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CHELONIANS FROM THE UPPER CRETACEOUS OF THE GOBI DESERT, MONGOLIA

(Plates XXII-XXIV)

Abstract. — Chelonian material collected by the Polish-Mongolian Palaeontological Expeditions (1963—1965) and earlier Soviet Expeditions to the Gobi Desert is described. The following species are identified: *Mongolemys elegans* n. gen., n. sp. (Dermatemydidae), *Trionyx* sp. and Amphichelydia gen. et sp. indet. from Tsagan Khushu, *Tsaotanemys rugosa* BOHLIN, 1953 (Dermatemydidae) and *Trionyx* sp. from Ulan Bulak and a large form of *Trionyx* sp. from Khar Teg. The localities in which the material was found, the state of preservation and fossilization of the specimens are described. The ecology of these turtles is discussed as is the taxonomy of the Mongolian Dermatemydidae. The new taxonomic division of the turtles suggested by ZANGERL (1969) has been adopted in this paper.

INTRODUCTION

As has been previously reported (MŁYNARSKI, 1968/69), the material collected by the Polish-Mongolian Palaeontological Expeditions includes many remains of aquatic chelonians which come from Upper Cretaceous beds in three localities. A particularly rich material was obtained from the Tsagan Khushu site in the Nemegt Basin, whose characteristics is given by GRADZIŃSKI *et al.* (1968/69, pp. 49—53), where turtles are found in large numbers in a complex of fine-grained beds in silty sands (*l. c.*, Text-fig. 9). The skeletons are found crowded together, overlaying one another and frequently even wedged into each other. Less numerous, and unfortunately very fragmentary remains of shells come from the beds in which an incomplete skeleton of an ornithomimid dinosaur (*l. c.*, p. 50, Text-fig. 8) was found. More material was collected from these localities by Soviet palaeontologists.

The remains of the turtles from Tsagan Khushu are well fossilized and so are relatively firm and easy to prepare. They do not bear any traces of the weathering and mechanical grinding which destroys the bone surface and has been frequently found in Mongolian land tortoises. The turtle remains show a slight radioactivity, much the same as in the bones of other vertebrates from this locality (JAWOROWSKI & PEŃSKO, 1967). The preservation of the turtles from Tsagan Khushu is mostly good, but all display traces of a dorso-ventral compression which, in many cases, makes the reconstruction of their shape and, in particular, their degree of convexity somewhat difficult.

Three clearly different chelonian forms are found in the material from Tsagan Khushu, the most numerous are small Dermatemydidae. The large numbers of specimens ranging from juvenile to adult individuals allows the morphological changes taking place during ontogeny to be traced. Remains of large turtles with massive, flat carapaces are much less abundant and provisionally have been classified as Amphichelydia. The rarest are small soft-shelled turtles, which do not differ from Recent froms of the genus *Trionyx* GEOFFROY.

The collections of the Polish-Mongolian Expeditions contain very few remains of the turtles found in 1963 in the northern part of the Ulan Bulak locality (cf. KIELAN-JAWOROWSKA & DOVCHIN, 1968/69, p. 16; GRADZIŃSKI *et al.*, 1968/69, pp. 34—38, Text-fig. 1). Similar to the turtles from Tsagan Khushu, there are representatives of the Dermatemydidae, i.e. soft-shelled turtles, as well as fragments of shells of an indeterminate, large turtle about 1 m long. Turtles are also abundant in Khar Teg (see KIELAN-JAWOROWSKA & DOVCHIN, 1968/69, pp. 14—15, Text-fig. 1). A fragment of shell of a large specimen of the genus *Trionyx*, found by the expedition in 1963, comes from this locality.

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Abbreviations:

Z. Pal. — Palaeozoological Institute, Polish Academy of Sciences, Warsaw,
ZIN. — Zoological Institute, USSR Academy of Sciences, Leningrad.

SYSTEMATICS

Systematics, suggested by MŁYNARSKI (1969), was adopted in a previous review devoted to land tortoises (MŁYNARSKI, 1968/69), but in 1969 essential changes in higher taxons were proposed by ZANGERL, whose system differs to a considerable extent from the hitherto accepted divisions of the order Testudines. Zangerl's division is based only on the morphological characters of the shell and is therefore very useful for palaeontologists. The names of the plates and shields of the shell, suggested by STAESCHE (1961) and used by MŁYNARSKI (1968/69) have, however, been retained in the present paper. These names differ considerably from ZANGERL'S (1969).

Suborder AMPHICHELYDIA LYDEKKER, 1889

AMPHICHELYDIA gen. et sp. indet.

Material. — Six incomplete specimens (fragments of the carapace, isolated plates and bone fragments) from Tsagan Khushu, housed in the Palaeozoological Institute, Polish Academy of Sciences, in Warsaw and numerous remains from the same locality, housed in the Zoological Institute, USSR Academy of Sciences, in Leningrad.

Discussion. — The remains of our collections belong to the same form whose excellently preserved shell, together with skull and parts of skeleton, is housed at the Museum of the Palaeontological Institute of the USSR's Academy of Sciences in Moscow (cf. ROZHDESTVENSKY, 1969, p. 81). The occurrence of large, fresh-water turtles in the Upper Cretaceous beds of the Nemegt Basin (Tsagan Khushu) was mentioned by EFREMOV (1954), who provisionally assigned these remains to the genus *Baena* LEIDY. The representatives of the turtles under study seem, however, to differ conspicuously not only from the representatives of the family Baenidae or Macrobaenidae, but also from Asian fossil chelonians described so far. The present form is archaic, with a farreaching specialization, expressed most conspicuously in a considerably advanced reduction of the plastron. Its massive carapace has a fairly distinct epidermal sculpture which is quite different than that in our Dermatemydidae. Fragments of the dorsal

part of carapace, preserved in the collection of the Polish-Mongolian Expeditions, resemble analogous fragments of carapaces of the turtles of the genus *Kallokibotion* NOPCSA, a form endemic in the Upper Cretaceous of Transylvania, Rumania (a collection housed in the Geological Institute in Budapest; MŁYNARSKI, 1966, pp. 242—243, Pl. 15, Fig. 3). In these turtles, the strong development of the dorsal vertebrae is noteworthy, this seems to be only slightly connected with neurals near a strong costal process connecting them with pleural plates. *Kallokibotion* differs, however, from our form in several characters including a massive plastron. The two turtles represent different trends of a narrow specialization. Both may be considered as relicts from the early Mesozoic which, under favourable conditions, persisted in refugial localities up to the Upper Cretaceous.

Suborder METACHELYDIA ZANGERL, 1969
Family DERMATEMYDIDAE GRAY, 1870

Genus **MONGOLEMYS** nov.

Type species: Mongolemys elegans n. sp.
Derivation of the name: Mongol — after Mongolia; Gr. *emys* — pond turtle.

Diagnosis. — As for the type species (the new genus is monotypic).
Occurrence. — Known only from the Upper Cretaceous of the Gobi Desert, Mongolia.

Mongolemys elegans n. sp.

(Pls. XXII–XXIII; XXIV, Figs. 1*a*, 1*b*; Text-figs. 1-6)

Holotype: Complete shell of a large specimen, 22 cm long (ZIN. No. RN. T/M-46.1), figured on Text-fig. 2.
Type horizon and locality: Upper Nemegt Beds, zone of *Tarbosaurus bataar* (MALEYEV), *Saurolophus angustirostris* ROZHDESTVENSKY and *Dyoplosaurus giganteus* MALEYEV; Nemegt Basin, Gobi Desert, Mongolia.
Derivation of the name: Lat. *elegans* — elegant.

