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Authors: GAFFNEY, EUGENE S., TONG, HAIYAN, and MEYLAN, PETER A.

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Galianemys, a New Side-Necked Turtle (Pelomedusoides: Bothremydidae) from the Late Cretaceous of Morocco

EUGENE S. GAFFNEY,[1] HAIYAN TONG,[2] AND PETER A. MEYLAN[3]

ABSTRACT

The Cenomanian redbeds of southern Morocco have yielded skulls of a new genus and two new species of side-necked turtles, *Galianemys whitei* and *Galianemys emringeri*. The genus is based on a series of nine well-preserved skulls and three partial skulls. *Galianemys* is a pelomedusoid pleurodire belonging to the family Bothremydidae Baur, 1891, because it has: (1) precolumellar fossa absent, (2) foramen stapedio-temporale facing anteriorly, (3) eustachian tube separated from stapes by bone, and (4) exoccipital-quadrate contact. Within the Bothremydidae *Galianemys* is best resolved as the sister group to *Cearachelys* because both have the jugal retracted from the orbital margin and a small, slitlike fenestra postotica. *Galianemys emringeri* has a deep fossa pterygoidei, ventrally exposed prootic, foramen nervi facialis and foramen nervi vidiani, a thicker labial ridge, and the jugal not exposed on the triturating surface, while *Galianemys whitei* has a shallow fossa pterygoidei, covered prootic and foramen nervi facialis and vidiani, a thinner labial ridge, and a jugal exposed on the triturating surface.

INTRODUCTION

Although the Bothremydidae was named as early as 1891 by George Baur, the term fell into disuse for most of this century, and the few included taxa, particularly *Bothremys* and *Taphrosphys*, were simply included in the Pelomedusidae. Broin in Antunes and Broin (1988) and Broin (1988) revived the Bothremydidae, provided a new diagnosis, and added taxa, such as *Rosasia*, based on

[1] Curator, Division of Paleontology, American Museum of Natural History.
[2] Research Associate, Division of Paleontology, American Museum of Natural History. Current address: 16 cour du Liegat, 75013 Paris, France.
[3] Eckerd College, Natural Sciences, 4200 54th Avenue South, St. Petersburg, FL 33711.

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skulls and shells. Recent papers on fossil pleurodires, such as Meylan (1996), Lapparent de Broin and Werner (1998), and Tong et al. (1998) used the Antunes and Broin (1988) terminology, in which the Bothremydidae, Podocnemididae, and Pelomedusidae (restricted to *Pelusios* and *Pelomedusa* only) are contained in the Pelomedusoides (which equals Pelomedusidae in the classic sense). Bothremydids are now recognized as a far more widespread and diverse group with several new forms being known from Morocco.

Turtle remains from the Cenomanian nonmarine redbeds of Kem Kem region (also known as Hamada du Guir), in southern Morocco, were first collected by R. Lavocat in the 1940s (Lavocat, 1954). Since then, Broin (1988), Gmira (1995) and Lapparent de Broin (2000) provided lists of turtle remains from those beds including *Araripemys* sp., and indeterminate Podocnemididae and Pelomedusoides, nearly all represented by postcranial fragments. Lapparent de Broin and Werner (1998) figured a complete bothremydid skull, as the ''Erfoud skull'' (see below), from the same region. *Hamadachelys escuilliei*, a primitive podocnemidid, is the only turtle hitherto described in detail from this region. It is known from a nearly complete skull (Tong and Buffetaut, 1996).

The age of these vertebrate-bearing redbeds has sometimes been considered as Albian, but recent reviews, based on paleontological evidence, suggest an early Cenomanian age (see Tong and Buffetaut, 1996; Wellnhofer and Buffetaut, 1999; Mateer et al., 1992).

Recently, a rich turtle fauna has been collected from Kem Kem redbeds. Most of the material consists of isolated skulls, mainly collected by local people for commercial purposes. Here we describe a series of bothremydid turtle skulls, which are the most abundant remains among the turtle fauna from the Kem Kem region. Other vertebrates have been reported by Russell, 1996; Buffetaut, 1994; and Taverne and Maisey, 1999.

Useful reviews of the literature on bothremydids can be found in Broin (1988), Antunes and Broin (1988), and Lapparent de Broin and Werner (1998). A general treatment and description of pleurodire skulls, turtle skull morphology, and a literature review is in Gaffney (1979). As *Galianemys* is compared with *Cearachelys* (Gaffney et al., 2001a.) should be seen. It also lists the more recent literature.

The absence of detailed stratigraphic and locality data for all the specimens of *Galianemys* is a significant problem for work on this taxon. However, the number of specimens is adequate for a morphological analysis of the alpha level taxonomy, which reveals two distinct morphs that we recognize as species. We do not know whether they were contemporaneous or had a nonoverlapping time range.

The two species are represented by a total of 12 skulls; six in each species. *Galianemys whitei* has five nearly complete adult skulls and a partial skull hypothesized as a juvenile due to its small size. *Galianemys emringeri* has three well-preserved adult skulls, one nearly complete juvenile skull and two braincases. The presumed juveniles are briefly mentioned in the description and included in the systematic analysis, but they will be described and figured in a later paper.

The purpose of this paper is to diagnose and name *Galianemys* and its two species. A more extensive description of all the available material, including variation among the specimens and a phylogenetic analysis, is underway for a future publication.

Institutional Abbreviations

AMNH	American Museum of Natural History
MDE	Musée des Dinosaures, Espéraza, France

Anatomical Abbreviations

bo	basioccipital
bs	basisphenoid
ex	exoccipital
fpcci	foramen posterius canalis carotici interni
fnt	foramen nervi trigemini
fr	frontal
fst	foramen stapedio-temporale
ju	jugal
mx	maxilla
op	opisthotic
pa	parietal
pal	palatine

pf	prefrontal
pm	premaxilla
po	postorbital
pr	prootic
pt	pterygoid
qj	quadratojugal
qu	quadrate
so	supraoccipital
sq	squamosal

SYSTEMATICS

ORDER TESTUDINES LINNAEUS, 1758

MEGAORDER PLEURODIRA COPE, 1864

(FIDE GAFFNEY AND MEYLAN, 1988)

HYPERFAMILY PELOMEDUSOIDES COPE, 1868

FAMILY BOTHREMYDIDAE BAUR, 1891

Galianemys, new genus

TYPE SPECIES: *Galianemys whitei*, new genus and new species

DISTRIBUTION: Late Cretaceous of Morocco.

ETYMOLOGY: In recognition of the assistance of Mr. Henry Galiano in obtaining specimens of this and other turtles, and for his lifelong interest and support of paleontology at the American Museum of Natural History.

DIAGNOSIS: A genus of bothremydid pleurodire with small, triangular skull, orbits facing dorsolaterally as in *Cearachelys* and *Kurmademys*; skull roof not extensively emarginate as in *Kurmademys*; jugal widely (rather than narrowly as in *Cearachelys*) separated from orbital margin by broad contact of postorbital and maxilla, unique among bothremydids; triturating surfaces triangular as in *Cearachelys* but in contrast to parallel-sided ones as in the *Nigeremys* Group, not greatly expanded as in *Bothremys*; deep pit in triturating surface absent; palatine not extensively exposed in triturating surface as in *Bothremys* Group; maxilla-quadrate contact absent; eustachian tube separated by bone from incisura columellae auris; incisura columellae auris completely enclosed by bone; quadrate-basioccipital contact present as in other Pelomedusoides; quadrate-exoccipital contact present as in other Bothremydidae; supraoccipital- quadrate contact present as in *Cearachelys* and *Bothremys* Group, but in contrast to *Nigeremys* Group; antrum postoticum larger than in *Bothremys*, *Azabbaremys*, *Nigeremys*, but same as in *Cearachelys*; precolumellar fossa absent as in most other Bothremydidae; foramen posterius canalis carotici interni formed by pterygoid and basisphenoid; foramen jugulare posterius open laterally; occipital condyle formed by exoccipital and basioccipital in contrast to nearly all other Bothremydidae except *Kurmademys*.

Galianemys whitei, new species

TYPE SPECIMEN: AMNH 29987, nearly complete skull (figs. 1, 2), donated by Mr. Richard White.

TYPE LOCALITY: Near Al Taouz, Province de Kasr-es-Souk, Morocco.

HORIZON: Presumed to be Cenomanian, Kem Kem beds.

