FLORIDA FOSSIL INVERTEBRATES

Part 5

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EOCENE, OLIGOCENE, AND MIOCENE DECAPOD CRUSTACEANS

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*Florida Fossil Invertebrates* is a publication of the Florida Paleontological Society, Inc., and is intended as a guide for identification of the many common invertebrate fossils found within the state. Two parts per year will be completed and each part will deal with a specific taxonomic group and contain a brief discussion of that group’s life history along with the pertinent geological setting. This series deals solely with published taxa; no new species descriptions are included. Prior to this issue, five parts have been published [Part 1 (June 2001) Eocene echinoids, Part 2 (January 2002) Oligocene and Miocene echinoids, Part 3 (June 2002) Pliocene and Pleistocene echinoids, and Part 4 (February 2004) Pliocene and Pleistocene decapod crustaceans]. Part 5 (this issue) reports on Eocene, Oligocene, and Miocene fossil decapod crustaceans (i.e., crabs, and shrimps). Part 6 (September 2004) and Part 7 (December 2004) discuss larger Foraminifera. Each issue will be image-rich and, whenever possible, specimen images will be at natural size (1x). Some of the specimens figured in this series are on display at Powell Hall, the museum’s Exhibit and Education Center. This publication is made possible through the generous financial support of James and Lori Toomey.

The Florida Paleontological Society, Inc., a non-profit group of avocational and professional paleontologists, is dedicated to the advancement of paleontology in Florida. Annual dues are $5.00 for Associate Membership (persons under age 18) and $15.00 for Full Membership and Institutional Subscriptions. Members receive the bi-annual Florida Paleontological Society Newsletter, *Florida Fossil Invertebrates*, and another new series, *Fossil Species of Florida*, that discusses a single taxon in each issue. Additionally, there are FPS sponsored fossil collecting trips (both invertebrate and vertebrate) in conjunction with our society meetings.

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INTRODUCTION

The Order Decapoda (crabs, shrimps, lobsters, and crayfishes) belongs in the Phylum Arthropoda (meaning jointed legs) whose species number far exceed that of all other invertebrates combined. Decapods (meaning ten legs) probably originated at the end of the Permian Period or the beginning of the Triassic Period (~245 million years ago) and significantly diversified during the Early Jurassic (Glaessner, 1969). Numerous forms of decapods exist. Most are marine, some brackish water, fewer live in fresh water, and even fewer are terrestrial. Today, the largest living species is the Japanese spider crab with outstretched limbs reaching nearly 12 feet across.

All decapods have a tough exoskeleton (the carapace). This carapace is made from chitin and reinforced to varying degrees by calcification. The carapace provides decapods with protection and the rigidity needed for efficient muscle use. However, the carapace does not allow for significant growth. Therefore, periodically, shedding (molting) of the old exoskeleton through dissolution of the inner chitinous layer and taking on fluid to expand the soft body, forces the rigid carapace to split along its many sutures and joints. Once split, the decapod discards the old shell (exuviae) and quickly hardens its new one. This process leaves behind many exoskeletons with potential for fossilization. Some of the fossil crabs discussed herein and in Florida Fossil Invertebrates (Part 4) are molted carapaces or parts thereof.

Published accounts of Eocene, Oligocene, and Miocene decapods in Florida are rare, although, occurrences (see Figures 1-3) of crabs and shrimps either as
whole exoskeletons, carapace fragments, or internal and external molds in many of Florida's stratigraphic units (those listed in Figure 4), are not. To date, only one taxon \((Portunus\ sp.)\) has been reported from the Middle Eocene Avon Park Formation (Ivany et al., 1990). However, preliminary examination of this unique specimen (Plate 4, figure A) indicates that this assignment is erroneous and that further study is needed. From the Upper Eocene Ocala Limestone, eight decapod species have been described: \(Ocalina\ floridana\) Rathbun, 1929; \(Stenocionops\ suwanneeana\) Rathbun, 1935; \(Callianassa\ inglisestris\) Roberts in Richards and Palmer, 1953; \(Calappilia\ brooksi\) Ross and Scolaro 1964; \(Calappa\ robertsi\) Ross et al., 1964; \(Calappa\ ocalana\) (Ross et al., 1964); \(Palaeocarpilius\ brodkorbi\) Lewis and Ross, 1965; and most recently \(Montezumella\ microporosa\) Portell and Collins, 2002. Additionally, \(Lophoranina\ georgiana\) (Rathbun, 1935), described from the Lower Oligocene Glendon Limestone of Georgia, was reported by Ross et al. (1964) and later by Toulmin (1977) as occurring in the Ocala Limestone of Florida. Both reports with regards to the genus are correct, however, examination of new, better preserved specimens, collected in the last twenty years, indicate that the specific identification of this common Florida Eocene crab may not be.