Diagnosis. — A small, typical representative of the Dermatemydidae with a strongly ossified shell, cross-shaped plastron and characteristic sculpture of dermal shields. Carapace with an even, nonserrated outer edge, without keels and, as a rule, wider in the caudal part. Proneural plate large, without traces of costiform processes. Neurals hexagonal, wider in their anterior part, separating all pleurals from each other. Two metaneurals occur in all cases and a small pygal is intersected by a sulcus of the last central. Praecentral is distinct and wide. The massive cross-shapped plastron is markedly shorter than the carapace with which it is connected by a wide, strong plastral bridge. Its anterior lobe is wider than the posterior, epiplastra very weak and entoplastron elongated. The posterior lobe is devoid of anal notch. Three or four large inframarginals are present. All connections of plastron elements are osseous and strong. The massive skull is marked by a strong development of the temporal region and a structure typical of the Dermatemydidae. Dentals terminating in a small, hooklike process; hyoidal bones strongly developed. Cervical vertebrae typical of the Dermatemydidae, long; caudal vertebrae shorter, proellar. Legs five-toed, strong although not very large; phalanxes with condyles. Tail long, reaching far beyond the edge of shell. Shell up to 25 cm long.

Material. — In addition to the holotype there are numerous specimens from Tsagan Khushu, Nemegt Basin and Bugin Tsav, Western Gobi, housed in the Zoological Institute

in Leningrad, and 36 fragmentary shells or isolated plates and bones from Tsagan Khushu, housed in the Palaeozoological Institute in Warsaw. The best preserved specimen in the collection of the Palaeozoological Institute in Warsaw is Z. Pal. No. MgCh/21, on which most of the present description is based.

Description. — Shell outline variable, in juvenile and young individuals where it does not exceed 15 cm in length, the carapace is normally much wider in the caudal part. Such a shape is also retained by most adults, as e.g. holotype or paratype (cf. Pl. XXII and Text-fig. 1*a*). Carapaces oval in outline and equally wide on both, cranial and caudal parts, are rare; such individuals do not, however, differ in any details of structure from those mentioned above. There is no reason therefore to assume that the carapaces found belonged to two different species. Several transitional forms may also be distinguished between the two morphological types (cf. Text-fig. 1). The outline of the carapace is also frequently changed as result of me-

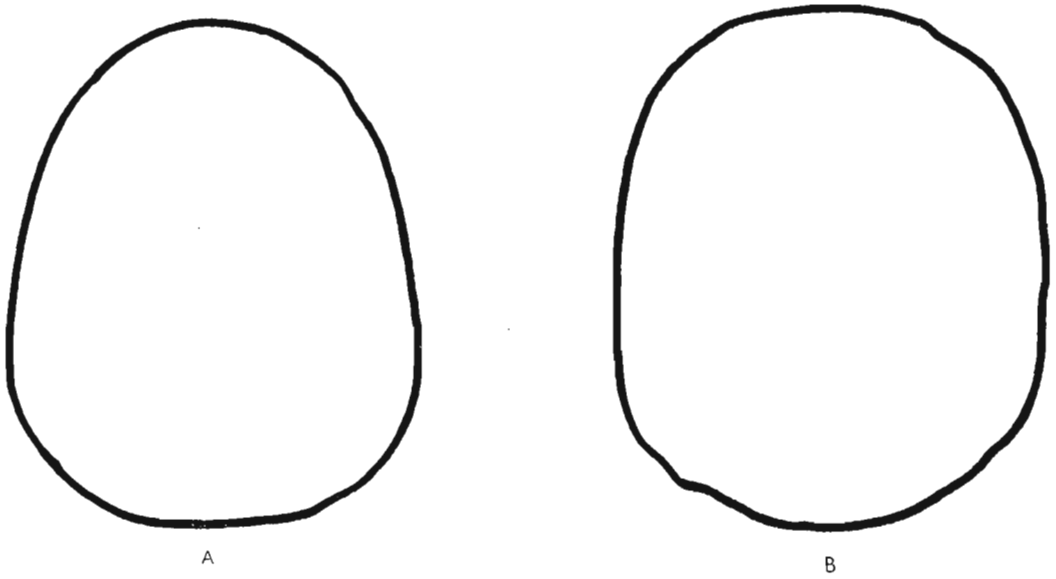

Fig. 1

Outline of the carapace of *Mongolemys elegans* n. sp.: *a* most frequent form, *b* rare form; ×0.5.

chanical crushing prior to the completion of fossilization. The edge of carapace is normally quite even, but a fine waving of the edge was observed in the caudal part in two individuals. This might result from mechanical compression of the entire shell or by a deformation evoked in this way.

Carapace of *Mongolemys elegans* shows no traces of keels and is quite smooth even in the youngest specimens. Likewise, no notch occurs in the cranial part. The convexity of the carapace is not very strong but distinct, as evidenced by isolated pleural plates. The carapace is reinforced by strong buttresses. The dorsoventral compression found in most individuals from Tsagan Khushu provides additional evidence for a mild convexity of the carapace. The carapace of the form under study can therefore be regarded as similar to that of the Recent representative of this group *Dermatemys mawii* GRAY. Plates of carapace are marked by a considerable regularity and display only small morphological deviations or irregularities. Pronеural is large, massive, symmetrical and pentagonal or hexagonal. We could find no costiform processes in any of specimens under study although many authors regard these as characteristic

of the Dermatemydidae. There are eight neurals similar in shape to those in the Recent Emydidae. In all specimens the first is oval, the rest hexagonal with much longer posterolateral edges and are all relatively wide. Together, they form an uninterrupted row by separating the pleurals from each other. The last of the neurals, shortened and with uniform edges, is fused with trapezoidal metaneural I. Metaneural II is also trapezoidal and is connected with the former plate by its longest edge. Pygal plate is small, elongated and narrow. There occur eight peripherals with approximately parallel long edges. The widest, but still relatively small, are PL. Is, the smallest PL. VIIIs. No lateral fontanels have been found, even in quite young individuals, evidence that the ossification of these turtles' shells took place both rapidly and early, as in many Emydidae or Testudinidae. Peripherals form a massive edge to the carapace and are strongly connected with each other. Dermal shields are always very distinctly impressed on the surface of plates. Their sulci, although not deep, are clearly visible in all specimens. On the whole these shields are symmetrical and regular deviations are relatively small. They were also fairly thin and closely adhere into the surface of plates. Except for a fine, distinct dermal sculpture, the surface of the plates has neither sulci, nor areols, nor any of the other structures so characteristic of the species with a thick, strongly horned epidermal shields. Centrals are large, with C-1 to C-2 being normally longer than wide. Of the laterals L-4 is much smaller than the remainder; 11 marginals always occur and are much lower than the peripherals. The symmetrical postcentrals are found in all specimens. The sulcus which separates them reaches approximately halfway down the lengsth of pygal. Sulci of the last central, i.e. C-5 are also visible on the pygal.