DIAGNOSIS: A species of *Galianemys* differing from *Galianemys emringeri* by having a straight rather than curved prefrontal-frontal suture; a relatively larger jugal-palatine contact; jugal exposed on triturating surface; small depression on posteroventral part of triturating surface; labial ridge relatively thinner; antrum postoticum usually relatively smaller; prootic not exposed ventrally; shallow or absent fossa pterygoidei; foramen nervi vidiani not exposed; and foramen posterius canalis carotici formed by basisphenoid and pterygoid equally.

ETYMOLOGY: For Richard S. White who brought a number of specimens to our attention and aided our work.

REFERRED MATERIAL: AMNH 29986—Skull lacking left orbital region and palate, near Al Taouz, Province de Kasr-es-Souk, Morocco, donated by Richard S. White.

AMNH 30027—Skull lacking left orbital region and palate, ''Kem Kem'', Morocco, donated by François Escuillie.

AMNH 30028—Nearly complete skull, ''Kem Kem'', Morocco, donated by François Escuillie.

AMNH 30036—Nearly complete skull, ''Kem Kem'', Morocco, donated by Michael Hammer

MDE 45—Skull lacking basicranium with quadrate incorrectly attached.

DISCUSSION: A specimen of what appears to be *Galianemys whitei* was figured in Lapparent de Broin and Werner (1998: figs. 4a,

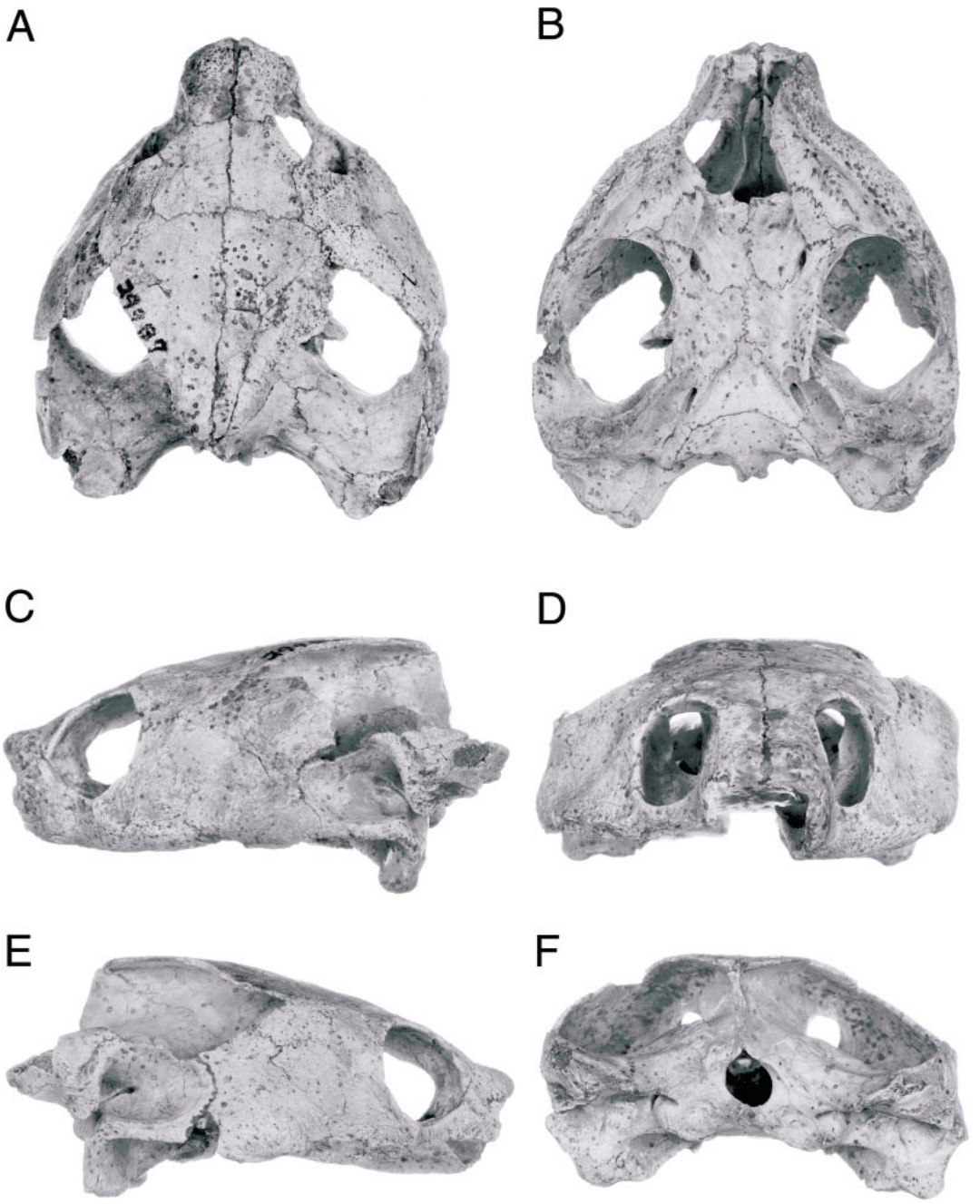

Fig. 1. *Galianemys whitei*, n. gen. & sp., holotype, AMNH 29987. **A,** dorsal view; **B,** ventral view; **C,** left lateral view; **D,** anterior view; **E,** right lateral view; **F,** occipital view.

4e) as ''new bothremydid form, Hammada [sic] du Guir, East of Erfoud, Morocco, Albian, MNHN (P) MRS 2098, Fectay coll.'' In the text (Lapparent de Broin and Werner, 1998: 10) it is characterized as ''A new bothremydid form, Albian of Morocco (that can be positioned early in the family development) . . . ''. No other information is provid-

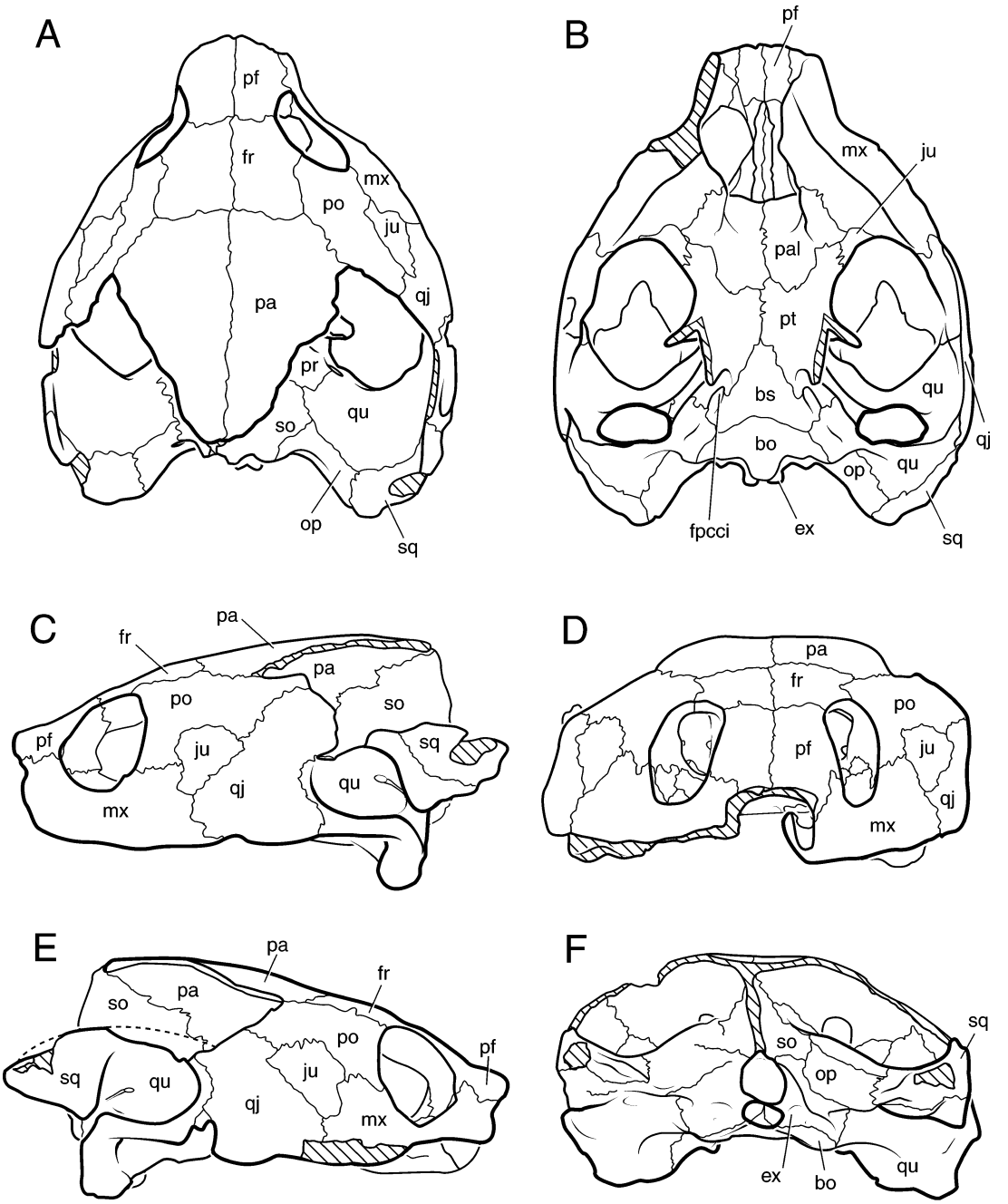

Fig. 2. Key for figure 1.

ed but the general shape and retracted jugal indicate *Galianemys*. The jugal on the triturating surface and the thin labial ridge suggest *Galianemys whitei*, but the area around the foramen posterius canalis carotici interni is too roughly drawn to determine the extent of the fossa pterygoidei or the exposure of the prootic, if any.

