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COON CREEK FORMATION, UNION COUNTY, MISSISSIPPI

GALE A. BISHOP

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FOSSIL DECAPOD CRUSTACEA FROM THE LATE CRETACEOUS COON CREEK FORMATION, UNION COUNTY, MISSISSIPPI

Gale A. Bishop

A B S T R A C T

Over 1,300 fossil decapods have been collected from the Upper Cretaceous Coon Creek Formation in Union County, Mississippi. The fauna is dominated by *Dakoticanter australis* Rathbun, 1935 (raised from subspecies rank) (49%), with smaller proportions of numerous other taxa: *Protocallianassa mortoni* (Pilsbry, 1901) (26.9%); *Hoploparia tennesseensis* Rathbun, 1926 (10.1%); *Linuparus canadensis* (Whiteaves, 1885) (4.7%); *Tetracarcinus subquad-rata* Weller, 1905 (2.8%); *Notopocorystes testacea* (Rathbun, 1926) (2.7%); *Paguristes whitteni*, new species (2.8%); *Raninella tridens* Roberts, 1962 (0.8%); *Eryma flecta* Rathbun, 1926 (0.3%), and *Cristipluma mississippiensis*, new species (0.1%). *Paguristes whitteni*, new species, is represented by an enigmatic series of 30 claws. *Cristipluma mississippiensis*, new species, is based on a single specimen. Its scarcity in the shallow water Coon Creek fauna attests to the probability of *Cristipluma* already at that time inhabiting deep water (as is the case with the recent retroplumids found mostly in deep Indo-Pacific waters).

Repeated collecting of a decapod-rich locality, the Blue Springs Locality in Union County, Mississippi, has yielded a collection of approximately 1,300 fossil decapods from the Lower Maastrichtian Coon Creek Formation (Owens *et al.*, 1980; Russell *et al.*, 1982). The outcrop is an unvegetated roadcut at the exchange of new U.S. Highway 78 and Mississippi Highway 9 approximately 22 km (13.4 mi) northwest of Tupelo, Mississippi (Fig. 1) and 2.5 km (1.6 mi) southwest of the village of Blue Springs (locality GAB 37; E $\frac{1}{2}$, NW $\frac{1}{4}$, Sec. 16, T8S, R4E, Union County, Mississippi). Exposed in this roadcut is about 6 m (19.7 ft) of sandy, glauconitic, and phosphatic light olive gray (5 Y 6/1) mudstone (Fig. 2). The sequence of sediment includes an interval of phosphatic nodules (at 4 m in the measured section) which marks a break in sedimentation and an interval of erosion (leaving the phosphate pebble lag). Some of these phosphate pebbles are bored and others are the site of attachment for epizoans (e.g., *Exogyra*, described by Bishop, 1981b). Fossil decapods are preserved both as phosphatic nodules and as nonphosphatized remains.

Stratigraphically, this outcrop lies approximately 30.5–36.6 m (100–120 ft) above the top of the Demopolis Formation (as determined by a three-point problem on electric logs of nearby water wells) (Fig. 2). Fossils collected at the Blue Springs Locality include *Exogyra costata* Say, an index fossil to sediments of Early and Middle Maastrichtian Age (Russell *et al.*, 1982, p. 16). These fossiliferous mudstones are interpreted to be time transgressive shelf sediments deposited by the prograding shorelines of the Mississippi Embayment. They overlie the deeper water chalks of the Demopolis Formation and are overlain by the deltaic and fluvial sands of the McNairy Formation (Russell, 1965).

In addition to a diverse, but poorly preserved molluscan fauna and a microfossil assemblage, the locality has yielded one of the most abundant and diverse decapod faunas (Fig. 3) known to this author. The decapod faunas as now known consists of ten species of described taxa and several unassigned claws (Table 1). Among the collected material is a suite of 30 claw and leg fragments of a previously undescribed hermit crab. As with most fossil crabs, the more heavily mineralized tissues, claws in this case, are preferentially preserved while other body parts remain unfossilized. The abundant claw material representing this hermit crab nearly allows the complete description of its claws.