In all the individuals the plastron is cross-shaped, massive and connected to the carapace by a wide bridge. In specimens of different size, the shape of plastron is variable. Even in very young individuals no fontanellae have been found. Dermal shields, clearly visible on its surface, have a sculpture which does not differentiate them from the plates of the carapace. Of the plastral plates the epiplastrals are the least strongly developed. They seem to be reduced, narrow, delicate and rather slightly connected with the further elements of plastron. In many specimens, they fell off, in most cases together with entoplastron, as early as during fossilization. No thickening is visible on the outer surface of epiplastral lips where, on the other hand, a distinct concavity occurs (see Text-fig. 4). Their anterior edge is frequently almost straight or somewhat laterally convex. In all the specimens the entoplastron is strongly elongated, clearly visible on the outer side. It has also a long process overlapping the surface of hyoplastra. The outer shape of the entoplastron differs from the inner. In young specimens, it is strongly elongated, triangular or diamond-shaped; in large, old individuals — wide, mostly hexagonal and retaining its slender structure in the inner part. This type of entoplastron structure is indicative of its primitivity and occurs in primitive species of turtles. Hyoplastra are massive and closely connected with each other, as well as with other plates of plastron. In many individuals, including small ones, about 10 cm long, the lateral margins of hyoplastra are bent outwards and, consequently, the surface of the anterior lobe is concave. This may be characteristic of males (see Text-fig. 3). Most part of the bridge is formed by hyoplastra. The hypoplastra are very strongly connected with the xiphiplastra by means of strong and immobile sutures. They form an oval, rounded or, in young individuals, a sharp termination to the posterior lobe. Anal notch does not occur even in very large specimens. The very wide plastral bridge is more than half as long as the entire plastron, strong sutures connect it with the peripheral margin of the carapace.

Plastral shields are distinct in all cases. The smallest of them, gullars cover the anterior part of entoplastron. Humeropectoral sulcus is situated below entoplastron and never intersect it. Humerals are approximately the same size as femorals, pectorals narrower or equally wide as anals, and abdominals are always the widest of all plastral shields. Particularly note-

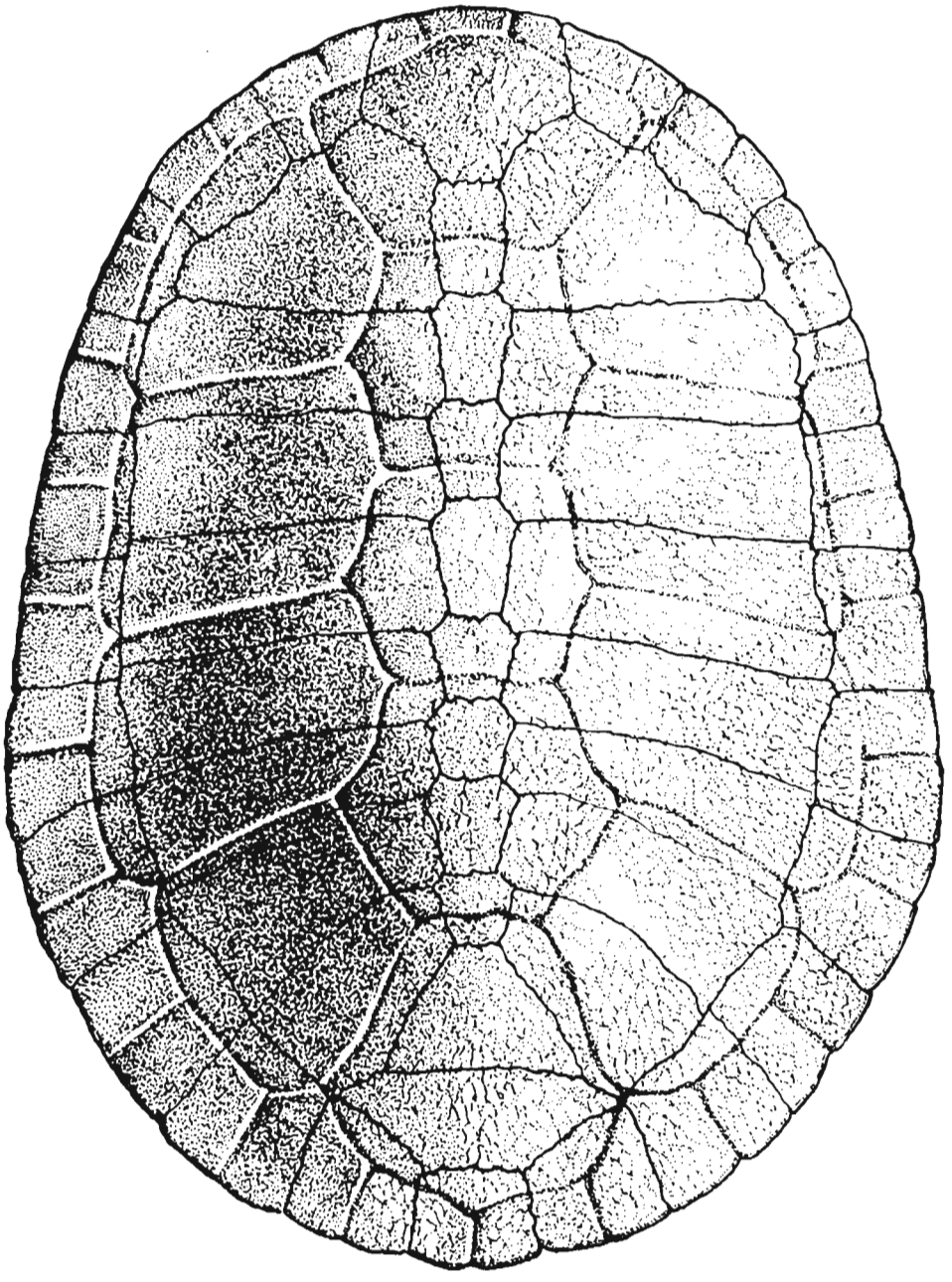

Fig. 2
Mongolemys elegans n. sp. the carapace of the holotype (ZIN. No. RN. T/M-46.1); ×0.75.

worthy are the wide inframarginals, occupying almost the entire surface of the bridge and separating the shields of plastron from those of carapace. There are usually four inframarginals, but inframarginal 4, corresponding to the inguinal, is so small that it escapes notice in young or incomplete specimens. Inframarginals 2 and 3, which are always well developed, are the largest and the widest.