The only Oligocene crab, a portunid, reported for the state is a single specimen of \(Necronectes\ vaughani\) Rathbun, 1935 that was collected from the Lower Oligocene Marianna Limestone in Jackson County. Miocene decapods reported from Florida included: \(Callianassa\ floridana\) Rathbun, 1935; \(Callianassa\ matsoni\) Rathbun, 1935; \(Paguristes\ chipolensis\) Rathbun, 1935; \(Petrochirus\ inequalis\) Rathbun, 1919; \(Calappa\ flammea\) (Herbst, 1794); \(Callinectes\ sapidus\) Rathbun, 1896; \(Portunus\ sp.;\) \(Portunus\ sayi\) (Gibbes, 1850); \(Scylla\ floridana\) Rathbun, 1935; \(Menippe\ nodifrons\) Stimpson, 1859; and \(Eurytium\ limosum\) (Say, 1818). Many of the above taxa, recorded by Rathbun (1935), occur in the Lower Miocene Chipola Formation. However, refinement of Florida's Miocene lithostratigraphy by Scott (1988) removed \(C.\ matsoni\) from the Chipola Formation, and based on localities given in Rathbun (1935) places those sediments and this species in the Penney Farms, Parachucla, and Torreya formations. Furthermore, \(Callianassa\ sp.\) cf. \(C.\ floridana\) was reported in the Coosawhatchie and Marks Head formations by Jones and Portell (1988). Rathbun
also recorded both *Portunus* sp. (Plate 5, figure B) and *Scylla floridana* (Plate 5, figure J) from the Tampa limestone in Gadsden County. The rocks at these localities are currently placed in the Lower Miocene Chattahoochee Formation.

As mentioned above, remains of Eocene to Miocene decapods in Florida are not as uncommon as the published record suggests. However, because decapods have relatively thin, multi-component exoskeletons (see Florida Fossil Invertebrates, Part 4, Figure 3) that are easily disarticulated and/or destroyed by biologic or geologic processes, it is rare to find whole specimens. Usually, only the most heavily calcified parts preserve. Of deposits listed in Figure 4, the Ocala Limestone provides the finest and most complete decapods (especially crab carapaces). However, for the greatest abundance and diversity of species, most yet to be reported or described, the Lower Miocene Chipola Formation is best. Unfortunately, the majority of the Chipola crabs are preserved as chela segments (dactyli, mani, fixed fingers).

Not all evidence of the existence of fossil crabs and shrimps are skeletal. Some evidence can be found on marine snails that have had their lips peeled or had their apertures hollowed out (these shells are typically covered in coral or bryozoan colonies). Sometimes traces such as fecal pellets or the distinctive mammilated burrows of callianassid shrimp are found. Trace fossil (ichnofossil) workers place these burrow structures in the genus *Ophiomorpha*. A future issue of Florida Fossil Invertebrates will deal with trace fossils.

Over the last several years, non-professionals have donated to the FLMNH, some important fossil decapod finds. Several incredible discoveries include a nearly complete carapace of a yet-to-be described Eocene species of swimming crab (Portunidae) donated by Phillip Whisler (Gainesville), and the donation of several unusually large *Palaeocarpilius brodkorbi* by Belinda Kuszynski (Marianna) and Richard Green (Tallahassee). Florida collectors probably have decapod specimens that are unknown to science, so if crab or shrimp fossils are in your collection, or if you discover a site with decapods, the author would appreciate knowing about them.