Galianemys emringeri, new species

TYPE SPECIMEN: AMNH 29985, a skull lacking most of the right triturating area, both cheeks, and the left otic chamber, donated by Henry Galiano.

TYPE LOCALITY: Near al Taouz, province de Kasr-es-Souk, Morocco.

HORIZON: Presumed to be Cenomanian, Kem Kem beds.

DIAGNOSIS: A species of *Galianemys* differing from *Galianemys whitei* by having a prefrontal-frontal suture convex anteriorly rather than straight; small or absent jugal-palatine contact; jugal not exposed on triturating surface; triturating surface flat; labial ridge relatively thicker; antrum postoticum relatively larger; prootic exposed ventrally containing foramen nervi facialis; deep fossa ptergoidei; foramen nervi vidiani exposed ventrally; and foramen posterius canalis carotici interni formed mostly by basisphenoid with only slight or no contribution from pterygoid.

ETYMOLOGY: In reference and thanks to Gilles Emringer for helping obtain Kem Kem specimens.

REFERRED MATERIAL: AMNH 30026–Partial braincase, ''Kem Kem'', Morocco, donated by Henry Galiano.

AMNH 30035–Nearly complete skull, ''Kem Kem'', Morocco, donated by Gilles Emringer and François Escuillie.

AMNH 30037–Skull lacking right cheek, ''Kem Kem'', Morocco, donated by Michael Hammer.

AMNH 30040–Nearly complete skull, donated by Michael Hammer.

MDE 46–Partial braincase.

DESCRIPTION

The description follows the bone order and pattern of Gaffney (1979) and recent bothremydid papers, Gaffney et al. (2001a, 2001b, 2001c). Although all specimens in the referred lists were used in the descriptions, the figures (figs. 1–4) are restricted to the two types. Table 2 lists the *Galianemys* specimens and the characters that we have found to vary among them (except for measurements, which are in table 3). These characters are described below in more detail. It is apparent from table 2 that the most consistent characters differentiating the two species are associated with the triturating surface and the basicranium.

PREFRONTAL

PRESERVATION: The prefrontal is preserved in *Galianemys whitei* in AMNH 30036, AMNH 29987, AMNH 29986, AMNH 30028, AMNH 30027, and MDE 45. In *Galianemys emringeri* it is preserved in AMNH 30035, AMNH 30037, AMNH 29985, and AMNH 30040. It can be seen particularly well in AMNH 30027 and AMNH 29986 where the left prefrontal is lost, allowing the internal surfaces on the right side to be seen.

CONTACTS: As in *Pelusios* and all other Pelomedusoides, the prefrontal in both species of *Galianemys* contacts the maxilla anteroventrolaterally, the frontal posteriorly, and the other prefrontal medially. In *Galianemys emringeri* the prefrontal-frontal suture trends posteromedially for a short distance medial to the orbital margin, then it trends anteromedially forming a midline projection of the frontal in all three skulls. In *G. whitei* the suture is nearly straight in AMNH 29986, AMNH 29987, AMNH 30036, AMNH 30027, and MDE 45. In AMNH 30028 the suture is asymmetric with the frontal projecting anteriorly on the right side but not the left. *Cearachelys* and *Kurmademys* have an anteriorly convex suture but it is nearly straight in *Bothremys* and *Rosasia* and slightly curved in other genera.

STRUCTURES: The prefrontal in *Galianemys* is similar to that in other Pelomedusoides. The dorsal plate forms the anterodorsal margin of the orbit and the dorsal margin of the apertura narium externa. The margin is slightly protruding over the apertura in *Galianemys*, as in most Pelomedusoides, but there is some variation within the available specimens. A specimen of *Galianemys whitei*, AMNH 29987, has a much thicker margin that forms a slightly concave profile in lateral view rather than convex as in all the other skulls. The skulls of *G. emringeri* and *G. whitei* do not differ consistently in the prefrontal. The prefrontal in *Galianemys* is very similar to that bone in *Cearachelys* and *Kurmademys*.

FRONTAL

PRESERVATION: The frontal is preserved in AMNH 29987, AMNH 29986, AMNH

30036, AMNH 30027, AMNH 30028, and MDE 45 in *Galianemys whitei*. In *Galianemys emringeri* it is preserved in AMNH 30037, AMNH 30040, AMNH 30035, and AMNH 29985. It is most visible in AMNH 30027, AMNH 29986, and AMNH 30037.

CONTACTS: The frontal contacts in *Galianemys* are with the prefrontal anteriorly, postorbital posterolaterally, parietal posteriorly, and the other frontal medially. These are the same in both *Galianemys* species and in *Cearachelys*.

STRUCTURES: The frontal is very similar in both *Galianemys* and *Cearachelys*. The ridge defining the sulcus olfactorius is deeper in *Galianemys* than in *Cearachelys*. There is some variation in this feature among *Galianemys* but they are all deeper than in *Cearachelys*, *Kurmademys*, and Pelomedusidae.

The interorbital width is wider in *Galianemys* than in *Cearachelys*, *Kurmademys*, and Pelomedusidae. This is the result of a greater overhang of the frontal over the fossa orbitalis lateral to the sulcus olfactorius.

PARIETAL

PRESERVATION: The parietal is preserved to some extent in all the *Galianemys* specimens. It is complete in AMNH 30028 and nearly complete in AMNH 29987 (both *Galianemys whitei)*. In *Galianemys emringeri*, AMNH 30037 has the most complete parietals.

CONTACTS: The parietal contacts in *Galianemys* are with the frontal anteriorly, the postorbital anterolaterally, and with the other parietal medially. Ventrally the processus inferior parietalis contacts the palatine anteroventrally, the pterygoid ventrally, the prootic posteroventrally, and the supraoccipital posteriorly as in *Cearachelys*, other Pelomedusoides, and most turtles.

STRUCTURES: The degree of emargination in *Galianemys* is similar to that seen in *Cearachelys* but not as extensive. *Kurmademys* and the pelomedusids have the most extreme emargination with *Cearachelys* being more covered and *Galianemys* more covered than *Cearachelys*. The temporal skull roof consists largely of parietal and postorbital. *Galianemys* is more emarginate than *Foxemys*. The other bothremydids do not have complete preservation of the roof for comparison.

In contrast to *Cearachelys*, *Kurmademys*, and pelomedusids, the parietal of *Galianemys* is wider posteriorly near the midline along the supraoccipital contact. Although the temporal emargination depth is not much less than in *Cearachelys*, the temporal opening in *Galianemys* is more covered due to the wider parietal roof along its posterior extension. As in *Cearachelys*, the parietal of *Galianemys* forms the dorsal part of the foramen nervi trigemini.

JUGAL

PRESERVATION: The jugal is preserved in all specimens of both species of *Galianemys*. In AMNH 29985, the type of *Galianemys emringeri*, it is incomplete posteriorly but in AMNH 30037 and AMNH 30035 of that species it is complete.

CONTACTS: The jugal in *Galianemys* contacts the postorbital dorsally, the maxilla anteroventrally, and the quadratojugal posteroventrally. These are as in *Cearachelys* except that the jugal of *Galianemys* is completely separated from the orbital margin by a wide postorbital- maxilla contact. The medial jugal process is exposed in the orbital floor and the postorbital wall. In the orbital floor it contacts the maxilla anteriorly and anterolaterally, the palatine medially, and the postorbital posterodorsally. The postorbital and maxilla have a strong lateral contact widely separating the jugal exposure in the orbital floor from the cheek jugal exposure. In *Cearachelys* the postorbital and maxilla barely meet along the orbital margin just separating the two parts of the jugal. The jugal is widely exposed on the orbital margin in *Kurmademys* and pelomedusids.

