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GLARICHELYS KNORRI (GRAY) — A CHELONIID
FROM CARPATHIAN MENILITIC SHALES (POLAND)

Abstract. — The fossil remains here described belonged to a young individual of *Glarichelys knorri* (Gray), a sea turtle. They were collected from Carpathian menilitic shales at Winnica near Jasło. Its systematic position is discussed and general comments are made on some fossil and recent sea turtles, on problems concerning their morphology, on the taxonomic significance of phalanges in fossil sea turtles, and on the presence in cheloniids of *foramina praenuchalia*. Biological and ecological notes concerning *G. knorri* (Gray) are likewise given.

INTRODUCTION

The fossil sea turtle remains here described have been collected from an outcrop in the steep bank of the Jasiołka stream, near the Winnica farm, about 10 km to the east of Jasło (Polish Carpathians). The specimen was found in greyish-brown menilitic shales intercalating the Krosno sandstone beds, about 30 m above the foot of the mentioned bank.

Unfortunately, the geological age of these beds has not, as yet, been definitely established. On their microfauna it is probably Lower Oligocene or Upper Eocene ¹.

The vertebrate fauna from the Jasło area has lately attracted the attention of palaeontologists. Abundant and well preserved bony fish remains have been collected there. They belong to several families, mostly to Clupeidae and Gadidae. They are now being worked out by A. Jerzmańska (1958) of the Wrocław University.

About 10 years ago, Dr. S. Kadyi, a Jasło physician, collected two specimens of a sea turtle. One of these is described in the present paper; the other has, unfortunately, been lost. In Dr. Kadyi's opinion the lost specimen was of about the same size as the one here described, its skull was in a better state of preservation. Imprints of a land plant of indeter-

¹ For these data the writer is indebted to Dr. J. Małeckı of the Cracow Academy of Mining and Metallurgy.

minate systematic position had been also preserved with it. The here studied specimen is part of a palaeontological collection in the possession of Dr. Kadyi.

Cheloniid sea turtles have frequently been recorded from the Tertiary of Europe, but never thus far from Poland.

During the identification of the Winnica turtle remains, the writer had at his disposal copious comparative material from the collections of the Institute of Zoology of the Polish Academy of Sciences and of the Wrocław University, as well as those belonging to scientific institutes in São Paulo and Rio de Janeiro. Some of the materials available had been received by the writer as a gift from the Brazilian institutions; others had been personally collected during an expedition from Brasil to the Island of Ilha da Trindade in the South Atlantic Ocean. The writer desires to express his warmest thanks for the assistance and friendly attitude shown to him by the following persons: Dr. S. Kadyi who kindly lent to the writer the Winnica specimen; Prof. Dr. Paulo Sawaya of the Departamento de Fisiologia Geral e Animal da Universidade de São Paulo; Dr. Illevellyn I. Price of Divisão de Geologia e Mineralogia of the Brazilian Geological Service; Prof. Dr. Vladimir Bessnard of Instituto Oceanografico da Universidade de São Paulo, Sr. João Cavalheiro and Dr. Alphons R. Hoge, both of Instituto Butantan of São Paulo, finally to Dr. Paulo Moreira da Silva, a frigate commander in the Brazilian Navy.

Most cordial thanks are also due to Dr. Rainer Zangerl of the Chicago Natural History Museum for his most valuable comments on the variability of the shell structure in sea turtles.

MATERIAL

The here studied sea turtle remains consist of a nearly complete carapace, well preserved fragments of plastron, inner surface impression of skull roof, shoulder girdle bones (*scapula*, *coracoid*), a small fragment of pelvic girdle (*os pubis*), also detached digit phalanges and limb bones. Moreover minute impressions of fragmentary skeleton bones which, owing to their small dimensions and inadequate state of preservation, cannot be accurately described or identified (see photograph of specimen — pl. I).

Our turtle remains are excellently preserved and bituminized, but compressed between two laminae of melilitic shales. Thanks to this, two impressions of the same specimen have been preserved: the “negative” and the “positive”. The attached photograph shows the “positive” impression only. However, during the analysis and description of the various skeletal elements the “negative” impression proved very serviceable, the

several neural plates being there far more clearly outlined. All these remains are exceedingly fragile and unsuitable for further preparation. Excellent impressions of many plastral bones as well as traces of many horny carapacial scutes permit an adequate reconstruction.

Dimensions of the studied specimen are (in mm):

Length of carapace including nuchal plate	80.0
Width of carapace on 3rd costal plate	50.0
Length of skull	24.0
Maximum width of skull	8.0

On the rather small dimensions of the studied remains and the degree of ossification of plastral fragments it may be inferred that they belong almost to a hatchling.

DESCRIPTION

Carapace

This is the best preserved part of the material. Thanks to the presence of nearly all the bony plates and impressions of many horny scutes, it has been possible to make a satisfactory reconstruction (fig. 1) by restoring the few missing elements. The surface of the vertebral and, in part, that of the pygal area has been rather strongly damaged.

The carapace is of oval outline, without marginal notches or depressions. It resembles young carapaces of the recent genus *Chelonia*, as well as those of the "ovata" type in species *Glarichelys knorri* (Gray) (R. Zangerl, 1958, p. 20, fig. 10).

Nuchale. A well preserved plate showing its inner surface, of subtrapezoid shape, so characteristic of cheloniids (close resemblance to young specimens of *Chelonia mydas* (L.)). Right antero-lateral margin damaged. Anterior margin slightly concave, massive. Margin (*sulcus*) connecting the nuchal with the first neural wall preserved. Notches forming part of margins of *foramina prae-nuchalia* not so distinct.

