

TURTLE SHELL REMAINS (TESTUDINES: BOTHREMYDIDAE) FROM THE CENOMANIAN OF MOROCCO

[Restos de quelonios (Testudines: Bothremydidae) del Cenomaniense de Marruecos]

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RESUMEN: Se describen un lóbulo delantero y una placa periferal aislada procedentes del Cenomaniense del sur de Marruecos. Se discute su determinación como *Galianemys*, de los estratos Kem Kem, pero este género se basa predominantemente en caracteres craneales. No es posible ubicarlos dentro de las dos especies conocidas hasta ahora, *Galianemys emringeri* o *Galianemys whitei*. También es imposible una comparación con los géneros *Hamadachelys* (Podocnemididae) y *Dirquadim* (Euraxemydidae), conocidos exclusivamente por su cráneo.

Palabras clave: Testudines, Bothremydidae, *Galianemys* sp., Cenomaniense, estratos Kem Kem, S. Marruecos.

ABSTRACT: From Cenomanian sediments of South Morocco a frontal plastron lobe and an isolated peripheral might become discussed with Kem Kem members of *Galianemys* (Bothremydidae), but that genus is based predominantly on cranial characteristics. A more detailed assignment to the two previously known species *Galianemys emringeri* or *Galianemys whitei* using carapace features is not possible. A comparison with the only skull taxa *Hamadachelys* (Podocnemididae) and *Dirquadim* (Euraxemydidae) is impossible also.

Key words: Testudines, Bothremydidae, *Galianemys* spec., Cenomanian, Kem Kem beds, South Morocco.

INTRODUCTION

In the collections of the Geocenter of University of Göttingen and Geomuseum there are two remains of turtles, which were collected in the 70s during student excursions. One specimen was *Spinosaurus*-remnants salvaged. Previously was a determination by isolated shell fragments difficult. Only through extensive comparative study on the skull characteristics of Bothremydidae by GAFFNEY *et al.* (2006) and the assignment of shell remains on several taxa is also a response of this material has become possible. The present turtle remains from Al Taouz in South Morocco will be described here and systematically filed.

SYSTEMATIC PALEONTOLOGY

Order Testudines Linnaeus, 1758

Infraorder Pleurodira Cope, 1864

Family Bothremydidae Baur, 1891

Subfamily Bothremydinae Baur, 1891

Infrafamily Cearachelyodda Gaffney, Tong & Meylan, 2006

Tribe Cearachelyini Gaffney, Tong & Meylan, 2006

Genus *Galianemys* Gaffney, Tong & Meylan, 2002

TYPE SPECIES: *Galianemys whitei* Gaffney, Tong & Meylan, 2002.

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

HORIZON: Cenomanian, Kem Kem beds.

CHARACTERS: For skull morphology see GAFFNEY, *et al.* (2006), for shell below.

FURTHER SPECIES: *Galianemys emringeri* Gaffney, Tong & Meylan, 2002.

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

HORIZON: Cenomanian, Kem Kem beds.

CHARACTERS: For skull morphology see GAFFNEY *et al.* (2006), for shell below.

DEPOSITIONAL ENVIRONMENT OF BOTH: According GAFFNEY *et al.* (2006) deltaic or fluvial (SERENO *et al.*, 1996; CAVIN *et al.*, 2001), found with dinosaurs and other freshwater/terrestrial fauna DUTHEIL (1999a,b) and NOUBHANI & CAPETTA (1997).

GEN. ET SPEC. INDET.

MATERIAL: GZG.V.22.664, a complete anterior plastron lobe, leg. H. Alberti, O. Cherif, U. Gorge in 1971 (plate 1).

LOCALITY: Tafikalt Taouz, Hammada du Guir, ca. 5 km NE of Taouz, South Morocco.

HORIZON: Lower Cenomanian, Cretaceous.

DESCRIPTION: Intergular large and wide; gulars not wider than intergular; humeropectoral sulcus posterior to epihyoplastral, but the median part crossing clearly the entoplastron; pectoroabdominal sulcus crossing the mesoplastron; hyohyoplastral suture straight.

GEN. ET SPEC. INDET.

MATERIAL: GZG.V.22.665, a single peripheral, leg. H. Alberti, O. Cherif & U. George 1971.

LOCALITY: 5 km northestern of Taouz, Hammada du Guir, Morocco.

HORIZON: Upper Albinian to lower Cenomanian, Cretaceous, together with *Spinosaurus*.