For more information pertaining to the geology of Florida Eocene formations or Oligocene and Miocene formations, see Florida Fossil Invertebrates Part 1 and Part 2, respectively.
Figure 1. Eocene decapod distribution in Florida. Shaded counties have records of crabs or shrimps from surface exposures, quarries (mined above groundwater or below groundwater levels), and along rivers or streams (either above or below water level). Data from the Invertebrate Paleontology Collection in the Florida Museum of Natural History were used to augment published records.
Figure 2. Oligocene decapod distribution in Florida. Shaded counties have records of crabs or shrimps from surface exposures, quarries (mined above groundwater or below groundwater levels), and along rivers or streams (either above or below water level). Data from the Invertebrate Paleontology Collection in the Florida Museum of Natural History were used to augment published records.
Figure 3. Miocene decapod distribution in Florida. Shaded counties have records of crabs or shrimps from surface exposures, quarries (mined above groundwater or below groundwater levels), and along rivers or streams (either above or below water level). Data from the Invertebrate Paleontology Collection in the Florida Museum of Natural History were used to augment published records.
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<td>AVON PARK FORMATION</td>
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Figure 4. Eocene, Oligocene, and Miocene epochs and stratigraphic units in Florida with reported decapod crustaceans.
PLATE 1
Family Callianassidae (ghost shrimps)

A) *Callianassa inglisestris* Roberts in Richards and Palmer, 1953; UF 108745 (Holotype formerly FGS I-7590); inner view of left cheliped propodus; 3x.

B) *Callianassa inglisestris* Roberts in Richards and Palmer, 1953; UF 108745 (Holotype formerly FGS I-7590); outer view of left cheliped propodus; 3x.

C) *Callianassa floridana* Rathbun, 1935; UF 76147; inner view of left major cheliped dactylus; 4x.

D) *Callianassa floridana* Rathbun, 1935; UF 76147; outer view of left major cheliped dactylus; 4x.

E) *Callianassa matsoni* Rathbun, 1935; UF 25364; outer view of right cheliped propodus; 3x.

F) *Callianassa matsoni* Rathbun, 1935; UF 25364; inner view of right cheliped propodus; 3x.

Family Diogenidae (left-handed hermit crabs)

G) *Paguristes chipolensis* Rathbun, 1935; USNM 371465 (Holotype); image from Rathbun, 1935, plate 24, figure 12; inner view of right cheliped dactylus; 4x.

H) *Paguristes chipolensis* Rathbun, 1935; USNM 371465 (Holotype); image from Rathbun, 1935, plate 24, figure 13; outer view of right cheliped dactylus; 4x.

I) *Petrochirus ineqaulis* Rathbun, 1919; UF 74966; outer view of left fixed finger; 3x.

J) *Petrochirus ineqaulis* Rathbun, 1919; UF 74966; inner view of left fixed finger; 3x.

**Notes:** For each taxon in Plates 1-8 see Table 1 (pages 24 and 25) for stratigraphic occurrence. Sean Roberts (FLMNH) assisted with digital photography on Plates 1-8.
PLATE 2

Family Raninidae (frog crabs)

A) Lophoranina sp. aff. L. georgiana (Rathbun, 1935); UF 67098; interior view of carapace; 1x.

B) Lophoranina sp. aff. L. georgiana (Rathbun, 1935); UF 67098; right lateral view of carapace; 1x.

Family Calappidae (box crabs)

C) Calappa flammea (Herbst, 1794); UF 30644; frontal view of Recent carapace (collected north of the Marquesas Keys, Florida) given as an example of a complete specimen and for comparison with fossil in figure J; 1x.

D) Calappa flammea (Herbst, 1794); UF 30644; dorsal view of Recent carapace given as an example of a complete specimen and for comparison with fossil in figure I; 1x.