The third area of jugal exposure is in the postorbital wall. Here the jugal contacts the postorbital dorsomedially, the pterygoid posteromedially, and the maxilla anteroventrally. In *Galianemys whitei* the jugal also contacts the palatine ventromedially but in *Galianemys emringeri* this contact is smaller (AMNH 30037, AMNH 30035) or absent (AMNH 29985), and the maxilla and pterygoid are closer to each other.

STRUCTURES: The medial process of the ju-

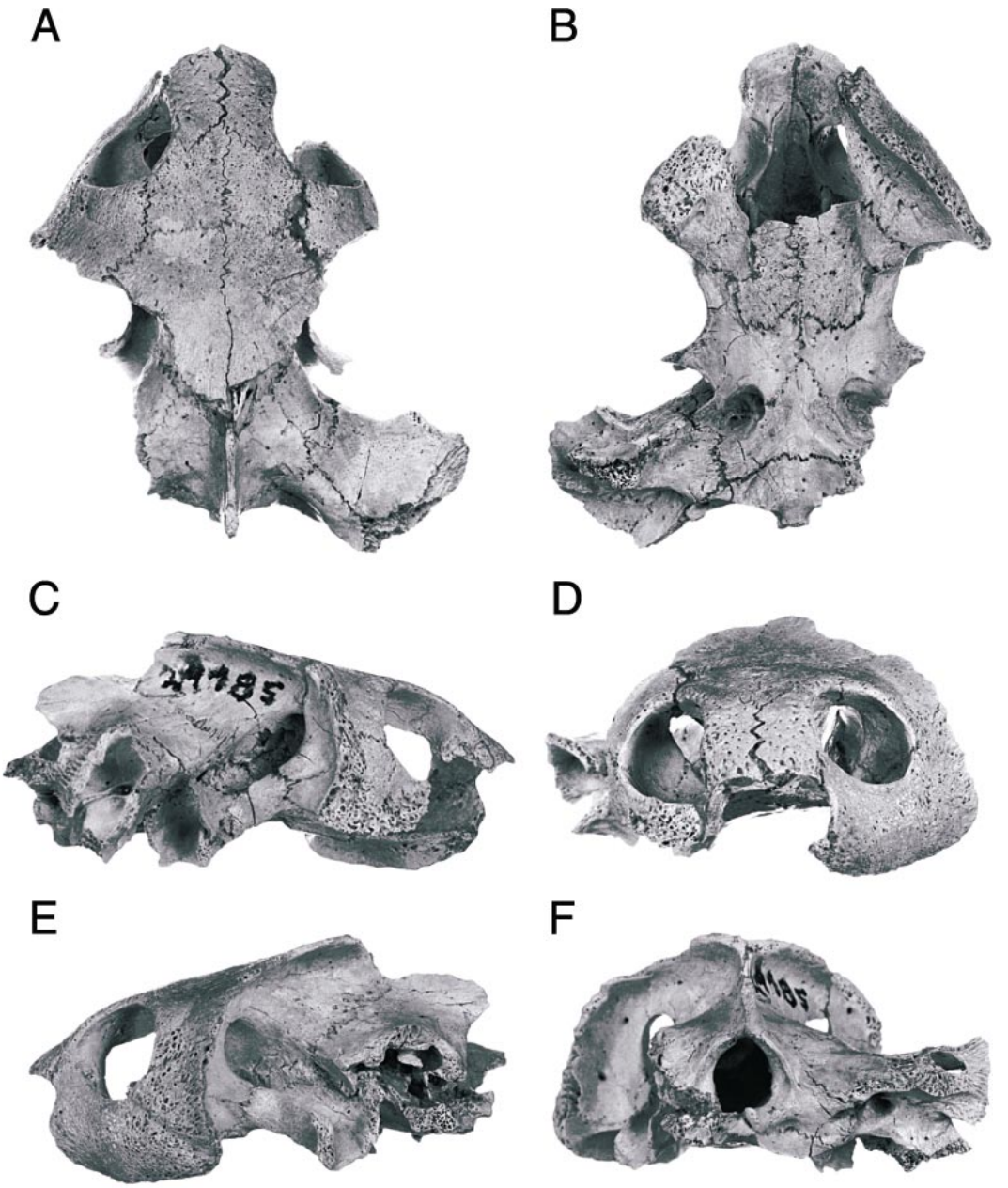

Fig. 3. *Galianemys emringeri*, n. gen. & sp., holotype, AMNH 29985. **A,** dorsal view; **B,** ventral view; **C,** left lateral view; **D,** anterior view; **E,** right lateral view; **F,** occipital view.

gal floors the orbit and forms part of the postorbital wall. In *Galianemys emringeri* the jugal is restricted to the vertical surface of the wall, but in *G. whitei* the jugal curves anteriorly and forms a small part of the triturating surface. This area of the triturating surface has a shallow but definitive depression in *G. whitei* but it is flat in *G. emringeri*.

QUADRATOJUGAL

PRESERVATION: The quadratojugal is present in *Galianemys whitei* specimens at least

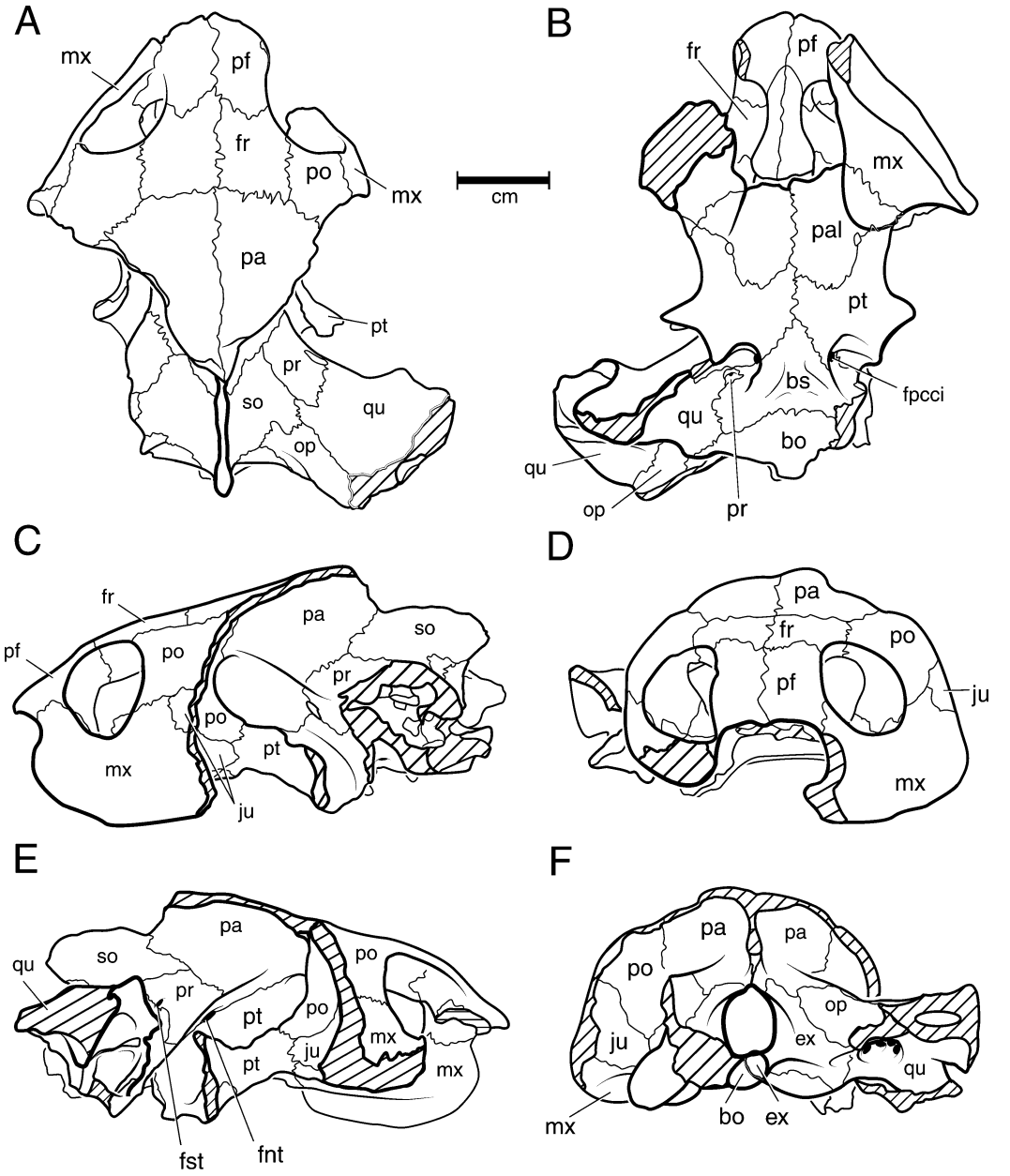

Fig. 4. Key for figure 3.

in part in AMNH 30036 and AMNH 29986; but it is most complete in AMNH 30028 and AMNH 29987. In *Galianemys emringeri* the quadratojugal is almost complete in AMNH 30035 and partial in AMNH 30037 and AMNH 30040.