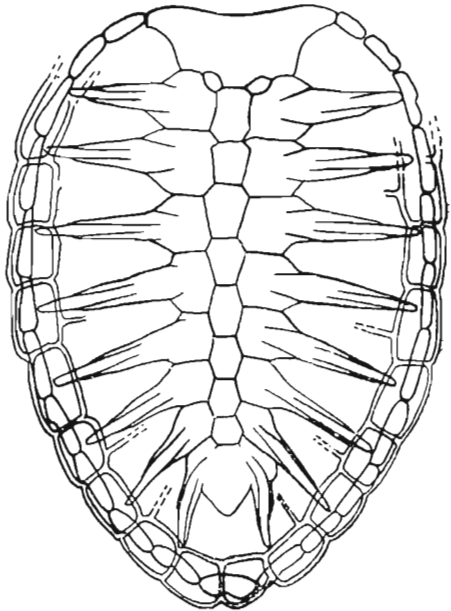


Fig. 1 — *Glarichelys knorri* (Gray), reconstruction of carapace in the young specimen from Winnica; nat. size.

Neuralia. Neurals very faintly outlined, except the first neural; this is well preserved but not very characteristic. Appearance of remaining plates detectable on the "negative". Neural morphology is as follows: 1st neural quadrangular, with slightly domed margins; the adjacent 2nd neural regularly hexagonal, resembling neural plates typical of *Chelonia* and *Eretmochelys*; 3rd and 4th neurals elongated with anterior and antero-lateral margins about equal in length; plates typical of recent cheloniids are similarly shaped; 5th neural broader than the others, with distinctly shorter antero-lateral margins; 6th and 7th neurals, on the contrary, more elongated and resembling these plates in genus *Geoemyda* Gray (Emydidae) in that their antero-lateral margins are longer than the postero-lateral; 8th neural smaller than the rest, quadrangular, with slightly domed lateral margins somewhat converging anteriorly.

It should be noted that all the neurals exhibit a characteristic symmetry and regularity of structure, together with lack of structural deviations so common within the *Caretta-Lepidochelys* group. Traces of junctures of the particular plates with the vertebral ossicles occur on the surface of plates, whereas e. g. in genus *Procolpochelys* (Zangerl, 1955) they are on the juncture of these plates. In the "negative" impression the vertebral margin of the carapace is readily discernible. It resembles analogous margins observable in recent young sea turtles, but disappearing with individual growth.

Suprapygale is a small plate, apparently wedged in between costals c 8, shaped like a rhombus with blunted angles. Suprapygal margins hardly detectable, as this part of carapace is overlapped by the xiphiplastral. The relatively well preserved pygal portion of the carapace suggests its poor development, similarly as in representatives of *Glarichelys knorri* (Gray), in many Taxocheliidae, and in recent young individuals of *Eretmochelys*.

Costalia, all excellently preserved. Outer bony structure readily discernible. The extent of costal ossification indicates that our specimen is not a true hatchling. The free rib ends of costals long and pointed. A distinct epithelial thickening, observable in the vertebral area of the carapace, interconnecting the several costal plates. Costal c 1 with fairly distinct traces of notches, constituting a part of *foramina praenuchalia*, most distinct in left plate c 1. Free ends of c 8 running nearly straight caudally approximately parallel to median carapacial margin, similarly as in young specimens of genus *Chelonia*.

Marginalia. Plates m 3 through m 11 satisfactorily preserved. Though rather narrow, they display fairly strong ossification and have a notably robust structure. They form the serrated outer margin of the carapace.

Pygale similar to marginals. Fairly small, with domed anterior margin and rather deep supracaudal incision.

Plastron

The plastral fragments are unfortunately not so satisfactorily preserved as the carapacial. Hence a complete reconstruction of plastron has not been possible.

Epiplastra shaped like robust characteristically bent bars. Right epiplastron notably well preserved. When compared to analogous plates of recent cheloniids of the same size, these epiplastrals are distinctly broader and flatter.

Hyoplastra fragmentary. A fragmentary right hyoplastral (see pl. II — 8) is particularly well preserved. It represents the reversed inner side of the left hyoplastron, provided with characteristic digit-like processes. An analogous small fragment of the right hyoplastral has been preserved on the opposite side of the specimen. The preserved fragments are notably robust considering the young age and small dimensions of the studied individual. A distinct depression in the inner bony surface does not resemble the plastral structure in recent cheloniids where the plastron of such young specimens is flat and thinner. The digit-like hyoplastral processes resemble these elements in somewhat older individuals of genus *Eretmochelys*. Strongly curved and directed anteriorly, the hyoplastral wing, provided with processes, resembles analogous plastral areas in some sea turtles, particularly those of *Glarichelys knorri* (Gray) (Zangerl, 1958).

Xiphiplastra excellently preserved (pl. I, II). They are flat robust plates, slightly sigmoid, with ends hardly curved. The terminal digital structure of these plates, particularly in the pygal area, so characteristic of cheloniids, is very distinct.

Bones of the shoulder girdle

The shoulder girdle bones of our specimen are excellently preserved. They are: both *coracoida*, *scapula* and *humerus*. The humerus, however, is not so satisfactorily preserved since its surface is concealed by small vertebral fragments. Only its contours have, therefore, been indicated (fig. 2). Among limb bones the radius is also in a satisfactory state of preservation. It is figured in the photograph on the left side of the specimen, between the coracoid and the epiplastron.

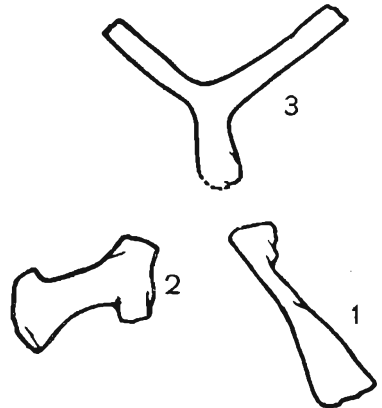


Fig. 2. — *Glarichelys knorri* (Gray), diagrammatic reconstruction of shoulder girdle in the Winnica specimen: 1 coracoid, 2 humerus, 3 scapula; $\times 2$.