E) Calappa flammea (Herbst, 1794); UF 30644; outer view of Recent right major cheliped dactylus for comparison with fossil in figure G; 2x.

F) Calappa flammea (Herbst, 1794); UF 30644; inner view of Recent right major cheliped dactylus for comparison with fossil in figure H; 2x.

G) Calappa flammea (Herbst, 1794); UF 69699; outer view of right major cheliped dactylus; 3x.

H) Calappa flammea (Herbst, 1794); UF 69699; inner view of right major cheliped dactylus; 3x.

I) Calappa flammea (Herbst, 1794); UF 71831; inner view of right major cheliped propodus; 6x.

J) Calappa flammea (Herbst, 1794); UF 71831; outer view of right major cheliped propodus; 6x.
PLATE 3

Family Calappidae (box crabs)

A) *Calappa ocalana* Ross, Lewis, and Scolaro, 1964; UF 1338 (Holotype); outer view of right major cheliped propodus; 1x.

B) *Calappa ocalana* Ross, Lewis, and Scolaro, 1964; UF 1338 (Holotype); inner view of right major cheliped propodus; 1x.

C) *Calappa robertsi* Ross, Lewis, and Scolaro, 1964; PRI 6064 (Holotype); inner view of left minor cheliped propodus; 1x.

D) *Calappa robertsi* Ross, Lewis, and Scolaro, 1964; PRI 6064 (Holotype); outer view of left minor cheliped propodus; 1x.

E) *Calappa robertsi* Ross, Lewis, and Scolaro, 1964; UF 114369; outer view of right major cheliped propodus and dactylus; 1x.

F) *Calappilia brooksi* Ross and Scolaro, 1964; UF 13349; dorsal view of carapace; 1x.

G) *Calappilia brooksi* Ross and Scolaro, 1964; UF 13349; frontal view of carapace; 1x.

Family Majidae (spider crabs)

H) *Stenocionops furcata coelata* (A. Milne Edwards, 1878); UF 68795; dorsal view of *Recent* carapace (Straits of Florida) given as example of a complete specimen; 1x.

I) *Stenocionops furcata coelata* (A. Milne Edwards, 1878); UF 68795; outer view of *Recent* left cheliped for comparison with fossil in figure J; 4x.

J) *Stenocionops suwanneeana* Rathbun, 1935; USNM 137885 (Holotype); image from Rathbun, 1935, plate 21, figure 1; outer view of left cheliped propodus; 1x.

Family Cheiragonidae

K) *Montezumella microporosa* Portell and Collins, 2002; UF 107150 (Holotype); dorsal view of carapace; 1.5x
PLATE 4
Family Portunidae (swimming crabs)

A) Genus and species unknown. UF 28199; dorsal view of incomplete carapace associated with fossil seagrass in dolomitic matrix; 1x.

B) *Callinectes sapidus* Rathbun, 1896; UF 3537; dorsal view of Recent carapace (collected in the lower Withlacoochee River) given as an example of a complete specimen and for comparison with fossils in figures F and G; 1x.

C) *Callinectes sapidus* Rathbun, 1896; UF 3537; frontal view of Recent carapace for comparison with fossils in figures F and G; 1x.

D) *Callinectes sapidus* Rathbun, 1896; UF 3537; outer view of Recent right cheliped propodus for comparison with fossil in figure F; 2x.

E) *Callinectes sapidus* Rathbun, 1896; UF 3537; inner view of Recent right cheliped propodus for comparison with fossil in figure G; 2x.

F) *Callinectes* sp.; UF 74941; outer view of incomplete right cheliped propodus; 2x.

G) *Callinectes* sp.; UF 74941; inner view of incomplete right cheliped propodus; 2x.

Note: The specimen in figure A is from the Middle Eocene Avon Park Formation (see text for discussion).
PLATE 5

Family Portunidae (swimming crabs)

A) Necronectes vaughani Rathbun, 1935; USNM 371728 (Holotype); image (modified slightly) from Rathbun, 1935, plate 22, figure 9; dorsal view of carapace; 1x.