CONTACTS: The quadratojugal contacts the maxilla anteroventrally preventing exposure of the jugal on the ventral edge of the skull and producing the complete absence of a cheek emargination. Anteriorly the quadratojugal contacts the jugal and anterodorsally it contacts the postorbital. Posteriorly the quadratojugal has a long S-shaped contact

TABLE 1
Comparison of *Galianemys* with Other Pelomedusoides

	Galianemys	*Cearachelys*	*Kurmademys*	Pelomedusidae
Prefrontal/frontal suture convex anteriorly	yes and no	yes	no	no
Interorbital distance	wider	narrower	narrower	narrower
Sulcus olfactorius ridge	deeper	shallower	shallower	shallower
Temporal emargination	least extensive	intermediate	most extensive	most extensive
Parietal wider posterolaterally	yes	no	no	no
Jugal retracted from orbit	widely	barely	not	not
Postorbital-maxilla contact	wide	very narrow	absent	absent
Cheek emargination	absent	absent	large	large
Labial ridge	thick	thin	thin	thin
Vomer-maxilla contact	present	?	?	absent
Fossa precolumellaris	absent	absent	present	present
Incisura columellae auris	closed	open	closed	closed
Incisura columellae auris shape	teardrop	open	oval	open
Antrum postoticum	smaller	large	very large	very large
Condylus mandibularis relative to condylus occipitalis	more posterior	more posterior	more anterior	more anterior
Foramen jugulare posterius enclosed	usually no	no	no	yes
Fenestra postotica subdivided	usually no	no	no	no
Foramen jugulare posterius slit-shaped	yes	yes	no	no
Fossa pterygoidei	deep and shallow	moderate	moderate	absent
Foramen posterius canalis carotici interni	PT-BS	PT-BS	BS	PRO
Tuberculum basioccipitale	large, shelflike	smaller, blunt	moderate, shelflike	small, acute
Condylus occipitalis made up only of exoccipitals	no	yes	no	yes

with the quadrate; above this a narrow posterior process of the quadratojugal meets a narrow anterior process of the squamosal (preserved in AMNH 30040 and AMNH 30035 of *Galianemys emringeri*).

STRUCTURES: The quadratojugal is a large, flat plate that forms about half of the cheek in *Galianemys*. A ventral emargination as seen in *Kurmademys* is completely absent and even the slight emargination seen in the cheek of *Cearachelys* is absent. Otherwise, the quadratojugal of *Galianemys* is very similar to that in *Cearachelys* in contacts, size, and shape.

SQUAMOSAL

PRESERVATION: The squamosal is present in AMNH 30037, AMNH 30040, and AMNH 30035 in *Galianemys emringeri*, and in AMNH 30028, AMNH 30027, AMNH 30036, AMNH 29987, and AMNH 29986 in *Galianemys whitei*.

CONTACTS: Squamosal contacts do not vary much in pelomedusoids. The conical squamosal fits on the quadrate, contacts the opisthotic medially, and has a short anterior process reaching the quadratojugal anterodorsally.

TABLE 2
Comparison of *Galianemys* Specimens

	Galianemys emringeri						*Galianemys whitei*					
	AMNH 29985	AMNH 30037	AMNH 30035	AMNH 30040	AMNH 30026	MDE 46	AMNH 29987	AMNH 29986	AMNH 30028	AMNH 30027	AMNH 30036	MDE 45
Prefrontal/frontal suture convex anteriorly	yes	yes	yes	no	?	?	no	no	yes[a]	no	no	no
Jugal/palatine contact	no	yes but small	yes but small	yes	?	?	yes	yes	yes	yes	yes	yes
Jugal exposed on triturating surface	no	no	no	yes	?	?	yes	yes	yes	yes	yes	yes
Small depression on posterolateral part of triturating surface	no	no	no	no	?	?	yes	yes	yes	yes	yes	no
Premaxilla concave	?	yes	yes	?	?	?	?	?	?	?	?	no
Labial ridge	thick	thick	very thick	very thin	?	?	thin	thin	thin	thin	thin	very thin
Pinched snout	slight	slight	slight	?	?	?	pronounced	absent	absent	?	absent	absent
Antrum postoticum	larger	larger	larger	?	?	smaller	smaller	smaller	smaller	?	larger	?
Prootic exposed ventrally	yes	yes	yes	yes	yes	yes	no	no	no	no	no	?
Fossa pterygoidei deep	yes	yes	yes	yes	yes	yes	no	no	no	no	no	?
Fully enclosed foramen jugulare posterius	no	yes	yes/no	?	no	no	no	no	yes	yes	no	?
Subdivided fenestra postotica	no	yes[b]	no	?	no	?	no	no	no	yes[b]	no	?
Foramen nervi vidiani exposed	yes	yes	yes	yes	yes	yes	no	no	no	no	no	?
Pterygoid and basisphenoid form foramen posterius canalis carotici interni	no	no	no	no	no	no	yes	yes	yes	yes	yes	?
Basisphenoid forms foramen posterius canalis carotici interni	yes	yes	yes	yes[b]	yes	yes	no	no	no	no	no	?

[a] entire suture asymmetric.

[b] damaged.

TABLE 3
Measurements of *Galianemys* Type Specimens (in millimeters)

	AMNH 29987	AMNH 29985
A. midline length as preserved	48.9[a]	46.5[a]
B. maximum width	46.9	46.0[b]
C. width between orbits	9.8	9.6
D1. width of left orbit	10.9	10.4
D2. width of right orbit	11.1	10.4
E. width of external nares	8.9	9.0[b]
F. width of internal nares	9.6	10.0[b]
G. maximum height at quadrate	25.6	21.0[a]
H. width of skull at middle of orbits	19.3	22.0[b]
I. length, anterior margin of prefrontals to posterior margin of supraoccipital	47.5[a]	46.8[a]
J1. height of left orbit	9.9	10.1
J2. height of right orbit	11.1	9.0[a]
K. skull height at occipital condyle	18.4	20.1[b]
L. anterior width of triturating surface	6.5	—
M. posterior width of triturating surface	10.2	8.5
N. width of palate across foramina palatinum posterius	16.5	18.4
O. length, front of skull to posterior edge of condylus articularis	45.7	40.8[a]

[a] damaged.
[b] estimated.

STRUCTURES: The cone shape of the squamosal in *Galianemys* is very similar to that bone in *Cearachelys*. There is no vertical flange on its ventral surface as in *Taphrosphys*.

POSTORBITAL

PRESERVATION: At least some of the postorbital is present in four *Galianemys emringeri* specimens and all six *Galianemys whitei* skulls. Nearly complete postorbitals are in AMNH 30035, AMNH 30040, and AMNH 30037 for *G. emringeri* and AMNH 30028 and AMNH 29987 for *G. whitei*.

CONTACTS: The lateral plate of the postorbital forms part of the temporal roof and in *Galianemys* contacts the frontal anteromedially, the parietal posteromedially, the maxilla anteroventrally, the jugal ventrolaterally, and the quadratojugal posterolaterally. The medial process is exposed on the postorbital wall and in the fossa orbitalis with these contacts: palatine ventromedially, jugal ventrally, maxilla ventrolaterally, and frontal dorsomedially. In posterior view, in the postorbital wall, the medial process of the postorbital has these contacts: parietal dorsomedially, jugal ventrolaterally, and pterygoid ventromedially. The strong postorbital- maxilla contact is unique among pleurodires.

STRUCTURES: The lateral plate of the postorbital forms most of the posterior orbital margin and extends posteriorly to reach the edge of the temporal margin. The medial process of the postorbital forms part of the roof and the lateral wall of the sulcus palatinopterygoideus and most of the postorbital wall. All of these structures are very similar in *Galianemys* and *Cearachelys*.