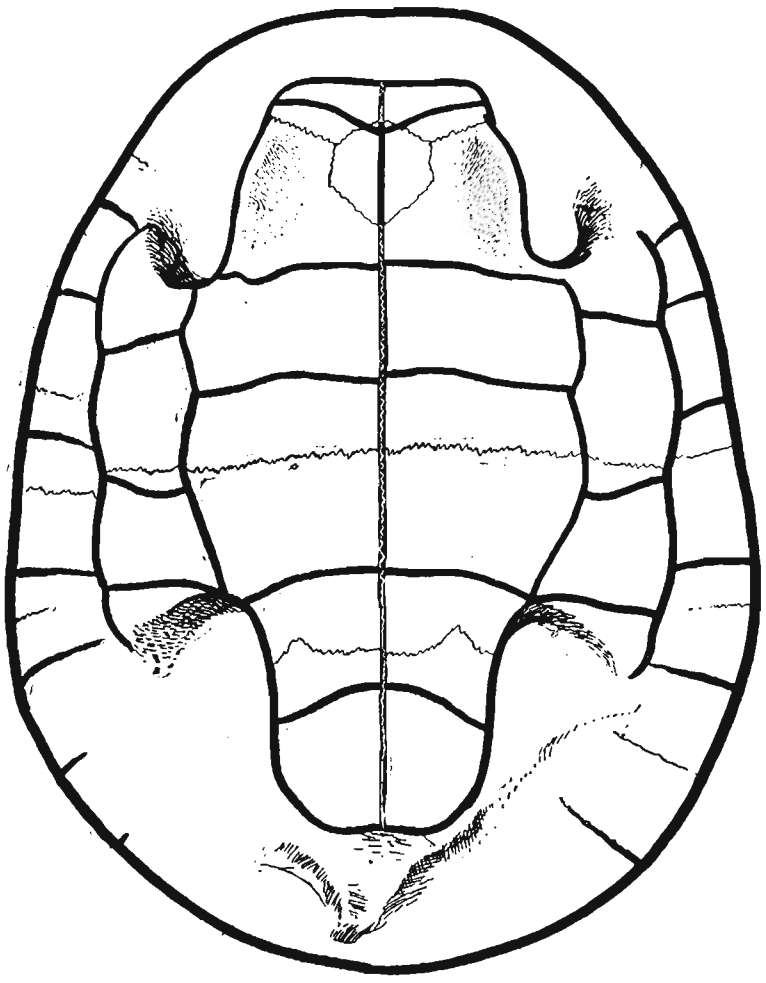

Fig. 3

Schematic drawing of a plastron, partialy restored, of *Mongolemys elegans* n. sp. (on the basis of Z. Pal. No. MgCh/21); ×0.5.

Skull (Z. Pal. No. MgCh/27) is strongly compressed dorsoventrally. On the basis of this specimen it was possible to reconstruct this skull. The skull of *Mongolemys* is not very strongly convex, but moderately wide and gently rounded. Temporal concavities, although not very deep, are distinct and posteriorly situated. Frontals form an upper margin of the orbit and there is no direct contact between the maxillar and the quadratojugal. Attention is attracted by the stoutness of the bones in the postorbital and temporal region. Squamosal is well developed and forms a long process directed caudally. Margins between prefrontal, frontal and parietal are straight. A strong development of the otic region is also marked. Maxillae are gently bent upwards. Maxillar margins are somewhat serrated and their alveolar surfaces not very wide. Noteworthy are massive hyoidal bones, well preserved (Z. Pal. No. MgCh/27).

Cervical vertebrae, although not very well preserved, are elongated and have weak lateral processes. Their entire structure and appearance in some better preserved specimens indicate that these animals retracted their necks under the shell as do other representatives of the Cryptodira. The second cervical vertebra proper, slightly differs from the remaining ones, but it is

rather difficult to state whether it is biconvex or biconcave. The articular surfaces are very indistinct. A long tail reaches far beyond plastron and carapace. Its procoel vertebrae have longer processes. Dorsal vertebrae are closely connected with neurals and have small, delicate, lateral connections with pleurals. Except for small fragments, no bones of pectoral and pelvic

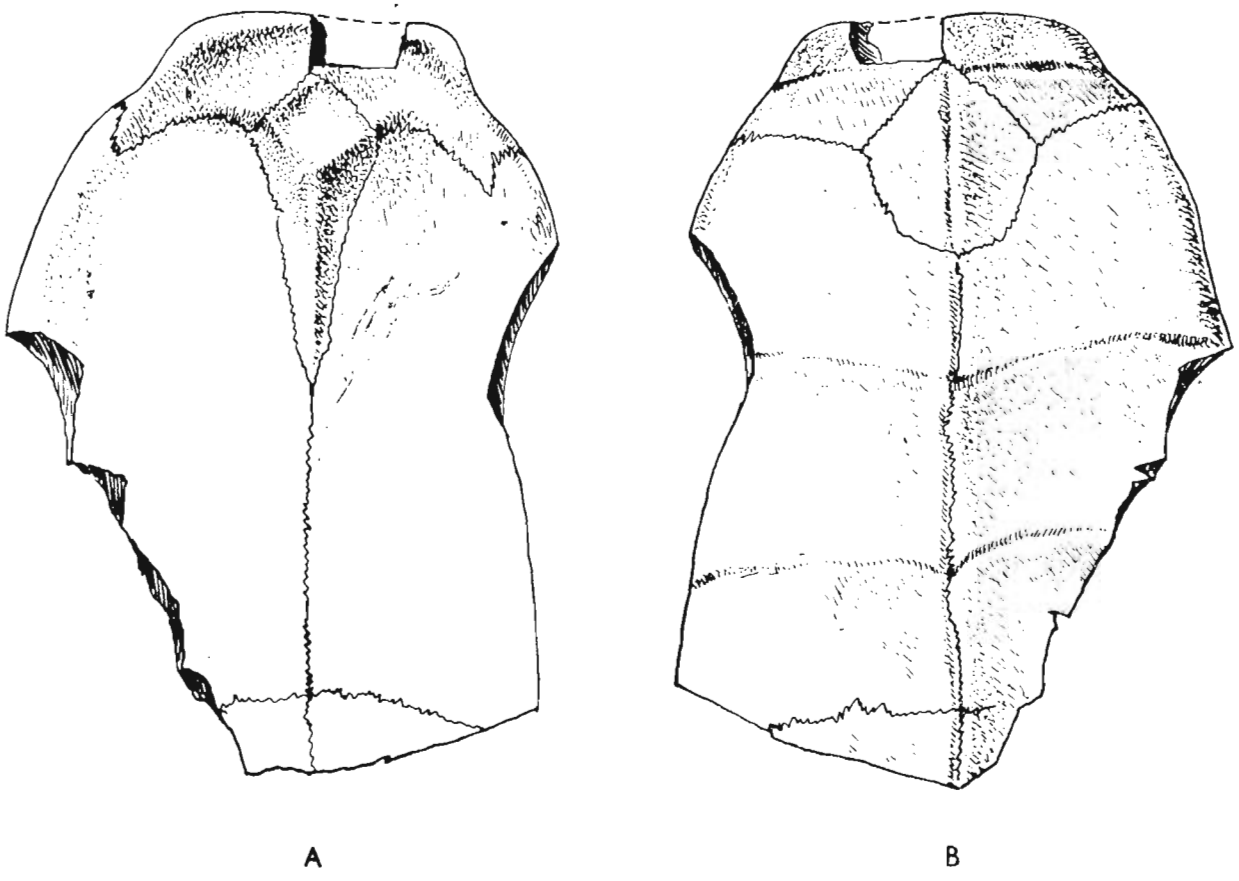

Fig. 4

Mongolemys elegans n. sp., fragment of anterior lobe of the plastron: *a* inner view, *b* ventral view (Z. Pal. No. MgCh/57); ×0.7.

girdle are preserved. Presumably, the pelvis was massive and strong, particularly the ilium, since in many specimens the surface of the last pleurals have symmetrical perforations for these bones. They were formed during the simultaneous processes of compression and fossilization and may be observed on the surface of carapaces in the form of symmetrical tubercles.

Our collections lack leg bones. However, on the basis of all available material, it was possible to make a reconstruction of a general appearance of the legs of the turtles under study (see Text-fig. 6). They were well developed, not very long, flat and five-toed. These are typical legs of animals adapted to a semiaquatic mode of life and are similar to those of both the Recent *Dermatemys mawii* GRAY and many mud and musk turtles (Knosternidae).

Discussion. — *Mongolemys elegans* n. sp. is assigned to the Dermatemydidae for the following reasons: very distinct and large inframarginals, structure of skull and a characteristic, epidermal sculpture of the shell. This species also displays features characteristic of the primitive

Cryptodira, now classified (ZANGERL, 1969) as Metachelydia. On the other hand, we did not find the more primitive characters which occur in representatives of such families as e.g. Baenidae or Anosteiridae. Of Recent species, the strongest similarity to the new species is displayed by the Mexican tortuga aplanada *Dermatemys mawii* GRAY (see BOULENGER, 1889; BIENZ, 1895).

