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PLIOCENE AND PLEISTOCENE 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 around 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. To date, three parts discussing echinoids have been published. Part 1 (June 2001) Eocene echinoids, Part 2 (January 2002) Oligocene and Miocene echinoids, and Part 3 (June 2002) Pliocene and Pleistocene echinoids. Part 4 (for 2003) and Part 5 (for 2003) report on fossil decapods (i.e., crabs, and shrimps). 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 soon will be 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.**

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INTRODUCTION

Decapod crustaceans (i.e., crabs and shrimps) from Pliocene and Pleistocene deposits around Florida (see Figures 1 and 2) have received little attention in the published literature. Until 2001, only four of the more than 400 living (and potentially preservable) decapod species inhabiting nearshore coastal areas around the state had been reported as fossil for the Pliocene and Pleistocene epochs. Three were listed in Mary J. Rathbun's (1935) comprehensive systematic review of Cretaceous to Pleistocene decapod crustaceans of the U.S. Atlantic and Gulf coastal plain. They were the rock crab *Cancer irroratus* Say, 1817, the stone crab *Menippe nodifrons* Stimpson 1859, and the ghost crab *Ocypode albicans* Bosc, 1801-1802 [currently designated *O. quadrata* (Fabricius, 1787)]. However, all three reports were questioned by later workers either because of insufficient locality or stratigraphic data [e.g., the occurrence of *O. albicans* is listed as "Florida (probably)"], poor preservation, or because the specimens were not figured or described and were no longer available for study. The fourth extant species to be recognized as fossil was recorded by Portell and Schindler (1991) who reported whole-bodied *Menippe mercenaria* (Say, 1818) from the upper Pleistocene Fort Thompson Formation in Pinellas County. They also reported cheliped segments of

Callianassa sp. (ghost shrimps) and Diogenidae (left-handed hermit crabs) along with carapace fragments of the purse crab *Persephona* sp. Rathbun (1935) also listed *Petrochirus bouvieri* Rathbun, 1918 (an extinct hermit crab described from the Gatun Formation of Panama) from the "Upper Miocene" (possibly Pliocene Jackson Bluff Formation) and "Caloosahatchee marl" of Florida as well as the spider crab *Euprognatha* sp. from the Florida "Upper Miocene" (also possibly Pliocene Jackson Bluff Formation). Both Rathbun reports remain questionable and are in need of verification. Furthermore, Rathbun (1935) described a rare elbow crab (*Parthenope charlottensis*) which, thus far, is known only from propodi and meri.

Other records of fossil crabs from Florida were published by Ross (1963), who listed "*Paguridae* sp." (right-handed hermit crabs) from the upper Pleistocene Pamlico Formation (now considered Holocene-Pleistocene undifferentiated sand deposits) and Bishop (1986) who referred to "casts of ?stone crabs (*Menippe*?)" in the upper Pleistocene Anastasia Formation. Bishop and Portell (1989) described a new species of Pliocene (Tamiami Formation) porcelain crab, *Petrolisthes myakkensis*, that was commensal with the sea star *Heliaster microbrachius.* Further reports of Florida Pliocene and Pleistocene decapods have been more tentative and include isolated cheliped segments and carapace fragments of *Persephona* sp. and cheliped segments of *Callianassa,* Portunidae, and Xanthidae from the Pleistocene Bermont and Fort Thompson formations at Leisey Shell pits, Hillsborough County (Portell et al., 1995). Morgan and Portell (1996) listed *Persephona* sp. in their fauna of Plio-Pleistocene Nashua Formation invertebrates from Brevard County and Campbell et al. (1997) listed *Calappa* and a majid crab from Charlotte County in their paper on a fossil Pliocene brachiopod.

Agnew et al. published several peer-reviewed abstracts (1999, 2000, 2001) based on shell deposits in Okeechobee County that contained thousands of decapod fragments. This research culminated with J. Agnew's Masters Thesis in 2001 which identified an additional ten still extant species new to the Florida Pliocene and Pleistocene record. It also added 8 taxa identifiable only to genus. Portell et al. (2003a) published a peer-reviewed abstract on the frog crab *Ranilia* from the Pliocene of the Florida panhandle. This new species has been described and awaits publication.