PREMAXILLA

PRESERVATION: The premaxilla is present in AMNH 30035 and AMNH 33037 in *Galianemys emringeri*, but in *Galianemys whitei* only the presumed juvenile, MDE 45 has the premaxilla preserved. This is unfortunate because, as preserved, this bone differs in the two species.

CONTACTS: The usual posterolateral contacts with the maxilla and with the other premaxilla on the midline occur in both specimens. In AMNH 30037 the vomer is not preserved and the premaxilla ends in a free margin on the apertura narium interna. In MDE 45, however, the vomer is present and contacts the posteromedial margins of both premaxillae.

STRUCTURES: In both specimens the anterior margins of the premaxillae are broken, but they seem to have formed the ventral margin of the apertura narium externa. In AMNH 30037 the premaxilla forms a high median ridge on the midline contact of the premaxillae, not seen in *Cearachelys* but similar to one in *Kurmademys*, partially dividing the fossa nasalis into paired choanal troughs. This ridge is not developed in MDE 45, although whether this could be growth related in unknown.

The ventral surface of the premaxilla forms part of the labial ridge and the triturating surface. The premaxillary part of these, as seen only in the three specimens available, are significantly different. In *Gal-*

ianemys emringeri, AMNH 30035 and AMNH 30037, the ridge is very thick, deep, and blunt. In *Galianemys whitei*, MDE 45, it is thin, shallow, and acute. Some degree of this variation is presumed to persist in the adult because *G. emringeri* has a thicker and blunter labial ridge than *G. whitei*. In AMNH 30037 the premaxilla has the thick labial ridge anteriorly; posterior to that is an inclined triturating surface; and posterior to that a more inclined surface forming a deep median concavity. Where the two surfaces are bent, the foramen praepalatinum penetrates the bone. In MDE 45 the foramen is visible on each side but the entire surface posterior to the labial ridge is flat; there is no inclination and no median concavity. In this skull, a medial process of the maxilla reaches the vomer to prevent the premaxilla from reaching the apertura narium interna. It is, of course, possible that MDE 45 is yet a third species distinct from *G. emringeri* and *G. whitei*, but it does agree with *G. whitei* in other features.

MAXILLA

PRESERVATION: The maxilla is present and nearly complete in all six *Galianemys whitei* skulls, and in four of the *Galianemys emringeri* skulls (AMNH 30037, AMNH 29985, AMNH 30035, and AMNH 30040); most show the sutures clearly.

CONTACTS: The vertical plate of the maxilla contacts the premaxilla anteromedially, the postorbital posterodorsally, the jugal posterodorsally (posterior to the postorbital), and the quadratojugal posteriorly. The horizontal plate (in ventral view) contacts the premaxilla anteromedially, the palatine posteromedially, and the jugal posteriorly. Among the 10 *Galianemys* skulls, the vomer is preserved only in MDE 45, a presumed juvenile of *G. whitei*. In this specimen the maxilla on both sides sends a process medially to meet the vomer and prevent the premaxilla from reaching the margin of the apertura narium interna. The condition is not determinable in either *Cearachelys* or *Kurmademys*.

STRUCTURES: The vertical plate of the maxilla forms the ventral orbital margin, the labial ridge, and the anterior part of the cheek. The dorsal process of the maxilla lies between the apertura narium externa and the orbit and is similar in size to that in *Cearachelys*, but thicker than in *Kurmademys*.

The snout just anterior to the orbit of some *Galianemys* specimens is more pinched—bent toward the midline—than others. In AMNH 29987 the pinching is most pronounced but other skulls of *Galianemys whitei*, AMNH 30036, AMNH 30028, and AMNH 29986, do not show this. This area of the maxilla in AMNH 29987 is rugose, and the pinching may be a pathology or just individual variation. The degree of pinching is the same on both sides. In *Galianemys emringeri* there is a slight pinching of the snout in the same area, but not to the extent seen in AMNH 29987. At present we interpret this as an individual variation of AMNH 29987.

The horizontal plate of the maxilla forms the floor of the orbit in dorsal view. The maxilla forms the ill-defined lateral edge of the foramen orbito nasale as in *Cearachelys* and other pelomedusoids.

The horizontal plate in ventral view forms most of the triturating surface. The triturating surface in *Galianemys* is very similar to that in *Cearachelys* in width and shape. It is slightly narrower than in *Kurmademys*. The labial ridge in *Galianemys* is distinctly thicker in both species than in *Cearachelys* and *Kurmademys*. The ridge is also thicker in *Galianemys emringeri* than in *Galianemys whitei*. In AMNH 30035 the ridge is thicker than in any other *Galianemys* specimen, but AMNH 29985 and AMNH 30037, the other two *G. emringeri* skulls, are also thicker than in any *G. whitei* skull. The type of *G. whitei*, AMNH 29987, has the thickest labial ridge in that species but it is still narrower than any of the *G. emringeri* skulls. Also, the labial ridge in *G. whitei* is relatively straight but in *G. emringeri*, particularly AMNH 30035 and AMNH 30037, the ridge has a slight medial trend anteriorly, making it thicker there.

At this point it should be mentioned that AMNH 30035 differs from other *Galianemys emringeri* skulls in being much larger, wider, more robustly ossified, and having thicker labial ridges. Because it has the other features of *G. emringeri* we include it in this species. The maxilla of this skull is particularly dis-

tinct in its more massive form and ossification.

The triturating surface is flat in the skulls of *Galianemys emringeri*, but in *G. whitei* there is a very shallow concavity formed mostly by the jugal, which is exposed on the triturating surface in this species. The palatine forms a significant part of the triturating surface in *Galianemys* as in *Cearachelys* and *Kurmademys*.

Vomer

Preservation: A small vomer is present only in one specimen of *Galianemys*, MDE 45, *Galianemys whitei*.

Contacts: The vomer contacts the premaxilla anteriorly, the maxilla anterolaterally, and the palatines posteriorly.

Structures: The vomer in *Galianemys* is slightly narrower than in *Cearachelys*, but it is expanded at both ends and separates the apertura narium interna. In contrast to most turtles which have the paired foramen praepalatinum on the vomer near the premaxilla suture, in *Galianemys* the foramina are in the middle of the premaxilla and not in the vomer.

Palatine

Preservation: The palatine is present in all six *Galianemys whitei* skulls and in four of the *Galianemys emringeri* skulls. It is missing in MDE 46 and AMNH 30026. Only MDE 45 has the thin, original anterior margin completely preserved.

Contacts: The palatine contacts the vomer anteromedially (preserved only in MDE 45), the maxilla anterolaterally, the other palatine medially, the pterygoid posteriorly, and the jugal posterolaterally (except in AMNH 29985, see Jugal). On the dorsal surface the palatine contacts the parietal posteriorly and the postorbital laterally.

Structures: Basically a flat bone, the palatine has differing relations on its ventral and its dorsal surfaces. On the ventral surface it forms the posteromedial part of the triturating surface and the posterior part of the choanal openings. These are all similar to *Cearachelys*. Posterolaterally the palatine forms the medial half of the foramen palatinum posterius. The foramen lies along a strong anterolateral process that is better developed in *Galianemys* than in *Cearachelys* and *Kurmademys*.

On the dorsal surface the palatine forms the posteromedial part of the orbital floor and the posterior margin of the foramen orbitonasale. There is a low dorsal process that meets the processus inferior parietalis. Lateral to this the palatine forms the anterior floor of the sulcus palatinopterygoideus.

Quadrate

Preservation: The quadrate is present in all 12 *Galianemys* skulls, although it is detached in MDE 45 and incomplete in AMNH 29985. All other specimens have at least one complete quadrate.

Contacts: In lateral view the quadrate contacts the quadratojugal anteriorly and the squamosal posterodorsally. In dorsal view the quadrate contacts the prootic anteromedially, the supraoccipital medially, and the opisthotic posteromedially. The supraoccipital contact is unusual for turtles. It occurs in *Cearachelys*, *Kurmademys*, *Foxemys*, *Polysternon*, *Rosasia*, and *Bothremys*, but not *Taphrosphys*, *Azabbaremys*, *Zolhafah*, and other pleurodires. In ventral and posterior views the quadrate contacts the pterygoid anteromedially, the basisphenoid medially, the basioccipital, the exoccipital and the opisthotic posteromedially, and the squamosal posterolaterally. In *Galianemys emringeri* the quadrate forms the posterior part of the deep pterygoid pit which exposes the prootic, so in that species there is a quadrate-prootic contact.

