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FOSSIL CRABS (CRUSTACEA, DECAPODA) FROM THE MAASTRICHTIAN DIFUNTA GROUP, NORTHEASTERN MEXICO

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ABSTRACT

Two species of fossil crabs have been collected from Maastrichtian deltaic deposits referred to the Potrerillos Formation of northeastern Mexico. *Mascaranada difuntaensis* is a new genus and species of carcineretid natatory crab. Morphological and paleoecological analysis suggest that the Carcineretidae is a heterogeneous group of reptant and natatory crabs whose taxonomy must be reconsidered. The fifth pereiopods of the natatory group are modified as in portunids, a family which may have descended from the carcineretids. The reptant forms may be more closely related to the Xanthidae. The youngest and southernmost occurrence of *Dakoticancer australis* Rathbun is recorded from two localities in the lower siltstone member of the formation. Twenty-four carapaces were found in two penecontemporaneous but paleoenvironmentally different localities. Most of the carapace remains are molts which, at one locality, were found associated with burrows, suggesting that this crab molted in burrows for protection. Some specimens are larger than previously reported for this species. Although this species is abundant in Mississippi Embayment *D. australis* Assemblages, it is an uncommon taxon in molluscan fossil assemblages at these Mexican localities. Biostratigraphic and paleobiogeographic ranges of *D. australis* are extended; the lower siltstone member or the Potrerillos Formation (Difunta Group) seems to be among the youngest Cretaceous crustacean-bearing units in North America.

INTRODUCTION

The Difunta Group is a terrigenous sequence of rocks comprising strata that range in age from Campanian to lower Eocene deposited in the Parras and La Popa basins in northeastern Mexico (Fig. 1) (Vega, 1987). The paleoenvironments interpreted for the Difunta units suggest the existence of two deltaic systems, whose progradation and local subsidence generated a cyclic lithologic sequence of chiefly siltstones, mudstones, and sandstones deposited in prodeltaic, delta front and marginal deltaic facies. Decapod crustaceans have been collected from several localities within the unit. It is the purpose of this paper to describe a new genus and species of carcineretid crab and to note the youngest and southernmost occurrence of *Dakoticancer australis* Rathbun from the Potrerillos Formation.

Although previous geologic work on the Difunta Group mentions some species of invertebrate fossils, the first paleontological report on the group was that of Wolleben (1977). He listed 52 species, including 1 coral, 13 gastropods, 28 bivalves, 7 cephalopods, 1 annelid, and 2 echinoderms. More recently, Vega and Perrilliat-Montoya (In press *a*) described the fossil molluscs collected in the lower siltstone member of the Potrerillos Formation within La Popa basin, recognizing

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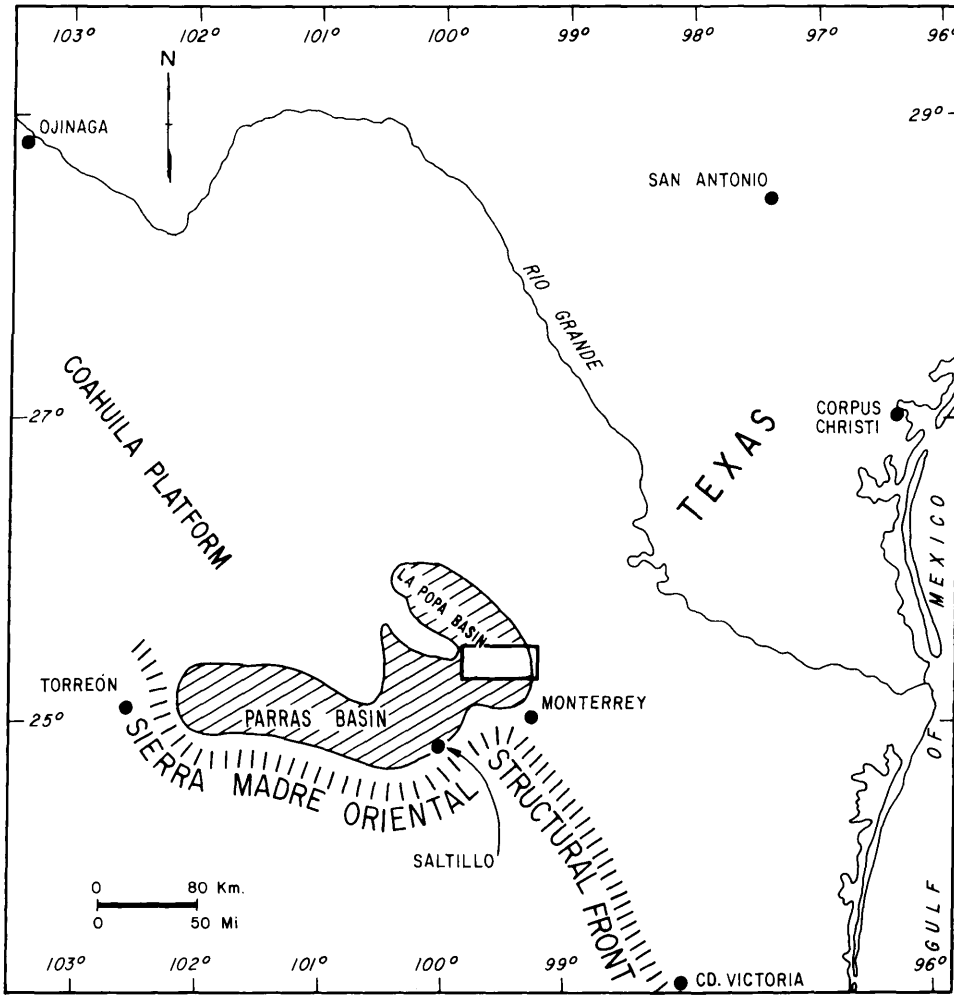


Fig. 1.—Geographic location map of Parras and La Popa basins (Difunta Group) in northeastern Mexico. Rectangle encloses area enlarged in Fig. 2.

