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THE OLDEST TRUE SEA TURTLE OF THE WORLD, *OERTELIA GIGANTEA* (OERTEL, 1914) N. GEN. FROM THE APTIAN OF KASTENDAMM NEAR HANOVER, GERMANY

[La más antigua tortuga marina verdadera del mundo,* Oertelia gigantea *(Oertel, 1914) nov. gen., del Aptiense de Kastendamm, cerca de Hanover, Alemania]

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ABSTRACT: The hitherto unknown original sample to *Toxochelys gigantea* Oertel, 1914 is first described and evaluated. A redescription is presented in connection with the original description of the skull material which is lost as holotype. The new genus *Oertelia* n. gen. is proposed and discussed. It is the oldest true sea turtle so far.

Key words: *Oertelia gigantea* (Oertel, 1914) n. gen., Early Cretaceous, Aptian, Northern Germany, oldest true sea turtle, description and comparison.

RESUMEN: Se describe y evalúa por primera vez el hasta ahora desconocido ejemplar original de *Toxochelys gigantea* Oertel, 1914. Se presenta una nueva descripción en relación con la original del material craneal, que se pierde como holotipo. Se propone y discute el nuevo género *Oertelia*. En este momento es la más antigua tortuga marina quelonídea conocida.

Palabras clave: *Oertelia gigantea* (Oertel, 1914) nov. gen., Cretácico Inferior, Aptiense, Norte de Alemania, más antigua tortuga quelonídea, descripción y comparación.

INTRODUCTION

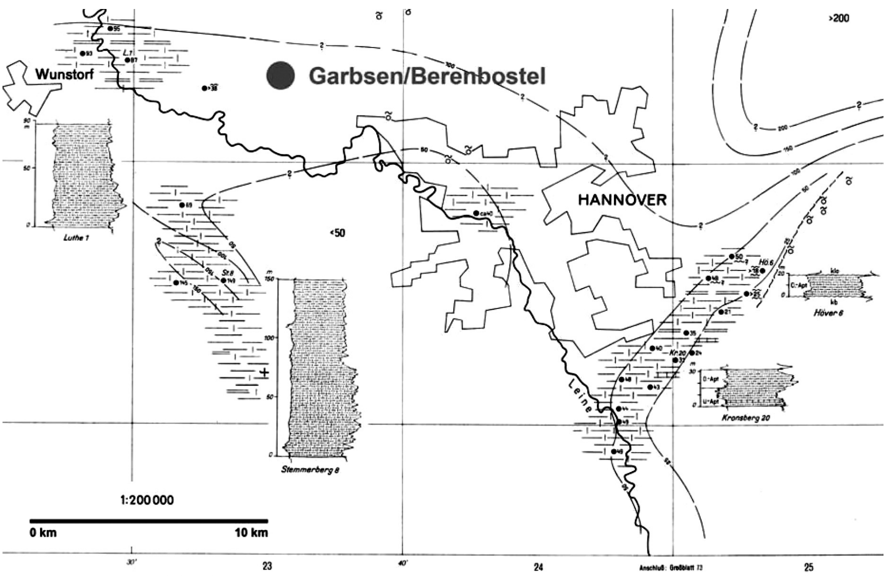

Figure 1. Geographical position of Kastendamm, Garbsen near Hanover, Lower Saxony, Germany, from BIERMANN *(2010).*

At the beginning of the last century Walter Oertel (*28.07.1889-†01.12.1924) described a skull of a sea turtle, which he designated as *Toxochelys gigantea* Oertel, 1914. During the 1st World War, no exchange of ideas took place in the scientific world and therefore his publication was hardly known. After the 2nd World War, Oertel's material could not be found and since then it was considered lost. Meanwhile, while the new organisation of the scientific collection of the Geoscience Centre of Göttingen (GZG) in 2007, the original packaged material from 2nd World War has been found. A comparison of the rediscoverd fragments with the catalogue statements, provided the identification of the original material of *Toxochelys gigantea*. Oertel's original figures from 1914 only shows the skull of a sea turtle, which probably broke up during the war, if it ever had been complete. Currently, the rediscovered postcranial material by BIERMANN (2010) is topic of a thesis recorded and processed scientifically. Today post cranial material, far richer but partly fragmentary also exists, which derives from the same locality. This, in connection with the original material allows a review. The location of the specimen was the so-called *Hoplites Deshayesi*-Zone (Lower Aptian) of Kastendamm near Garbsen close to Hanover. Probably, the locality which comes into consideration is the western end of so-called road Kastendamm of the city Berenbostel/Garbsen. There, according to the geological map of 1978, Aptian sediments are exposed. In the corresponding notes of this map, the brick clay mine Windmeyer & Schünhoff from Kastendamm at Berenbostel is mentioned. Today, the Berenbostel-Lake is located there. The brickyard with clay quarrying was in operation from 1890 until 1922.

LOCALITY AND HORIZON

Concerning the site, OERTEL wrote in 1914 only "[…] in the lower Aptian Kastendamm near Hanover […]". Only the western end of the Kastendamm at Berenbostel/Garbsen can be considered as the site in question. On the geological map of Lower Saxony, leaf 3523 Garbsen (ROHDE, 1978) there Aptian is mapped. On the western shore of Berenbostel-Lake layers of lower Aptian are outcropping, whereas south of the road, Aptian is covered by a thin layer of Quaternary sediments (ROHDE, 1978).

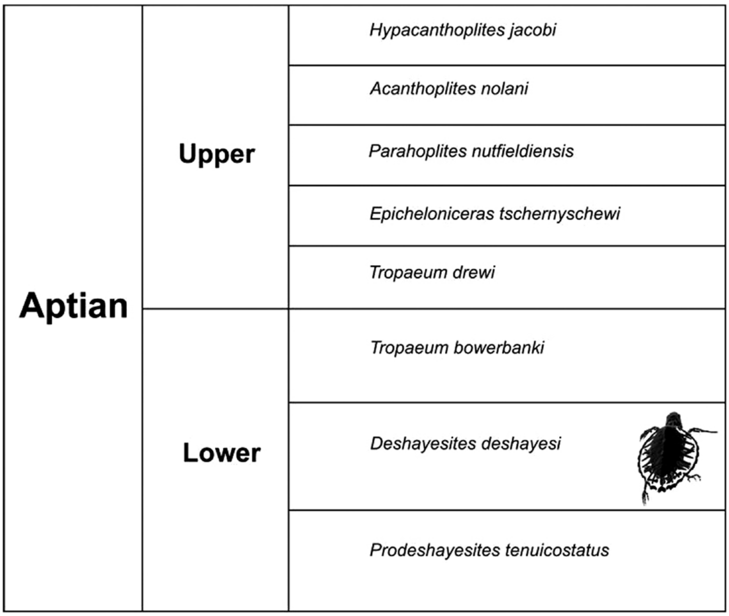

Figure 2. Stratigraphical position of the Deshayesites deshayesi *- zone using a figure of WYNEKEN (2001), Early Aptian, Lower Cretaceous (~120 Mio YB), from BIERMANN (2010).*