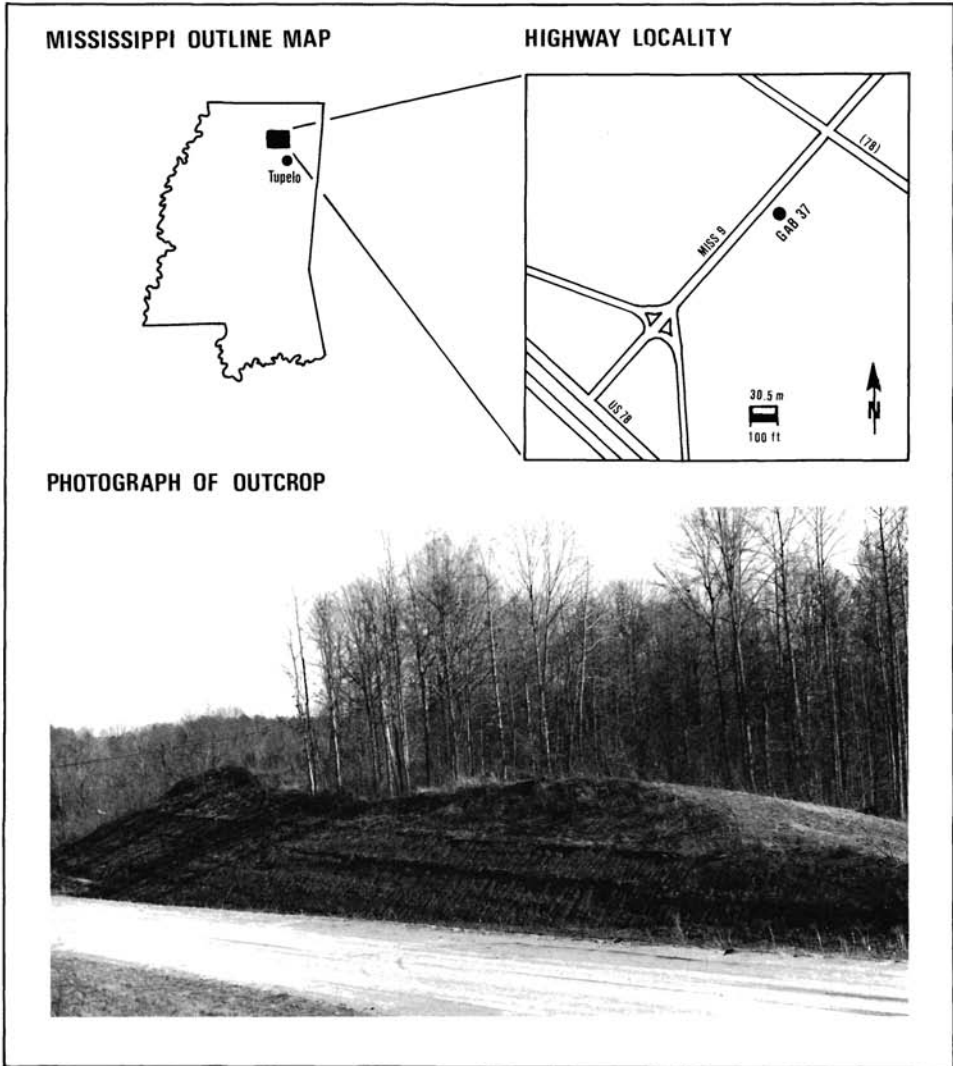


Fig. 1. Map showing location in Mississippi of the Blue Springs Locality relative to U.S. Highway 78 and Mississippi 9, and a photograph of the roadcut exposure of the Coon Creek Formation.

One partial carapace of a new crab, *Cristipluma mississippiensis*, attests to this taxon's presence and rarity in the Coon Creek sediments.

Dakoticancer australis comprises 49% of the decapods from Blue Springs and dominates the decapod fauna by its abundance.

SYSTEMATIC PALEONTOLOGY
 Family PAGURIDAE Latreille, 1802
 Subfamily DIOGENINAE Ortmann, 1892
 Genus *PAGURISTES* Dana, 1851

Type-species.—“*P. hirtus* by subsequent designation by Stimpson, 1858 (=Pagurites Lörenthey, 1929, erroneous spelling).” (Glaessner, 1969).

Table 1. Tabulation of fossil decapod crustaceans collected at the Upper Cretaceous Blue Springs Locality. This table also acts as a description for Fig. 3 giving figure letters, magnifications, specimen numbers, and references to subsequent figures in this paper. The numerical data do not include more than 200 unidentifiable fragments.

Taxon	Fig. 3	Magnification	Specimen no.	Other Figs.	No. of specimens	% Decapods
<i>Linoparus canadensis</i> (Whiteaves, 1885)	A	1.5	GAB 37-1141		51	4.7
<i>Hoploparia tennesseensis</i> Rathbun, 1926	B	0.75	GAB 37-56		109	10.1
" <i>Eryma</i> " <i>flecta</i> Rathbun, 1926*	C	2.0	GAB 37-909		3	0.3
<i>Protocallianassa mortonii</i> (Pilsbry, 1901)	D	1.0	GAB 37-162		290	26.9
<i>Paguristes whitteni</i> , new species	E	1.5	GSCM 1684	4, 5	30	2.8
	F	1.5	GSCM 1683			
<i>Dakoticancer australis</i> Rathbun, 1935**	G	1.0	GAB 37-515	5, 6, 7	528	49.0
	H	2.0	GAB 37-1094			
<i>Tetracarcinus subquadratus</i> Weller, 1905	I	2.0	GAB 37-1113		28	2.6
	J	2.0	GAB 37-882			
<i>Cristipluma mississippiensis</i> , new species	K	2.0	GSCM 1685	8	1	0.1
<i>Raninella tridens</i> Roberts, 1962	L	2.0	GAB 37-833		9	0.8
<i>Notopocorystes testacea</i> (Rathbun, 1926)	M	2.0	GAB 37-844		29	2.7
Totals					1,078	100.0

* "*Eryma*" *flecta* is now thought to be a brachyuran of unknown affinities.

** The total number of specimens does not include 34 disarticulated claws.

Diagnosis.—Chelipeds similar, equal, unequal, or more commonly subequal, left usually larger. Carpal-propodal articulation oblique to strongly oblique. Propodal-dactylus articulation oblique, fingers closing horizontally.

Discussion.—Because only the claws of hermit crabs are normally preserved in the fossil record, it is necessary to attempt to understand these crabs only from their claws. Unfortunately, the systematics of this group still remain confused because of the lack of a systematic review and analysis of claw morphology. This new taxon, with its strongly oblique carpal-propodal articulation, does not fit Glaessner's (1969) diagnoses of *Pagurus*, *Anapagurus*, *Diogenes*, *Eocalcinus*, *Clibanarius*, *Dardanus*, or *Orhomalus*, and poorly fits *Paguristes*, *Petrochirus*, *Goniochirus*, and *Palaeopagurus*. Comparison of this new taxon with figures of these genera shows that *Petrochirus* is a poor match, since it is too long and the carpal-propodal articulation is nearly vertical; *Palaeopagurus* is somewhat similar but has a vertical to backwardly inclined carpal-propodal articulation; *Paguristes* is somewhat similar as is the poorly known *Goniochirus*. The best assignment possible at this time is to *Paguristes*.

Forest (1982, personal communication) points out that the assignment of fossil claws such as those I call *Paguristes whitteni*, new species, to the extant genus *Paguristes* is questionable. Recent *Paguristes* have nearly smooth claws and fingers that open along a horizontal plane. He calls attention to the similarity of *P. whitteni* to *P. johnsoni* Rathbun (Eocene of Alabama) and suggests that these forms ought not to be assigned to *Paguristes*, and perhaps may not even be hermit crabs.

Forest points out that if this is a hermit crab, the major claws must necessarily be on one side; the left claws shown (Figs. 3E, 4I) would represent major claws of females exhibiting sexual dimorphism. A suggestion of Forest that these claws might represent a third species of *Dakoticancer* does not seem probable because of the lack of preserved carapace material of a third species (while carapaces of *Dakoticancer overanus* and *D. australis* are readily preserved).