Scapula is shaped boomerang-like, as is characteristic of all sea turtles. *Processus acromialis* is here of nearly equal length with *proc. scapu-*

laris. This morphological feature characteristic of *Glarihelys knorri* (Gray) has been discussed at large by Zangerl (1958, p. 21—24). In young recent cheloniids, examined by the present writer, these two processes are of uneven length, confirming Zangerl's opinion. The *capitulum* of the *scapula* fairly well preserved.

Coracoida. Both these bones are well preserved, each differently oriented, making their structure readily discernible. They have a characteristic spade-like shape. There is a distinct bony crest on the inner surface. It forms a margin constituting the axis of the bone symmetry. This symmetric position of the crest is most likely a feature observable in very young individuals, analogously to recent young specimens of *Chelonia mydas* (L.).

Humerus short and robust, more so than the radius in recent forms. The bone is very slightly curved too. The general structural type of humerus corresponds to that described by Zangerl (*op. cit.*).

Radius of our specimen exhibits a structure similar to the structure of this bone in recent cheloniids and is without any individual features.

Summarily, the structure of the shoulder girdle in our specimen differs somewhat, in what concerns the here mentioned elements, from young recent cheloniids. E. g. the *scapula* is slightly longer (distance between ends of processes) than the *coracoid*, contrary to all recent young and adult cheloniids. A diagrammatic reconstruction of the shoulder girdle is given in fig. 2, showing the agreement of this skeletal portion to analogous elements in specimens from Glarus described by Zangerl (*op. cit.*, p. 21).

Fragment of pelvic girdle

Os pubis is the only preserved element of the pelvic girdle. Its state of preservation is sufficiently adequate to show the contour lines. In shape it resembles analogous bones of recent cheloniids, without notable deviations.

Fragments of digits of forelimbs

Digital phalanges of the left forelimb are fairly well preserved. They are probably the 1st and 2nd phalanges of the 3rd and 4th digits, also the 1st and fragmentary 2nd phalanges of the 5th digit. They are with well developed *capitula*. In the 2nd phalange of the 3rd digit (the only one completely preserved) even the structure of the articular surface is discernible. Nevertheless this is not a condyle, i. e. a surface permitting the free motion of digits. The presence of conspicuous *capitula* in phalanges is associated with the young age of the described specimen. It is equally observable in young recent sea turtles. Bony fragments of the right forelimb are preserved near the nuchale. They are, however, strongly

damaged, and may, therefore, only be supposed to represent the phalanges or *carpalia* of the longest (3rd) digit. Some of them are oriented at an acute angle. The terminal phalange is conspicuous by a strong and characteristic curvature. It is readily discernible on the left side of the specimen (see pl. I).

It should be stressed that in our specimen the several phalanges are slightly longer than those observed in recent sea turtles of the same size.

Impressions of cranial bones

Cranial fragments of the here considered individual are very few and in a very bad state of preservation. The cast, however, filling in the cranial cavity, is satisfactorily preserved, together with imprints of the parietal sutures. The inner structure of *ossa parietalia* is that most readily discernible. The preserved fragments of these bones are somewhat longer and less concave than those in recent specimens of *Chelonia mydas* (L.) with which they have been compared by the writer.

Sutures connecting the *frontale* with the *praefrontale* are not indicated. However, the suture connecting *parietalia* with *frontalia* is relatively distinct. The two last named elements in shape very closely resemble analogous bones in recent specimens of moderate dimensions. In the anterior area of the mentioned impressions well preserved casts are noted. They have been formed by the filling in of the nasal cavity, delimited by *maxillaria* and *intermaxillaria*, separated by the *vomer* and covered by *praefrontalia*. Imprints of the junctures of all these bones are fairly well preserved on the surface of casts.

In order to compare imprints of the inner skull surface the writer availed himself of some young specimens of *Chelonia mydas* (L.) collected from Ilha da Trindade. For this purpose he prepared the skull cap filling in the prepared bones with plastelin or wax. Casts analogous to the cast of the studied specimen were obtained by this method. On the whole, it was possible to ascertain that in our specimen the outer surface of parietal bones is flatter, while the *frontale* and *praefrontale* are slightly more elongate.

Imprints of carapacial horny scutes

Imprints of carapacial horny scutes are not so satisfactorily preserved as bone fragments. Imprints, or rather traces of scutes form a dark background of bituminous substance against which the scutes are outlined as light streaks. They are fairly distinctly indicated on the surface of fontanelle of carapacial scutes. Unfortunately, in the photograph these streaks are not readily discernible. It was necessary to use a lens in order to detect the contours of scutes.

Scuta marginalia fairly well preserved, permitting their reconstruction. There are eleven of them (I-XI). The latero-marginal ones are the most distinct. They are shaped like irregular quadrangles or pentagons. The outer scute margins slightly protrude beyond the carapacial margin, producing a faintly notched line. The marginal plates on which the considered scutes are inserted take up about 1/3 of the width of plates. Bone plate sutures never correspond with horny scute furrows in the marginal area. Scutes M I are missing in our material, while scutes M IX are damaged.

Scuta supracaudalia. On the presence of a complete right *scutum supracaudale*, and fragment of the left scute, it has been possible to reconstruct that part of the horny shell. They are pentagonal, with rectilinear regular margins, symmetrically separated from one another by furrows. These scutes resemble *scuta supracaudalia* in young individuals of *Chelonia mydas* (L.).

Scuta costalia and *scuta vertebralia*. Poorly preserved furrow imprints of *scuta costalia* permit the reconstruction of the lateral portions only. These scutes (C I-IV) are broad, regularly shaped and symmetrically arranged on either side of the carapace.

Scuta vertebralia have been approximately outlined in the writer's carapacial reconstruction. Owing to the inadequate state of preservation of the vertebral area of the carapace, the contours of only some of the vertebral scutes could be detected under the lens and placing the specimens in appropriate light. Hence, in the attached diagrammatic reconstruction of the carapace of *Glarichelys knorri* (Gray) from Winnica it was not possible to indicate the vertebral horny scutes as in other areas of the shell.