After OERTEL (1914), the material is from the *Hoplites deshayesi* - zone, which was established by VON KOENEN (1902). Von Koenen took his division of Aptian in the "[…] large clay pit of Windmeyer's brick factory at Kastendamm […]". This was the clay pit Berenbostel-Lake, from where also the material derives which was described by Oertel. The horizon, mentioned by him, belongs to the *Deshayesites deshayesi* - zone (STOLLEY, 1911; KEMPER, 1970, 1971; MUTTERLOSE, 2000a, 2000b; GRADSTEIN *et al.*, 2004) and, which is one of the eight ammonite zones, in which the Aptian in Germany is divided (MUTTERLOSE, 2000a, 2000b) (figure 2), see also the position of *Deshayesites deshayesi* (Leymerie, 1841) according ROPOLO *et al.*, 2006: "Occurrence: Beds 129a & b, 135, 150 of Comte Quarry section, *D. deshayesi* Zone. Distribution: Lower Aptian (*D. deshayesi* Zone) of England, North Germany, Bulgary, SE France (La Bédoule), Turkmenistan; Lower Aptian of Daghestan (Russia), Mangyshlak (Kazakhstan), Kopet Dagh (NE Iran)". The Aptian belongs to the early Cretaceous, and has no international standard subdivisions (MUTTERLOSE, 2000a). For Northern Germany, a subdivision in Lower Aptian and Upper Aptian (MUTTERLOSE, 2000a) is still used.

SYSTEMATIC PALAEONTOLOGY

Order Testudines Linnaeus, 1758

Infraorder Cryptodira Cope, 1868

Superfamily Chelonioidea Agassiz, 1857

Family Toxochelyidae Baur, 1895

Subfamily Lophochelyinae Zangerl, 1953

Genus *Oertelia* n. gen.

SYNONYMS: *Toxochelys* in part., *Ctenochelys* in part.

TYPE SPECIES: *Toxochelys gigantea* Oertel, 1914.

DIAGNOSIS: Palate area similar to *Toxochelys procax* Hay, 1905, but the roughness on the anterior choanal edge much stronger pronounced; vomer extends further posteriorly to the level of the pterygoidal processus, these also developed much clearer; smaller exoccipital angle; relatively long skull in relation to the width of mandibular joints.

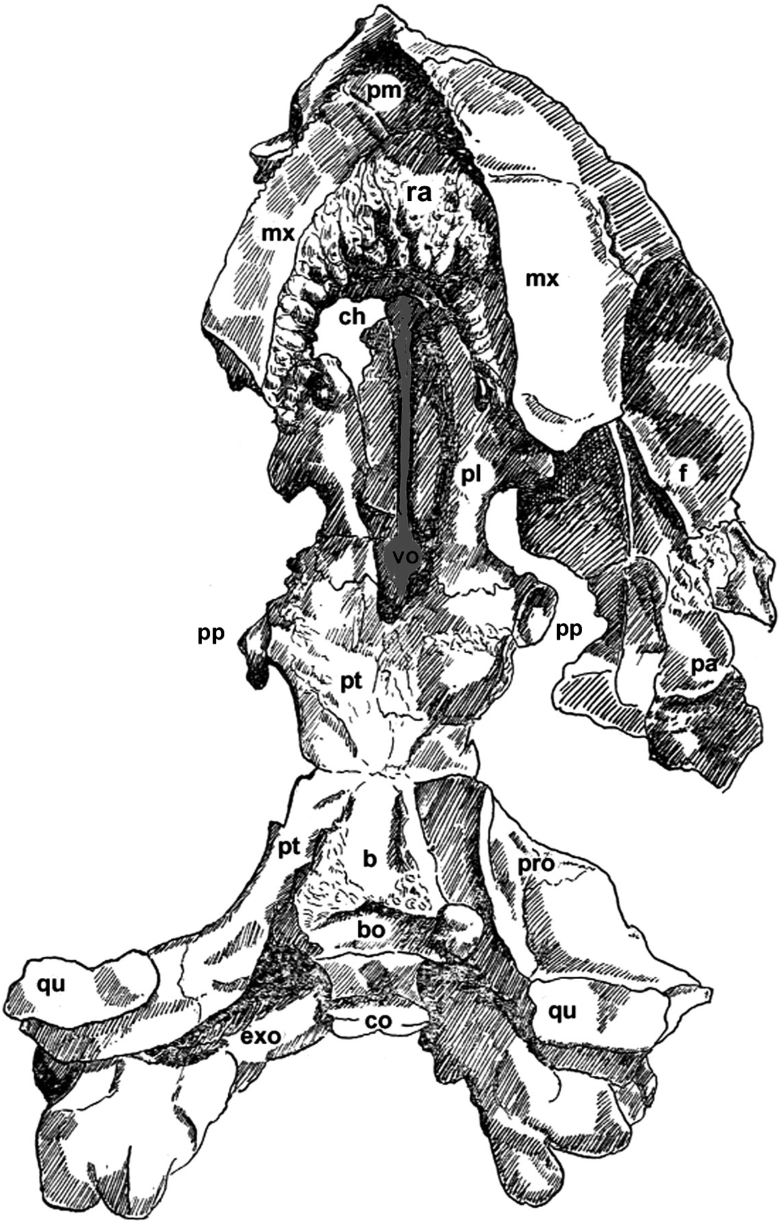

Plate 1. Oertelia gigantea *(Oertel, 1914), lost holotype from Kastendamm, Garbsen near Hanover, adapted from* Oertel *(1914): pm- premaxilla, mx- maxilla, ra- rough area, ch- choana, pl- palatine, f- frontal, vo- vomer, pt- pterygoid, b- basioccipital, pro- prooticum, bo- basioccipital, exo- exoccipital, co- condyle, qu- quadrate, pp- pterygoidal processus.*

Oertelia gigantea (Oertel, 1914)

SYNONYMS: See KUHN (1964) and KARL (2002).