Structures: In lateral view the quadrate in *Galianemys* does not form part of the temporal margin due to the quadratojugal-squamosal contact. The cavum tympani and its associated structures dominate the lateral view. The cavum itself is slightly deeper in *Galianemys* than in *Cearachelys*, but as in *Cearachelys*, there is no fossa precolumellaris, a structure seen in *Kurmademys*. The incisura columellae auris is completely closed by the quadrate and separated from the eustachian tube opening by bone. In *Cearachelys* the incisura is open but it is closed in *Kurmademys* as in *Galianemys*. The incisura in *Galianemys* is teardrop-

shaped with the acute tip pointed posteriorly in contrast to the symmetric oval of *Kurmademys* and most bothremydids. The apex of the teardrop shape in *Galianemys* is continued posteriorly as a trough that opens into the eustachian tube notch.

The antrum postoticum in *Galianemys* is present and completely developed, and is best seen in AMNH 30037, AMNH 29985 (internally, with the squamosal removed), and AMNH 30027. Its size varies slightly but perceptibly among the available skulls. It is smaller in AMNH 29987, AMNH 30028, and AMNH 29986, all *G. whitei*, and larger in AMNH 29985, AMNH 30037, and AMNH 30035, all *G. emringeri*. This is consistent with the recognition of two species but AMNH 30036, a specimen of *G. whitei* has a larger antrum, similar to that in *G. emringeri*. Among other genera, the antrum postoticum of *Galianemys* is smaller than that in *Cearachelys* and much smaller than that in *Kurmademys* and pelomedusids. It is larger, however, than in *Taphrosphys* and *Bothremys*.

The groove for the eustachian tube in *Galianemys* is a nearly enclosed oval trending dorsomedially to ventrolaterally. It is open at its lateral end. It is narrow and extends for half of the distance between the incisura collumellae auris and the edge of the cavum tympani; there is no bone covering the other half. In *Kurmademys* the eustachian opening is wide open laterally, not constricted. In *Cearachelys* the eustachian opening and the incisura columellae auris are confluent. In other bothremydids, such as *Taphrosphys* and *Bothremys*, the eustachian groove or notch is more widely open laterally and farther separated from the incisura columellae auris.

The foramen stapedio-temporale in *Galianemys*, formed in the quadrate-prootic suture, is on the anterior surface of the otic chamber as in nearly all other bothremydids, but it is not very close to the foramen nervi trigemini as in *Bothremys* and other genera. In *Kurmademys* this foramen is slightly more posterior, just enough to make it more visible in dorsal view. It is only slightly more anterior in *Kurmademys* than in pelomedusids and we judge the condition to be the same in both and primitive with respect to all other bothremydids.

On the ventral surface, the quadrate forms the lateral margin of the foramen posterius canalis carotici interni in *Galianemys whitei*, but not in *G. emringeri* (see Pterygoid for discussion). In *G. emringeri* the quadrate and the prootic form a portion of the posterior wall of the large fossa pterygoidei (see Pterygoid for discussion). The condylus mandibularis in *Galianemys* is very similar in both species in position and shape. The condylus mandibularis is in about the same position with respect to the condylus occipitalis in *Cearachelys* and *Galianemys*, but in *Kurmademys* the condylus mandibularis is more anteriorly placed. The foramen for the chorda tympani is preserved in nearly all the *Galianemys* skulls and it is very close to its position in pelomedusids.

In posterior view the quadrate forms a number of structures in the occipital area. The quadrate forms the lateral margin of the fenestra postotica and its subdivisions. In *Galianemys* the fenestra postotica is preserved in nine skulls. In two of these the fenestra is subdivided into smaller foramina; in the rest there may be low ridges or spurs but these do not connect to completely subdivide the fenestra. The subdivided specimens are AMNH 30037, a skull of *Galianemys emringeri*, and AMNH 30027, a skull of *G. whitei*. Neither species shows more of a tendency toward subdivision than the other among the available material. In AMNH 30037 the fenestra postotica is subdivided into two foramina, an upper one presumably for the stapedial artery and a lower one presumably for the lateral head vein. In AMNH 30027, however, there are three foramina, as a result of the lower foramen being further subdivided into two. One of these must be the lateral head vein, but the other is a mystery. One foramen is ventral and the other ventrolateral. In AMNH 30027 this subdivision into three foramina was present on both sides, but was broken during preparation. The other skulls of both *Galianemys* species have variably developed grooves or spurs that are less ossified indications of these structures. In any case, the subdivision of the fenestra postotica in *Galianemys* is interpreted as an individual variation. In the majority of individuals it is

open as a narrow gap from the foramen jugulare posterius to the aditus canalis stapedio-temporalis, a condition also seen in *Cearachelys*.

Pterygoid

Preservation: The pterygoid is present in the three adult *Galianemys emringeri* skulls, AMNH 30035, AMNH 30037, and AMNH 29985, and in all five adult *G. whitei* skulls, AMNH 30036, AMNH 29987, AMNH 29986, AMNH 30028, and AMNH 30027. Among the juveniles it is present on both sides in *Galianemys emringeri*, AMNH 30040, but only partially in *Galianemys whitei*, MDE 45.

Contacts: On the ventral surface, the pterygoid in *Galianemys* has the usual pelomedusoid contacts: palatine anteriorly, the other pterygoid anteromedially, basisphenoid posteromedially, and quadrate posterolaterally. In *Galianemys emringeri* there is also a posterior contact with the prootic which is present but not visible in *Galianemys whitei*.

On the dorsal surface, the pterygoid of *Galianemys* also has the usual pelomedusoid contacts. The processus trochlearis pterygoidei contacts the postorbital dorsolaterally, jugal anterolaterally, and palatine anteroventrally. The crista pterygoidea contacts the palatine anteriorly, parietal dorsally, prootic posterodorsally, and quadrate posteriorly.

Structures: On the ventral surface the pterygoid of both species shows differences in the structures around the foramen posterius canalis carotici interni. In *Galianemys whitei* the foramen is formed anteriorly by the pterygoid and posteriorly by the basisphenoid. There is a slightly depressed area marking the attachment site of the M. pterygoideus, but the area medial to the quadrate ramus of the pterygoid in *G. whitei* is not a deep depression. In *G. emringeri*, however, the M. pterygoideus attachment area, the fossa pterygoidei, is a deep depression as seen in some other bothremydids like *Foxemys* and *Polysternon* as well as *Nigeremys* and *Arenila*. This development of the fossa pterygoidei in *G. emringeri* ''erodes'' the quadrate, pterygoid, and basisphenoid as described in *Kurmademys* (Gaffney et al., 2001b) and exposes structures present but not visible in the more ossified *G. whitei*. Thus, in *G. emringeri*, the foramen posterius canalis carotici interni is more anterior and formed mostly by the basisphenoid with only a small pterygoid contribution to its margin. The deep fossa pterygoidei in *G. emringeri* exposes the prootic and the foramen nervi facialis within the prootic. In the anterior wall of the fossa pterygoidei the pterygoid has a small foramen exposed: the foramen nervi vidiani. In CT scans of AMNH 29987 and AMNH 30035 the entire canalis nervi vidiani can be followed.

The foramen palatinum posterius in *Galianemys* is formed by palatine and pterygoid as in *Cearachelys* and *Kurmademys*. The processus trochlearis pterygoidei is very similar in both species of *Galianemys* and is similar in size and orientation to that process in *Kurmademys* and *Cearachelys*.

Structures on the dorsal surface of the pterygoid in *Galianemys* are visible and well preserved in a number of specimens. The sulcus palatinopterygoideus is floored by the pterygoid as in all pleurodires and in *Galianemys* its size is about the same as in *Cearachelys*, but longer than in *Kurmademys* and pelomedusids. The crista pterygoideus meets the palatine anteriorly and the processus inferior parietalis dorsally. It is lower than the palatine dorsal process. Posteriorly the crista pterygoideus forms the ventral margin of the foramen nervi trigemini. The anterodorsal margin of this foramen is formed by the parietal and its posterior margin by the prootic.

Supraoccipital

Preservation: The supraoccipital is present in all the adult *Galianemys* and in

AMNH 30040, but the crista supraoccipitalis is broken in all of them.

Contacts: As in other pleurodires the supraoccipital of *Galianemys* contacts the parietals dorsally, the prootic anterolaterally, the opisthotic posterolaterally, and the exoccipitals posteroventrally. In both species of *Galianemys* there is also a supraoccipital-quadrate contact laterally that separates the prootic and opisthotic. This contact also occurs in *Kurmademys*, *Cearachelys*, *Bothremys*, *Rosasia*, *Foxemys*, and *Polysternon*, but

not in *Zolhafah*, *Taphrosphys*, and *Azabbaremys*.