17 species of gastropods, 20 bivalves, and five cephalopods. The fossil content of this member also includes crustacean carapaces and chelae. Vega and Perrilliat-Montoya (In press *b*) erected a new species of *Costacopluma* (Retroplumidae), a genus that had been reported previously from the Upper Cretaceous and Paleocene of western Africa (Collins and Morris, 1975).

A paleoecological analysis of the invertebrate fauna was made by Vega in an outcrop of the upper part of the lower siltstone member of the Potrerillos Formation near Las Ovejas Ranch, Municipio Mina, Nuevo Leon (Fig. 2, loc. B; IGM-1582). The lithology (mudstone and siltstone), scarcity of fauna, and lack of bioturbation, compared to the abundance and diversity of fossils in the basal coquinas, sandstones, and siltstones of the member, suggests a relatively deep-water environment in a lower delta-platform facies.

The lower siltstone member of the Potrerillos Formation contains *Exogyra*

costata Say, and *Sphenodiscus pleurisepta* (Conrad), which are index fossils for the Maastrichtian of the Atlantic and Gulf Coastal Plain provinces (McBride et al., 1974; Cooper, 1971; Russell et al., 1982). On the basis of the stratigraphic range of several gastropod and bivalve species, Vega (1988) proposed that the lower siltstone member was deposited during the last three million years of the Maastrichtian, and concluded that the Cretaceous-Tertiary transition was preserved between the third and fourth members of the Potrerillos Formation (Fig. 3).

SYSTEMATICS

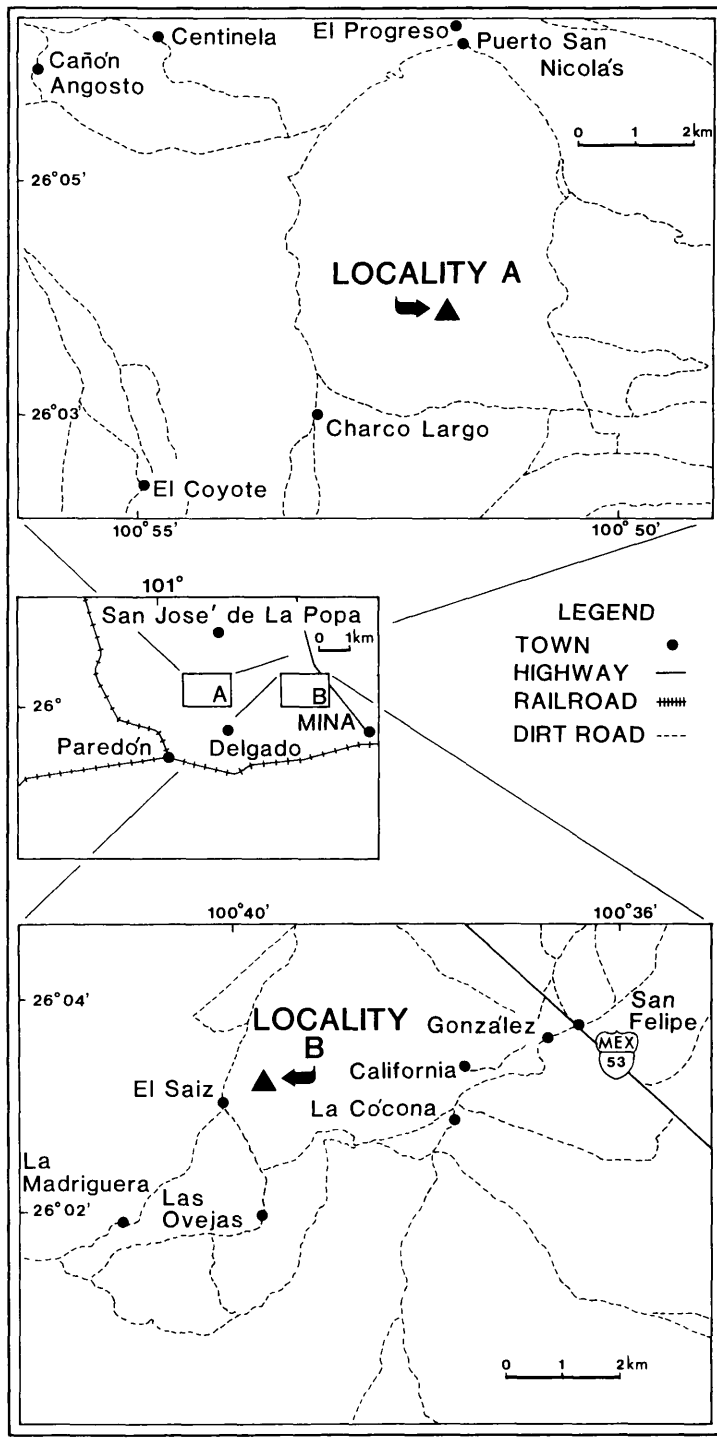
Order Decapoda Latreille, 1803
Infraorder Brachyura Latreille, 1803
Section Podotremata Guinot, 1977
Subsection Dromiacea Guinot, 1977
Superfamily Dakoticancroidea Rathbun, 1917
Family Dakoticancridae Rathbun, 1917
Genus *Dakoticancer* Rathbun, 1917

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

Dakoticancer australis Rathbun, 1935
(Fig. 4, 5)

Dakoticancer overana: Rathbun *in* Wade, 1926.
Dakoticancer overanus: Glaessner, 1929.
Dakoticancer overana australis: Rathbun, 1935.
Dakoticancer overanus australis: Glaessner *in* Moore (ed.), 1969.
Dakoticancer australis: Bishop, 1983.
Dakoticancer australis: Bishop *in* Gore and Heck (eds.), 1986.