HOLOTYPE: Lost skull remains described and figured by OERTEL (1914), plate 1 here.

LECTOTYPE: Trunk vertebra (GZG.V.5000).

TYPE LOCALITY: Kastendamm, Garbsen near Hanover (52,43° N; 9,58° E).

TYPE HORIZON: *Hoplites Deshayesi* - zone, according v. KOENEN (1902), Early Aptian, Lower Cretaceous (~120 Mio YB).

DIAGNOSIS: As for the genus.

DESCRIPTION OF THE LOST HOLOTYPE: OERTEL (1914) noted the following characteristics in the type specimen of *Toxochelys gigantea*: Prämaxillaria and maxillaria with attachment area for horn sheaths; external nasal opening very high up; präfrontalia far down up to the base of the nasal opening in the median line of the skull and raised backwards; frontals such as recent cheloniids; vomer long and narrow, with a sharp, rod-shaped extension between the palatins: contact with praefrontals, clear chewing surfaces (porous surface, attachment area for horn-sheaths) at the front end; palatins tilted narrow; inner choanae far back at the top of the palatins; pterygoids narrow, deeply cut, upper ends elognated to curved extensions; basisphenoid triangular and low cut at the baseline, well pointed between the pterygoids; quadrats hollowed out, with massive extensions; exoccipitals, opisthotics, pterygoids and quadrats form a fairly shallow cavity; opisthotics and prootics as in recent cheloniids; basioccipital narrow, deeply cut, and bead-like thickend at the contact with pterygoids, in the area of the occipital condylus rounded; tripartite occipital condylus; closed cranial roof.

POSTCRANIAL MATERIAL

Spinal column remains (GZG.V.5001; GZG.V.5002) and **trunk vertebra** (GZG.V.5000): The trunk vertebra has a length of 80 mm. In the middle, the breadth amounts 14,65 mm, and the ends 27,6 mm and 26,19 mm. See plate 2.

Scapula fragments (GZG.V.5026): There is only fragment of the scapula, which shows the joint, with parts of the acromion and the scapularprocessus. The bearing area of the joint is rounded and triangular with a surface of 11, 78 x 8, 37 mm. See plate 5.

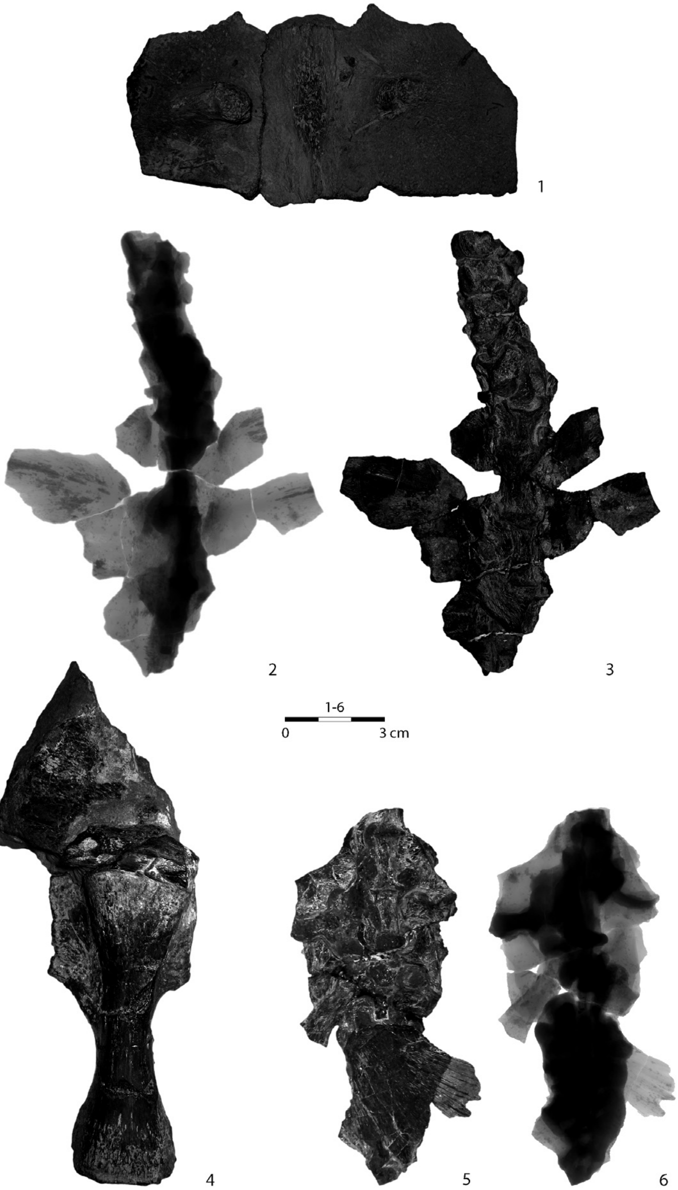

Plate 2. Oertelia gigantea *(Oertel, 1914). Vertebrae with carapace remains from Kastendamm, Garbsen near Hanover. 1: GZG.V.5003, neural I with proximate parts of pleurals I; 2: x-ray of GZG.V.5002, trunk vertebra; 3: GZG.V.5002, trunk vertebra; 4: GZG.V.5000, Lectotype, trunk vertebra; 5: x-ray of GZG.V.5001, trunk vertebra; 6: GZG.V.5001, trunk vertebra. Original. Scale bar = 3 cm. Photos Stefanie Biermann, design Heike Künzel, TLDA.*