DESCRIPTION: The plate is striking plan with a smooth surface. The marginal sulcus lies at the proximal boundary edge. The sutural surfaces are relatively smooth also.

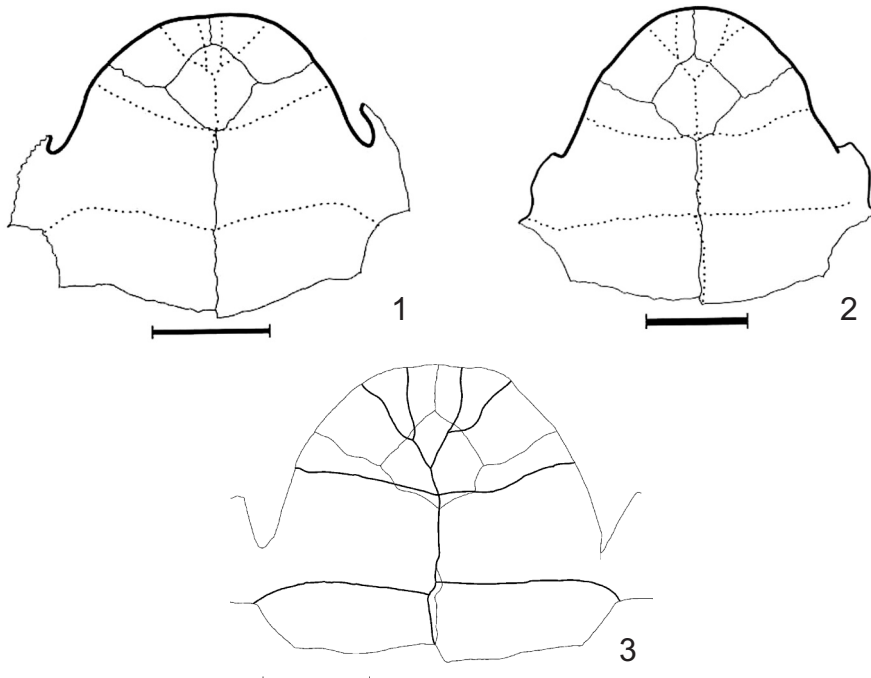


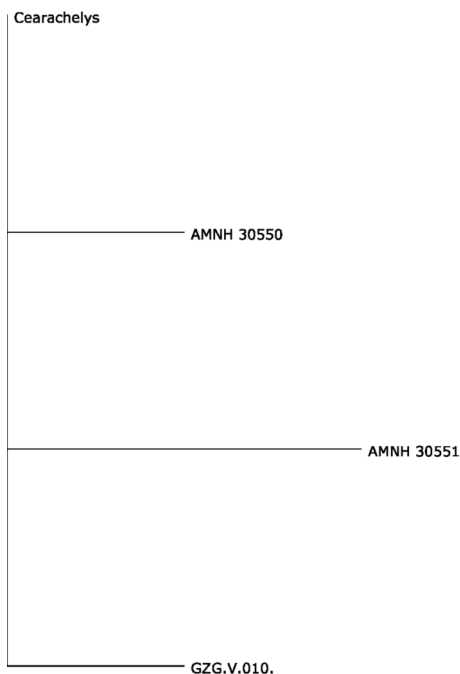
Figure 1. The hitherto known plastra of *Galianemys* represents probably two species: 1= cf. *Galianemys emringeri* (AMNH 30551), 2= cf. *Galianemys whitei* (AMNH 30550), both from the Kem Kem beds, according GAFFNEY, TONG & MEYLAN (2006), 3= line drawing of *Galianemys* spec. (GZG.V.010.404) by Heike Künzel, Weimar. Scale bars 5 cm.

COMPARISON OF CHARACTERS (adapted by table 22 according GAFFNEY *et al.* (2006):

The character distribution between GZG.V.22.664 and the hitherto known plastral remains of *Galianemys* from the Kem Kem formation is follow:

1= intergular, 2= gular much wider than intergular, 3= humeropectoral sulcus posterior to epihyoplastral suture, 4= humeropectoral sulcus clearly crossing the entoplastron, 5= pectoroabdominal sulcus crossing mesoplastron, 6= hyohyoplastral suture angular or straight. 7= locality and horizon = (Mor.= Morocco, Br.= Brazil).

