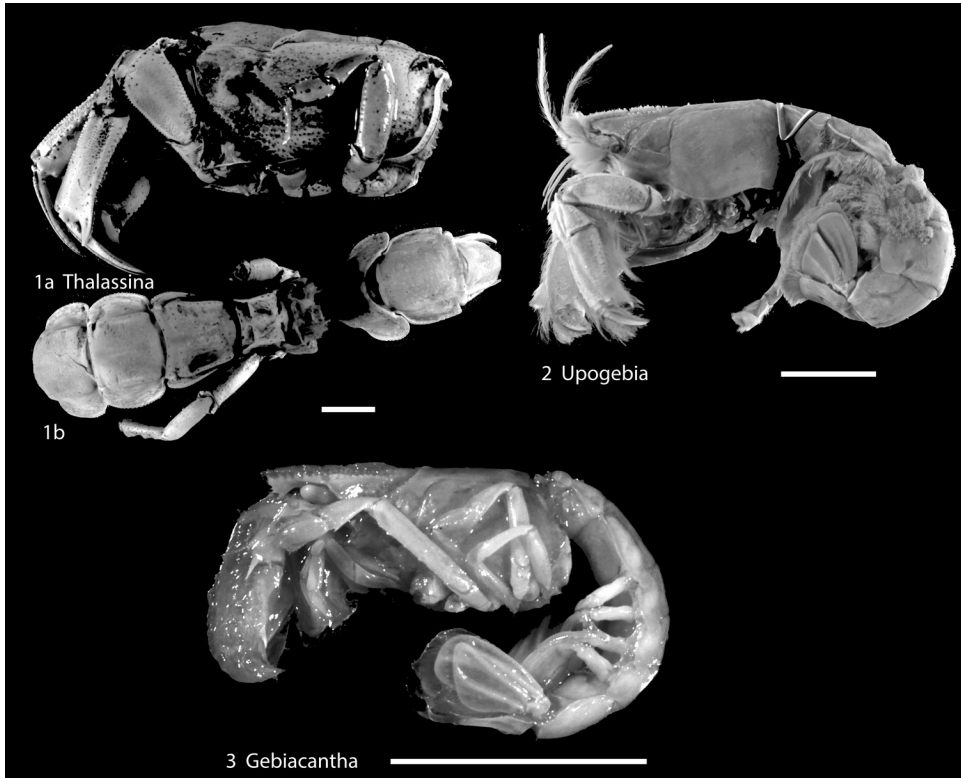


FIG 16. Thalassinidae, Upogebiidae (p. 25).

that have been referred to *Callianassa sensu lato* over the past 150 years. Fossil species referred to this genus are mostly mani of the major cheliped and should probably be construed as *Callianassoidea sensu lato*. There are approximately 150 species currently referred to *Callianassa sensu lato* (SCHWEITZER & others, 2010) based on fossils, and it is likely that in reality there are multiple genera and families represented among them, possibly including members of both Axiidea and Gebiidea. *Upper Jurassic (Oxfordian–Pleistocene)*: Cosmopolitan.

ABBREVIATIONS OF MUSEUM REPOSITORIES

GSC: Geological Survey of Canada, Eastern Paleontology Division, Ottawa, Ontario, Canada
 KSU D: Decapod Comparative Collection, Department of Geology, Kent State University, Kent, Ohio, USA
 M: Museo di Paleontologia di Napoli, Italy
 MCM: Mikasa City Museum, Mikasa, Hokkaido, Japan
 MCSNV: Museo Civico di Storia Naturale di Verona, Italy

MCZ: Museo Civico “G. Zannato” di Montecchio Maggiore, Vicenza, Italy
 Mendoza: Paleontología Invertebrados del Museo de Historia Natural de Mendoza, Argentina.
 MFM: Mizunami Fossil Museum, Mizunami, Gifu, Japan
 MGSB: Museo Geológico del Seminario de Barcelona, Barcelona, Spain
 MNHAH D: Museum of Nature and Human Activities, Hyogo, Hyogo, Japan
 MNHN.F: Muséum National d’histoire naturelle, Paris, Collection de Paléontologie, France
 MPEF: Museo Paleontologico Egidio Feruglio, Trelew, Chubut, Argentina
 MPZ: Museo Paleontológico de la Universidad de Zaragoza, Spain
 MSNM: Museo Civico di Storia Naturale di Milano, Italy
 NHMUK: Palaeontology Collections, The Natural History Museum, London, UK
 NHMW: Naturhistorisches Museum Wien (Natural History Museum of Vienna), Austria
 PKNM: Národní Muzeum, Prague, Czech Republic
 RGM: Naturalis Biodiversity Center, Leiden, The Netherlands

SDSNH: San Diego Museum of Natural History, San Diego, California, USA
SGO.PI: Museo Nacional de Historia Natural, Sección Paleontología, Santiago, Chile
SMF: Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt, Germany
SMNS: Staatliches Museum für Naturkunde, Stuttgart, Germany
SNM: Slovenské Národné múzeum (Slovak Natural History Museum), Bratislava, Slovakia
SS: Comprehensive Marine Biodiversity Survey (NUS-NParks), Singapore
TMNH: Toyohashi Museum of Natural History, Toyohashi, Aichi, Japan
USNM: United States National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA
WMNH-Ge: Wakayama Prefectural Museum of Natural History, Kainan, Wakayama, Japan

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