Stenzel (1945) commented on the poor record of pagurids in the Cretaceous. I believe this paucity needs to be re-emphasized, as the good Jurassic record and

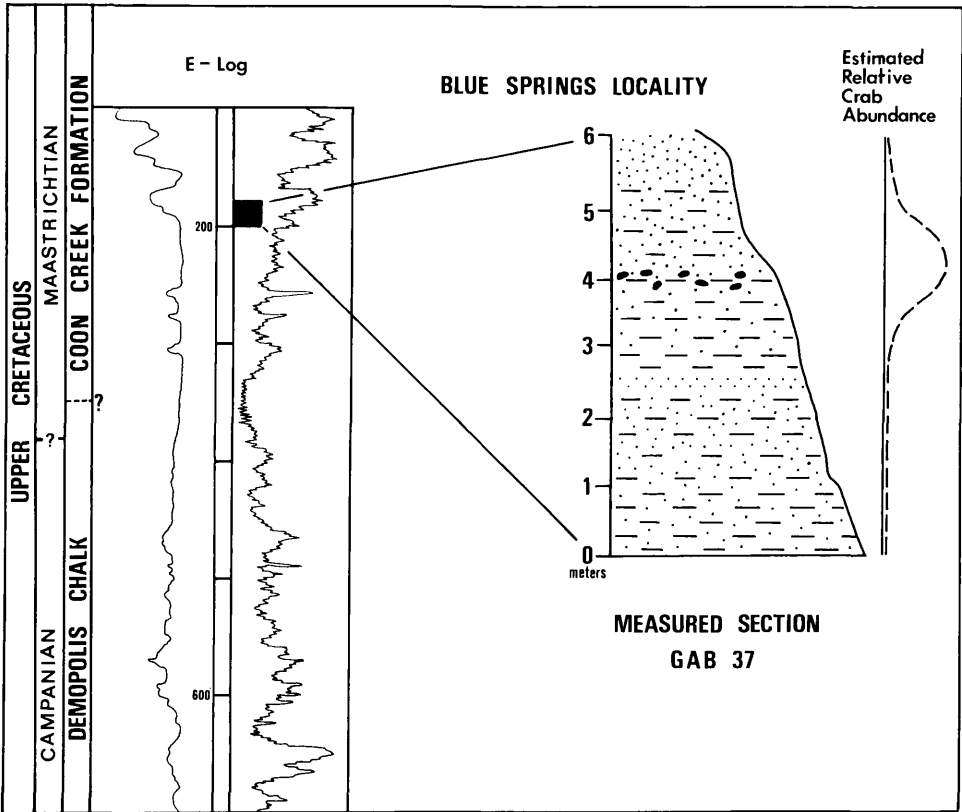


Fig. 2. Blue Springs Locality showing stratigraphic position relative to a nearby well electric log (Sec. 12, T.7 S., R.3 E.) and a generalized measured section of the exposed Coon Creek at the roadcut. (Phosphatic nodules shown by heavy, irregular, black symbol, clay by dashes, and sand by stippling.)

the abundance of hermit crabs in the Recent, coupled with their heavily mineralized claws, must mean a preservational bias is operating which obscures the record. This bias might well be related to the high energy of the environments in which hermit crabs often live.

Paguristes whitteni, new species

Figs. 3E-F, 4A-I, 5

Etymology.—Named in honor of N. C. Whitten, who collected and donated to the United States National Museum the types of *Dakoticancer overanus australis* Rathbun, 1935, from his farm approximately two miles west of the Blue Springs Locality.

Types.—The holotype of *Paguristes whitteni* is a nearly complete left major propodus (Figs. 3F, 4A-D) and the paratype is a left major (female?) claw (Figs. 3E, 4I). Both are from the Blue Springs Locality and are deposited in the collections of the GSC Museum, Georgia Southern College, Statesboro, Georgia 30460, as specimens GSCM 1683 and GSCM 1684, respectively.

Preservation and Sample Size.—The specimens representing this taxon are all claw elements, mostly propodus elements, but with carpus and merus elements.