Description.—Carapace slightly longer than wide, semirectangular to oval longitudinally. About equally wide at levels of hepatic and branchial regions, slightly narrower at midlength. Carapace strongly vaulted; one specimen (IGM-5211) presumed not to be a molt, with a length of 41.5 mm, attains a height of 27.8 mm. Rounded ridges and relatively deep grooves differentiate carapace regions. Surface ornamented by conspicuous, coarse granules that cover all regions. Dorsal surface convex. Front downturned and narrow. Fronto-orbital margin $\frac{2}{5}$ maximum width. Orbital margin defined laterally by small but conspicuous spine, with another smaller spine situated toward the rostrum at about midpoint of orbit; rostrum sulcate axially, downturned distally, laterally compressed at the base and widens downward. Anterolateral margin convex, continued posteriorly as nearly straight line. On lateral surface below hepatic and mesobranchial areas three fine ridges with granulated crests and three shallow furrows, last of which continues to abdominal region, project anteroventrally. Posterolateral margin curves abruptly to a short straight posterior margin which is nearly half of the maximum carapace width. Shallow marginal rim and furrow border posterior margin. Epigastric regions elongated posterolaterally on either side of rostral sulcus which is continuous with interior grooves defining epigastric regions. Epigastric and protogastric regions separated by posteriorly convergent grooves that disappear at frontal margin. Protogastric and mesogastric regions separated by shallow, longitudinal grooves that diverge posteriorly from rostral sulcus. Shallow grooves parallel to those between protogastric and mesogastric regions separate inflated protogastric and hepatic regions. Transverse cervical groove strongly convex an-


Centinela
El Progreso
Puerto San Nicolás
Cañón Angosto
0 1 2km
26°05'
LOCALITY A
26°03'
Charco Largo
El Coyote
100° 55'
100° 50'
101°
San Jose' de La Popa
0 1km
A
B
26°
MINA
Paredón
Delgado
LEGEND
TOWN
HIGHWAY
RAILROAD
DIRT ROAD
100°40'
100°36'
26°04'
LOCALITY B
González
San Felipe
MEX 53
California
El Saiz
La Cocona
La Madriguera
26°02'
Las Ovejas
0 1 2km

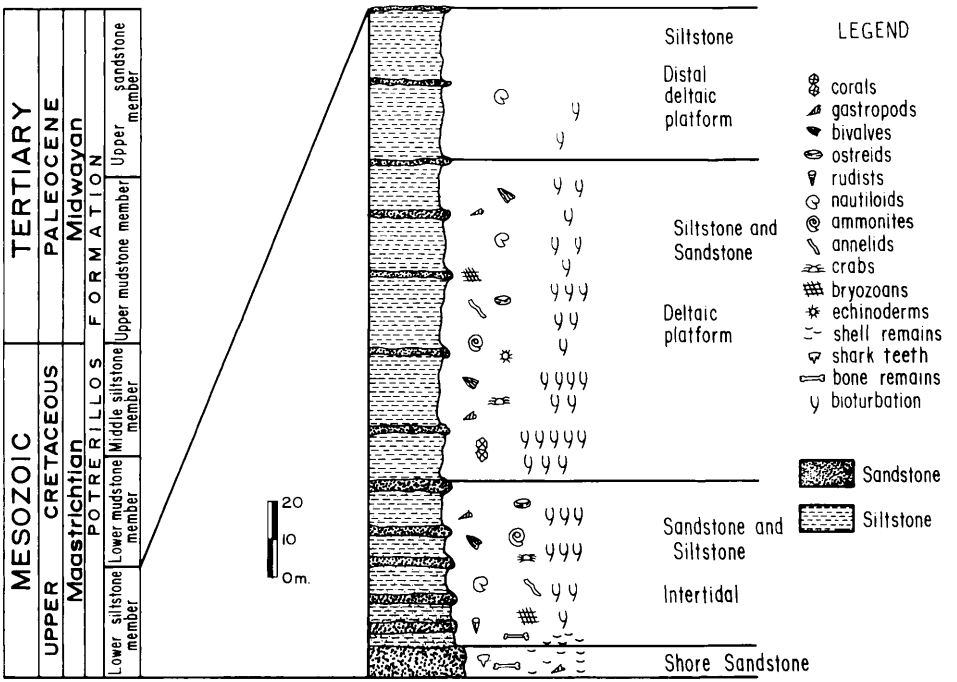


Fig. 3.—Stratigraphic section of the lower siltstone member of the Potrerillos Formation showing lithologic characteristics, faunal distribution and environmental interpretations.