Character	GZG.V.22.664	AMNH 30551	AMNH 30550	<i>Cearachelys</i>
1	large, wide (1)	small,narrow (0)	large, wide (1)	large, wide (1)
2	no (1)	yes (0)	no (1)	no (1)
3	yes (0)	yes (0)	yes (0)	yes (0)
4	yes (1)	no (0)	no (0)	no (0)
5	yes (0)	yes (0)	no (1)	yes (0)
6	straight (0)	angular (1)	angular (1)	straight (0)
7	Cenomanian, Mor.	Kem Kem, Mor.	Kem Kem, Mor.	Santana Fm, Br.



Outtree by DOLMOVE (Joseph FELSENSTEIN) requires a total of 4.000 between *Cearachelys* (length 0.00), AMNH 30550 (length 1.00), AMNH 30551 (length 2.00) and GZG.V.22.664 (length 1.00).

With respect to the other known plastra of Bothremydidae/Euraxemydidae and Araripemydidae, GZG.V.22.664 show a separate position:

1= Frontal lobe clearly wider than long, 2= entoplastron clearly longer than wide, 3= intergular crossing the entoplastron, 4= intergular reaching the middle of the entoplastron or beyond it, 5= gulars reaching the entoplastron, 6= humeropectoral sulcus reaching the entoplastron, 7= humeropectoral sulcus reaching the epiplastrals, 8= pectoroabdominal sulcus crossing the mesoplastrals.

	1	2	3	4	5	6	7	8
<i>Euraxemys</i>	0	1	1	0	0	0	0	1
<i>Kurmademys</i>	?	0	?	?	?	1	1	0
<i>Cearachelys</i>	1	0	1	0	0	0	0	1
<i>Foxemys</i>	1	0	1	0	0	1	1	0
<i>Polysternon</i>	1	0	1	0	0	1	1	0
<i>Rosasia</i>	1	0	1	1	0	0	0	1
<i>Araiochelys</i>	?	0	?	?	?	1	0	0
<i>Chedighaii</i>	1	0	1	0	0	1	0	1
<i>Taphrosphys</i>	1	0	1	1	0	1	0	?
<i>Ummulisani</i>	1	0	1	1	1	0	0	1
<i>Elochelys</i>	1	0	1	1	0	1	1	0
<i>Galianemys</i>	1	0	1	0	1	1	0	1
<i>Bairdemys</i>	1	0	1	0	0	1	1	0
GZG.V.010.404	1	0	1	1	1	1	0	1

Outtree by DOLMOVE: (V.010.404, (*Bairdemys*, (*Galianemys*, (*Elochelys*, (*Ummulisani*, (*Taphrosphys*, (*Bothremys*/*Chedighaii*, (*Araiochelys*, (*Rosasia*, (*Polysternon*, (*Foxemys*, (*Cearachelys*, (*Kurmademys*, *Euraxemys*))))))))))

Most of 60 trees by PARS shown V.010.404 in relation to *Galianemys* and *Ummulisani*, e.g.:

((((V.010.404: 0.00,*Galianemys*: 1.00): 1.00, *Ummulisani*: 0.00): 1.00, *Rosasia*: 0.00): 1.00, *Cearachelys*: 0.00 (*Bothremys*/*Chedighaii*: 0.00 (*Taphrosphys*: 1.00, *Araiochelys*: 0.00 (*Bairdemys*: 0.00, *Elochelys*: 1.00, *Polysternon*: 0.00, *Foxemys*: 0.00, *Kurmademys*: 0.00): 1.00): 1.00): 1.00, *Euraxemys*: 2.00) [0.0167]

DISCUSSION

The hitherto known shells from the Kem Kem beds probably belong to *Galianemys*. But, the shells are not identical and may represent the skull based

species *Galianemys emringeri* and *Galianemys whitei*. That two species of *Galianemys* are the best known bothremydids by skulls (GAFFNEY *et al.*, 2006). The new specimen GZG.V.010.404 shows relationships to the hitherto described shells especially to AMNH 30551 (Fig. 1-1), but clear differences shown in the character analysis of the other known genera may be caused by an own separated position. According GAFFNEY *et al.* (2006) other Cenomanian turtle species of the Kem Kem beds such as *Hamadachelys* (Podocnemididae) and *Dirquadim* (Euraxemydidae) are known by skulls only. Several indeterminate turtle remains from the lower Cretaceous, the Kem Kem formation also, was listed by GMIRA (1995). The material is discussed as indeterminate Pleurodira, Pelomedusoidea and Bothremydidae, one hyoplastral fragment as *Araripemys* spec. (Araripemydidae).