Portell et al. (2003b) recorded the discovery of fossil ghost crabs (*O. quadrata*) found commonly along Brevard County beaches. This report confirmed and augmented the questionable occurrence listed in Rathbun (1935). Portell et al. (2003b) also determined that Bishop's (1986) report of "casts of ?stone crabs (*Menippe*?)" from the Florida Anastasia Formation is in actuality *O. quadrata*.

Remains of Pliocene and Pleistocene decapods in Florida are not as uncommon as the above published record might suggest. However, because decapods have relatively thin, multi-component exoskeletons (see Figure 3) that are easily disarticulated and/or destroyed by biologic or geologic processes, it is rare to find intact specimens. Usually, only the most heavily calcified parts preserve. In shell pits of southern Florida (especially those in which the Caloosahatchee or Bermont formations are being excavated), some of the most common elements found include: meri of *Persephona* (see Plate 5, Figures H and I); dactyli and fixed fingers of the stone crab *Menippe* (see Plate 8); dactyli and fixed fingers of *Calappa* (see Plate 5, Figures A-D), and propodi and fingers of several genera in the family Callianassidae (see Plates 1 and 2). Also, beautifully preserved carapaces can sometimes be washed from inside large gastropods or bivalves (e.g., *Persephona mediterranea* washed from a large bivalve (*Dinocardium*) found in an Okeechobee County shell pit (Plate 5, Figures G-I).

As might be expected, many of the important Pliocene and Pleistocene decapod discoveries discussed herein were brought to the attention of FLMNH paleontologists by non-professionals. Some of these fantastic finds include: unearthing of abundant and well-preserved *Menippe mercenaria* by Brian Ridgway; discovering of *Heliaster microbrachius* (sea star) with *Petrolisthes myakkensis* by the late Lelia and William Brayfield; finding the Okeechobee County crab localities by Steve Wilson that were the basis of J. Agnew's Masters Thesis; and lastly the reporting of *Ocypode quadrata* localities by John Beerensson, Patrick Brett, Thomas McConnell, and Ron Winn. However, collectors may have additional decapod specimens that are unknown to science; so if crab or shrimp fossils (from Florida) are in your collection or if you discover a site with decapods please contact the senior author.

For a brief discussion of the geological setting for the Pliocene and Pleistocene formations see Florida Fossil Invertebrates (Part 3).