teriorly, poorly defined or absent in axial region, delineates posterior margins of hepatic and protogastric regions, which are inflated posteriorly. Mesogastric and cardiac regions separated by lateral constriction of axial region and subtle sulcus. Longitudinal grooves continuous with cervical groove, interrupted by shallow pits at both sides of anterior portion of intestinal regions. A transverse groove, weakly convex anteriorly, separates mesobranchial and metabranchial regions but does not cross axial regions. Mesobranchial region strongly inflated, highest portion of carapace, as reniform ridge extending posterolaterally and decreasing in height toward lateral margin. Small, but prominent, boss projects axially at posteromesial corner. Metabranchial not as high as mesobranchial but with a central ridge that extends to the lateral margin, where it abruptly ends. Cardiac region slightly more elevated than metabranchial, and continuous posteriorly to lower and narrower intestinal region which is a shallow, inverted triangle terminating at level of metabranchial ridge. Pronounced slope extends to posterior margin. Sternal plastron well defined; triangular in shape, with granulated acute ridge near base of coxa of second pereiopod. Fourth to eighth thoracic sternites with transverse depressions and posterior granulated ridge. Eighth sternite small and subdorsal. Male sternum deeply and narrowly sulcate to near anterior termination.

←

Fig. 2.—Location map of the fossiliferous outcrops of the lower siltstone member of the Potrerillos formation where remains of *Dakoticancer australis* Rathbun and *Mascaranada difuntaensis* n. sp. were collected. Locality A (IGM-2444) lies at the northwest extremity of the Delgado syncline. Locality B (IGM-1582) is situated at the southwest side of La Zorra hill.

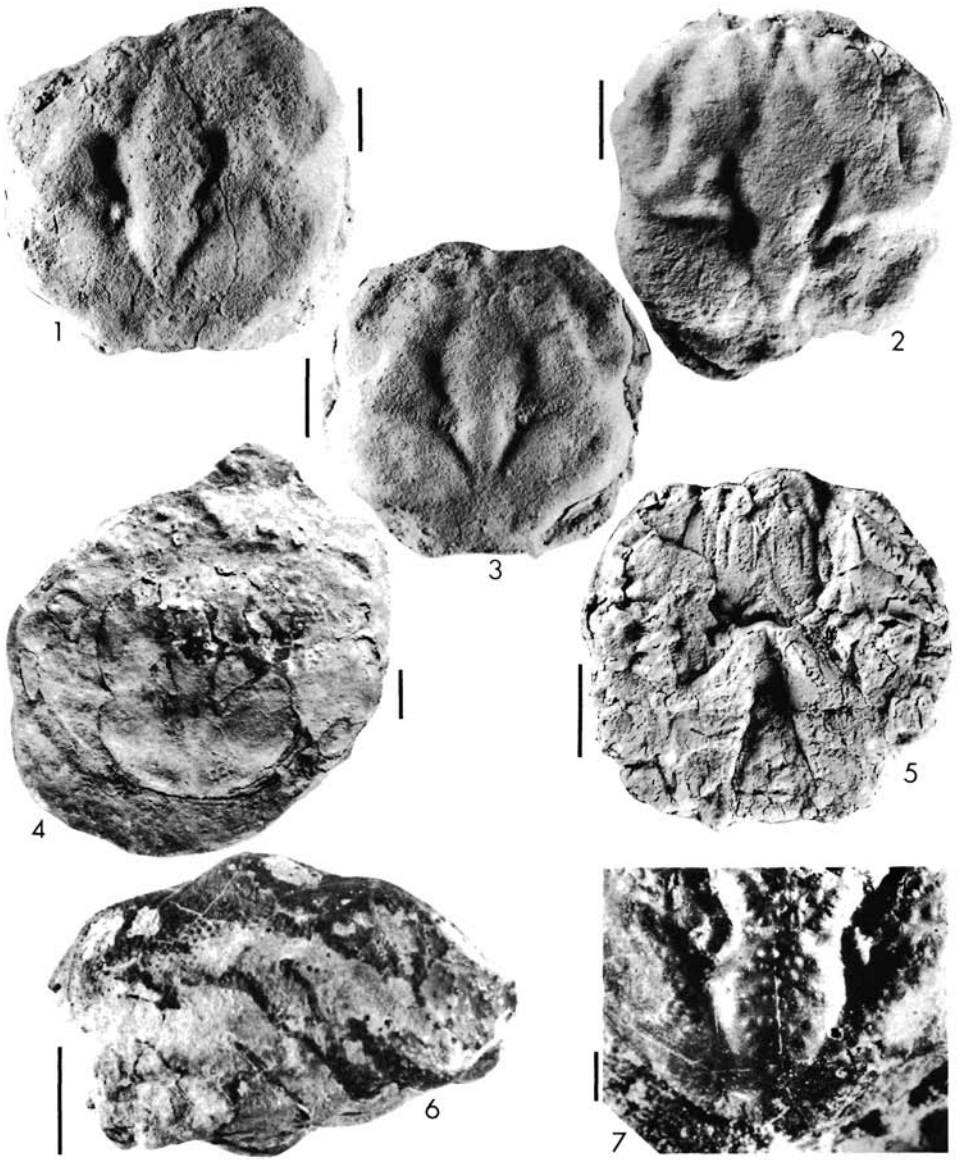


Fig. 4.—*Dakoticancer australis* Rathbun. Bar scales for figures 4.1–4.6 = 1 cm. Bar scale for figure 4.7 = 1 mm. 1, Dorsal view of carapace of largest specimen (IGM-5206) found in Difunta Group. Locality A. 2, Dorsal view of carapace showing details of fronto-orbital margin. Specimen IGM-5207, locality A. 3, Dorsal view of carapace showing details of posterior and posterolateral margin. Specimen IGM-5208, locality A. 4, Dorsal view of carapace with articulated appendages, included in a sandstone-filled burrow. Locality B. 5, Ventral view of carapace showing details of the sternum and buccal region. Specimen (IGM-5208). 6, Lateral view of right side of specimen IGM-5211, preserving carapace material, unwhitened. This specimen may not be a molt. Locality B. 7, Dorsal view of posterior portion of an incomplete juvenile specimen (IGM-5213). Locality A.