SYSTEMATIC POSITION

An accurate determination of the systematic position of the studied sea turtle remains meets with difficulties and cannot, therefore, be quite certain. These remains belong to an extremely young individual, almost a hatchling, probably one of the youngest fossil turtles so far described in palaeontological literature. The absence of the skull, of the hind limbs and the notably fragmentary state of the plastron are obstacles in the accurate determination of the systematic position. Taking account of these difficulties, these remain are — on a number of morphological characters, and their geological age and environment — assigned to a species described from the Oligocene of Switzerland, whose systematic position has lately been revised by Zangerl (1958). Hence the systematic position of the Winnica sea turtle is as follows:

Sectio **Chelonioidea**²Family **Cheloniidae**Genus *Glarichelys* Zangerl, 1958*Glarichelys knorri* (Gray, 1831) *iuv.*

1831. *Chelonia knorri* Gray; J. E. Gray, Synopsis Reptilium, p. 54.

1834. *Chelonia glaricensis* Keferstein; Ch. Keferstein, Naturgeschichte des Erdkörpers, p. 255.

1865. *Chelonia ovata* Heer; O. Heer, Die Urwelt der Schweiz, p. 235.

Locality: menilitic shales in Winnica near Jasto, Polish Carpathians.

Age: Lower Oligocene or Upper Eocene.

The here studied fossil remains have been assigned to the above species on following grounds:

1. Its general shell contour resembles that of the "ovata" form described by Heer, 1865 (*vide* Zangerl, 1958). As a whole the character of shell suggests its assignment to the *Chelonia-Eretmochelys* group (tribus Cheloniini: Zangerl, 1955-1958).

2. The morphology of the vertebral area of the carapace (*nuchale* and *neuralia*) approaches the morphology of analogous parts of shell in the specimens from Glarus. The presence of only eight neural plates in the Winnica specimen is recognized as an individual feature without taxonomic significance. The same applies to the presence of *foramina praenuchalia*.

3. The pygal area of the carapace exhibits the same structural type as is noted in the Swiss specimens. Moreover, it closely resembles the pygal carapacial area in juvenile representatives of the recent species *Eretmochelys imbricata* (L.).

4. The preserved plastral fragments, particularly so the winged hyoplastral fragment, have a shape typical of the mentioned fossil species.

5. The morphology of digital phalanges of forelimbs, as well as of the shoulder girdle which is an important taxonomic feature. Its description and correlation with the Swiss forms have been given in the preceding chapter.

GENERAL REMARKS ON *GLARICHELYS KNORRI* (GRAY)

The first fossil remains of turtles which, on evidence now available have been referred to *G. knorri* (Gray), were described nearly two hundred years ago by G. W. Knorr and J. E. J. Walch, 1773 (*vide* Zangerl, 1958). They were discovered in Switzerland, in canton Glarus, from shales containing an abundant fauna of early Tertiary fishes. These beautifully

² Systematic after Mertens & Wermuth, 1955.

preserved turtle remains were later re-described and cited by several outstanding writers of the first half of the XIX century. Among others, G. Cuvier (1825) also referred these fossil remains to a recent European species *Emys orbicularis* (L.), at the same time postulating that this sea turtle had since very remote geological times inhabited the lakes of Switzerland. In Zangerl's opinion, the specific name had been established by Gray (1831) in his renowned work "Synopsis Reptilium".

The first more detailed description of this turtle was given by H. v. Meyer (1856) who had the opportunity of examining these remains in the collections of the Zurich University.

Detailed information concerning the history of *Glarichelys knorri* (Gray) has been published by Zangerl (1958). That author was able to acquaint himself with the holotype „*Chelonia*“ *knorri* described by Gray (1831), as well as with other fossil remains of sea turtles. After a close morphological analysis they were referred by him to the here studied species. Studies on these turtles led Zangerl to a revision of the systematic position of the Glarus turtles and to the establishment of a generic name to include them. At the same time species described by Heer (1865) and Keferstejn (1834) were by Zangerl recognized as synonyms of *Glarichelys knorri* (Gray).

It is certainly a noteworthy fact that the state of preservation of the Glarus turtles is very similar to that of fossil remains found in Winnica near Jasło. Our specimen and the "ovata" form described by Heer (1865) have both been dorso-ventrally compressed and beautifully preserved in shales formed by petrification of bottom slime.

REMARKS ON FOSSIL AND RECENT CHELONIIDAE

Zangerl (1958) has given a most interesting review of thus far described species which either belong or are allied to the family Cheloniidae (*s. lat.*). In order not to repeat data published by that author the present writer will confine his statements to a brief account of his personal comparisons and observations concerning the studied systematic group in its relation to the Polish specimen.

A correlation of the Winnica turtle remains with the fossil remains of cheloniids is difficult owing to the scarcity of descriptions of ontogenetically younger forms. Moreover, the majority of descriptions are based on preserved skulls or long bones of large individuals (e. g. R. Lydekker, 1889; O. P. Hay, 1908b; C. W. Gilmore, 1937; E. Daqué, 1912; F. Rüschkamp, 1926, and others).

Making allowances for differences in size and degree of fossilization of the correlated individuals, the here described remains may be said to

bear quite strong resemblance to the fossil remains of *Chelonia gwinneri* Wegner, described in 1914 by Th. Wegner from the Oligocene of Germany. In that author's opinion the presence of one free claw in the paddle-like forelimbs, as well as a number of other morphological characters, indicate the assignment of this turtle to genus *Chelonia* Latreille. After Zangerl (1958), however, the systematic position of this species calls for revision, its forelimbs being of a type structurally different than that noted in recent genera of the sea turtle, and thus suggesting another specialization. The present writer believes that the plastron of *Ch. gwinneri* Wegner shows more similarities to that in genus *Eretmochelys* Fitzinger than to that in *Chelonia*. The so-called sternal index (Brückenindex) of the studied form—as determined by Zangerl (*op. cit.*)—is typical of representatives of the caretine group (*tribus*). The writer supposes that *Ch. gwinneri* (Wegner) belongs to some separate evolutionary line of fossil cheloniids. It displays features common to both recent groups, Caretteni and Cheloniini, but no close relationships to our sea turtle from Winnica. On the base of the plastral morphology shown in Wegner's reconstruction (1914) it may reasonably be inferred that this turtle is notably more primitive than *Glarichelys knorri* (Gray), among others in xiphiplastral structure.