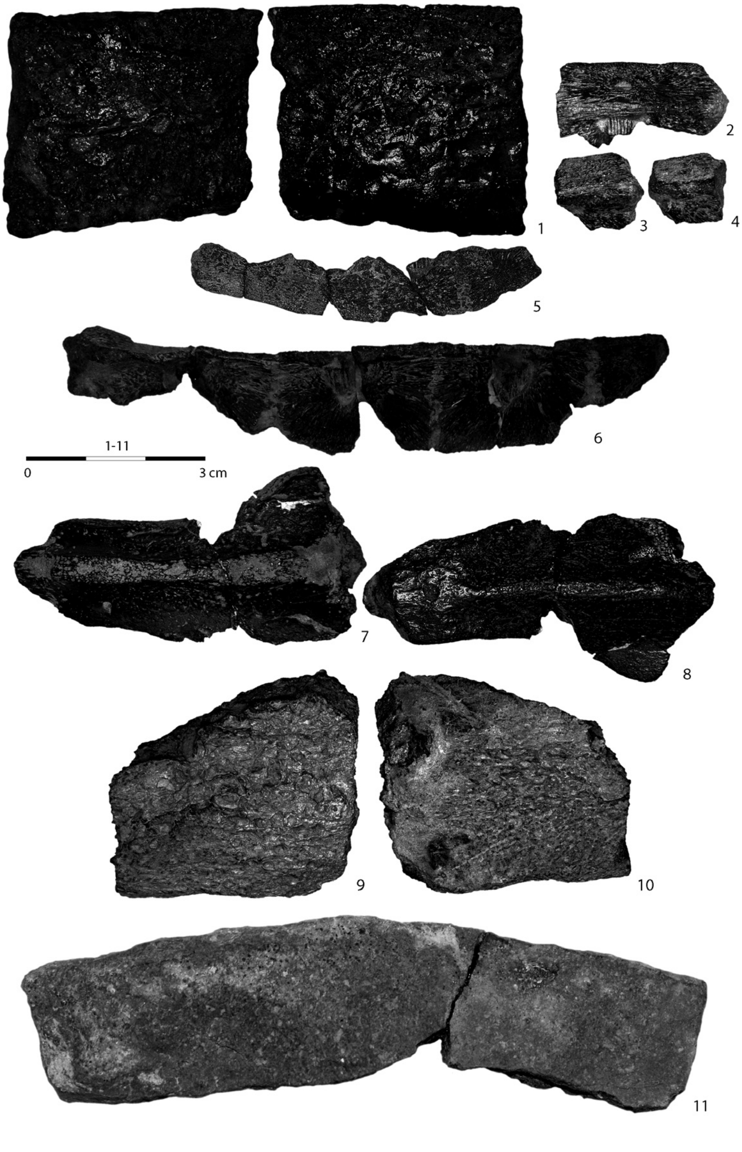

Plate 3. Oertelia gigantea *(Oertel, 1914). Carapace remains from Kastendamm, Garbsen near Hanover; 1: GZG.V.5017 in dorsal and visceral view, indeterminate plastron plate remain; 2-4: GZG.V.5010, indeterminate peripheral remains; 5: GZG.V.5023, peripheral row remain; 6: GZG.V.5009, peripheral row remain; 7: GZG.V.5011, neural with keel in visceral view; 8: GZG.V.5011, neural with keel in dorsal view; 9: GZG.V.5020, indeterminate plastron plate remain in dorsal view; 10: GZG.V.5020, indeterminate plastron plate remain in visceral view; 11: GZG.V.5008, peripheral row remain. Scale bar = 3 cm. Photos Stefanie Biermann, design Heike Künzel, TLDA.*

Carapace fragments (GZG.V.5003; GZGZ.V.5008; GZG.V.5009; GZG.V.5010; GZG.V.5011; GZG.V.5012; GZG.V.5013; GZG.V.5014; GZG.V.5015; GZG.V.5016; GZG.V.5017; GZG.V.5018; GZG.V.5019; GZG.V.5020; GZG.V.5021; GZG.V.5023): After the analysis of the carapace material three parts could be stick together. The new carapace fragment (GZG.V.5003) has a length of 111, 47 mm and involves a neural and two pleural. The edges of the bone fragments are hard to detect, probably the cuttings edges are the true ones. The pleural I has a breadth of 43,57 mm, pleural II a breadth of 49,22 mm. the length could not measured, because the condition is fragmentary. The neural is 53, 82 mm long and 23, 04 mm wide. All three fragments show clear contact points for vertebras or rips. At pleural I the cross-section measures 9, 8 mm, at pleural II 10, 50 mm. Both show a round shape. See plates 2, 3 and 4.

Plastron fragment (GZG.V.5022): See plate 4. These is only one piece of a new material which could be identified as a fragment of the plastron.

Humerus fragments: The dimensions of the humeri fragments are summarized in the table, incomplete bone measurements in parentheses. See plate 6.

NUMBER	LENGTH	PROXIMALLY WIDE	DISTALLY WIDE	THICKNESS
GZG.V.5005	(65,95)	54,88 x 49,70)	–	20,14
GZG.V.5032	–	Corpus (7,09) Caput 11,76 x 9,68	–	–
GZG.V.5006	–	–	73,68 x 32,36	48,40 x 22,70
GZG.V.5033	(15,18)	–	16,75 x 6,53	(9,44 x 3,75)
GZG.V.5034	(11,86)	–	18,45 x 6,22	(11,70 x 2,56)

Iliac bone fragments (GZG.V.5007): The left ilium has a length of 154,71 mm and a width of 35,05 mm. The diameter of the length measures 65,05 mm and the one of the width measures 43, 43 mm. the iliac blade is 58,97 mm long and 13,19 mm wide. See plate 5.

Ischial fragments (GZG.V.5024): See plate 5.

Pubic bone fragment (GZG.V.5025): See plate 5.

Femor fragments: The dimensions of the femor fragments are summarized in the table, incomplete bone measurements in parentheses. See plate 7.

NUMBER	LENGTH	PROXIMALLY WIDE	DISTALLY WIDE	THICKNESS
GZG.V.5030	–	–	12,56	2,64
GZG.V.5031	(28,82)	–	11,70	2,89
GZG.V.5027	(20,33)	11,65	–	7,67
GZG.V.5028	(32,12)	7,30	16,43	6,20-6,30
GZG.V.5029	–	10,25 x 12,37	–	(5,1)

