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FOSSIL SPECIMENS OF MACROCHELYS FROM THE TERTIARY OF THE PLAINS

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Among the collections of fossil reptiles in Chicago Natural History Museum are two fragmentary skulls, both congeneric with the recent alligator snapping turtle, *Macrochelys temminckii* Troost. One fossil representative of this genus has been described from the Florida Peace Creek beds (Pleistocene) as *M. floridana* Hay, based on a few isolated fragments of peripheral bones. The present material consists of a fairly well-preserved skull, C.N.H.M. No. P26014, from the Marsland formation (early middle Miocene), Marsland, Nebraska, and an unusually well-preserved fragment of the right anterior half of a skull, C.N.H.M. No. P15823, from Big Spring Canyon (early Pliocene), Bennett County, South Dakota. The specimen from Big Spring Canyon has been identified as *M. temminckii* Troost, since its features fall well within the range of variation of recent individuals. The Marsland specimen, on the other hand, definitely represents a new species. I take pleasure in naming it for Mr. Karl Patterson Schmidt, Chief Curator, Department of Zoology, whose wide interests in chelonian phylogeny have led him to describe a number of important forms, and who has done all of the preliminary work for the description of the specimen from Big Spring Canyon.

I am indebted to the authorities of the United States National Museum, the American Museum of Natural History, the Museum of Comparative Zoology, and the University of Michigan Museum of Zoology for the loan of recent specimens for study.

Order **Testudinata**

Family **Chelydridae**

Macrochelys schmidti sp. nov.

Holotype.—Chicago Natural History Museum No. P26014, a skull. The present fossil (figs. 2 and 3) is somewhat crushed and the

postero-dorsal parts, the supraoccipital, the squamosals and parietals, the right frontal and postorbital and parts of the right quadratojugal are missing. A large number of fine cracks obscure the courses of most of the sutures on the ventral aspect. Remains of matrix inside of the braincase indicate that the fossil was embedded in a fine sandstone; it was deposited in a stream channel, in intimate association with mammal bones.

Horizon and locality.—Marsland formation, Hemingfordian (early middle Miocene); Marsland, Nebraska.

Diagnosis and description.—The general habitus of the skull clearly indicates the generic affiliation of the specimen. It is distinctly triangular, somewhat wider than long. The roof of the skull is flat, its sides stand nearly vertical, the orbits face laterad and the prefrontals reach forward to or slightly beyond the premaxillae, as in the recent *M. temminckii*. Unfortunately, the skull of the recent *Devisia mythodes* Ogilby, which seems to be closer to *Macrochelys* than to *Chelydra*, is unknown. It is, therefore, not possible at present to outline the skull characters of the three genera of the Chelydridae, or to determine the position of the Miocene fossil in regard to *Macrochelys* on the one hand and *Devisia* on the other. Geographical considerations, however (since the monotypic genus *Devisia* is known only from the Fly River of New Guinea, and there is fossil evidence of the presence of *M. temminckii* as far north as South Dakota in the Pliocene), strongly suggest that the Miocene form is more closely related to *Macrochelys* than to *Devisia*.

The determination of specific characters is not a very easy matter, because of the wide range of individual variation in the living species. A collection of twenty-five skulls of *M. temminckii* ranging from 96 mm. to 195 mm. skull length (occipital condyle to tip of snout) was studied and measured for comparison and the results are given (table, p. 11).

C.N.H.M. Spec. no.	U.S.N.M. Spec. no.	M.C.Z. Spec. no.	A.M.N.H. Spec. no.	U.M.M.Z. Spec. no.
22059 La.	03770a	a	7182 ...	S220 Okla.
22111 ...	03770	46617 Miss.	7187 ...	
22412 ...	029355 Ala.	b	7165 ...	
39296 Ark.	016224 Miss.	c	7720 ...	
37481 Ark.	03769 Miss.	46566 Miss.	9099 La.	
	59062	46567 Miss.		
		d		
		e		

The skull is approximately 72 mm. long (condyle to tip of snout), therefore representing a relatively small specimen compared to

large individuals of the recent species, in which the length of the skull approximates 200 mm. in adults. In many of its features the fossil resembles these giants of the recent species, rather than specimens more nearly its own size. The most outstanding difference between the living and the fossil species lies in the shortness of the antorbital part of the snout of the latter (table, p. 11). Compared to skulls of the living species ranging in length from 96 to 123 mm., the fossil skull surpasses the recent ones in its overall width, the width

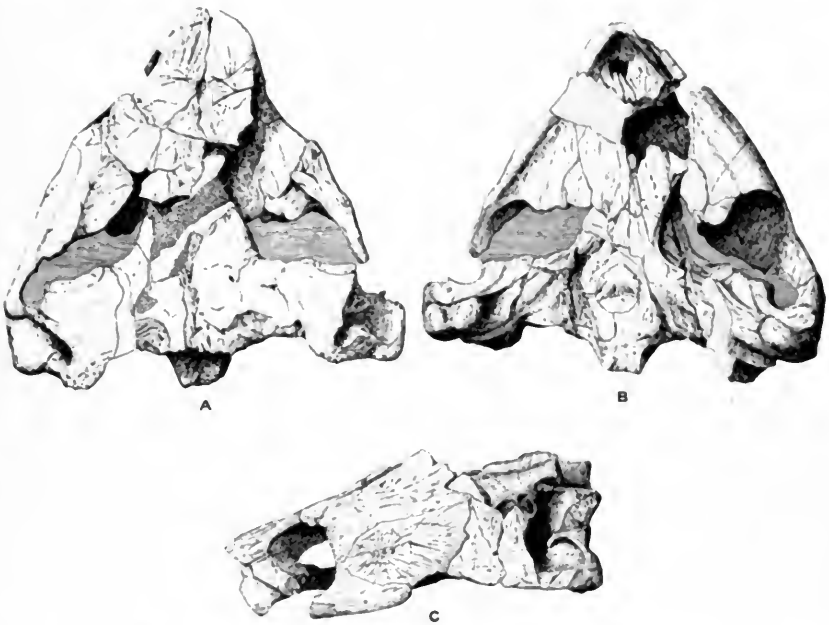

FIG. 2. *Macrochelys schmidti* sp. nov. A, dorsal, B, ventral, and C, lateral view of type. Approx. × 5/7.