B) Portunus sp.; USNM 371892; image from Rathbun, 1935, plate 24, figure 30; outer view of distal portion of left fixed finger and dactylus; 1x.

C) Portunus sayi (Gibbes, 1850); FSBC I 3840; dorsal view of Recent carapace (collected west of Egmont Key, Hillsborough County, Florida) given as an example of a complete specimen; 1x.

D) Portunus sayi (Gibbes, 1850); FSBC I 3840; outer view of Recent right cheliped carpus, propodus, and dactylus for comparison with fossils in figures F and H; 2x.

E) Portunus sayi (Gibbes, 1850); FSBC I 3840; inner view of Recent right cheliped carpus, propodus, and dactylus for comparison with fossils in figures G and I; 2x.

F) Portunus sayi (Gibbes, 1850); UF 5267A; outer view of right cheliped carpus and partial propodus and dactylus; 1.5x.

G) Portunus sayi (Gibbes, 1850); UF 5267A; inner view of right cheliped carpus and partial propodus and dactylus; 1.5x.

H) Portunus sayi (Gibbes, 1850); UF 5267B; outer view of right cheliped carpus and partial propodus and dactylus; 1.5x.

I) Portunus sayi (Gibbes, 1850); UF 5267B; inner view of right cheliped carpus and partial propodus and dactylus; 1.5x.

J) Scylla floridana Rathbun, 1935; USNM 371717 (Holotype); image (modified slightly) from Rathbun, 1935, plate 23, figure 8; outer view of right cheliped dactylus and fixed finger; 1x.
PLATE 6
Family Carpilliidae (mud crabs)

A) *Ocalina floridana* Rathbun, 1929; UF 32725; ventral view of carapace; 1x.

B) *Ocalina floridana* Rathbun, 1929; UF 32725; frontal view of chelipeds (dorsal carapace absent); 1x.

C) *Ocalina floridana* Rathbun, 1929; UF 105902; dorsal view of carapace; 1x.

D) *Ocalina floridana* Rathbun, 1929; UF 105902; frontal view of carapace; 1x.
PLATE 7

Family Carpiliidae (mud crabs)

A) *Palaeocarpilius brodkorbi* Lewis and Ross, 1965; UF 112462; dorsal view of carapace internal mold (posterior partially displaced anteriorly); 1x.

B) *Palaeocarpilius brodkorbi* Lewis and Ross, 1965; UF 112462; frontal view of carapace internal mold (partially compacted); 1x.

C) *Palaeocarpilius brodkorbi* Lewis and Ross, 1965; UF 114368; frontal view of carapace; 1x.

D) *Palaeocarpilius brodkorbi* Lewis and Ross, 1965; UF 114368; dorsal view of carapace; 1x.

E) *Palaeocarpilius brodkorbi* Lewis and Ross, 1965; UF 114368; ventral view of carapace infilled with Ocala Limestone; 1x.

**Note:** Belinda Kuszynski (Marianna) kindly donated UF 112462 for inclusion in this publication.
PLATE 8

Family Menippidae (stone crabs)
A) *Menippe nodifrons* Stimpson, 1859; FSBC I 989; dorsal view of Recent carapace (collected in Departamento de Gracias a Dios, Honduras) given as an example of a complete specimen and for comparison with fossils in figures C-F; 1x.
B) *Menippe nodifrons* Stimpson, 1859; FSBC I 989; frontal view of Recent carapace given as an example of complete specimen and for comparison with fossils in figures C-F; 1x.
C) *Menippe nodifrons* Stimpson, 1859; UF 45586; inner view of partial left cheliped propodus; 2x.
D) *Menippe nodifrons* Stimpson, 1859; UF 45586; outer view of partial left cheliped propodus; 2x.
E) *Menippe nodifrons* Stimpson, 1859; UF 44843; outer view of distal portion of right fixed finger; 2x.
F) *Menippe nodifrons* Stimpson, 1859; UF 44843; inner view of distal portion of right fixed finger; 2x.