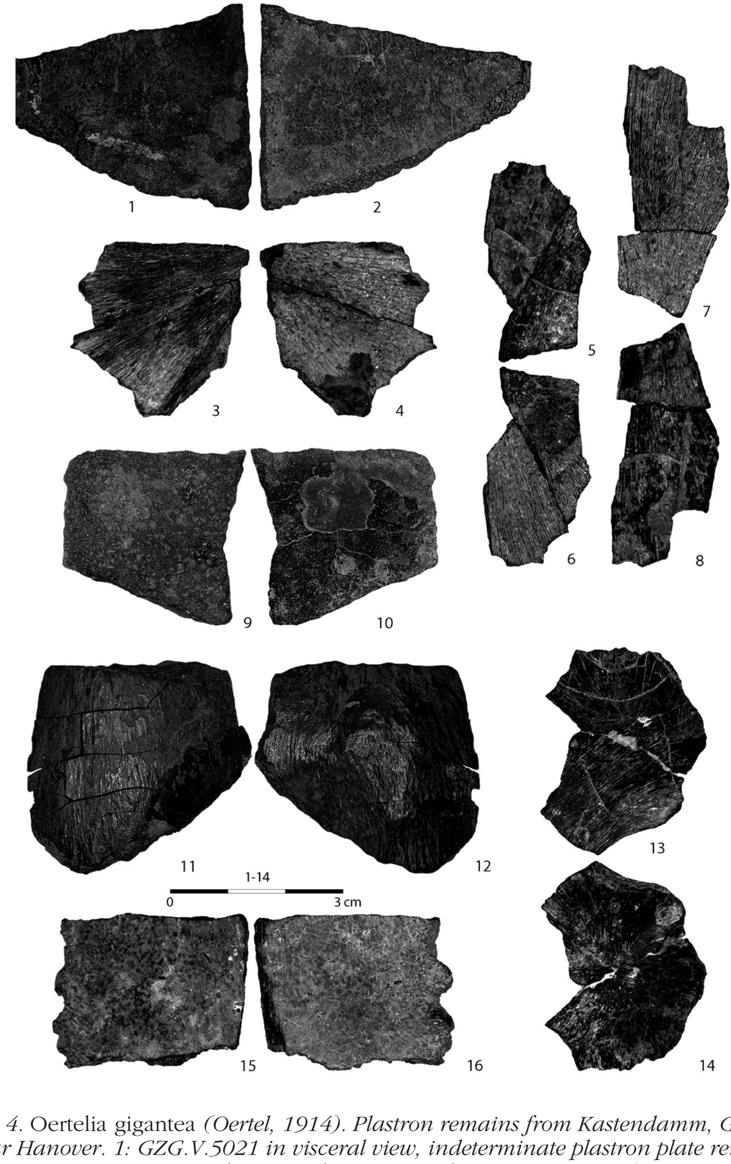

Plate 4. Oertelia gigantea *(Oertel, 1914). Plastron remains from Kastendamm, Garbsen near Hanover. 1: GZG.V.5021 in visceral view, indeterminate plastron plate remain; 2: GZG.V.5021, in ventral view, indeterminate plastron remain; 3-4: GZG.V.5015, indeterminate plastron plate remain in both views; 5-6: GZG.V.5013, indeterminate plastron plate remain in both views; 7-8: GZG.V.5012, indeterminate plastron plate remain in both views; 9-10: GZG.V.5019, indeterminate plastron plate remain in both views; 11-12: GZG.V.5022, indeterminate plastron plate remain in dorsal view; 13-14: GZG.V.5014, indeterminate plastron plate remain in both views; 15-16: GZG.V.5018, indeterminate plastron plate remain in both views. Original. Scale bar = 3 cm. Photos Stefanie Biermann, design Heike Künzel, TLDA.*

Plate 5. Oertelia gigantea *(Oertel, 1914). Girdle remains from Kastendamm, Garbsen near Hanover. 1: GZG.V.5007, left ilium; 2: GZG.V.5024, left ilium remains; 3: GZG.V.5024, left ischium remain in ventral view; 4: GZG.V.5025, left ischium remain in ventral view; 5: GZG.V.5025, left pubis remain in dorsal view; 6: GZG.V.5026, right scapula remain in dorsal view; 7: GZG.V.5026, right scapula remain in ventral view. Original. Scale bars = 3+2 cm. Photos Stefanie Biermann, design Heike Künzel, TLDA.*

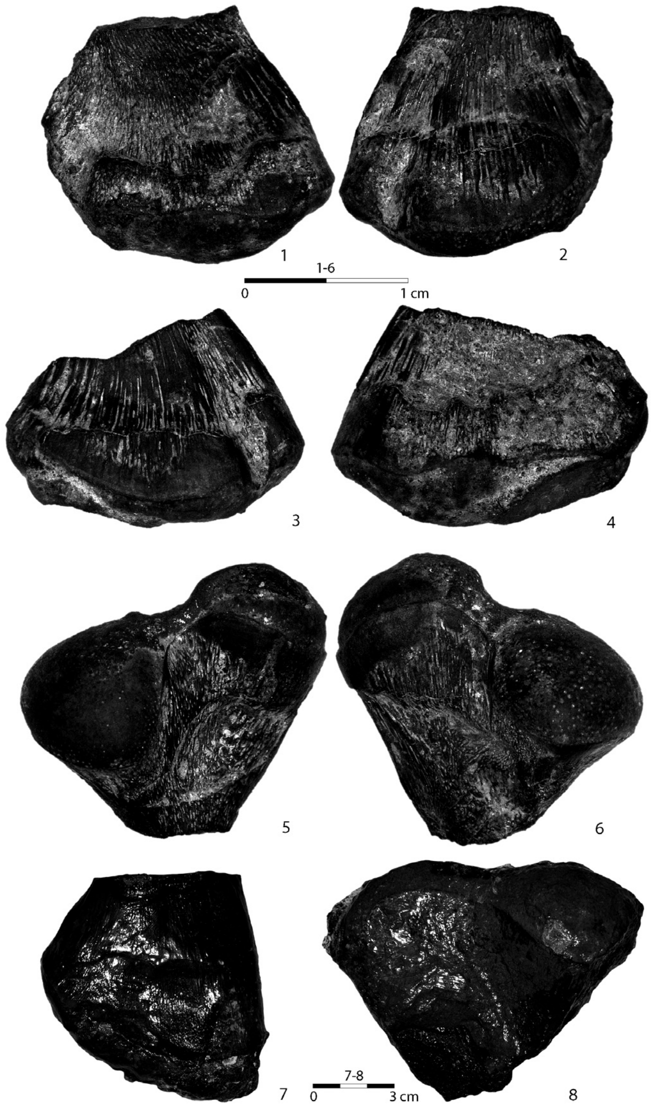

Plate 6. Oertelia gigantea *(Oertel, 1914). Humerus remains from Kastendamm, Garbsen near Hanover. 1: GZG.V.5033, left distal humerus remain in ventral view; 2: GZG.V.5033, left distal humerus remain in dorsal view; 3: GZG.V.5034, right distal humerus remain in dorsal view; 4: GZG.V.5034, right distal humerus remain in ventral view; 5: GZG.V.5032, left proximate humerus remain in ventral view; 6: GZG.V.5032, left proximate humerus remain in dorsal view; 7: GZG.V.5006, left distal humerus remain in ventral view; 8: GZG.V.5005, right proximal humerus remain in dorsal view. Original. Scale bars = 2+3 cm. Photos Stefanie Biermann, design Heike Künzel, TLDA.*