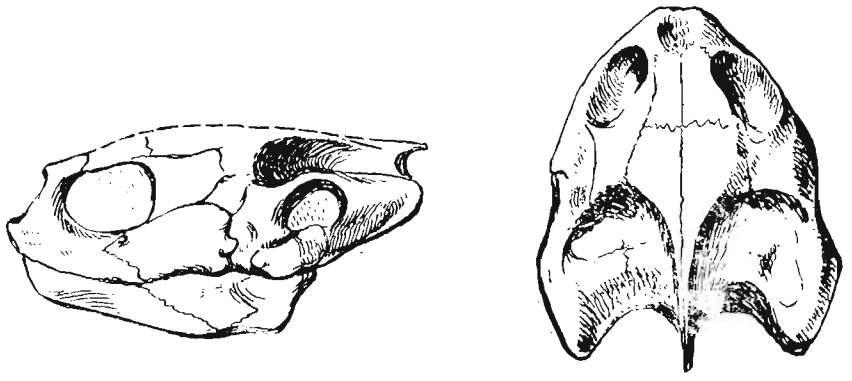

Fig. 5
Mongolemys elegans n. sp., restoration of the skull of a large specimen; nat. size.

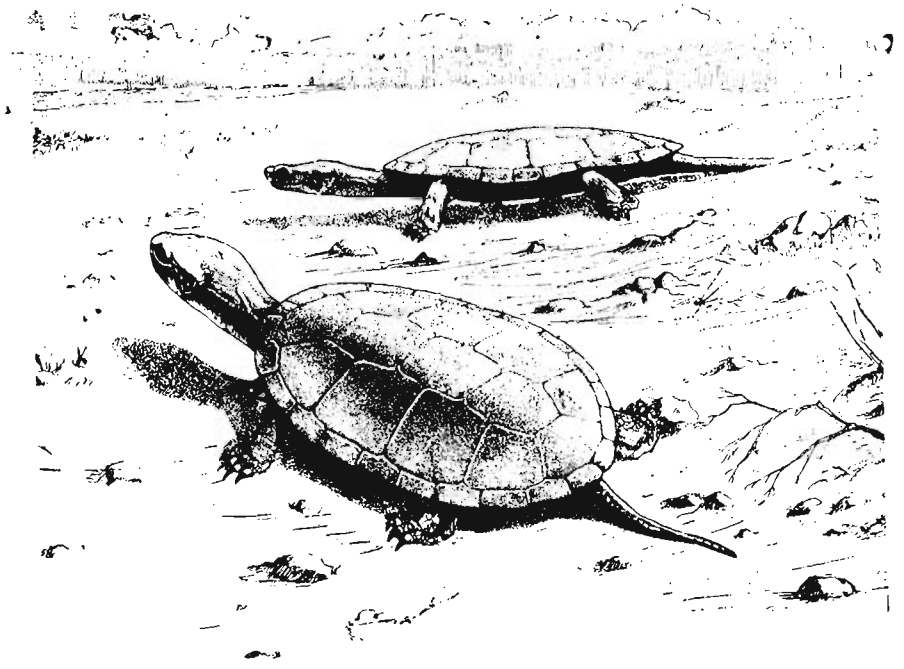

Fig. 6
Reconstruction of *Mongolemys elegans* n. sp.

In *Dermatemys*, however, part of the neurals was reduced and, consequently, the last pleurals directly contact each other. Its plastron is condiserably wider, not cross-shaped and has a very distinct anal notch; its wide entoplastron also intersects the humeropectoral sulcus. The dermal sculpture of the shields in *Dermatemys* is considerably less distinct and it may be clearly recognised only when slightly magnified. The skull also has deeper temporal notches and the suture,

which connects the praefrontal with the frontal, is bent. The temporal region is also less well developed and the maxillary bones have a different structure. *Mongolemys* resembles *Dermatemys* in having similarly developed inframarginals and alveolar surfaces of jaws.

Costiform processes of the proneural were not found in neither *Dermatemys* or *Mongolemys*, although many authors, including SIEBENROCK (1909, p. 448), maintain that such processes not only occur, but are also a taxonomic character of *Dermatemys*. The second author has, however, studied the specimens from SIEBENROCK's early collection (housed in the Museum of Natural History in Vienna). It is possible that the existence of short processes was suspected in young individuals of the Recent species, where the lateral elongated parts of the proneural plate are wedged between pleurals I and the peripherals. These may be easily confused with and taken for such processes. Such apparent processes may quite sporadically be observed in many turtles and even in small land tortoises. These are not costiform processes, such as those found in snapping turtles (Chelydridae). It may well be, therefore, that their presence is not an archaic but a progressive character, related to the reinforcement of the anterior, cranial margin of carapace. These processes have nothing in common with true cervical costae and have not, so far, been found in fossil turtles.

Mongolemys elegans n. sp. differs from all previously recognised fossil Dermatemydidae. This is particularly true of the species described by WIMAN (1930) and BOHLIN (1953) from China and Mongolia. *M. elegans* also differs from the indeterminate Dermatemydidae from Djadokhta formation (Bayn Dzak), housed in the collections of the American Museum of Natural History (Nos. 6658 and 6659) and mentioned by GILMORE (1929, p. 223). The quite different sculpture of the epidermal shields is sufficient evidence for this.

Genus **TSAOTANEMYS** BOHLIN, 1953

Type species: **Tsaotanemys rugosa** BOHLIN, 1953

Tsaotanemys cf. **rugosa** BOHLIN, 1953

Material. — A damaged, incomplete carapace without cranial part. Length of the preserved fragment is 16 cm; presumable length of the entire carapace 20 cm. Eleven small fragments of carapace of a larger individual, all from Ulan Bulag (Z. Pal. No. MgCh/67 and 68).

Discussion. — In 1953, *Tsaotanemys rugosa* BOHLIN was described by BOHLIN from the Cretaceous beds of Chia-ÿu-knah in Kansu Province, China. As suggested by YEH HSIANG-K'UEI (1963, p. 87), we have here one species characterized by a considerable variability. A reconstruction of the shell of *T. rugosa*, presented by BOHLIN, was made by him on the basis of the fragments he assigned to several species (cf. also YEH HSIANG-K'UEI, 1963, p. 15, Text-fig. 9). This is a form similar to *Mongolemys elegans* in size and shape, but differing considerably in the structure of the plastron and in the epidermal sculpture. It is mostly on the basis of this radial sculpture in the dorsal part that these remains are assigned to *T. rugosa*. The structure of the pygal region of the carapace and a similar geological age are also arguments favouring such an assignment which we regard as tentative, especially as the plastron is absent from material under study.

Tsaotanemys rugosa is also a representative of true Dermatemydidae: primitive Cryptodira with strongly developed inframarginals. Despite the differences it may be also assigned, together with *Mongolemys elegans*, to one and the same group of species with eight well developed neurals.

Family TRIONYCHIDAE Bell, 1828
Genus **TRIONYX** Geoffroy, 1899

Type species: Trionyx triunguis (Forskal, 1775).

Diagnosis. — See Hummel, 1929, pp. 11—18, and Młynarski, 1969, pp. 111—112.