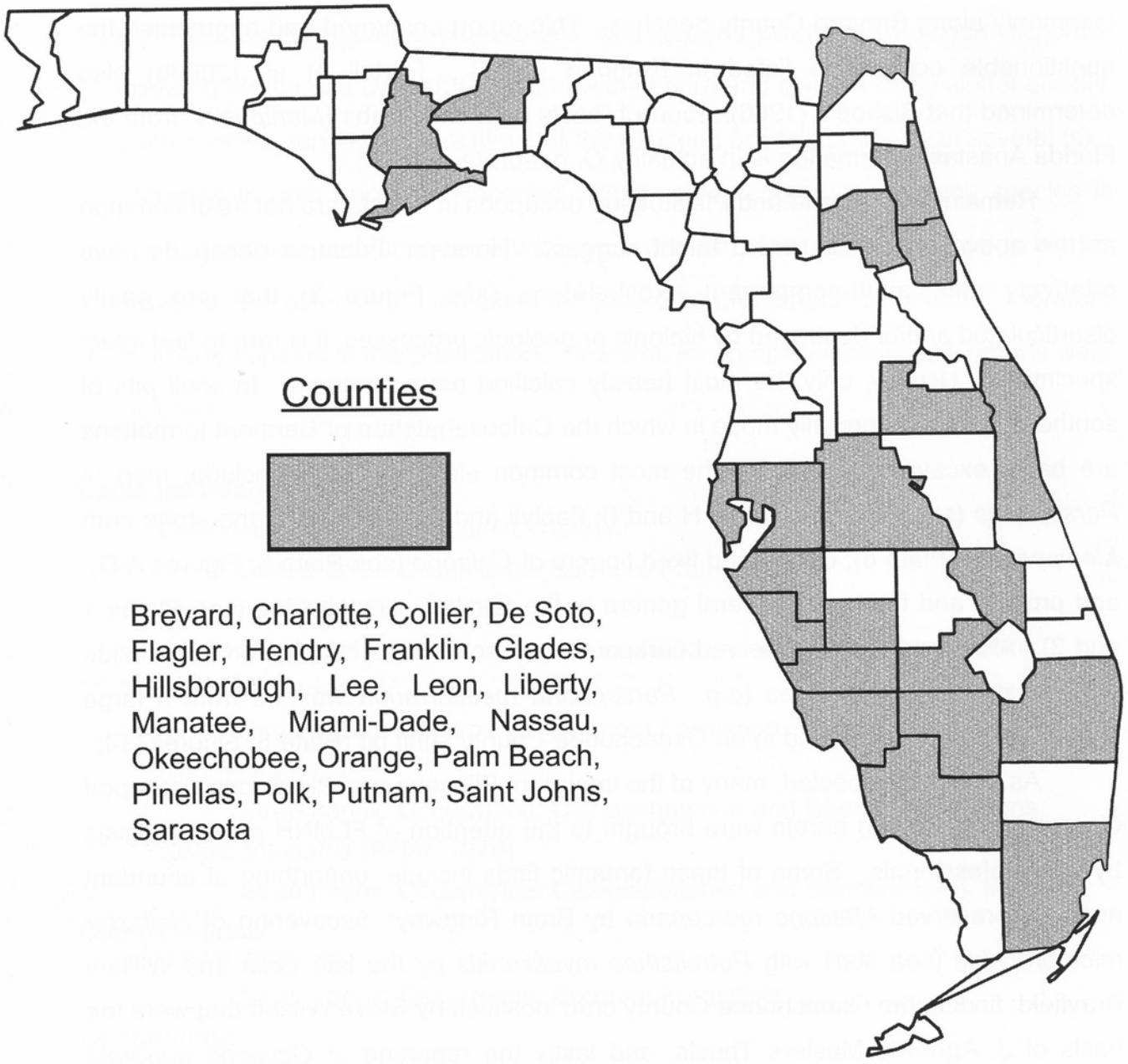


Figure 1. Pliocene and Pleistocene decapod distribution in Florida. Shaded counties have records of crabs or shrimps from surface exposures, quarries (mined above groundwater or below groundwater levels), and along rivers or streams (either above or below water level). Data are from the Invertebrate Paleontology Collection in the Florida Museum of Natural History in Gainesville, Florida.