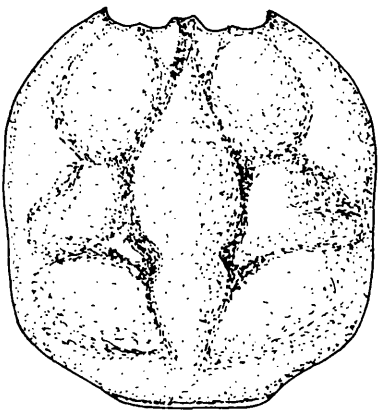


Fig. 5.—Line drawing of *Dakoticancer australis* showing the general disposition of body regions. The coarse pustulose ornamentation is not shown.

First abdominal somite subdorsal, crossed transversely by subtle granulate ridge. Second somite slightly wider than first, with well-marked transverse ridge that bears thick granules.

Buccal cavity nearly square. Small triangular notch in front of sternal plastron separates coxae and bases of third maxillipeds. Ischium of third maxillipeds long, rectangular and with pair of shallow furrows that extend longitudinally to subquadrate merus. Elongate, acute exognath on coxae of third maxilliped. Coxa-basis of first pereiopod inflated and with granulations. P2–P5 coxae-bases subtrapezoidal, centrally inflated and with low granules. Ischia not seen. Merus and cheliped stout and short, little compressed with strong granules and short spines on outer margin. Carpus shorter than merus but with strong granulations and spines; three strong ridges on upper surface. Palm with strong granulations and shallow grooves on its medial upper and lower surfaces. Moveable and fixed fingers not preserved. Pereiopods P2–P4 ambulatory, similar in size. Fifth pereiopod smaller than others and subdorsal.

A juvenile, incomplete specimen (Fig. 4.7) possesses nearly same posterior carapace morphology as do adults.

Hypodigm.—IGM-5206 to IGM-5213, deposited in the Museo de Paleontologia, Instituto de Geologia, Universidad Nacional Autonoma de Mexico; CM35511 to CM35514, in the Section of Invertebrate Paleontology, The Carnegie Museum of Natural History, Pittsburgh, Pennsylvania.

Localities and stratigraphic position.—There are two principal outcrops of the lower siltstone member of the Potrerillos Formation where carapaces of *Dakoticancer australis* have been collected (Fig. 2). Eight molds of the interior and four molds of the exterior of carapaces were collected by Vega about 11.5 km southwest of San Jose de La Popa, at the margin of the Delgado syncline (Fig. 2, loc. A; IGM-2444). The same collector found nine molds of the interior with partial carapace material preserved, and three molds of the exterior, in an outcrop situated 21.2 km southeast of San Jose de La Popa, near the feature known locally as "La Zorra" hill (Fig. 2, loc. B; IGM-1582).

As is typical of deltaic deposits, the lower siltstone member undergoes lateral facies changes. Although the two localities where the material was collected are

Fig. 6.—Outcrop of lower siltstone member at locality B. Note burrow where specimen IGM-5212 (Fig. 5.4) was collected.

situated at the same stratigraphic level, they represent different facies. Thus, preservational styles of the fossils are distinct. The molds of the interior found at locality A have lost the carapace material completely, and none was found with preserved appendages. This characteristic and the posterior displacement of the sternal plate suggests that these remains were molts deposited in a shallow environment. The matrix is a light-gray sandstone, which lacks bioturbation. In the same bed, two big chelae referrable to *Prehepatus* were collected. A bank that contains *Pycnodonte mutabilis* and *Exogyra costata,* with an approximate thickness of four meters, was located two meters above. This occurrence suggests that the molts may have been transported shoreward and filled with intertidal sandstone.

The lithology at locality B is finer-grained sediments, siltstones and mudstones, preserving a great diversity of molluscan species. Most of them are infaunal bivalves such as *Pholadomya* spp., and *Panopea* sp. Intense bioturbation with burrows filled with coarse brown sandstone (Fig. 6) is evident. Carapaces of *D. australis,* with appendages articulated (Fig. 4.4), were found in these burrows. Nevertheless, the carapaces show dislocation of sternal plates, which suggests that

Table 1.—*Measurements and computed ratios of Dakoticancer australis* Rathbun.

Specimen	Length (mm)	Width (mm)	W/L ratios
IGM-5206	54.0	53.1	0.98
IGM-5207	44.7	42.8	0.95
IGM-5208	40.3	37.5	0.93
IGM-5209	40.6	37.7	0.93
IGM-5210	39.1	37.6	0.96
			Mean = 0.95
IGM-5213[a]	9.3	9.1	0.98
Blue Springs, Miss.[b]	52.4	49.3	0.94
USNM F3840[c]	25.8	24.8	0.96

[a] The sole juvenile specimen collected from Nuevo Leon and the smallest member of the species collected to date.
[b] The largest specimen reported by Bishop (1986, p. 426, fig. 7).
[c] The holotype of *Dakoticancer australis* Rathbun.

these crabs molted while seeking haven in the burrows. This prevented transport and subsequent disarticulation of appendages. The exuviae were gradually filled by sand within the burrow during consolidation. This suggests a deeper environment than the one represented at locality A, in delta platform facies.