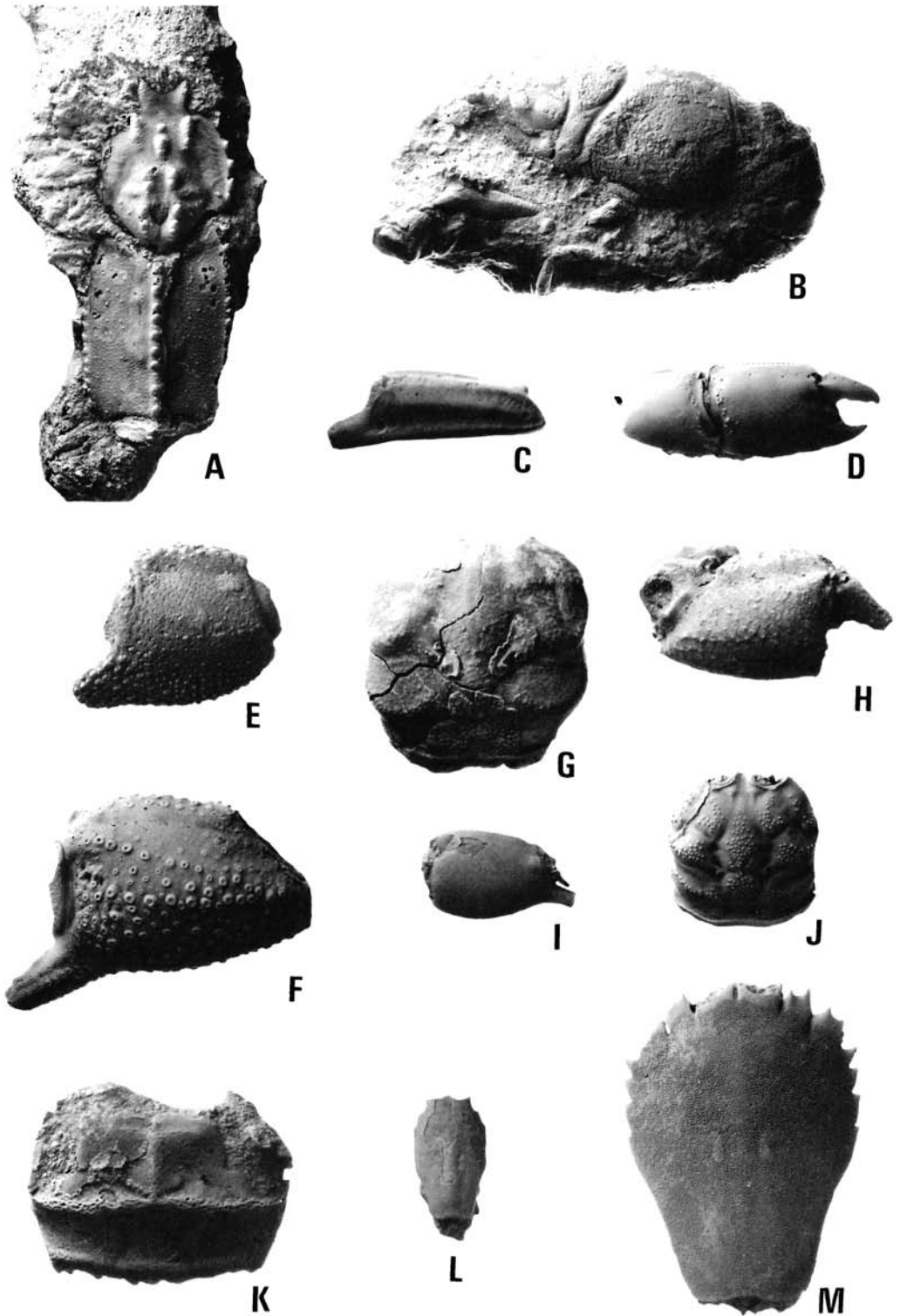


Fig. 3. Decapod assemblage collected at the Blue Springs Locality. See Table 1 for identifications.

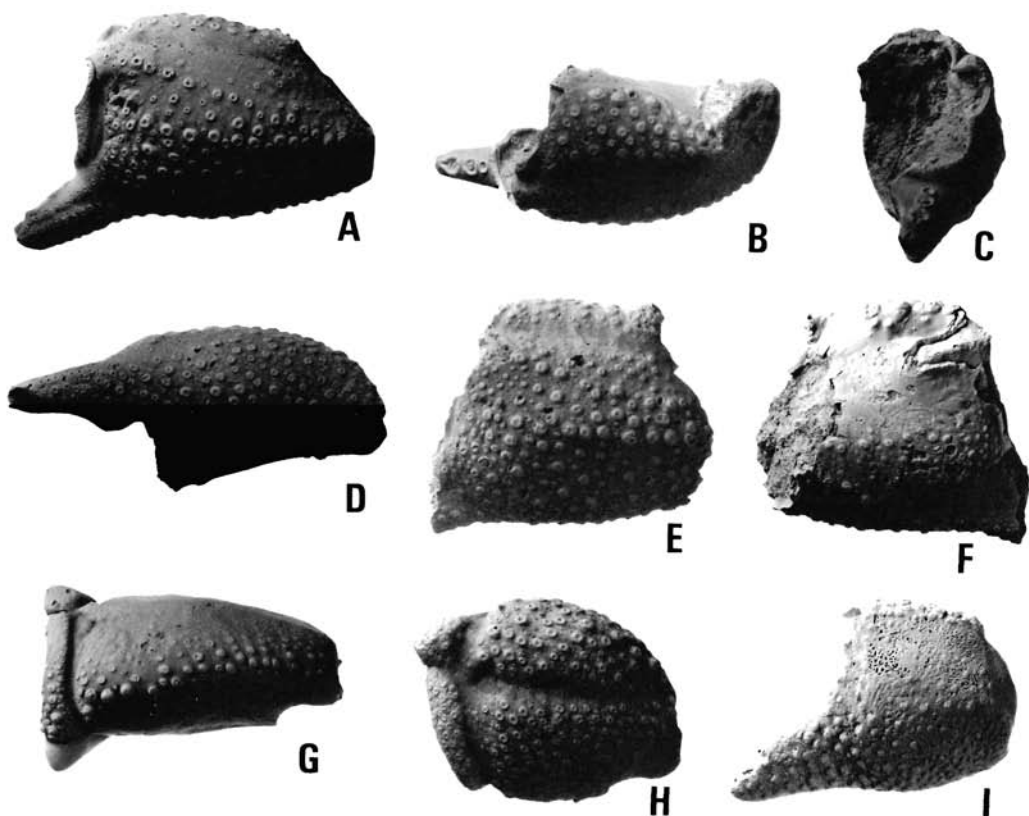


Fig. 4. *Paguristes whitteni*, new species. A–D, holotype left major claw, GSCM 1683; E–F, left major claw (GAB 37-857); G, merus (GAB 37-861); H, carpus (GAB 37-863); and I, paratype, left major female? claw (GSCM 1684). All figures $\times 1.5$.

This preservational bias is consistent with the pagurids because of the heavy mineralization of the claws, which protect the hermit crab both as offensive weapons and as a passive “operculum” when the crab withdraws into a shell for protection.

Description.—Merus triangular in cross section: 1.2 times longer than carpus, 1.8 times longer than wide with broad distal articulators separated from rest of well-developed distal ridge. Inner surface in plane of carpal articulators somewhat convex, tuberculate over entire surface; tubercles largest on upper angle. Upper face of merus more convex, coarsely tuberculate on angles with tubercles decreasing in size away from edges. Lower surface smooth to slightly undulatory except for tuberculate angles.

Carpus 1.4 times longer than wide, very convex above, concave below; bordered at both ends by articulating ridges; deep furrow running from upper meral articulator to midway between propodal articulators. Outer surface densely tuberculate; inner surface smooth on concave portion, tuberculate on convex portion. Claws subequal, left usually larger, heterochelous. Major propodus ~ 1.5 times as long as high, upper and lower margins convex, carpal articulation strongly oblique, propodal articulation nearly vertical. Merus 1.4 times as long as high; fixed finger

short and turned downward. Outer face strongly convex with shallow trough running from just below upper carpal articulator to outer dactyl articulator; surface tuberculate. Tubercles largest and densest on lower part, randomly located except for those arranged in 3 poorly defined rows below shallow trough, then in dense random pattern below onto lower surface and lower part of inner surface. Shallow trough mostly smooth, giving way above to crested upper surface overhanging inner face to degree, especially distally. Below tuberculate crest inner face mostly smooth and flared into convexity by ridge running from middle of proximal edge upward to inner dactyl articulator. Articulating ridge present on inner and outer distal (propodal) edges. Fixed finger short, downturned, slightly grooved, and finely tuberculate with 3 teeth increasing in size distally. Only stub of dactylus preserved, but apparently stout and presumably short.