Chelonia sismondai (Portis) (A. Portis, 1890; A. Fucini, 1909; R. Zangerl, 1958) exhibits conspicuous differences of morphology as compared with the Winnica specimen. The latter is with a completely different type of plastron, deprived of the inner winged hyoplastral processes. According to Zangerl (*op. cit.*) this Pliocene species, recorded from the wide known Valdarno exposures, most likely belongs to genus *Chelonia*, as is, *inter alia*, suggested by its sternal index.

To end up his notes on fossil cheloniids the writer wishes to mention the numerous sea turtle remains from the London Clay, first described by R. Owen and T. Bell (1849) and later revised by R. Lydekker (1889). On the base of these descriptions and excellent lithographs published by Owen and Bell (*op. cit.*), it is supposed that the London Clay turtles contain representatives of various marine forms besides those of family Cheloniidae *s. str.* The systematic position of these forms, as well as of all fossil sea turtles, described or revised by earlier authors, has lately been revised in detail by E. Williams (*vide* Zangerl, 1958). The present writer has not succeeded to find among these forms any remains bearing similarities to the Winnica specimen.

Among the recent forms *Eretmochelys imbricata* (L.) bears closest resemblance with the discussed turtle remains. In the first place this is observable in plastral morphology. Regrettably, owing to the fragmentary preservation of our remains it has not been possible to determine the sternal index of the Winnica specimen.

FORAMINA PRAENUCHALIA IN CHELONIIDAE

Distinct *foramina praenuchalia* occur in representatives of *Glarichelys knorri* (Gray) from the Swiss Oligocene, also in our specimen. These elements have so far been considered by O. P. Hay (1908), F. v. Huene (1956) and others, as a diagnostic morphological character. However, it has not actually been possible to ascertain their presence in all of the known representatives of that fossil Mesozoic group. According to Zangerl (1953), e. g. they do not occur in such genera as *Osteopygis* (Osteopyginae), *Prionochelys* and others. Similar *foramina praenuchalia* are sporadically encountered in recent representatives of the cheloniids. When examining, in Brazilian scientific institutes, the turtle shells of *Chelonia mydas* (L.) this writer noted the presence of typical *foramina praenuchalia* in a mature but rather small specimen from the neighbourhood of Santos, deposited in the Departamento de Fisiologia Geral e Animal da Universidade de São Paulo. Moreover, in other conspecific specimens he observed *foramina praenuchalia* — either single or of uneven size — similar to those probably possessed by the here described *Glarichelys knorri* (Gray). The presence of *foramina praenuchalia* in recent sea turtles has been repeatedly noted by Dr. Zangerl in specimens examined by that author in museums and scientific institutions of the U. S. A. (letter communication).

The occurrence of these *foramina* in representatives of *Glarichelys knorri* (Gray) is by Zangerl (1958) held as a merely transitional feature. He suggests that they would have probably occurred during further ontogeny (*op. cit.*, p. 17). *Foramina praenuchalia*, sporadically present in cheloniids, are vestiges persisting from the stage of the early ossification of the shell. They are probably connected with certain disturbances in the normal ontogeny. Conclusions concerning phylogenetic relationship between Toxochelyidae and Cheloniidae, drawn on the mentioned morphological characters, may be incorrect.

Hence, the presence of *foramina praenuchalia* in representatives of *Glarichelys knorri* (Gray) cannot be regarded as a feature characteristic of this form, or as being of taxonomic significance here.

PHALANGES OF SEA TURTLES

The presence or absence of condyles in digital phalanges of sea turtles is an important taxonomic character. The presence of condyles, permitting the motion of digits, is undoubtedly a primitive character in marine turtles. It is believed to be one of the diagnostic taxonomic features in the separation e. g. of Toxochelyidae from Cheloniidae (Hay, 1908a; Huene, 1956, and others). Zangerl (1953) likewise states that toxocheliids were able more freely to bend the digits of their forelimbs.

In the remains of young *Glarichelys knorri* (Gray) from Winnica the few digital phalanges are strongly thickened in the diaphysal area, having the semblance of condyles (see photograph). Similar thickenings are always encountered in very young individuals; however, they are not the typical condyles enabling the digits to bend. Therefore, the differentiation in fossil materials of true condyles from thickenings similar to those here described presents considerable difficulties.

ON BIOLOGY AND ECOLOGY OF THE SEA TURTLE FROM WINNICA

In the writer's opinion, the presence in menilitic shales of Winnica of the remains of young sea turtles testifies to the littoral character of the fauna in that area. This is also indicated by the find, besides the other missing specimen, of the impression of a land plant. On the writer's own observations of young recent sea turtles, in size corresponding to the Winnica specimen, the occurrence of such individuals is associated with an off-shore environment, being only occasionally encountered in pelagic areas. Research work, done concerning the fish fauna of these areas by Jerzmańska (1958), confirms the supposition as to the littoral character of the marine fauna near Jasło. The presence in early Tertiary deposits of the Polish Carpathians of young specimens of *Glarichelys knorri* (Gray) suggests certain faunistic similarities between this area and that of canton Glarus in Swiss. Most likely some islands of a beachy sea shore, favourable for the laying of reptile eggs, must have existed near the locality that yielded the discussed turtle remains.