Trionyx sp. **a**

(Pl. XXIV, Fig. 2; Text-fig. 7)

Material. — An almost complete, well preserved carapace (discus) of a small specimen, 11 cm long, three separate fragments of pleurals, including one of a considerable larger individual, all from Tsagan Khushu.

Description. — The only complete carapace of a soft-shelled turtle in the present collection does not differ from the carapaces of Recent representatives of this genus. It has eight narrow, elongated neurals, of which the anterior ones narrow posteriorly. There is only one, wide

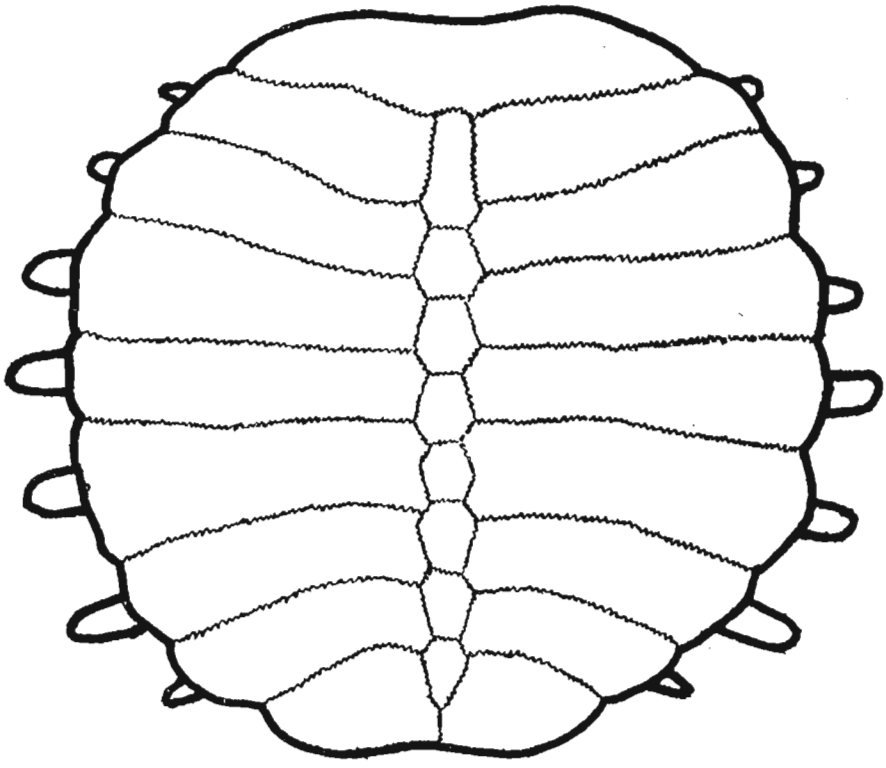

Fig. 7
Schematic drawing of the carapace of *Trionyx* sp. from Tsagan Khushu (Z. Pal. No. MgCh/52); nat. size.

proneural, whilst no traces of the praenuchale (epineural) can be observed. Wide pleurals are strongly connected with each other and with other plates of the discus. Almost all the free costal terminations of the pleurals have been preserved. The sculpture of the surface of plates, typical callositets, is similar to that in Recent species, as e.g. in *Trionyx sinensis* Wiegman. An identical type of sculpture is recorded in isolated plates coming from the same beds.

Discussion. — The only one well preserved carapace of a soft-shelled turtle from the material, collected by the Polish-Mongolian Expeditions, undoubtedly belongs to the genus *Trionyx*. The material is, however, too scant to allow of a specific determination. The representatives of the genus *Trionyx* have very similar carapaces and, at the same time, great morphological variability within the species. At present, more than 180 fossil species of these turtles are already known, most of them described on the basis of the discus only (cf. KUHN, 1964). The specific identification of soft-shelled turtles is impossible as long as the structure of their plastrons is unknown (see SIEBENROCK, 1902) and in our material plastrons have not been preserved. The fragmentary pleurals (Z. Pal. No. MgCh/60) include a plate of a considerably larger individual. It belonged to a very old specimen or represents second species of soft-shelled turtle. The greatest number of the remains of these small soft-shelled turtles are in the collections of Zoological Institute in Leningrad.

INDETERMINATA

Discussion. — The materials collected by the Polish-Mongolian Expedition in Ulan Bulag in 1963 include shell fragments of a large turtle (about 1 m long) (Z. Pal. No. MgCh/70). Its plates, although relatively thick, are so weathered that neither the sculpture, nor even traces of sulci or sutures may be seen on their sufaces. A fairly small convexity of the shell and its overall dimensions are noteworthy. Large, flat turtle can be regarded as present in Ulan Bulag on the basis of these remains. As their identification is impossible, it is not unlikely that these are also the remains of a form determinated as Amphichelydia gen. et sp. indet. from Tsagan Khushu.

SYSTEMATIC POSITION OF THE MONGOLIAN DERMATEMYDIDAE

Despite many attempts at making its definition more precise (e.g. SUKHANOV, 1964; MÜLLER, 1968; MŁYNARSKI, 1969), the family Dermatemydidae has been represented, until the present, by an assemblage of various forms, often inaccurately recognised. In our opinion, only the forms related to the type genus, i.e. *Dermatemys* GRAY should be considered as certain. Such genera as e.g. *Tretosternon* OWEN are closer to the evolutionary lineage of the Pleurodira and, consequently, according to the terminology used here, should be included in the suborder Mesochelydia.

Among the forms from Mongolia described so far and assigned to the Dermatemydidae, *Adocus orientalis* GILMORE from the Upper Eocene of Indrian Manka, Inner Mongolia, and *Adocus* sp. from the Lower Cretaceous of Dhoin Usu, Outer Mongolia (GILMORE, 1929, pp. 220—222) are noteworthy. The representatives of the genus *Adocus* COPE have the intergular shield and therefore they could be placed near the Chelidae. The presence of a vermiculated sculpturing of the plastral surface in the Mongolian representatives of the genus *Adocus* is not an important character. A similar, although delicate sculpture of the epidermal shields also occurs in the Recent Chelidae, e.g. in the Australian turtles of the genus *Chelodina* FITZINGER. The forms mentioned above are not, therefore, typical Dermatemydidae, but some protochelidians. According to the generally accepted division, the representatives of the genus *Anosteira* LEIDY, mentioned by GILMORE (1929) from Mongolia, do not belong to this group either.

The genera *Mongolemys* and *Tsaotanemys* are among the typical representatives of the Dermatemydidae. *Mongolemys* displays the characters of the old Cryptodira. In some respects,

it is intermediate between the Dermatemydidae and Emydidae, from which it primarily differs in the presence of the inframarginals. It stays close to the ancestral forms of the extant predominant group Neochelydia.

ECOLOGICAL CONDITIONS

In Tsagan Khushu, the most numerous species is *Mongolemys elegans*. Recent species related to *M. elegans* (*Dermatemys mawii* and the mud and musk turtles) are associated with a fresh-water environment, shallow, warm bassins, overgrown by exuberant vegetation. The similarity in the structure of jaws between *M. elegans* and *Dermatemys* suggests that they are herbivorous animals or alternatively frequently fed on plants. They, presumably, lived in shallow, flooded areas, old river-beds, shallow, interconnected lakes or ponds with a soft, sandy-muddy bottom and exuberant vegetation. Such an environment is unfavourable for soft-shelled turtles; this explains their infrequent occurrence in the collected material. These animals probably lived in deeper basins, perhaps even in river-beds, and their presence in shallow places is purely accidental. Large turtles of the group of the Ampichelydia were inhabitants of deeper water basin.