Minor claw relatively higher than major, outer face more uniformly convex and tuberculate with only shallow depression paralleling upper edge, forming straight ridge surmounted by coarser tubercles. Inner surface dominated by oblique ridge running from midpoint of proximal margin to dactylus articulator. Claw concave above this ridge and convex below it except for depression at base of finger. Tubercles becoming coarser on lower part of outer face. Lower margin sharp, almost keellike as upper margin.

Comparison.—*Paguristes whitteni* is larger than *P. ouachitensis* Rathbun, 1935, is tuberculate instead of scaly, and has a much more oblique carpal articulation. The shape and ornamentation easily differentiate this taxon from other fossil pagurids. *Pagurus banderensis* Rathbun, 1935, is relatively narrower, has a thicker, straighter fixed finger, a reversed carpal articulation, and is more finely tuberculate. *Pagurus travisensis* is thinner, has a reversed carpal articulation, is much smoother, and has a much more spinose crest. *Paguristes johnsoni* Rathbun, 1935, from the Paleocene Porter's Creek Formation of Alabama, is smaller, has a much more oblique dactyl articulator, a less oblique carpal articulator, and a much better developed crest than *P. whitteni*.

Remarks.—When collections were made at the Blue Springs Locality, it was rapidly recognized that these large claws formed a sample of an undescribed taxon. Their morphology at first suggested a homolid crab, but the complete lack of homolid carapaces at Blue Springs (and in the entire Gulf Coast Cretaceous) seemed to mitigate against that identity. The claws also seemed close to those usually assigned to hermit crabs, but, as noted above, were not quite conformable with those concepts. They also seemed to resemble claws of *Dakoticancer australis*; a similarity so striking that I concluded that the large "hermit crab claws" might be nothing more than claws of large specimens of *D. australis*. A search for *D. australis* carapaces with claws attached yielded only four specimens (out of 528), all amongst the largest of the carapaces. The length and height of claws of *D. overanus*, *D. australis*, and this new taxon were plotted (Fig. 5) on a graph along with a regression line based on each data set. The claws of *D. overanus* are clearly distinguishable from the other claws. The claws of *D. australis* and *Paguristes whitteni*, new species, are clearly distinguishable, although they form an enigmatic picture. The two plots have parallel regression lines but different intercepts. The questions were asked 1) are these claws of two distinct species showing convergence, or 2) are these all claws of one species (*D. australis*) with preferential preservation of very large claws (or allometric growth of claws exceeding the rate of carapace size increases)? Although I cannot prove either hypothesis at this time I feel the separation of the data points and their regression lines even at small

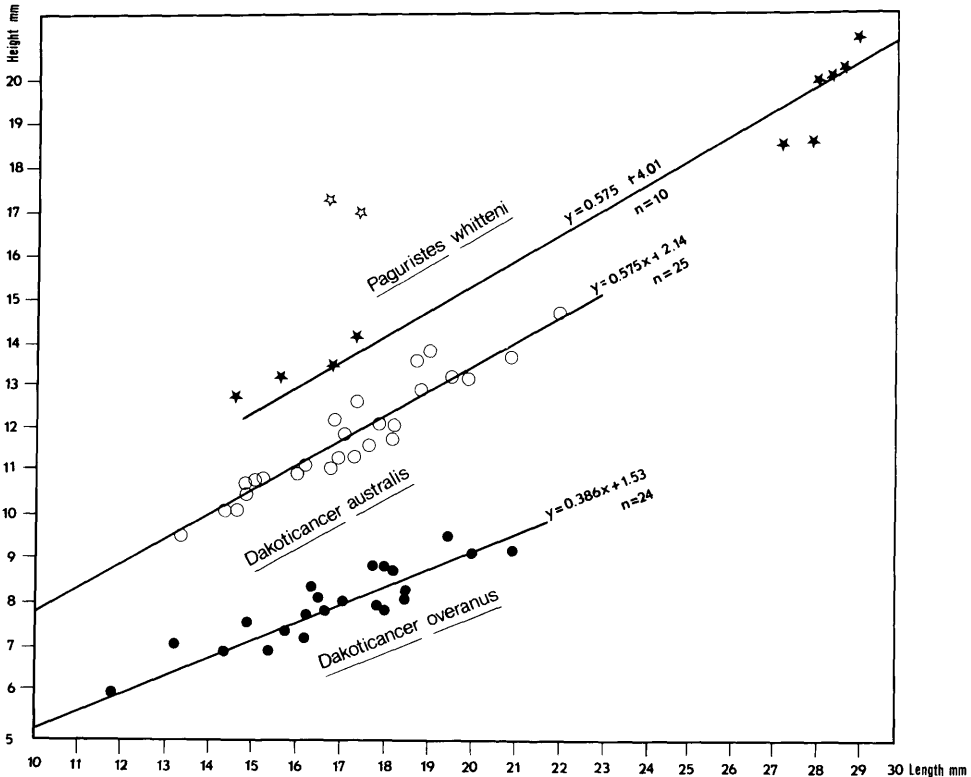


Fig. 5. Graph of height against length with regression lines for the claws of *Dakoticancer overanus* (dots), *D. australis* (circles), and *Paguristes whitteni* (open stars for minor claws, closed stars for major claws).

sizes, the existence of different morphologies even at small sizes, the presence of two minor claws of a pagurid morphology, and the lack of allometry in *D. overanus* all seem to indicate that these claws are from different species. The fact that none of the claws attached to large *D. australis* carapaces fall into the *P. whitteni* group lends additional weight to support this hypothesis. The proof will have to await the finding of carapace material with *P. whitteni* claws (which is unlikely if it is a pagurid and likely if it is a *D. australis*).