Zangerl (1958) supposes that *G. knorri* (Gray) was a turtle of moderate size, frequenting the calm waters of fiord-like sea bays (*op. cit.*, p. 27-28). In his opinion, the state of preservation of the Glarus specimens does not suggest their fossilization at greater depth. The here discussed remains have been preserved under similar environmental conditions. They experienced rapid fossilization in a shallow bay on an argillaceous floor, where petrification set in very soon.

Certain similarities of *G. knorri* with the recent species of *Eretmochelys imbricata*, and the Tertiary faunal finds from the vicinity of Jasło so far available, suggest that climatic conditions prevailing there were similar to the present climate near Ceylon or in the tropical areas of the Atlantic Ocean.

REFERENCES

- BERGOUNIOUX, F. M. 1955. Testudinata. In: Piveteau, J., *Traité de Paléontologie*, 5, 487-544, Paris.
- BOULENGER, G. A. 1889. Catalogue of Chelonians, Rhynchocephalians and Crocodiles in the British Museum (Nat. Hist.). Part. 3, 1-311, London.
- CARR, A. 1952. Handbook of Turtles. The Turtles of the United States, Canada and Baja California. 1-542, Ithaca.
- CUVIER, G. 1825. Recherches sur les ossements fossiles. 5, 2. 1-243, Paris.
- DAQUÉ, E. 1912. Die fossilen Schildkröten Aegyptiens. — *Geol. Paläont. Abh.*, 10, 4, 275-333, Wien.
- DERANYIAGALA, P. E. P. 1953. Colored atlas of some vertebrates from Ceylon. 2: Tetrapoda Reptilia, 1-101, Colombo.
- FUCINI, A. 1909. La Chelone Sismondai Port. del Pliocene di Orignano in Provincia di Pisa. — *Palaeontogr. Ital.*, 15, 101-123,
- GILMORE, C. W. 1937. A new marine turtle from the Miocene of California. — *Proc. Calif. Acad. Sci.*, 4 ser., 23, 10, 171-174, California.
- GRAY, J. E. 1831. Synopsis Reptilium. Part 1. 1-72, London.
- GREGORY, W. K. 1951. Evolution Emerging. 1 & 2, 1-736+1-1009, New York.
- HAY, O. P. 1908a. The fossil turtles of North America. — *Carnegie Inst. Publ.*, 79, 1-568, Washington.
- 1908b. On three existing species of sea-turtles, one of them (*Caretta remivaga*) new. — *Proc. U. S. Nat. Mus.*, 34, 183-193, Washington.
- HUENE, F. v. 1956. Paläontologie und Phylogenie d. niederen Tetrapoden. 1-716, Jena.
- JERZMAŃSKA, A. 1958. Stan badań nad rybami trzeciorzędowymi w Polsce (Status of research on Tertiary fishes of Poland). — *Kwart. Geol.*, 2, 1, 177-186, Warszawa.
- *KEFERSTEIN, Ch. 1834. Naturgeschichte des Erdkörpers usw. 2, Leipzig.
- *KNORR, G. W. & WALCH J. E. J. 1773. Die Naturgeschichte der Versteinerungen zur Erläuterung der Knorr'schen Sammlung von Merkwürdigkeiten der Natur. 1-2, Nürnberg.
- LYDEKKER, R. 1889. Catalogue of the fossil Reptilia and Amphibia in the British Museum (Nat. Hist.). Part 3: Chelonia, 1-239, London.
- MERTENS, R. & WERMUTH, H. 1955. Die rezenten Schildkröten, Krokodille und Brückenechsen. — *Zool. Jb. (Syst.)*, 83, 3, 323-440, Jena.
- MEYER, H. v. 1856. Schildkröte und Vogel aus dem Fischeschiefer von Glarus. — *Palaeontographica*, 4, 84-91, Stuttgart.
- OWEN, R. & BELL, T. 1849/58. Monograph on the fossil Reptilia of the London Clay. 1-76, London.
- PORTIS, A. 1890. Rettili pliocenici del Valdarno. Firenze.
- RÜSCHKAMP, F. 1926. Die Seeschildkröte der Maastrichter Kreide. Ein Schädel von *Allopleuron* (Chelone) Hoffmanni Gray. — *Palaeont. Ztschr.*, 6, 122-140, Berlin.
- SHIKAMA, T. 1956. Miocene Chelonia of Japan. — *Sci. Rep. Yokohama Nation. Univ.*, 2, 5, 35-62, Yokohama.
- SIEBENROCK, F. 1909. Synopsis der rezenten Schildkröten usw. — *Zool. Jb.*, Suppl. 10, 427-618, Jena.
- SZALAI, T. 1934. Die fossilen Schildkröten Ungarns. — *Folia Zool. Hydrobiol.*, 6, 97-142, Riga.
- WEGNER, Th. 1914/18. Chelonia *gwinneri* Wegner aus dem Rupelton von Flörsheim. — *Abh. senckenberg. naturf. Ges.*, 36, 361-372, Frankfurt a.M.

- ZANGERL, R. 1953. The vertebrate fauna of the Selma Formation of Alabama. 4: The Turtles of the family Toxochelyidae. — *Fieldiana: Geol. Mem.*, 3, 4, 137-277, Chicago.
- 1958. Die oligozänen Meerschilddrüsen von Glarus. — *Abh. Schweiz. Palaeont. Ges.*, 73, 1-56, Basel.
- ZANGERL, R. & TURNBULL, W. D. 1955. *Procolpochelys grandaeva* (Leidy), an early Carettine sea turtle. — *Fieldiana: Zool.*, 37, 345-382, Chicago.

* Papers noted by asterisks were inaccessible for the author.

MARIAN MŁYNARSKI

GLARICHELYS KNORRI (GRAY) — ŻÓŁW MORSKI Z ŁUPKÓW MENILITOWYCH KARPAT

Streszczenie

Praca niniejsza zawiera opis szczątków młodego osobnika żółwia morskiego, pochodzącego z łupków menilitowych z miejscowości Winnica koło Jasła, znalezione przez Dra S. Kadyia z Jasła.