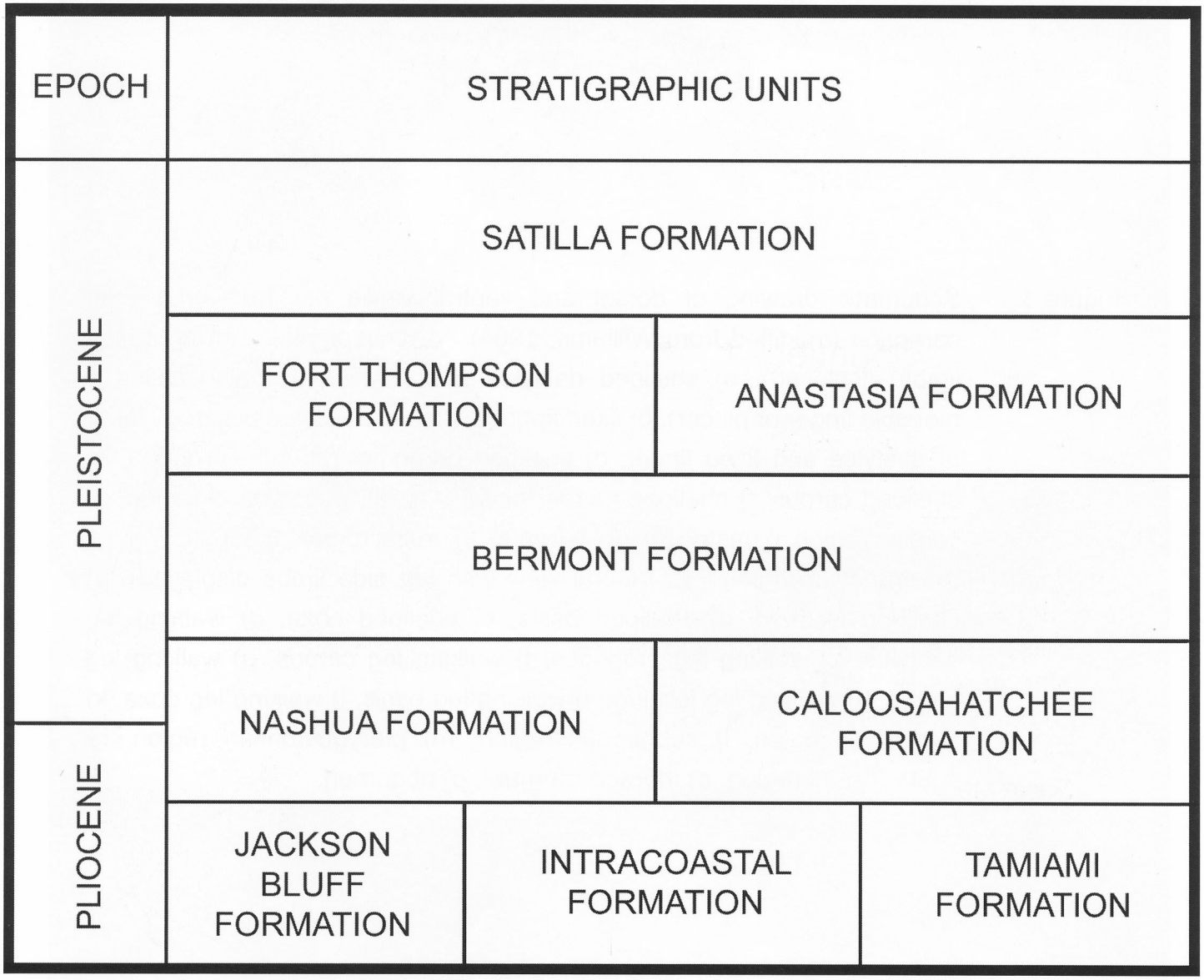
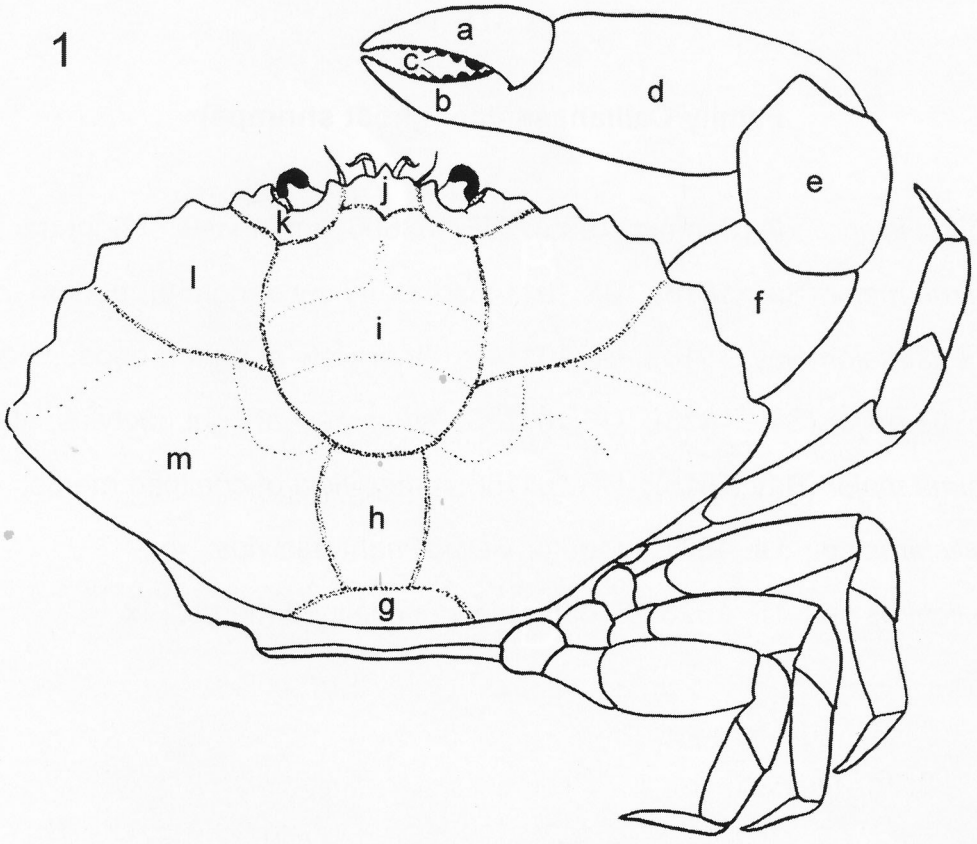


Figure 2. Pliocene and Pleistocene stratigraphic units with reported decapod crustaceans.