Superfamily DAKOTICANCROIDEA Rathbun, 1917

Family DAKOTICANCRIDAE Rathbun, 1917

Genus DAKOTICANCER Rathbun, 1917

Type-species.—*Dakoticancer overanus* by original designation (Rathbun, 1917).

Diagnosis.—Carapace rectangular to transversely ovoid, wider than long, front narrow, orbits well developed, bilobed, median part of cardiac groove weak, gastric regions hardly separated from cardiac-intestinal region, branchiocardiac groove well developed, pleural sutures on carapace sides, genital openings on coxae, female on third leg and male on fifth, fifth legs much reduced. Chelae equal.

Discussion.—Rathbun (1935, p. 40) erected a subspecies, *Dakoticancer overanus australis*, based on a collection of "six large specimens" collected in 1925 by N.

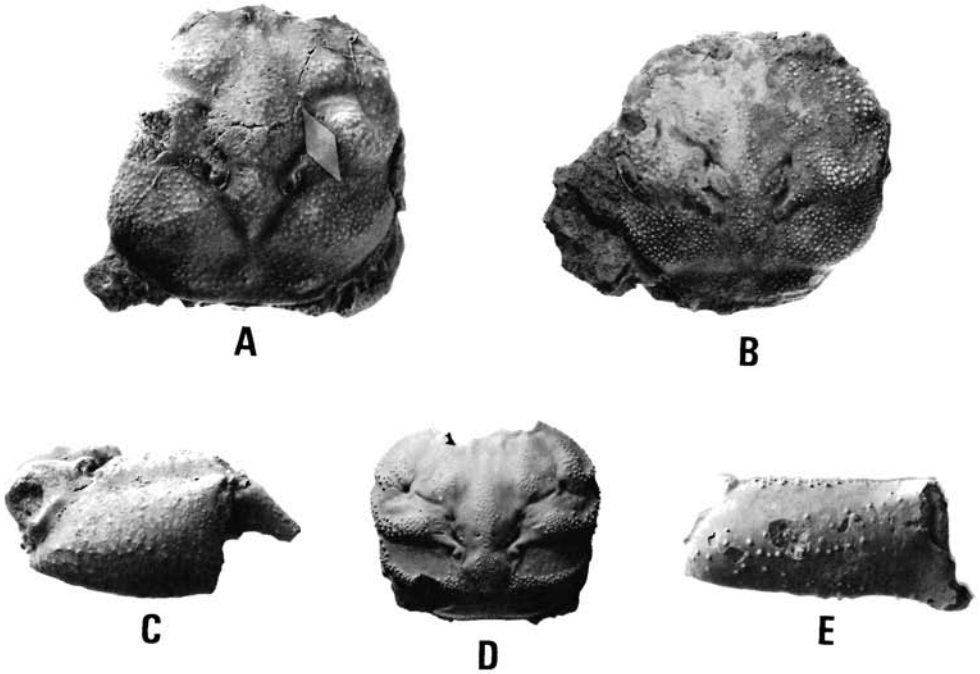


Fig. 6. Comparison of *Dakoticancer australis* from the Coon Creek in Mississippi (A–C) and *D. overanus* (D, E). A, dorsal view of holotype carapace, $\times 1.5$, USNM no. 73840; B, dorsal view of carapace exhibiting posterior shelf and degree of ornamentation, $\times 1.0$, USNM (U.S. Geological Survey) no. 18628; C, right claw, $\times 2.0$, GAB 37-1094; D, carapace of *D. overanus* in dorsal view showing restricted tuberculation, posteriorly converging lateral margins, shorter scapular arch, and somewhat different (but similar aereolation), $\times 1.5$, USNM no. 173529 (=GAB 4-2006), Mobridge, South Dakota; E, right propodus of *D. overanus*, $\times 2.0$, GAB 4-2196.

C. Whitten on his farm in the SW corner of the SW $\frac{1}{4}$, Sec. 21, T8S, R4E, Union County. Rathbun differentiated *D. overanus australis* from *D. overanus overanus* Rathbun, 1917, because of its more complete carapace granulation, its relative narrowness, and probably because of its much greater size. In addition to these differences *D. overanus australis* is subquadrate (i.e., has more parallel sides), has a better developed posterior shelflike intestinal and metabranchial regions, and has a shorter, more oblique claw very different from the long claws (Fig. 5) of *D. overanus overanus*. These differences, and especially their consistency of occurrence, warrant raising Rathbun's subspecies to species-level rank (Fig. 6).

As a test of these differences, lengths and widths of carapaces were measured on suites of crabs from the *Dakoticancer* Assemblages of South Dakota (*Dakoticancer overanus sensu stricto*) (Bishop, 1981a) and 86 from Blue Springs, Mississippi (*Dakoticancer australis*). These measurements were plotted as length-width diagrams (Fig. 7) and regression lines for each collection calculated. Each population sample plots as a relatively discrete linear cloud with very similar slopes on their regression lines but different intercepts (thus offsetting the nearly parallel regression lines). The diagram also documents the consistent size difference of these two taxa.

The differences in carapace size, outline, and sculpture along with the major differences in claw morphology indicate that the distinction between *Dakoticancer overanus* and *D. australis* is of species-level value.