STRUCTURES: The crista supraoccipitalis is best preserved in AMNH 29985, AMNH 30028, and AMNH 29987 in which it extends just posterior to the foramen magnum. However, it ends in a broken edge so its total length is unknown. The supraoccipital forms the dorsal edge of the foramen magnum as in most turtles. The cavum labyrinthicum can be seen in the CT scans and AMNH 29985.

EXOCCIPITAL

PRESERVATION: The exoccipital is present in all the adult *Galianemys*, AMNH 30040 and AMNH 30026, but not in MDE 45.

CONTACTS: The exoccipital in *Galianemys* has the usual pelomedusoid contacts: supraoccipital dorsally, opisthotic laterally, basioccipital ventrally; it has a bothremydid synapomorphy, the quadrate ventrolaterally.

STRUCTURES: The condylus occipitalis in *Galianemys* is tripartite, with the exoccipitals and basioccipital making up one-third each. This is also the condition in *Kurmademys*, but in *Cearachelys* and all other bothremydids the basioccipital is excluded. There are two foramina nervi hypoglossi ventrolateral to the foramen magnum as in *Cearachelys* and *Kurmademys*, with the upper one larger and the lower one close to or in the exoccipital-basioccipital suture.

The foramen jugulare posterius is closed in AMNH 30037 (*G. emringeri*), AMNH 30028 (*G. whitei*), and AMNH 30027 (*G. whitei*) and on the left side of AMNH 30035 (*G. emringeri*), but never by the surrounding exoccipital. Rather, the opisthotic and quadrate (see Quadrate for discussion) meet to close it off. Nonetheless, the foramen jugulare posterius is not widely open in any of the specimens.

BASIOCCIPITAL

PRESERVATION: The basioccipital is present in all the *Galianemys* skulls, except the juvenile MDE 45.

CONTACTS: As in other bothremydids the basioccipital of *Galianemys* contacts the basisphenoid anteriorly, the quadrate laterally, and the exoccipital dorsally.

STRUCTURES: The basioccipital forms the ventral third of the condylus occipitalis in both species of *Galianemys*. The bone is wider than long as in most other pelomedusoids. The posterolateral corner of the basioccipital is extended into a paired shelflike tuberculum basioccipitale, distinctly larger than those in *Cearachelys*. A shallow, median concavity lies between the tuberculum basioccipitale as in *Cearachelys* and *Kurmademys*.

PROOTIC

PRESERVATION: The prootic is present in all of the *Galianemys* specimens except MDE 45.

CONTACTS: The usual suspects are the parietal medially, the quadrate laterally, the supraoccipital posterodorsally, and the pterygoid ventrally. Due to the supraoccipital-quadrate contact there is no prootic-opisthotic contact, as in nearly all turtles except Bothremydidae, Baenidae, and *Annemys* (Sukhanov, 2000).

STRUCTURES: The blocklike prootic is exposed in the fossa temporalis where it forms the dorsolateral margin of the foramen nervi trigemini as in other turtles. The prootic also forms the medial margin of the foramen stapedio-temporale, which is placed on the anterior face of the otic chamber as in all other bothremydids except *Kurmademys* where it is more dorsally placed. However, the foramen stapedio-temporale in *Galianemys* is not very close to the foramen nervi trigemini as it is in all bothremydids except *Cearachelys* and *Kurmademys*.

The prootic is exposed ventrally in *Galianemys emringeri* in the roof of the deep fossa pterygoidei. The prootic forms the ventrally opening foramen nervi facialis which can be traced dorsally into the fossa acusticofacialis in the CT scans and in the broken otic chamber of AMNH 29985.

OPISTHOTIC

PRESERVATION: The opisthotic is present in all the *Galianemys* except MDE 45, but it is obscured by matrix and breakage in AMNH 30040.

CONTACTS: As in other turtles: supraoccipital anteromedially, quadrate anterolaterally, squamosal posterolaterally, and exoccipital

posteromedially. In contrast to most other turtles, there is no opisthotic-prootic contact. There is also a narrow, ventral contact with the quadrate in the fenestra postotica of some individuals.

STRUCTURES: The opisthotic forms much of the roof of the cavum acustico-jugulare and forms the dorsal margin of the fenestra postotica (see Quadrate) and foramen jugulare posterius (see Exoccipital). In *Galianemys* there is some variation in the subdivision of the fenestra postotica and the foramen jugulare posterius (see above), but there is still a common morphology that *Galianemys* shares with *Cearachelys*. The foramen jugulare posterius in all *Galianemys* is vertically compressed to form a horizontal slit extending laterally and never closed by the exoccipital. In all *Galianemys* the opisthotic variably constricts this slit by meeting or nearly meeting a similar process or ridge from the quadrate ventrally. In four *Galianemys* specimens the quadrate meets the opisthotic to close off the slit (see table 1), but in the others it communicates laterally with the fenestra postotica. In some *Galianemys*, such as AMNH 30037, the opisthotic forms a thick wall between the foramen jugulare posterius and the fenestra postotica, or there may be only a thin separation as in AMNH 30035.

The internal morphology of the cavum acusticojugulare can be seen in some of the specimens as well as the CT scans, and this will be dealt with in a future paper.

BASISPHENOID

PRESERVATION: The basisphenoid is present in all of the *Galianemys* specimens except MDE 45.

CONTACTS: The contacts of the basisphenoid common with other turtles are pterygoid anterolaterally and basioccipital posteriorly. All Podocnemididae and Bothremydidae including *Galianemys* have a broad lateral contact with the quadrate. In *G. emringeri* the basisphenoid contacts the prootic laterally, but in *G. whitei* the pterygoid-quadrate contact covers this. In both *Galianemys* species as well as all other turtles the prootic contacts the basisphenoid internally at least (visible in the medial view of a sectioned cavum cranii). The prootic-basisphenoid contact is exposed in *G. emringeri* by the deep fossa pterygoidea characteristic of that species. In *Kurmademys* the prootic and its associated foramen nervi facialis are exposed, but not in *Cearachelys*. Thus, there is an exposed prootic-basisphenoid contact in *Kurmademys*.

STRUCTURES: The fossa pterygoidei is large in *Galianemys emringeri* and the basisphenoid forms the medial wall of this depression. The basisphenoid also forms most of the foramen posterius canalis carotici interni which is oriented nearly vertically in *G. emringeri* rather than nearly horizontal as in *G. whitei*.

The structures on the dorsal surface of the basisphenoid are visible in a number of *Galianemys* specimens of both species, particularly AMNH 29986 and AMNH 30026. There is a rodlike rostrum basisphenoidale without a dorsal ridge, an oval sella turcica with posterior, laterally placed foramen anterius canalis carotici interni, and a slightly ovehanging dorsum sellae. The processus clinoideus is a distinct anterolateral process with the sulcus cavernosus lateral to it. There is no indication of a foramen caroticum laterale.

RELATIONSHIPS

Galianemys is a pleurodire because it has these synapomorphies of the group listed by Gaffney and Meylan (1988) as diagnostic for Pleurodira: (1) processus trochlearis pterygoidei present, (2) quadrate process below cranioquadrate space, (3) epipterygoid absent, and (4) foramen palatinum posterius behind orbit. It is a member of the Pelomedusoides (sensu Broin, 1988; Meylan, 1996; Lapparent de Broin and Werner, 1998) because it has these characters: (1) nasal absent and (2) prefrontals meeting on midline. *Galianemys* is a member of the family Bothremydidae because it has these characters: (1) precolumellar fossa absent, (2) foramen stapedio-temporale facing anteriorly, (3) eustachian tube separated from stapes by bone, and (4) exoccipital-quadrate contact. Within the Bothremydidae, *Galianemys* seems to be most closely related to *Cearachelys* (Gaffney et al., 2001a) because of the retracted jugal in both.

Galianemys differs from *Cearachelys* (see table 1) particularly in having a wider interorbital space, a thicker labial ridge (in both species compared to *Cearachelys*), a closed incisura columellae auris, much smaller antrum postoticum, and a condylus occipitalis made up of both exoccipitals and the basisphenoid. Whether or not *Cearachelys* and *Galianemys* are allied with the *Bothremys* Group of Lapparent de Broin and Werner (1998) or are the sister to the *Bothremys* Group plus the *Nigeremys* Group remains in question. At the present time a more rigorous phylogenetic analysis of bothremydids and pleurodires in general awaits the naming of currently known new taxa which affect the geometry of the cladogram.

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