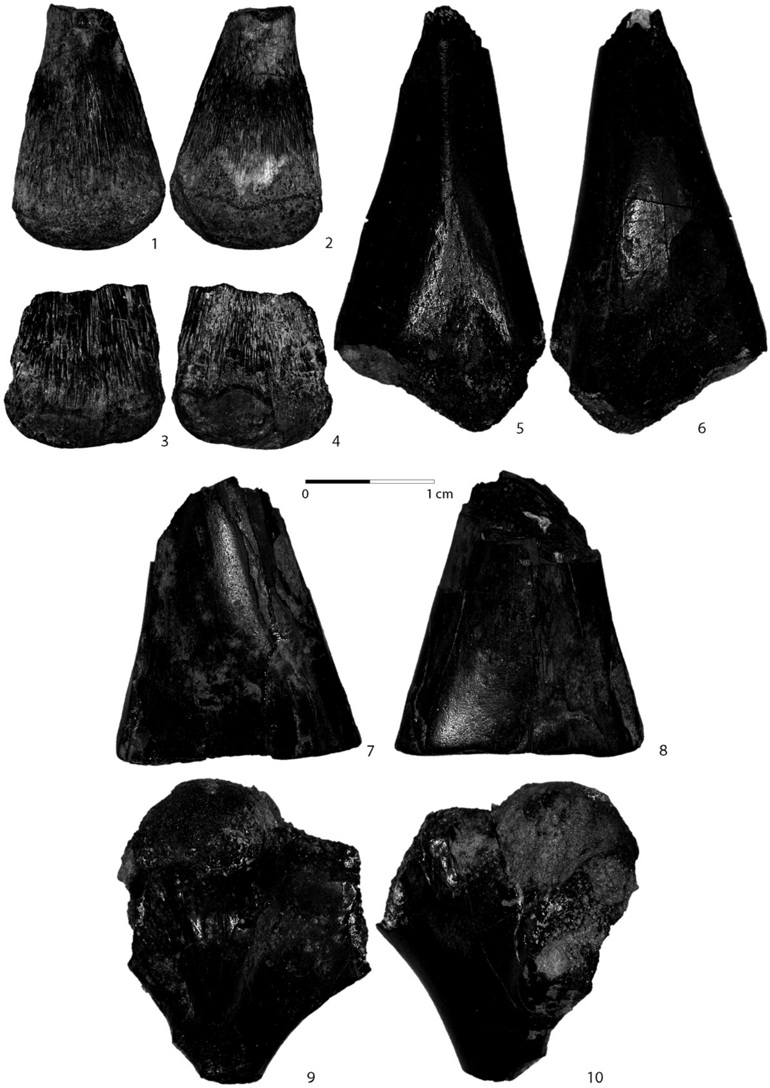

Plate 7. Oertelia gigantea *(Oertel, 1914). Femor remains from Kastendamm, Garbsen near Hanover. 1: GZG.V.5031, left distal femor remain in dorsal view; 2: GZG.V.5031, left distal femor remain in ventral view; 3: GZG.V.5030, left distal femor remain in dorsal view; 4: GZG.V.5030, left distal femor remain in ventral view; 5: GZG.V.5028, femor remain in both views; 6: GZG.V.5028, femor remain in both views; 7: GZG.V.5027, femor remain in both views; 8: GZG.V.5027, femor remain in both views; 9: GZG.V.5029, left proximate femor remain in dorsal view; 10: GZG.V.5029, left proximate femor remain in ventral view. Original. Scale bar = 2 cm. Photos Stefanie Biermann, design Heike Künzel, TLDA.*

Autopodium (metapodials): The dimensions of the metapodials are summarized in the table, incomplete bone measurements in parentheses. See plate 8.

NUMBER	LENGTH	WIDES	THICKNESS	CONDITION
GZG.V.5035	27,54	9,28/7,29	4,92 x 2,97	complete / flat
GZG.V.5039	13,25	7,36/6,00	5,22 x 2,07	complete / flat
GZG.V.5040	12,26	5,30	1,54	incomplete
GZG.V.5038	10,68	3,55/4,37	2,65 x 1,83	complete / flat
GZG.V.5004	53,16	31,76/30,80	14,45	complete / round
GZG.V.5041	(10,79)	4,51	3,25 x 1,84	incomplete / flat
GZG.V.5036	(18,95)	11,03	4,20	incomplete/round
GZG.V.5043	(8,77)	5,51 x 3,48	3,25 x 2,36	incomplete / flat
GZG.V.5037	(11,70)	7,03 x 4,68	3,64 x 1,98	incomplete / flat
GZG.V.5042	(10,62)	5,32 x 2,05	3,12 x 1,69	incomplete / flat
GZG.V.5044a	(11,38)	4,16 x 2,60	2,75 x 1,97	incomplete / flat
GZG.V.5044b		4,16 x 2,60	2,48 x 2,06	incomplete / flat
GZG.V.5045a	(15,63)	4,33 x 2,51	2,64 x 1,95	incomplete / flat
GZG.V.5045b		4,33 x 2,51	1,82 x 2,18	incomplete / flat

DIFFERENTIAL DIAGNOSIS

The following characters have been used for analysis: 1- premaxillas fused, 2- nasals present, 3- nasal-frontal contact and medial seperation of prefrontals, 4- secondary palate in beginning by very rough area (ra), 5- prepalatinal foramen, 6- vomer-premaxilla contact, 7- posterior vomer-palatine contact, 8- apertura narium interna formed by palatine and vomer, 9- posterior palatine foramen, 10- vomer with constant posterior width, 11- parietal-squamosal contact, 12- narrow superior temporal notch, 13- lateral carotid foramen much larger than the foramen anteris canalis caroticus interni, 14- basisphenoid with V-shaped ventral ridge, 15- large processus pterygoideus externus, 16- dorsolateral orientation of the orbits, 17- lower jaw with a flat occlusal surface, 18- tomial ridge, 19- surangulare extends far forward, 20- double articulation between the seventh and eighth cervical vertebrae, 21- 7. procoel cervical vertebrae center, 22- coracoid shorter than humerus, 23- relatively wide angle between scapular process and acromion, 24- humerus similar long as femur, with a straight shaft and lateral projection (distal to the humeral head), 25- ulnar radius contact distal with roughnesses, 26- pelvis with large, confluent obturator foramen, 27- ischium with distinct projection, 28- trochanter femori separated by a fossa without complete edge, 29- tibia without muscular fossa attachments, 30- flattened carpals and tarsals, 31- first and second fingers and toes with movable joints, 32- third to fifth fingers and toes without moving joints, 33- prefrontal with horny scute sulci, 34- nuchal with ventral socket for contact with the eighth cervical vertebra, 35- postnuchal fontanelles, 36- neurals with keel, 37- epineurals with keel, 38- pygal scored at anterior side, 39- straight plastron with broad bridge.