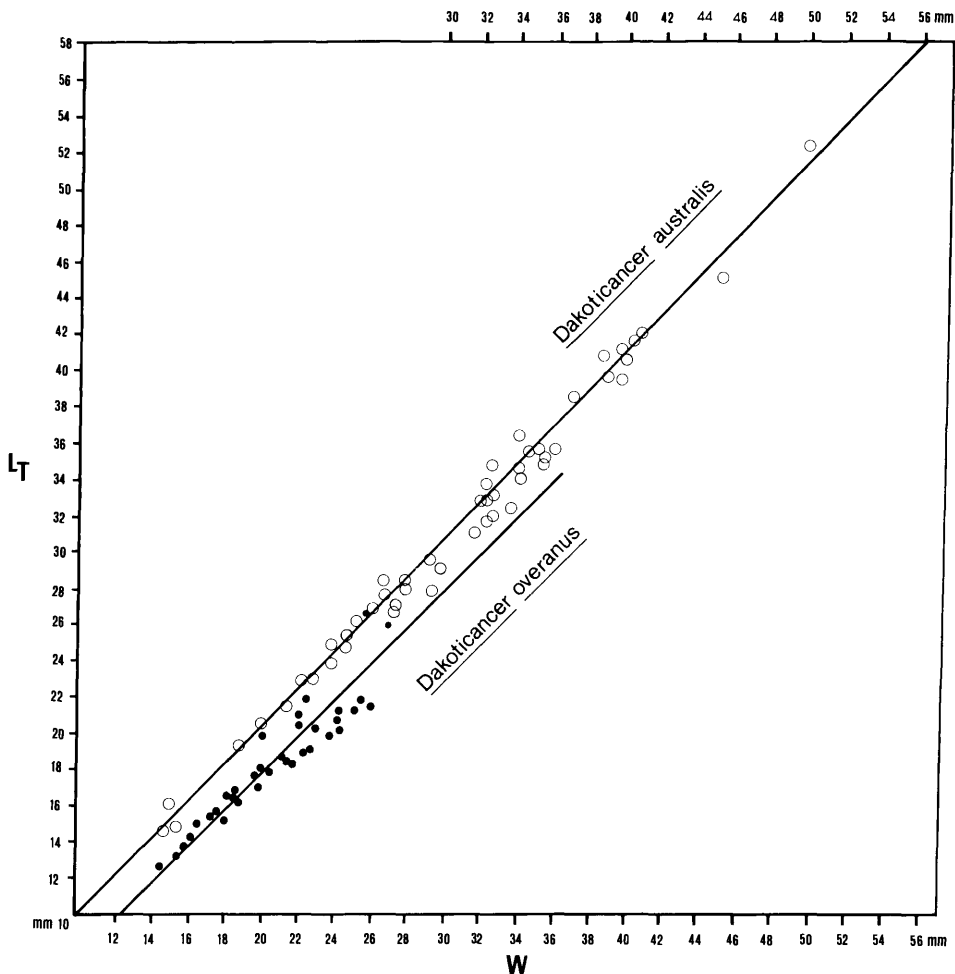


Fig. 7. Graph of length against width of carapaces and regression lines for *Dakoticancer overanus* (dots) and *Dakoticancer australis* (circles).

Dakoticancer australis Rathbun, 1935

Figs. 3G–H, 5, 6A–C, 7

- 1926 *Dakoticancer overana* Rathbun—Rathbun in Wade, U.S.G.S. Prof. Paper 137, p. 189, pl. 67, fig. 3.
 1929 *Dakoticancer overanus* Rathbun—Glaessner, Fossilium Catalogus, Pt. 41, Crustacea, Decapoda, p. 134.
 1935 *Dakoticancer overana australis* Rathbun—Rathbun, Geol. Soc. Am. Spec. Paper 2, pp. 40–41, pl. 10, fig. 20.
 1969 *Dakoticancer overanus australis* Rathbun—Glaessner in R. C. Moore (ed.), Treatise Invert. Paleo. (R, 2), Decapoda, p. R491, fig. 303, 2b. (Cop. Rathbun, 1935, pl. 10, fig. 20).

Diagnosis.—Carapace large, slightly longer than wide, widest across branchial and hepatic regions (sides nearly parallel), well differentiated by grooves, ornamented by granules over entire surface. Claws similar, equal, short, stout, and crested; carpal articulation very oblique; fingers short, downturned.

Remarks.—The use of Richter's open nomenclature in the synonymy (Matthews, 1973) draws together the cited specimens now referable to *Dakoticancer australis* Rathbun, 1935. The International Code of Zoological Nomenclature, adopted by the XV International Congress of Zoology, considers the categories in the species-group as coordinate (Art. 46) and that they fall under the same rules. Rathbun described and figured *D. australis* and designated USNM no. 73840 as a type. The carapace figured in Rathbun (1935, pl. 10, fig. 20) and Glaessner (1969, fig. 303, 2b) was marked and designated as the holotype.

Section BRACHYRHYNCHA Borradaile, 1907
 Superfamily OCYPODOIDEA Rafinesque, 1815
 Family RETROPLUMIDAE Gill, 1894
 Genus *Cristipluma*, new genus

Type-species.—*Cristipluma mississippiensis*, new species.

Diagnosis.—Carapace oval, wider than long, gently arched and poorly differentiated by grooves. Two prominent, continuous transverse ridges crossing carapace; one at midpoint just behind urogastric region, forming widest part of carapace, other behind subtle, crescentic, branchiocardiac grooves.

Etymology.—*Cristipluma* from the transverse crests (*crista*, Latin, crest) and the familial root *pluma*. Gender feminine.

Generic Discussion.—The retroplumids are discussed by Collins and Morris (1975, pp. 826–828) and Glaessner (1960, p. 47). The family consists of *Retropluma* Gill, 1894, with six species [*R. eocenica* Vía Boada, 1959 (Eocene of Spain); *R. craverii* (Crema, 1895), from the Pliocene of Italy; and four extant Indo-Pacific species: *R. notopus* Alcock and Anderson, 1894; *R. chuni* Doflein, 1904; *R. plumosa* Tesch, 1917; and *R. denticulata* Rathbun, 1932]. Collins and Morris (1975) described *Costacopluma concava* from the Coniacian, Campanian, and Maastrichtian of Nigeria and reassigned *Archaeopus senegalensis* Remy (1960, p. 316) from the Paleocene of Senegal to *Costacopluma*, citing it as a probable descendant of *C. concava*.

Beurlen (1930, p. 352), Vía Boada (1969, p. 339), and Collins and Morris (1975, p. 823) considered *Archaeopus* Rathbun, 1908, to belong in, or to be closely allied to, the Retroplumidae, a conclusion which seems justified on the basis of the transversely ridged carapace of *Archaeopus*. Vía Boada (1969) also included *Ophthalmoplax* in the Retroplumidae, a conclusion based on scant similarity and which must await further substantiation.