Both the soft-shelles turtles and the Dermatemydidae can live in either fresh or brackish water, such as places where river waters are discharged into the sea, but their optimum environment is always related to the fresh water. The herbivorous Dermatemydidae are particularly associated with fresh waters, and the exuberant vegetation absent from brackish water. In Tsagan Khushu they also had favourable conditions for laying eggs nearby, as indicated the many young specimens found at this site. A similar fresh-water environment was also found in Ulan Bulag, where the analogous composition of the fauna indicates the presence of rivers or lakes interconnected by rivers. The locality of Khar Teg is of an indeterminate character, but the presence of a large, soft-shelled turtle (Z. Pal. No. MgCh/71 — an imprint of a large fragment of carapace, together with pleural plate) is indicative of a large river or a deep lake with a water flow.

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PLATES

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PLATE XXII

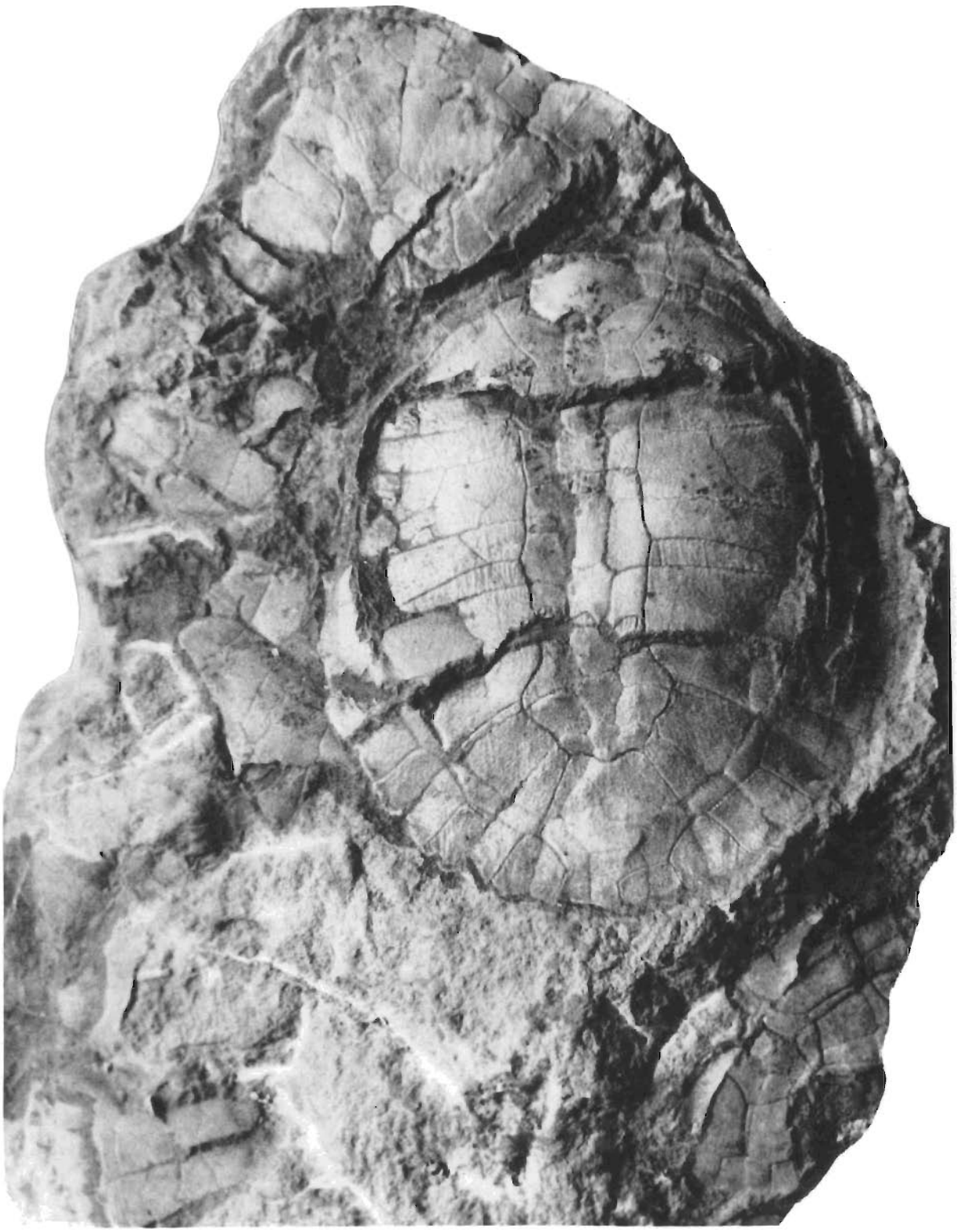
Page

Mongolemys elegans n. sp. 133

Upper Cretaceous, Tsagan Khushu, Nemegt Basin, Gobi Desert, Mongolia

(Z. Pal. No. MgCh/23); × 0.66.

Photo: J. Małecki



L. I. KHOSATZKY & M. MŁYNARSKI: CHELONIANS FROM THE UPPER CRETACEOUS

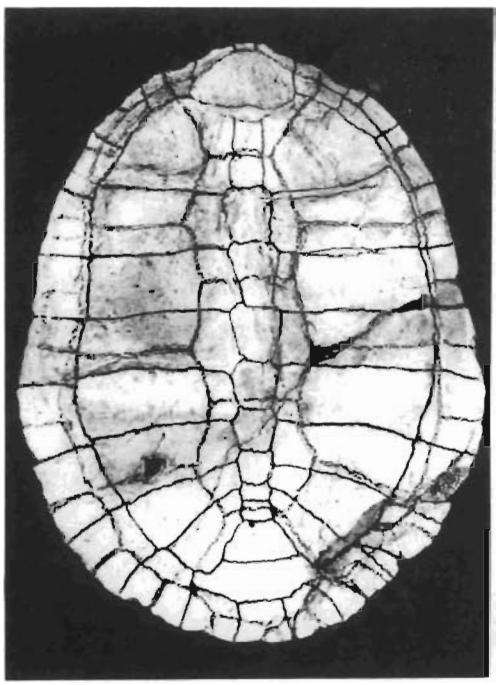
L. I. KHOSATZKY & M. MŁYNARSKI: CHELONIANS FROM THE UPPER CRETACEOUS

PLATE XXIII

Upper Cretaceous, Nemegt Basin, Gobi Desert, Mongolia

Fig. 1*a-b*. Carapace and plastron (ZIN. No. RN. T/M-47,2).
Fig. 2*a-b*. Carapace and plastron (ZIN. No. RN. T/M-47,1).