Measurements and condition of specimens.—The measurements reflecting the range of variation in size of specimens of *Dakoticancer australis* are given in Table 1. Those specimens with IGM numbers were collected from Nuevo Leon.

Although most of the molts lack carapace material, their preservation is adequate to describe the dorsal and ventral surfaces, as well as part of the chelipeds.

Remarks.—The specimens conform closely to the original description (Rathbun, 1935) and subsequent emendation (Bishop, 1983) of *Dakoticancer australis.* Rathbun (1935:40), referring to *Dakoticancer overana australis,* stated "This form differs from the typical one in the greater extent of the granulation of the carapace, the smooth areas restricted to narrow depressions between the elevations instead of covering their slopes as in the typical form. The carapace is narrower. The single rostrum is compressed at base and widens slightly toward the extremity. A female paratype (73840) measures 35.1 millimeters long from the orbital margin and 40 millimeters wide, or 1:1.14, whereas a typical *overana* (32056) measures 19.4:24.7 or 1:1.27." Bishop (1983:425) noted that *D. overana australis* tended to be subquadrate and had more strongly developed, shelf-like posterior intestinal and metabranchial regions. Furthermore, the claws were more oblique than those of *D. overanus overanus sensu* Rathbun. Bishop's (1983:425–426; fig.7) statistical treatment of *Dakoticancer overana sensu stricto* and *D. australis* indicated that the differences in carapace and claw morphology warranted specific distinction between the two taxa, a conclusion confirmed by a recent description of *D. overana* (Tucker et al., 1987).

The only other taxon that might be confused with *D. australis* is *Seorsus wadei* Bishop, 1988*b*. The latter is represented by only two partial molds of the interior. They appear to be more finely ornamented and have more convergent posterolateral margins than typical *Dakoticancer australis.* Otherwise, the two taxa are very similar with regard to the critical point of definition of regions. Certainly, whether or not *Seorsus wadei* represents a distinct genus, it certainly would appear to be a dakotacancrid.

Although most specimens of Nuevo Leon *D. australis* fall into the size range

observed by Bishop (1983), at least four specimens are larger than those reported previously (Table 1). The sole juvenile specimen from the Nuevo Leon Assemblage is the smallest specimen of *D. australis* ever found (IGM-5213, Fig. 4.7). The Nuevo Leon Assemblage does not yield as many specimens as does the Coon Creek Formation where Bishop (1986) found 637 specimens.

This occurrence extends the paleogeographic range of *D. australis* southward from the Navarro Formation in Bexar County, Texas (Rathbun, 1935). The biostratigraphic range of *D. australis* is also extended from the middle Maastrichtian Prairie Bluff Formation (Bishop, 1986) to the late Maastrichtian lower siltstone member of the Potrerillos Formation.

Section Heterotremata Guinot, 1977
Superfamily Portunoidea Rafinesque, 1815
Family Carcineretidae Beurlen, 1930
Mascaranada, new genus

Type species.—*Mascaranada difuntaensis,* new species.

Description.—Carapace subhexagonal to oval, 12% wider than long, widest part near midlength. Dorsal regions well defined by transverse, straight, finely granulated ridges and deep grooves. Rostrum very narrow. Anterolateral margin rounded, terminating in a fine extra-orbital spine; orbits narrow. Posterolateral margins straight, converging toward straight posterior margin, posterolateral corner gently curved. Protogastric region with well-marked transverse ridge that extends distally to cervical groove. Hepatic lobes with ridge which is oblique to orbital margin. Epibranchial lobes small, sinuous, ridged; mesogastric region forms inverted trapezoid, with transverse, straight, strong ridge. Branchial lobes well developed, semicircular in shape. Mesobranchial region broad, with strongly marked straight ridge extending to the carapace margin. Metabranchial regions nearly circular, domed, well defined. Cervical groove deepens and curves smoothly from margin toward axis and crosses axial regions as straight, narrow, deeply incised groove. Chelipeds not seen. Walking legs long (P2–P4); fifth pereiopod with flattened propodus and oval dactylus.

Etymology.—The generic name combines two Spanish words, *mascara,* mask and *nadar,* to swim. The pattern of regions, ridges, and grooves on the carapace of this swimming crab resembles a primitive mask.

Comparison.—The regions, which are well defined by grooves and transverse ridges, the shape of the frontal margin, and the form of the fifth pereiopods are characteristic of the Upper Cretaceous family Carcineretidae, which contains the following genera: *Carcineretes* Withers, 1922; *Cancrixantho* Van Straelen, 1934; *Lithophylax* Milne Edwards and Brocchi, 1879; *Ophthalmoplax* Rathbun, 1935; *Woodbinax* Stenzel, 1952; *Longusorbis* Richards, 1975; and *Icriocarcinus* Bishop, 1988*a*. Bishop recognized "two natural groups" within the Carcineretidae (1988*a*: 247). The first group includes those species with a U-shaped carapace, straight lobed fronts, and bilobed rostra, including *Ophthalmoplax, Woodbinax,* and *Carcineretes.* Those species with pentagonal or subhexagonal carapaces, with similar areolation and more or less well-developed transverse ridges, spiny or lobed fronts, and narrow non-bifurcated rostra comprise the second group. *Cancrixantho, Longusorbis, Icriocarcinus,* and probably *Lithophylax* are referrable to this group.