W części opisowej podano dokładną charakterystykę zachowanych szczątków oraz przeprowadzono szereg porównań poszczególnych części z współczesnymi i kopalnymi żółwiami morskimi.

Uzasadniając stanowisko systematyczne omawianego okazu zaliczam go do gatunku *Glarichelys knorri* (Gray) (Cheloniidae), opisanego z oligoceńskich warstw kantonu Glarus w Szwajcarii. Przy określaniu stanowiska systematycznego opierałem się przede wszystkim na najnowszej, monograficznej rewizji kopalnych żółwi szwajcarskich R. Zangerla (1958).

W części ogólnej podaję kilka uwag dotyczących morfologii i taksonomii kopalnych i współczesnych żółwi morskich. Uwagi te dotyczą typów budowy pancerza brzuszego u poszczególnych rodzajów współczesnych, występowania otworów pre-nuchalnych (*foramina praenuchalia*) u współczesnych przedstawicieli rodziny Cheloniidae oraz morfologii palców u młodych osobników tej samej grupy systematycznej.

Na zakończenie podano kilka uwag o warunkach życia żółwi morskich w trzeciorzędzie w regionie Jasła. Panował tam przypuszczalnie klimat tropikalny lub subtropikalny oraz znajdował się brzeg morski lub wyspy, umożliwiające żółwiom składanie jaj.

Przy przygotowywaniu niniejszej publikacji korzystałem z materiałów współczesnych, znajdujących się w kilku zakładach naukowych w Brazylii, oraz z materiałów zebranych osobiście na wyspie Ilha da Trindade na Atlantyku Południowym.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1. (p. 179)

Rekonstrukcja karapaksu młodego osobnika *Glarichelys knorri* (Gray) z Winnicy; wielk. nat.

Fig. 2 (p. 181)

Glarichelys knorri (Gray). schematyczna rekonstrukcja kości pasa barkowego okazu z Winnicy: 1 coracoid, 2 humerus, 3 scapula; $\times 2$.

Pl. I

Fotografia młodego osobnika *Glarichelys knorri* (Gray) z Winnicy; prawie wielk. nat.

Pl. II

Schematyczny rysunek ułatwiający znalezienie poszczególnych fragmentów na załączonej fotografii: 1 ośrodek czaszki wraz z fragmentami kostnymi, 2 płytka nuchalna, 3 humerus, 4 scapula, 5 carpalia (?), 6 płytki kostalne, 7 kości korakoidalne, 8 fragmenty hyoplastronów, 9 płytki marginalne, 10 płytki ksifiplastralne, 11 os pubis, 12 płytki neuralne, 13 płytka epiplastralna, 14 fragmenty falang, 15 kość radialna, 16 płytka suprapygalna, 17 bruzdy tarczek kostalnych, 18 odciski tarczek marginalnych

МАРИАН МЛЫНАРСКИ

GLARICHELYS KNORRI (GRAY) — МОРСКАЯ ЧЕРЕПАХА ИЗ МЕНИЛИТОВЫХ СЛАНЦЕВ КАРПАТ

Резюме

Настоящая работа содержит описание остатков молодой особи морской черепахи, найденной Др-ом С. Кадьи в менилитовых сланцах в местности Винница близь г. Ясло.

В описании дана подробная характеристика сохранившихся остатков и сравнение отдельных частей современных и ископаемых морских черепах.

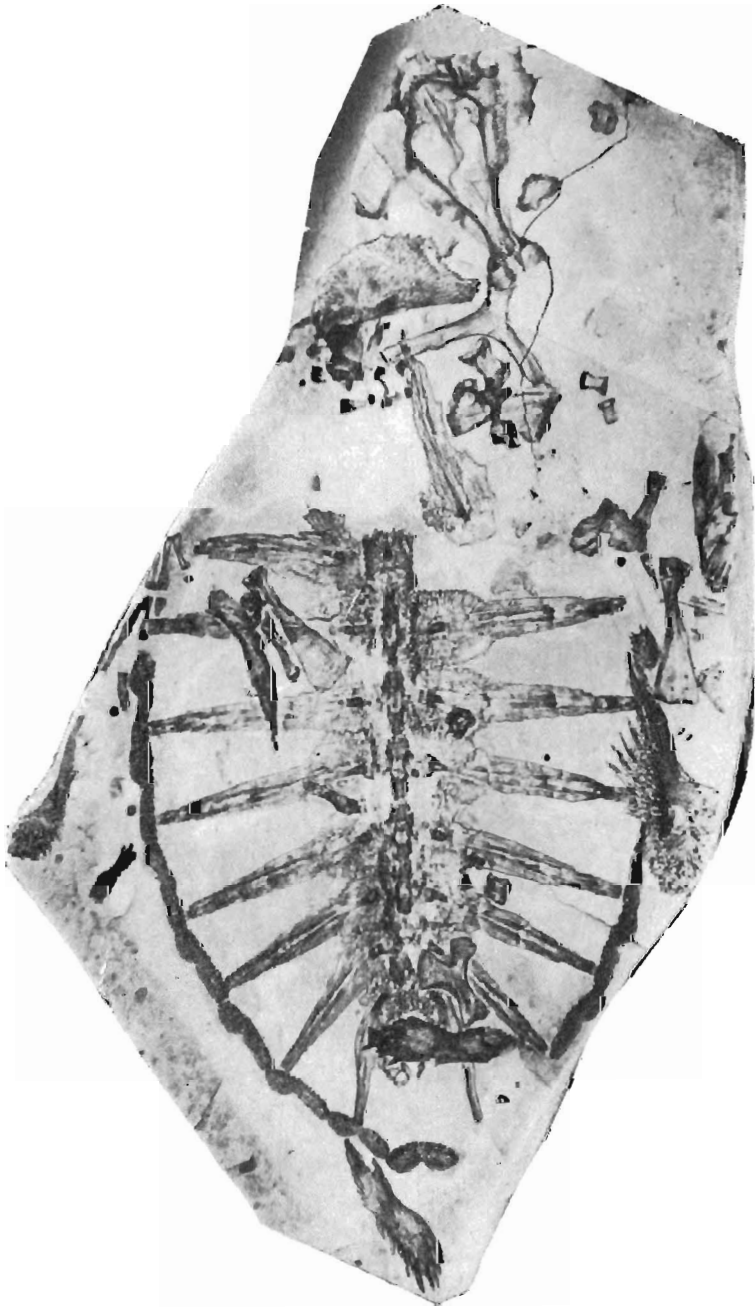
Обосновывая систематическое положение этого образца автор причисляет его к виду *Glarichelys knorri* (Gray) (Cheloniidae), описанному из олигоценовых отложений кантона Гларус в Швейцарии. Определяя систематическую принадлежность, автор основывался прежде всего на самой новой монографической ревизии швейцарских ископаемых черепах Р. Цангерля (R. Zangerl, 1958).