Figure 3. Schematic drawing of dorsal and ventral views of brachyuran crab carapace (modified from Williams, 1984). 1. Dorsal view with right side limbs displayed). a) cheliped dactylus (plural = dactyli; also called a movable finger or pincer), b) fixed finger (also called a fixed pincer, c) teeth of dactylus and fixed finger, d) cheliped propodus (plural = propodi), e) cheliped carpus, f) cheliped merus (plural = meri), g) intestinal region, h) cardiac region, i) gastric region, j) frontal, k) orbital region, l) hepatic region, m) branchial region. 2. Ventral view with left side limbs displayed). a) cheliped ischium, b) cheliped basis, c) cheliped coxa, d) walking leg dactylus, e) walking leg propodus, f) walking leg carpus, g) walking leg merus, h) walking leg ischium, i) walking leg basis, j) walking leg coxa, k) suborbital region, l) subhepatic region, m) pterygostomian region, n) subbranchial region, o) thoracic sternum, p) abdomen.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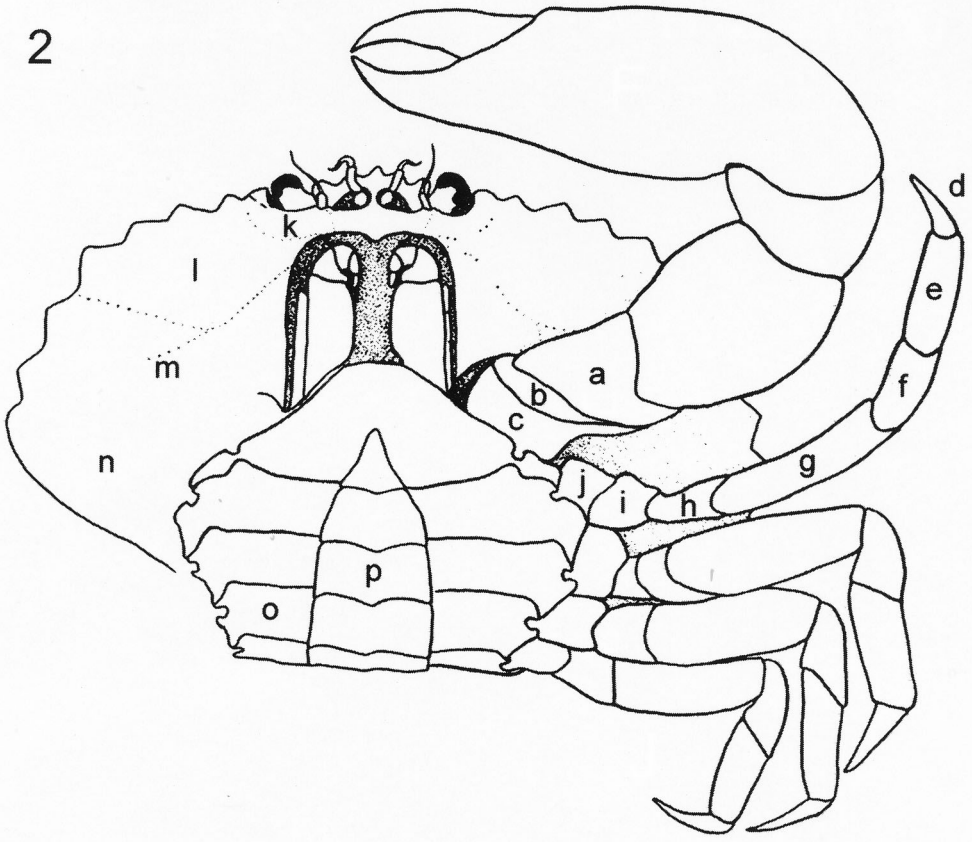
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PLATE 1

Family Callianassidae (ghost shrimps)

A) *Callichirus islagrande* (Schmitt, 1935); UF 103606; inner view of right dactylus; 4x.

B) *Callichirus major* (Say, 1818); UF 101148; outer view of right propodus; 3x.

C) *Callichirus major* (Say, 1818); UF 101148; inner view of right propodus; 3x.

D) *Callichirus major* (Say, 1818); UF 103715; inner view of right dactylus; 4x.

E) *Callichirus major* (Say, 1818); UF 101158; outer view of cheliped merus; 4x.

F) *Neocallichirus* sp.; UF 107738; outer view of right dactylus; 4x.

G) *Neocallichirus* sp.; UF 107819; outer view of cheliped merus; 4x.