Although the shape of the carapace and transverse ridges suggests that the affinities of *Mascaranada* are with Bishop's second group, the new genus lacks areolation, and the fifth pereiopods are natatory, in contrast with the ambulatory ones

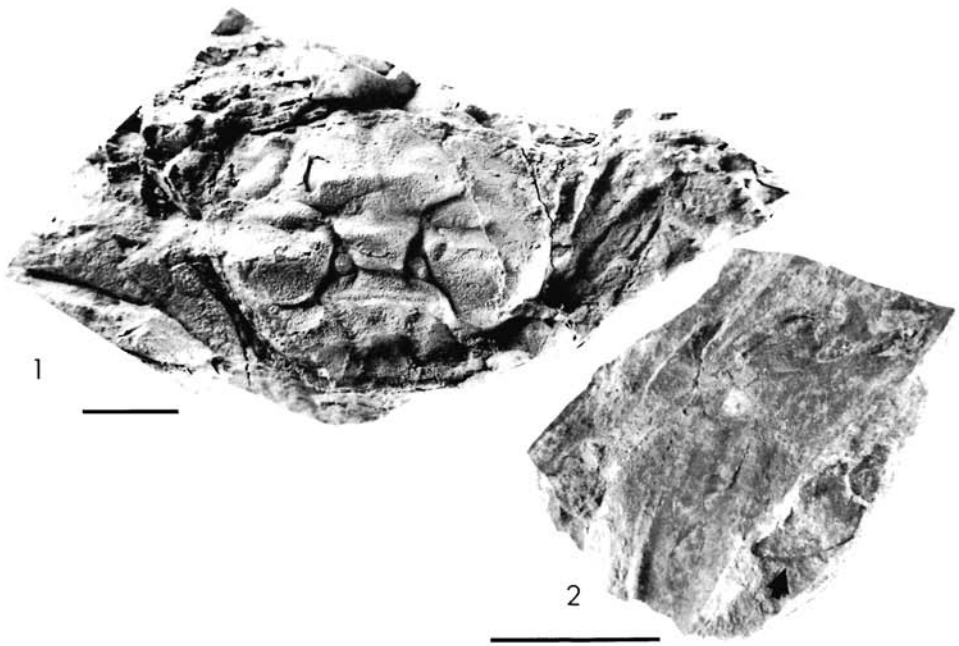


Fig. 7.—*Mascaranada difuntaensis.* 1, Dorsal view of carapace of holotype IGM-5204 (× 1.9). 2, Fifth left pereiopod (arrow) with flattened propodus and oval dactylus. Same specimen (× 3.3). Locality IGM-1582).

of *Longusorbis* (Richards, 1975:1858), and *Icriocarcinus* (Bishop, 1988*a*:251). *Cancrixantho* differs from *Mascaranada* in having much wider and spinier frontal and posterolateral margins. *Lithophylax* is small, has a narrower marginal front, less-pronounced transverse ridges, and stronger pereiopods. Whether *Mascaranada* is a member of Bishop's first group is also unclear. The lack of areolation, and the presence of natatory fifth pereiopods, are morphological characteristics that suggest that *Mascaranada* is related to Bishop's first group. However, the urn-shaped carapace of *Ophthalmoplax,* its lateral spines, and short posterior margin readily distinguish this genus from *Mascaranada. Woodbinax* is smaller, has a straighter anterior margin, and better defined anterior portion of the mesogastric area. Thus, *Mascaranada* exhibits some morphologic characters of both groups, which may suggest that differentiating between the two groups is not possible.

Mascaranada difuntaensis, new species
(Fig. 7, 8)

Description.—Carapace subhexagonal to oval, 12% wider than long. Widest part at level of epibranchial lobes, arched longitudinally and straight transversely; highest in center, with deep grooves and strong transverse ridges. Fronto-orbital margin narrower than the maximum width, sinuous in form. Frontal area narrow, defined laterally by short, well-defined preorbital spines. Central part of frontal margin with elongated granulations. Orbital margin a curved ridge terminating laterally at distinct postorbital spines directed anteriorly and axially. Anterolateral margins broadly rounded, merging with straight, steeply inclined posterolateral margins. Posterolateral corners sharply rounded; posterior margin straight, nar-

Fig. 8.—Line drawing of *Mascaranada difuntaensis* carapace (× 1.8).

row, about same width as frontal region. Carapace grooves rather broad, clearly differentiating regions. Protogastric area crossed by transverse ridge with three nodes, one central and the others situated 3.9 mm on either side of midline. Transverse ridges somewhat reduced axially, and decreased laterally. Mesogastric region an inverted trapezoid, continuous with obscurely marked narrow extension that vanishes before reaching front. Central part of mesogastric region with strong transverse ridge that marks maximum height of carapace. Hepatic lobes relatively narrow, well differentiated from protogastric and epibranchial lobes by shallow groove that curves from inner orbital margin to anterolateral corner at point of origin of cervical groove. Epibranchial lobes narrow and transverse, slightly inclined toward mesogastric region, delimited anteriorly by cervical groove, and posteriorly by groove that deepens axially. Cervical groove arched, attaining maximum depth along margin of axial regions, continuous from lateral margin to midline. Mesobranchial lobe subrectangular with a strong medial transverse ridge that reaches margin near point of maximum carapace width. Urogastric area inclined, subtrapezoidal and separated by a short but very deep groove from mesogastric region. Branchial lobes semicircular, well differentiated as prominent tubercles near deepest part of cervical groove. Cardiac region with distinct transverse ridge and pronounced slope that reaches posterior margin; intestinal region indistinct. Metabranchial areas narrow, circular, domed on line with transverse ridge on cardiac region. Crests of ridges with granulations.