Photo: L. I. Khosatzky



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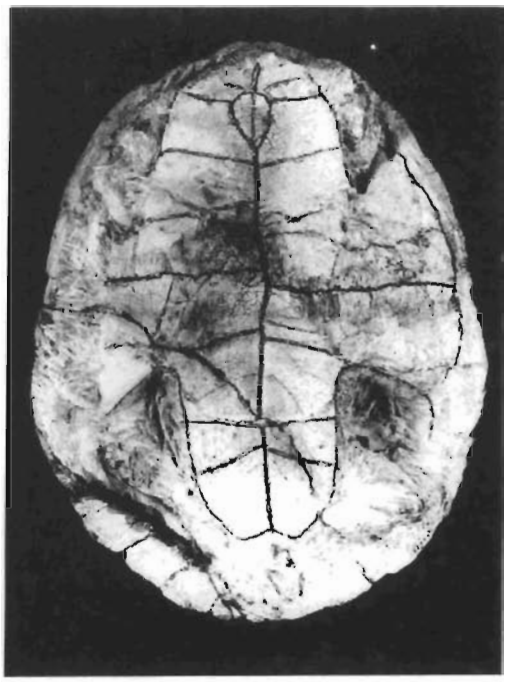

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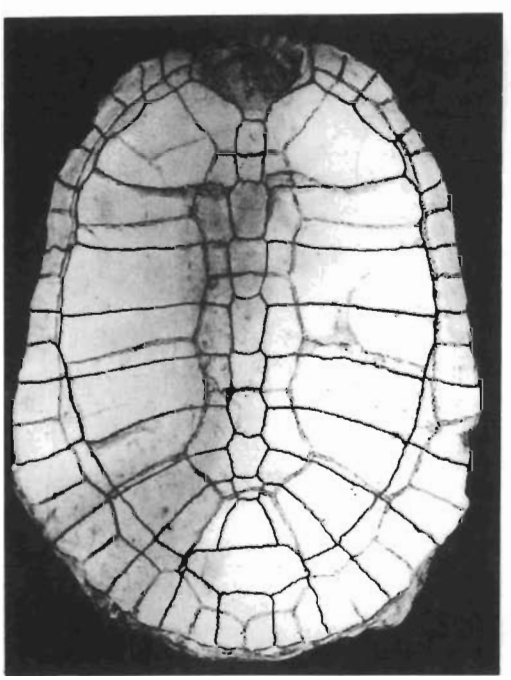
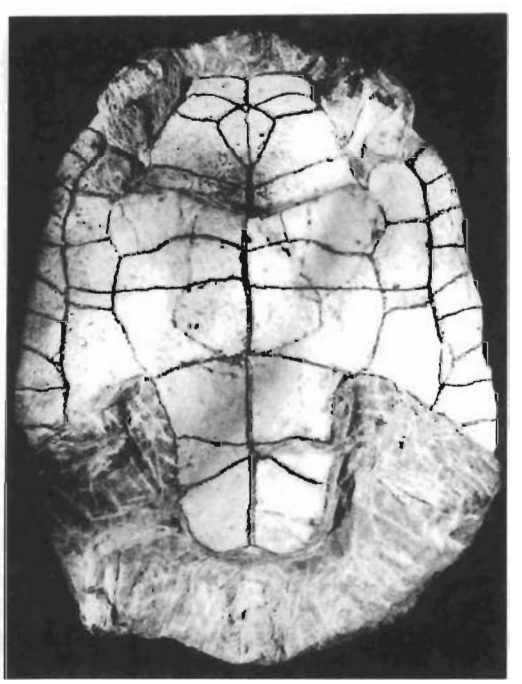


2a



2b

10 cm

L. I. KHOSATZKY & M. MŁYNARSKI: CHELONIANS FROM THE UPPER CRETACEOUS

PLATE XXIV

Page

Mongolemys elegans n. sp. 133

Upper Cretaceous, Tsagan Khushu, Nemegt Basin, Gobi Desert, Mongolia

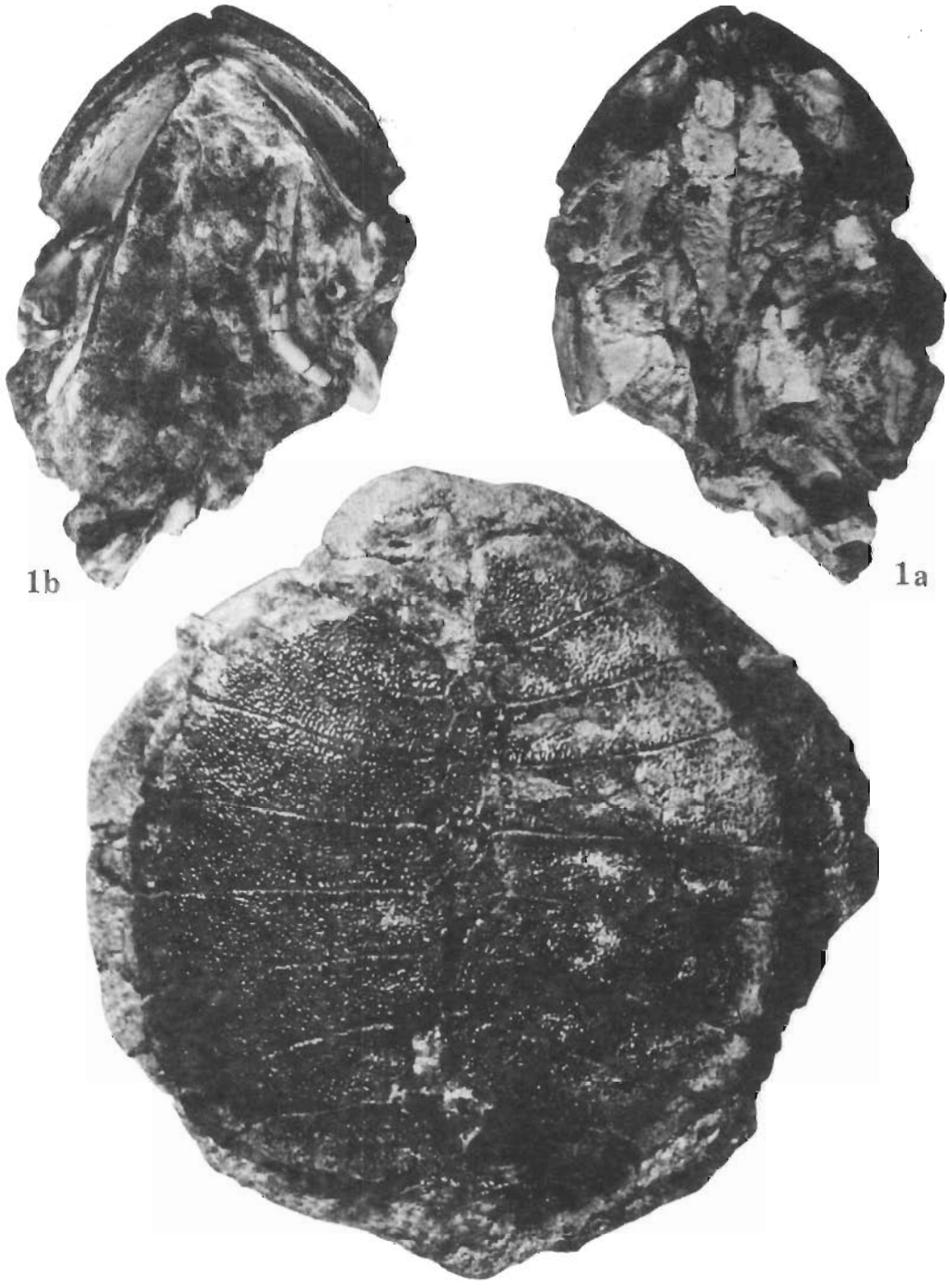
Fig. 1*a-b*. The skull, in dorsal and ventral view (Z. Pal. No. MgCh/27); nat. size.

Trionyx sp. 141

Upper Cretaceous, Tsagan Khushu, Nemegt Basin, Gobi Desert, Mongolia

Fig. 2*a-b*. The carapace (Z. Pal. No. MgCh/52); nat. size.

Photo: L. Sych



1b 1a

2