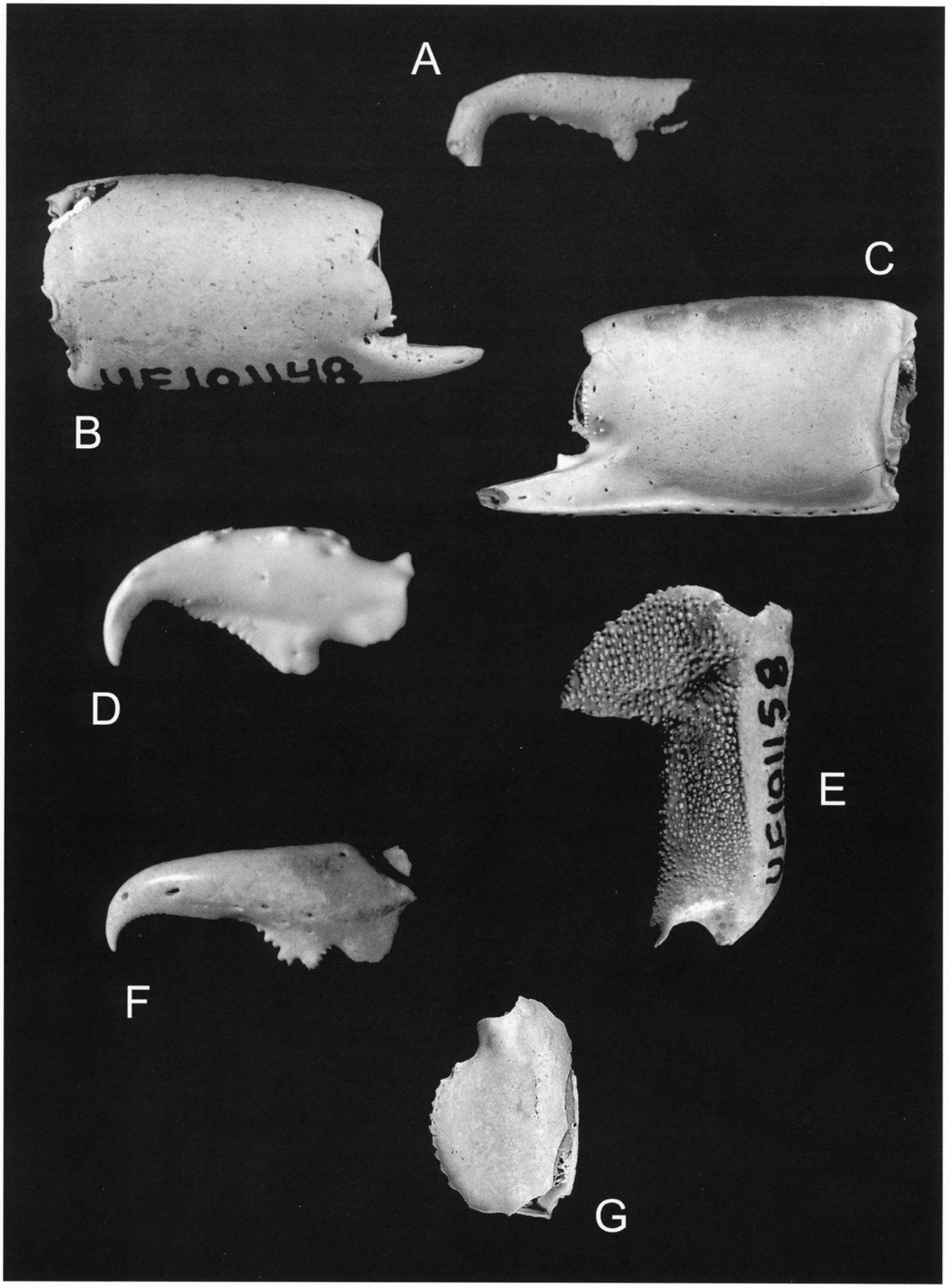
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PLATE 2

Families Callianassidae and Ctenochelidae (ghost shrimps) and Upogebiidae (mud shrimps)

A) *Neotrypea* sp.; UF 107736; outer view of left propodus; 4x.

B) *Neotrypea* sp.; UF 107736; inner view of left propodus; 4x.

C) *Neotrypea* sp.; UF 103710; outer view of cheliped merus; 4x.

D) *Sergio trilobatus* (Biffar, 1970); UF 101193; inner view of right propodus; 4x.