We need more complete material with skulls. Open nomenclature is the most usefully conclusion for our present material.

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Figure 2. GZG.V.010.404, a new single peripheral of a possibly bothremydid turtle from the Cenomanian of Morocco; 1= dorsal view, 2= visceral view. Photo Max Hundermark, Göttingen, plate by Dirk Urban, Erfurt. Scale bar 1 cm.

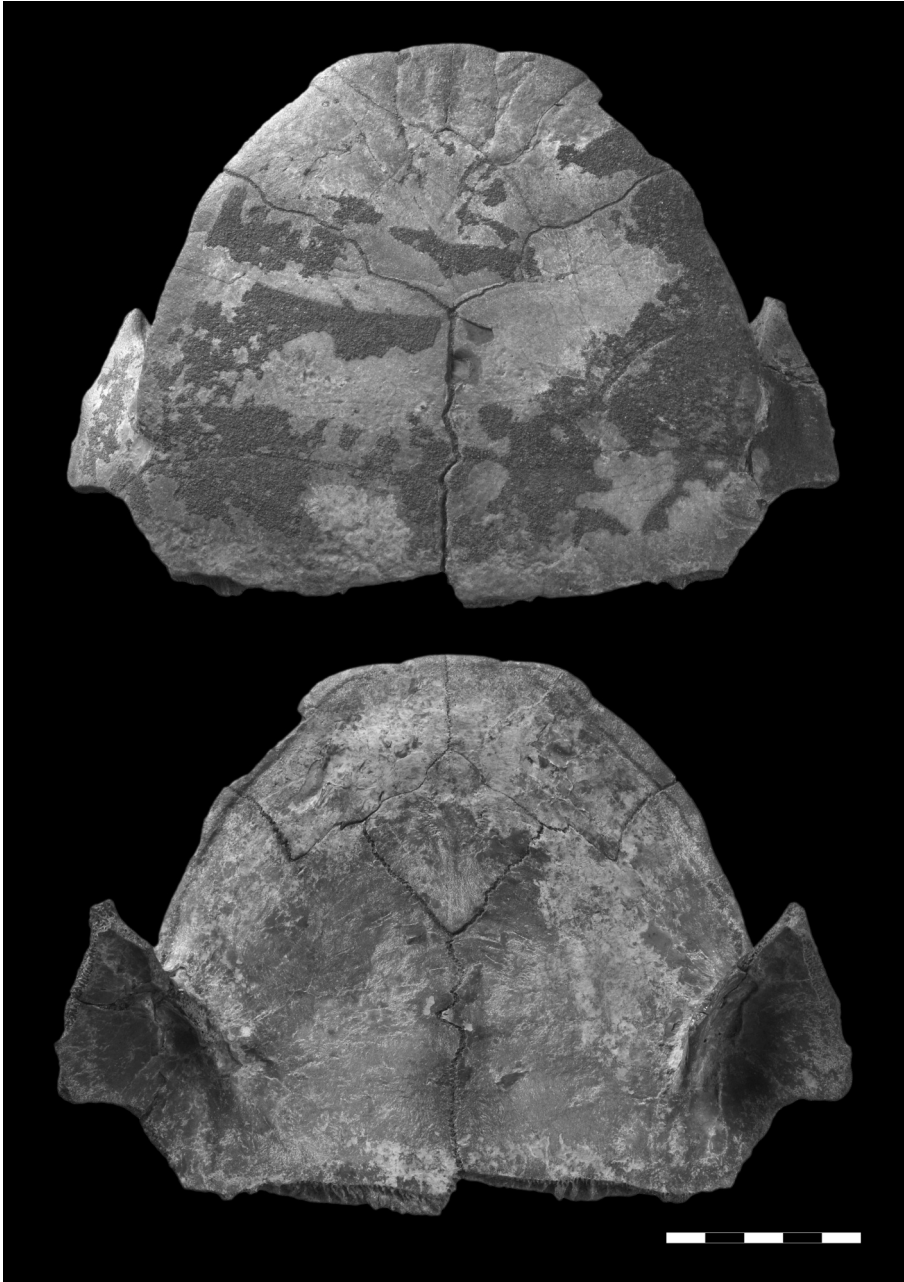


Plate 1. GZG.V.010.404, the frontal plastron half of Galianemys spec. from the lower Cenomanian of Hammada du Guir, ca. 5 km NE of Taouz, South Morocco. Photo Max Hundertmark, Göttingen, plate by Dirk Urban, Erfurt. Scale bar 5 cm.

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