В общей части автор приводит некоторые замечания, касающиеся морфологии и таксономии ископаемых и современных морских черепах, а главным образом наличия пренухальных отверстий (*foramina praenuchalia*) у современных представителей семейства Cheloniidae и морфологии пальцев у молодых особей этой же систематической группы.

Затем автор высказывается по поводу условий жизни морских черепах в районе г. Ясло в третичном периоде. По всей вероятности господствовал там в те времена тропикальный или субтропикальный климат, а в близости должен был находиться морской берег или острова, дающие черепахам возможность кладки яиц.

При обработке описанного образца автор пользовался современными материалами, находящимися в нескольких научных институтах в Бразилии, и собранными лично автором на острове Триндаде в южной части Атлантического океана.

P L A T E S



Glarichelys knorri (Gray), Winnica specimen, photograph; approx. nat. size.

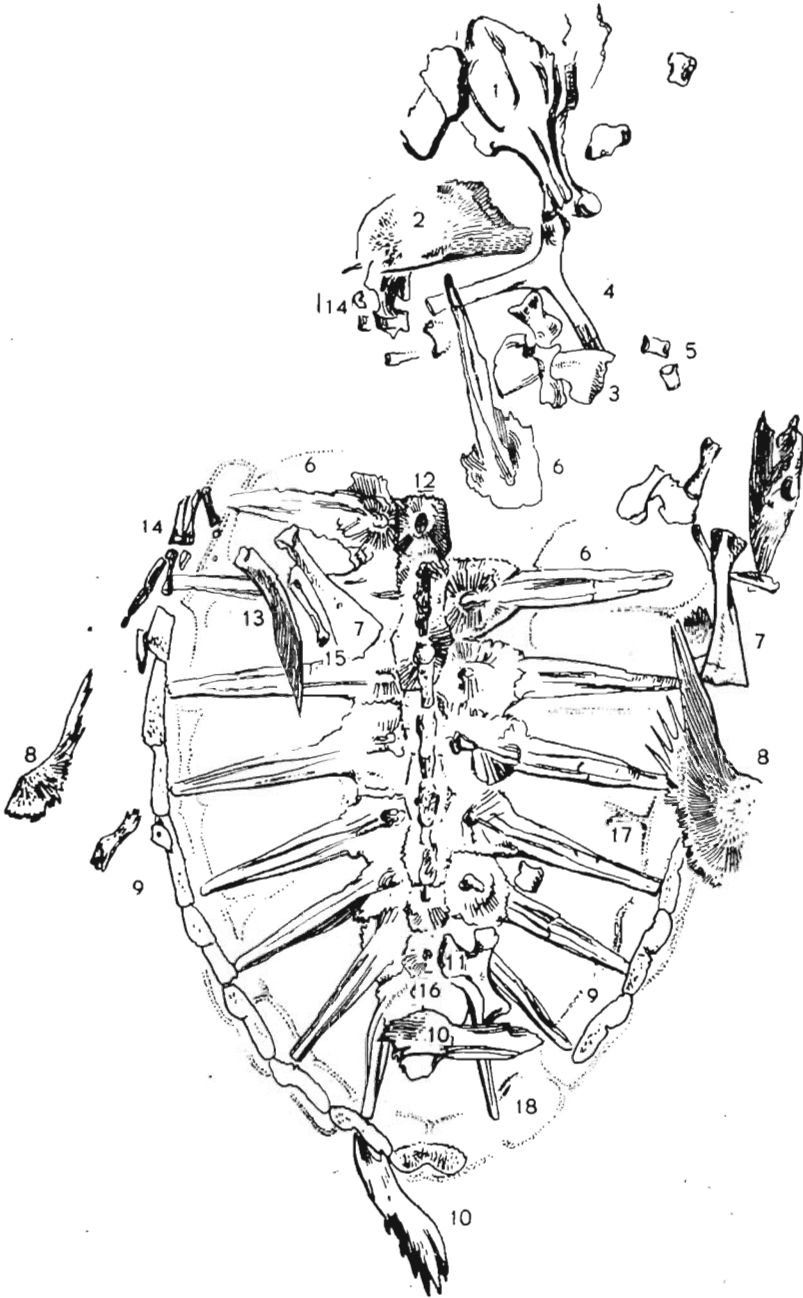


Diagram of the photograph: 1 cast of skull and bone fragments. 2 nuchal plate, 3 humerus, 4 scapula. 5 carpalia (?), 6 costal plates, 7 coracoids, 8 fragmentary hyoplastrals. 9 marginals. 10 xiphiplastrals. 11 os pubis, 12 neurals, 13 epiplastron, 14 fragmentary phalanges, 15 radius, 16 suprapygal plate. 17 furrows of costal plates, 18 imprints of cranial bones.