E) *Sergio trilobatus* (Biffar, 1970); UF 101193; outer view of right propodus; 4x.

F) *Sergio trilobatus* (Biffar, 1970); UF 27657; outer view of merus; 4x.

G) *Ctenocheles* sp.; UF 101462; inner view of right dactylus; 4x.

H) *Upogebia affinis* (Say, 1818); UF 103607; outer view of left dactylus; 4x.

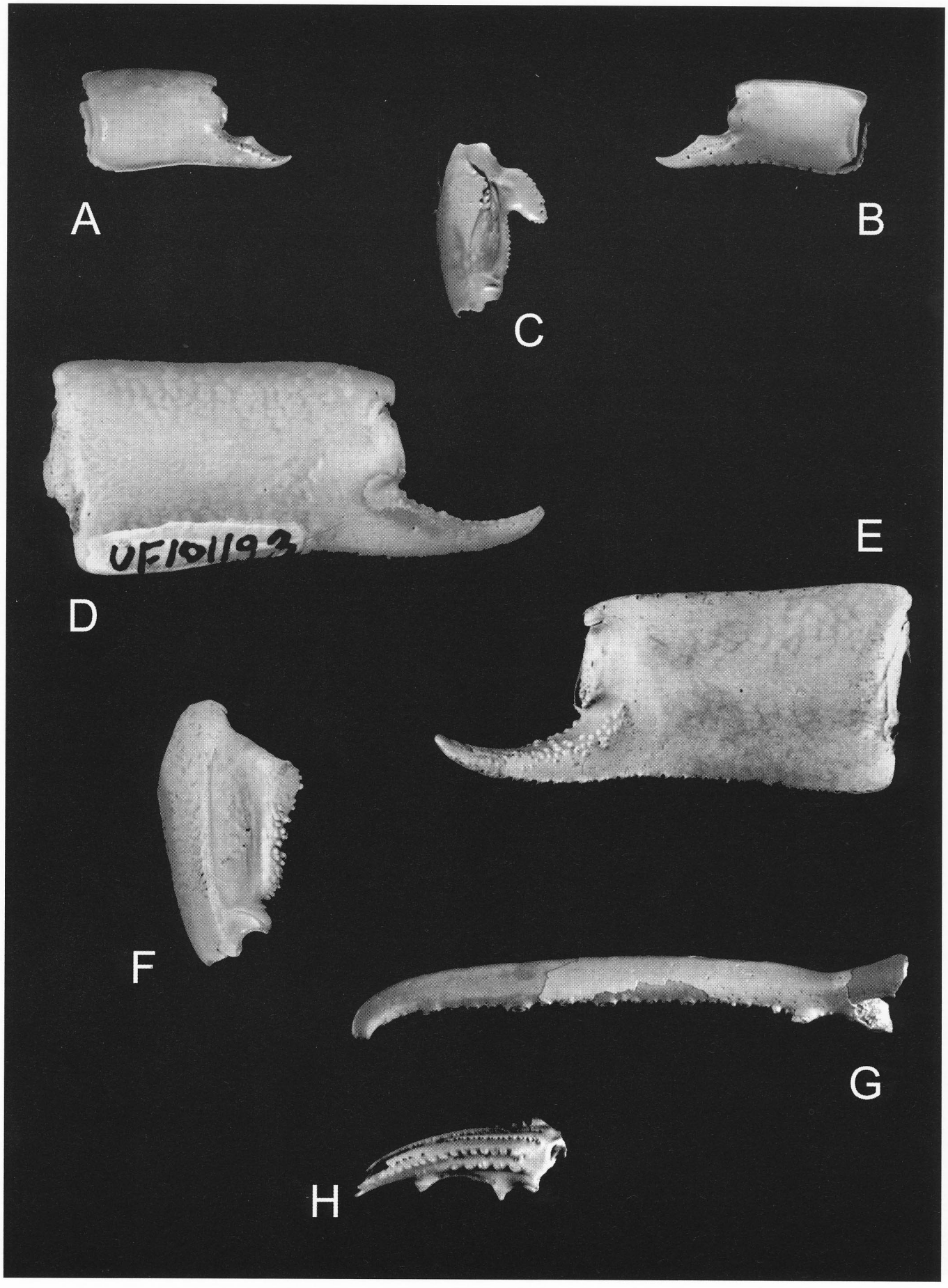
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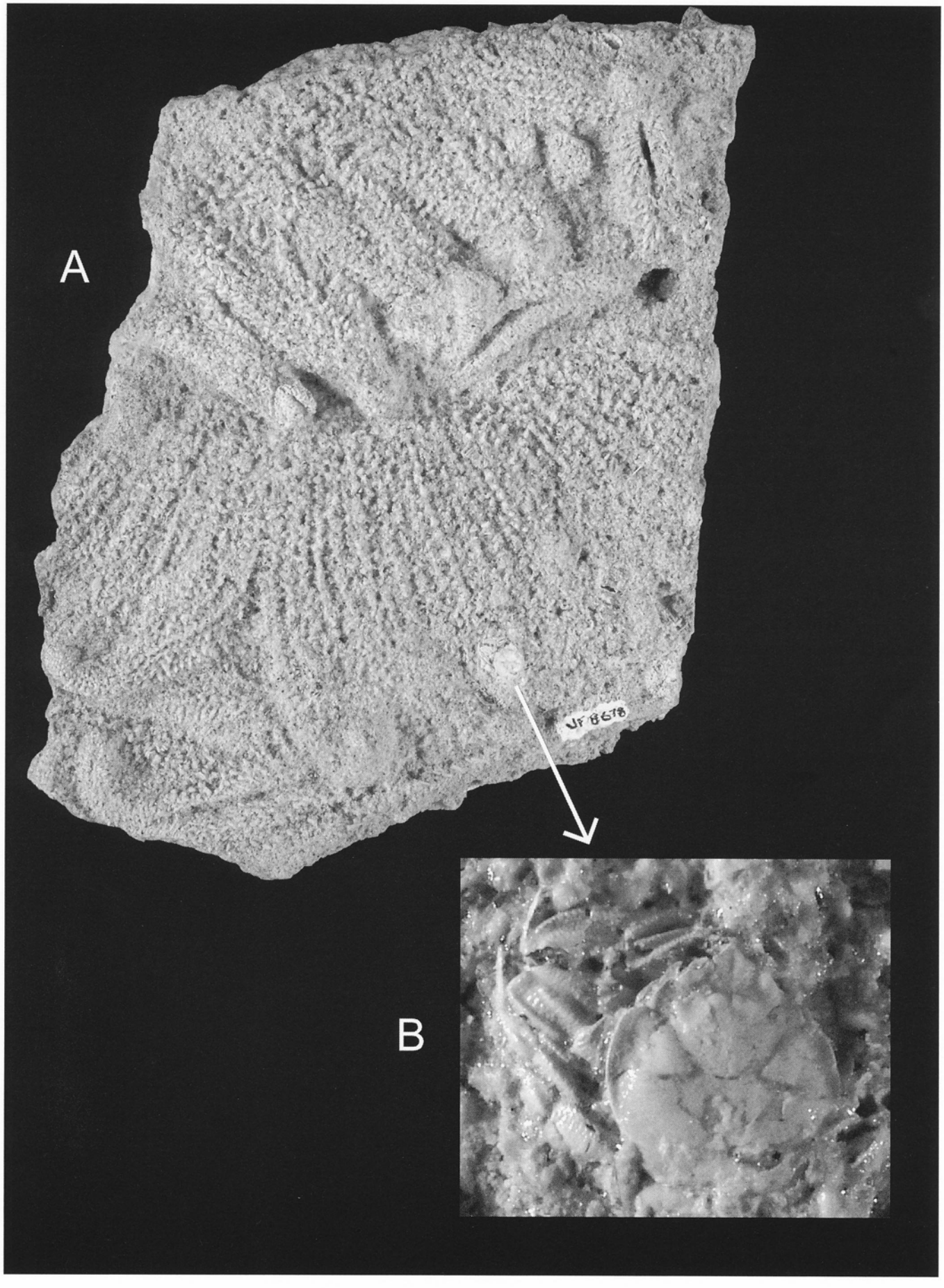
PLATE 3

Family Porcellanidae (porcelain crabs)

A) *Petrolisthes myakkensis* Bishop and Portell, 1989; UF 8678 (Holotype); dorsal carapace preserved on sandstone slab (consisting of three partial sea stars *Heliaster microbrachius* Xantus, 1860); 1x.

B) *Petrolisthes myakkensis* Bishop and Portell, 1989; UF 8678 (Holotype); enlarged dorsal view of carapace; 4x.

Note: Sean Roberts (FLMNH) assisted with digital photography on Plates 3-9.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