Family Xanthidae (mud crabs)
G) *Eurytium limosum* (Say, 1818); University of Florida Marine Laboratory 340; dorsal view of Recent carapace (collected at Crescent Beach Salt Marsh, St. Johns County, Florida) given as an example of a complete specimen and for comparison with fossil in figure J; 1x.
H) *Eurytium limosum* (Say, 1818); University of Florida Marine Laboratory 340; frontal view of Recent carapace for comparison with fossil in figure I; 1x.
I) *Eurytium limosum* (Say, 1818); UF 71379; outer view of right cheliped dactylus; 4x.
J) *Eurytium limosum* (Say, 1818); UF 71379; inner view of right cheliped dactylus; 4x.
Table 1. Species list of described or reported (but as yet undescribed) Florida Eocene, Oligocene, and Miocene decapod crustaceans with families arranged in systematic order following Martin and Davis (2001), and with genera and species listed alphabetically. For some, a brief synonymy (an older name no longer in use) is provided. Reported stratigraphic occurrence (updated to currently recognized formational names) for each species is listed. An asterisk (*) indicates the Florida record as problematic. However, for completeness, these reports were included.

**Callianassidae**

*Callianassa* sp. cf. *C. floridana* Rathbun, 1935.
Stratigraphic Occurrence: Coosawhatchie and Marks Head formations.

*Callianassa floridana* Rathbun, 1935.
Stratigraphic Occurrence: Chipola Formation.

*Callianassa inglisestris* Roberts in Richards and Palmer, 1953.
Stratigraphic Occurrence: Lower Member of Ocala Limestone.

*Callianassa matsoni* Rathbun, 1935.
Stratigraphic Occurrence: Torreya?, Penney Farms, and Parachucla formations.

**Diogenidae**

*Paguristes chipolensis* Rathbun, 1935.
Stratigraphic Occurrence: Chipola Formation.

*Petrochirus inequalis* Rathbun, 1919.
Stratigraphic Occurrence: Chipola Formation.

**Raninidae**

*Lophoranina georgiana* (Rathbun, 1935).
Stratigraphic Occurrence: Ocala Limestone.
Synonymy: *Ranina georgiana* Rathbun, 1935. As noted by Portell & Collins (2002) the Florida Eocene reports of this species warrant further research.

**Calappidae**

*Calappa flammea* (Herbst, 1794).
Stratigraphic Occurrence: Shoal River and Chipola formations.

Stratigraphic Occurrence: Ocala Limestone.

Stratigraphic Occurrence: Ocala Limestone.
Calappilia brooksi Ross and Scolaro, 1964.
   Stratigraphic Occurrence: Ocala Limestone.

Majidae
   Stenocionops suwanneeana Rathbun, 1935.
   Stratigraphic Occurrence: Ocala Limestone.

Cheiragonidae
   Stratigraphic Occurrence: Ocala Limestone.

Portunidae
   Callinectes sapidus Rathbun, 1896.
   Stratigraphic Occurrence: Chipola Formation.
   Necronectes vaughani Rathbun, 1935.
   Stratigraphic Occurrence: Marianna Limestone.
   *Portunus* sp.
   Stratigraphic Occurrence: Avon Park Formation.
   Synonymy: The reported genus for this fossil is doubtful.
   Portunus sp.
   Stratigraphic Occurrence: Chattahoochee Formation.
   Portunus sayi (Gibbes, 1850).
   Stratigraphic Occurrence: Chipola Formation.
   Scylla floridana Rathbun, 1935.
   Stratigraphic Occurrence: Chattahoochee Formation.

Carpiliidae
   Ocalina floridana Rathbun, 1929.
   Stratigraphic Occurrence: Ocala Limestone.
   Palaeocarpilius brodkorbi Lewis and Ross, 1965.
   Stratigraphic Occurrence: Ocala Limestone.

Menippidae
   Menippe nodifrons Stimpson, 1859.
   Stratigraphic Occurrence: Chipola Formation.

Xanthidae
   Eurytium limosum (Say, 1818).
   Stratigraphic Occurrence: Chipola Formation.
REFERENCES CITED


NOTES