DATA MATRIX: *Oertelia* ???1?1111?1??1???????????????1??????1??, *Ctenochelys* 00 0101110111011111001101111111110011110, *Toxochelys* 01000 1111110011111 011101111111 110110010.

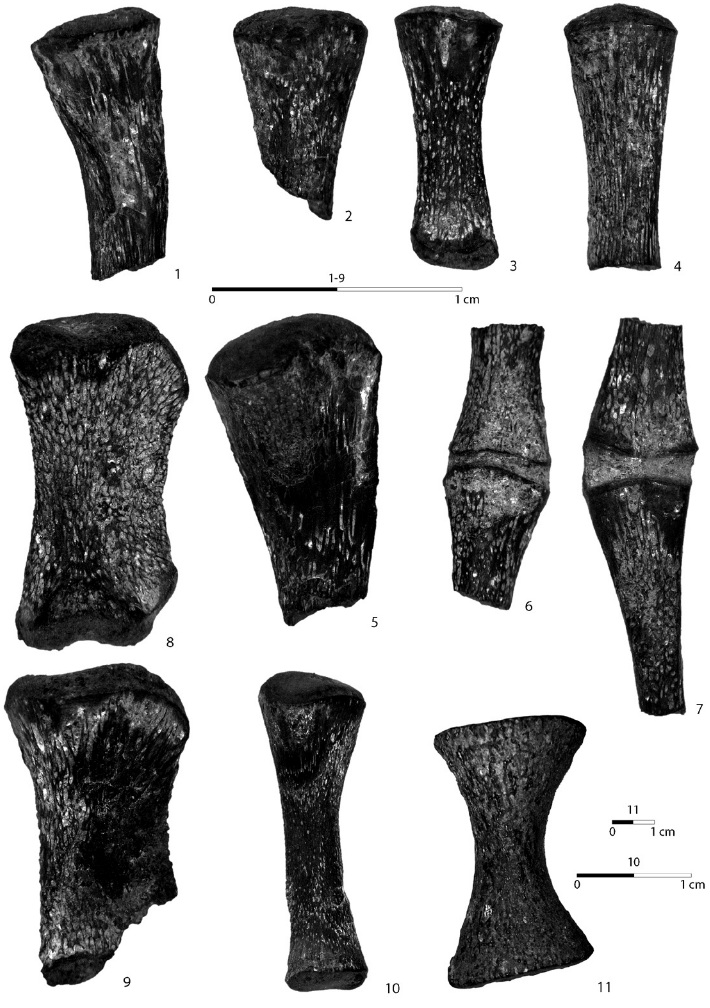

Plate 8. Oertelia gigantea *(Oertel, 1914). Metapodial remains from Kastendamm, Garbsen near Hanover (1-5, 8-11 carpals/ tarsals, 6-7 phalanges). 1: GZG.V.5042; 2: GZG.V.5043; 3: GZG.V.5038; 4: GZG.V.5041; 5: GZG.V.5037; 6: GZG.V.5044; 7: GZG.V.5045; 8: GZG.V.5039; 9: GZG.V.5040, 10: GZG.V.5035, 11: GZG.V.5004. Original. Scale bars = 2 cm. Photos Stefanie Biermann, design Heike Künzel, TLDA.*

The character differentiation with DOLMOVE (Interactive Dollo and Polymorphism Parsimony by Joseph FELSENSTEIN, 1986a) shows a simple tree: (*Toxochelys* (*Ctenochelys*, *Oertelia*)); that with PARS (Discrete character parsimony algorithm, version 3.6a3 by Joseph FELSENSTEIN, 1986b) is conform and shows a larger distance of *Toxochelys* and *Ctenochelys* to *Oertelia* n. gen. One most parsimonious tree found: (*Toxochelys*: 4.50, *Ctenochelys*: 3.50, *Oertelia*: 0.00); that is a clear generic differentiation of the new genus described here. One most parsimonious tree found and requires a total of 8.000.

BETWEEN	AND	LENGTH
1	*Toxochelys*	4.50
1	*Ctenochelys*	3.50
1	*Oertelia*	0.00

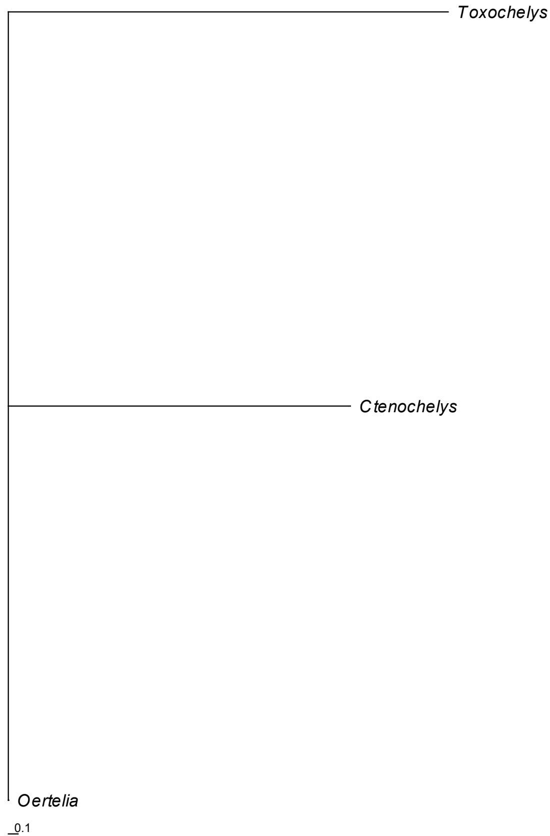

Figure 3. One most parsimonious tree of the genera Ctenochelys, Toxochelys *and* Oertelia *n. gen. found by PARS, Discrete character parsimony algorithm, version 3.6a3 by Joseph* FELSENSTEIN *(1986b) made with TreeView©Roderic Page.*

Consequently, *Oertelia* n. gen. has an initial position where there is a closer correlation to *Ctenochelys* with 3,5 steps as to *Toxochelys* with 4.5 ones. Furthermore, no palatinate contact of vomer and palatine in *Oertelia*, the ratio of vomer length and condyobasal length is 3, 5, in *Ctenochelys procax* lesser than 3. In *Toxochelys latiremis* the ratio is over 6 and the palatinate contact of vomer and palatines is present.