Pereiopods P1–P4 ambulatory, and fifth pereiopod with flattened propodus and paddle-like dactylus (Fig. 7.2). Ventral and frontal carapace surfaces and chelipeds not seen.

Holotype.—IGM-5204, deposited in the Museo de Paleontologia, Instituto de Geologia, Universidad Nacional Autonoma de Mexico.

Locality and stratigraphic position.—The holotype was collected from the upper portion of the lower siltstone member (upper Maastrichtian) of the Potrerillos Formation (Fig. 3), at the base of Cerro La Zorra, Municipio Mina, Nuevo Leon, approximately 50 km northwest of Monterrey, in a canyon known regionally as Cañon de Potrerillos (Fig. 2, loc. B: IGM-1582).

Measurements and condition of specimen.—Carapace length 29.6 mm; width 35.1 mm. The height cannot be measured, as the abdominal region is covered. The holotype of the new species described here was found nearly complete, and is interpreted to be a mold of the interior. When collected, the fifth pereiopod exhibited a portunoid form with a flattened propodus and oval dactylus. Erosion has damaged the anterolateral portions of the carapace and parts of the appendages

were broken during collecting. The left pereiopod was rescued. Although the preservation of the specimen is good, the fragile nature of the matrix precludes cleaning of the abdominal region.

Etymology.—The trivial name refers to the Difunta Group, which seems to yield the most diverse Cretaceous brachyuran fauna known from Mexico.

Comparison.—*Mascaranada difuntaensis* superficially resembles *Ophthalmoplax brasiliana* (Maury), from the Upper Cretaceous of Brazil (Beurlen, 1958) in the distribution and shape of the deep grooves and transverse ridges and in the natatory nature of the fifth pereiopods. However, *O. brasiliana* is larger (L, 85–99 mm; W, 102–120 mm; Beurlen, 1958:8) and has long spines on the distal portions of the frontal margin. The urogastric region seems to be longer and the cardiac shorter than in *M. difuntaensis.* The illustration of *O. brasiliana* by Maury (1930:4, fig. 1) shows a rectangular carapace, much wider than long, with posterolateral spines. *Ophthalmoplax stephensoni* Rathbun is more nearly square and has a small spine on the anterolateral margin. The shape of the frontal margin is similar to that of *M. difuntaensis. Ophthalmoplax stephensoni* also has three prominent nodes in the middle part of the protogastric ridge (Rathbun, 1935). Description of *O. comancheensis* Rathbun is based on dactylus shape, but the general carapace form in all species of *Ophthalmoplax* differs from that of *Mascaranada.*

Phylogeny and paleoecology.—Glaessner (1969:R440) stated, "The origin of the Portunoidea, . . . was sought near the Cancridae because of their resemblance with the Carcininae. These were thought to be primitive compared with the advanced Portuninae and the aberrant Podophthalminae. The available fossils show that the history of crabs adapted for active swimming is more complicated, and they could even be polyphyletic . . . The Cretaceous Carcineretidae are unlike typical xanthids. They have a number of advanced portunoid characters, such as adaptation of the fifth pereiopod (where known) for swimming, transverse ridges on the carapace. . . ." *Mascaranada difuntaensis* has the typical characters of the Carcineretidae, including swimming adaptations that suggest relationship to the Tertiary Portunidae. Some of the representatives of Bishop's second group, for example *Longusorbis cuniculosus* Richards, were found associated with burrows in lowest-tide level facies (Richards, 1975:1857) and on muddy bottoms, below wave base (Bishop, 1988*a*:246). It seems that this group inhabited shallow waters, burrowing for protection, as reptant crustaceans. Representatives of the natatory group could crawl and swim in deeper waters, as none was found associated with burrows. A lower delta-platform facies was interpreted to be the environment of deposition for the siltstones and mudstones at the type locality. There was no evidence of bioturbation or of transport of the specimen, as articulated appendages were preserved. *Mascaranada difuntaensis* was probably an active crawler and swimmer on the deltaic platform of this portion of the ancestral Gulf of Mexico. It also seems that the paleogeographic distribution of the natatory group, consisting of *Ophthalmoplax, Carcineretes, Woodbinax,* and *Mascaranada difuntaensis,* was restricted to the Gulf Coast and Caribbean provinces, while the members of the reptant group mainly inhabited the Pacific Slope Province (Bishop, 1986). This distributional pattern also tends to ally *M. difuntaensis* to Bishop's first group. He has previously (1986) suggested that the Cretaceous crabs of North America exhibit a high degree of provincialism. If this separation of groups is correct, the shape of the fifth pereiopod could be the basis for subdivision of the Carcineretidae. The natatory forms may be the ancestors of the Portunidae, which are dis-

tinguished from the remaining Heterotremata on the basis of the natatory modifications of the fifth pereiopod. Another possibility might be inclusion of the reptant Carcineretidae in the Xanthidae.

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