The family Retroplumidae thus consists of *Retropluma*, *Costacopluma*, *Cristipluma*, and *Archaeopus*. *Archaeopus* is characterized by having 3 discontinuous transverse ridges, a disarticulate margin, and a continuous cervical groove. *Costacopluma* is characterized by having 3 nearly continuous curved transverse ridges (with the middle ridge obliquely oriented forward and outward), a cervical furrow which weakens distally, and raised carapace margins. *Retropluma* is characterized by having 3 nearly continuous transverse ridges, the anterior and posterior being straighter and the posterior being more complete. *Cristipluma* has 2 transverse ridges, both nearly complete, the anterior ridge having the position of the posteriormost ridge in the other retroplumids and the posterior ridge being placed near the hind margin of the carapace. The similarity of *Retropluma*, *Archaeopus*, and *Costacopluma* in number and placement of transverse ridges unites them more closely than any of them with *Cristipluma*.

If *Ophthalmoplax* is removed from the Retroplumidae, the evolutionary de-

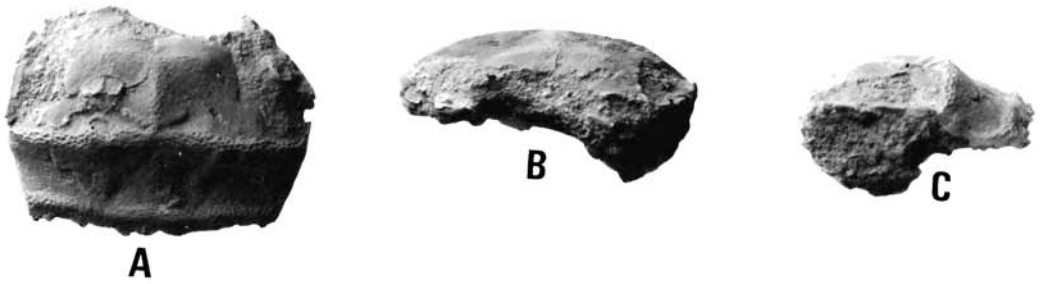


Fig. 8. *Crisipluma mississippiensis*, new species in (A) dorsal, (B) anterior, and (C) left lateral views, $\times 2.0$, GSCM 1685.

velopment of the family becomes obscure, since *Archaeopus* (from the Campanian–Maastrichtian of the Pacific Slope), *Crisipluma* (from the Upper Campanian of the Mississippi Embayment), *Costacopluma* (from the Coniacian–Paleogene of West Africa), and *Retropluma* (from the Eocene to Holocene in Spain, Italy, and the Indo-Pacific) do not clearly fall into a pattern of development that makes a significant amount of sense. *Archaeopus*, least highly specialized in its carapace ornamentation, can be considered closest to the ancestral morphology. *Costacopluma* and *Retropluma* seem to be closely related lineages which developed in two geographic centers. *Crisipluma* is a more distantly related lineage with a more highly modified carapace ornamentation. As the fossil record of this family becomes more complete, I predict the ancestral morphotype will not differ significantly from that of *Archaeopus*.

Crisipluma mississippiensis, new species

Figs. 3K, 8A–C

Etymology.—Named after the state of Mississippi, source of the only specimen of this taxon and so many fine fossil crabs.

Holotype.—The holotype (GSCM 1685) of *Crisipluma mississippiensis* (originally GAB 37-1114) is deposited in the collection of the GSC Museum, Georgia Southern College, Statesboro, Georgia 30460-8061.

Occurrence, Sample Size, and Preservation.—The single specimen of this taxon is a phosphatized carapace fragment missing most of the anterior and all of the posterior margins. It is from the Coon Creek Formation, at the Blue Springs Locality, and represents 0.1% of the 1,078 decapods collected there.

Diagnosis.—Carapace ovoid, wider than long, gently arched and poorly differentiated by grooves. Two prominent, continuous transverse ridges crossing carapace; one at midpoint just behind urogastric region, forming widest part of carapace, other behind subtle, crescentic branchiocardiac grooves.

Description.—Carapace oval, wider than long, moderately convex transversely and longitudinally, poorly differentiated by grooves, but with 2 prominent transverse, granulate ridges. Orbits occupying most of front. Anterolateral margin straight, turned upward into sharp edge, deflexed below. Lateral margins convex, carapace widest at midpoint (just ahead of anterior ridge). Posterolateral margins straight, convergent posteriorly. Posterior wide, hind margin raised. Anterior transverse ridge lying just behind mesogastric region, running nearly straight across

carapace. Posterior transverse ridge lying just behind shallow indistinct, crescentic, branchiocardiac furrows (which lie completely between transverse ridges). Cephalic arch ornamented only by shallow furrow around posterior of mesogastric region. Carapace convex to level ahead of anterior ridge, sloping downward and backward, and concave between ridges.

Comparison.—*Cristipluma mississippiensis* has a carapace much less differentiated than *R. eocenica* Vía Boada, 1969. The anterior transverse ridge of *C. mississippiensis* is complete, whereas that of *R. eocenica* is less distinct, placed farther forward on the carapace.

CONCLUSIONS

The description of *Paguristes whitteni* adds to our sparse knowledge of the North American Cretaceous hermit crabs. Because of the lack of fossilized carapace material of these crabs, I suspect that there are many specimens of numerous taxa lying undescribed (awaiting the unlikely discovery of their carapaces) in collections of Cretaceous fossils in North America.

The elevation of *Dakoticancer australis* to species-level rank recognizes its morphologic separation from *D. overanus*, while maintaining the phylogenetic closeness of the two lineages of *Dakoticancer* descent. More systematically distant is *Tetracarcinus subquadrata* Weller, 1905, which co-existed with *D. australis* in the Mississippi Embayment and with *D. overanus* in the Western Interior (based on only one specimen from Wyoming, perhaps chance distribution). The systematic position of *Avitelmessus grapsoides* Rathbun, 1923, the only other taxon assigned to the Dakoticancroidea, seems even more remote from *Dakoticancer* than *Tetracarcinus* and remains to be demonstrated.

The presence of a retroplumid in the Coon Creek Formation was unexpected. Not only does this record significantly extend the geographic and stratigraphic range, but it is also paleoecologically anomalous, being a deep-water crab preserved in shallow-water sediments. This Late Cretaceous record places *Cristipluma* in close stratigraphic and geographic proximity to *Archaeopus*, a taxon considered to be near the base of the ocypodoidid adaptive radiation (Vía Boada, 1980; Glaessner, 1980).

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Address: Department of Geology and Geography, Georgia Southern College, Statesboro, Georgia 30460.