PALAEOCLIMATIC ASPECTS OF SECONDARY PALATE

The formation of a secondary palate, by the change of palatinum and vomer, should not only be seen in response to a change of diet supply. Rather, the shifting of the inner nasal opening (apertura narium interna) should be seen as an adaptation to a climatic cooling. The required time factor is an important reason for this "change". If the change that affected large parts of the skull would be a response to a changing food supply, than this must happened very quickly, because the support of the food sources is an important point to survive in a new environment. However, such a complex restructuring is not enforceable within a few generations. For this reason, a completely different factor has to be considered as the origin for the change in the snout region. The time factor during a slow climatic cooling does not play such an important role because the creatures have time enough for adaptation. The shift in the apertura narium interna in the posterior area of the palate is used to heat the respiratory air through the extended nasal passage. But, this must be accompanied by a tendency to the endothermy, to take effect.

It is known that during Lower Cretaceous several climatic changes happened in Northern Germany. Especially in the former epicontinental sea, the water temperature was influenced by the different tributaries. So the inflowing water at the time of the Barremian-Aptian border came exclusively from northern areas such as the Arctic Ocean (BELOW & KIRSCH, 1997; MUTTERLOSE, 1998). In consequence of this effect, the water temperature dropped (MUTTERLOSE, 1992). However, during the Aptian the climate and the water supply situation of the adjacent sea, changed. The inflowing water came also from the warmer Tethys (MUTTERLOSE, 1992 and 2000a,b; BELOW & KIRSCH, 1997; MUTTERLOSE & BÖCKEL, 1998).

It is now assumed that an adaptation of the body took place over a longer period, so it is quite possible to find a sea turtle with relocated internal nasal openings in the Lower Aptian. The animals already have been adapted to cooler conditions during the Barremian.

Due to regional climate changes, it can be also explained that, for example, there are parallel findings of Toxochelyidae and Ctenochelyidae from the Cretaceous of North America (NICHOLLS & RUSSELL, 1990), which above all differ by the construction of the secondary palate.

Different climatic conditions and the longer "response time" at climatically related adaptations allow this diversification, for comparison see also the relationships with *Australobaena* discussed by KARL & TICHY (2002).

DISCUSSION

OERTEL (1914) compared the skull from Kastendamm with North American representatives of the genus *Toxochelys*, in particular with *Toxochelys procax* Hay, 1905. This is why he called this find *Toxochelys gigantea*. Later *Toxochelys procax* was classified by ZANGERL (1953) into his newly established genus *Ctenochelys* and henceforth known as *Ctenochelys procax*. After this, consequently also *Toxochelys gigantea* should have assigned to this genus. But ZANGERL (1953) was restricted to assign this species to a doubtful systematic position to the Cheloniidae. Later, KUHN (1964) considered *Toxochelys procax* as a synonym of *Ctenochelys stenopora*. KARL (1993) again responded to the problem to *Toxochelys gigantea* and introduced the provisional designation of *Ctenochelys gigantea* according to the changes in the systematics, also the starting development of the secondary Palatinum with significant tuberous growths on the inner edge of the choanae shows significant relations to *Ctenochelys*.

Now, *Oertelia gigantea* is the oldest true sea turtle, with approximately 120 million years which goes stratigraphically further back than *Santanachelys gaffneyii* (HIRAYAMA, 1998). Last-mentioned is ten million years younger. Both developed elongated and flattened phalanges, as a condition for paddle or flipper. These are completely missing with the Jurassic species, which are still no real sea turtles, but ecological transitional forms. *Santanachelys gaffneyii* (HIRAYAMA, 1998) comes from the Romualdo unit of the Santana formation of Brazil. This turtle was found in the vicinity of Santana do Cariri (GPS data: - 7.185, 39.737), in the state of Ceará. Stratigraphically, the Romualdo unit belongs to the Upper Aptian or Lower Albian.

HIRAYAMA (1998) assigns his new genus of *Santanachelys* to the Protostegidae. It is a family of the Chelonioidea, which includes several older sea turtle species. The related species come from Upper Jurassic to Lower Cretaceous strata of South America and southern Germany, from the Lower Cretaceous of Australia, from the Middle Cretaceous of Europe, and from the Late Cretaceous of North America and Japan (HIRAYAMA, 1997; LAPPARENT DE BROIN, 2001).

On the basis of the morphology of the extremities, HIRAYAMA (1997) assumes that the Protostegidae mainly lived at the top of the water column and their diving capabilities were not yet well developed. Compared with modern sea turtles, the formation of the paddle of the Protostegidae was even more developed, which is why for this family a diet of planktonic organisms is assumed (HIRAYAMA, 1997). It is possible, that the limb with immovable metacarpals and elongated fingers whith the Protostegidae and the remaining Chelonioidea (Cheloniidae and Dermochelyidae) could have developed by convergence (HIRAYAMA, 1998) relating to the development of the paddle. After him, Ctenochelyidae are rather ground dwellers as good swimmers which lived in very shallow sea areas, and subsisted by benthos, which also is true in modern Chelydridae (Snapping turtles) and Trionychidae (Trionychine turtles). The rather primitive transformation of running feet to paddling (mobile device displacements between the 1st and 2nd finger) and the dorsal direction of orbitae should be an evidence for his theory (HIRAYAMA, 1997). This assumption would limit the life of *Oertelia gigantea* mainly the coastal areas of an adjacent sea. In this case, extended migrations to the nesting sites would not be needed, since habitat and nestling sites would be only in short distance from each other. Other features for the primitive state of development of this genus are the small plastron with a narrow bridge area, as well as the weak development of the shoulder girdle and pelvic girdle (HIRAYAMA, 1997).

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