across the quadrates, the width of the pterygoids, the posterior width of the alveolar surface, the length of the orbit, and the width of the snout at the anterior and posterior rims of the orbits. In all of these characters (with the exception of the length of the orbit) the fossil exhibits proportions more nearly like those seen in skulls of *M. temminckii* of two and one-half times its size (table, p. 11). The relatively large size of the orbit in the fossil specimen is probably an age character.

There are no significant differences in the courses of the sutures between the living and the fossil forms, so far as can be determined

in the latter. The pattern of the surface relief, however, is more pronounced in the fossil than in both small and large specimens of *M. temminckii* and resembles more nearly the condition in *Chelydra serpentina;* the jugular bone in particular exhibits a system of fine, bony ridges radiating in all directions from a point in the anterior half of the bone.

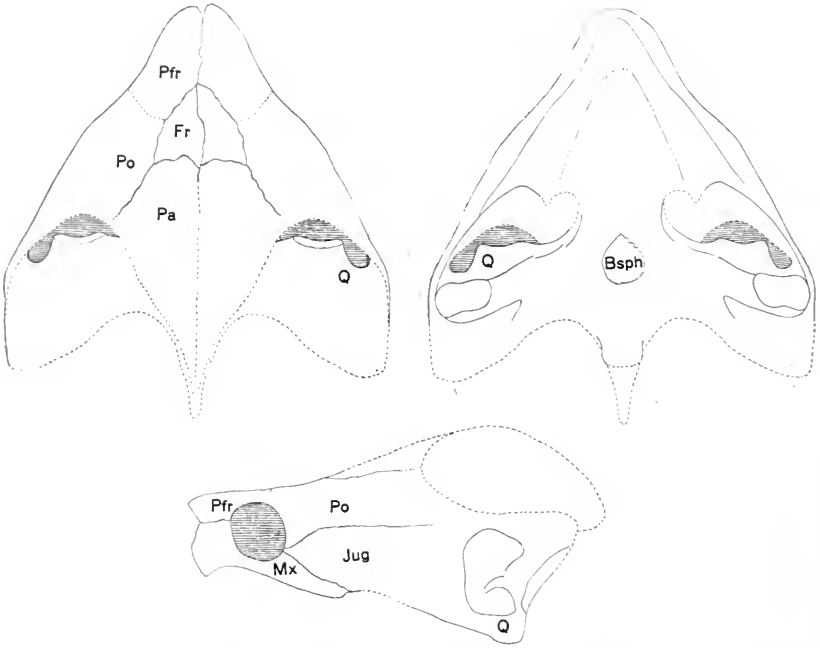

FIG. 3. Reconstruction of the skull of *Macrochelys schmidti*. Outlines for which there is no evidence in the specimen are represented by dotted lines. Bsph, basisphenoid; Fr, frontal; Jug, jugal; Mx, maxilla; Pa, parietal; Pfr, prefrontal; Po, postorbital; Q, quadrate.

While the generic identity of *M. schmidti* is unmistakable, the skull does show some resemblances to the genus *Chelydra*. Such characters are the short antorbital part of the snout, the relatively great width of the snout at the levels of the anterior and posterior rims of the orbits, the comparatively short "tooth" formed by the premaxillae, the low alveolar ridge of the maxilla, and the surface sculpture of the roof bones of the skull.

Although few specimens listed in the table (p. 11) were sexed, the indices of the greatest width of the skull seem to indicate that skulls of female individuals of 150 mm. and more in length are

distinctly narrower than others of comparable size. Pending confirmation it is here suggested that there is a sexual dimorphism expressed in the relative width of the skull in large individuals of this species. Since the type specimen of *M. schmidti* differs greatly in its proportions from specimens of comparable size of the recent form, it seems doubtful that the proportional changes due to age as determined for the recent species apply in a similar manner to the fossil and the question of its sex must therefore be left unanswered.

Measurements	mm.
Total length (condyle to tip of snout)	72
Greatest width	76
Width across quadrates	73
Width across pterygoids	9.5
Width of alveolar surface posteriorly	12
Height of snout at anterior end	16
Least height of snout (just anterior to orbit)	13.6
Width of suborbital bar	4
Height of snout at orbit	19.5
Length of orbit	17
Width of snout at anterior rim of orbit	22.5
Width of snout at posterior rim of orbit	44
Length of prefrontal suture	15
Distance between anterior orbital rim and nasal notch	8.5

Macrochelys temminckii Troost

Referred specimen.—C.N.H.M. No. P15823, Big Spring Canyon, Bennett County, South Dakota; Clarendonian (early Pliocene).

FIG. 4. *Macrochelys temminckii* from Big Spring Canyon (early Pliocene), South Dakota. C.N.H.M. P15823. Approx. × 7/10.

An exceedingly well-preserved fragment of the right half of the snout of a large individual (fig. 4) belonging to the genus *Macrochelys* was obtained from a poorly consolidated, rather fine sandstone.[1] The fragment suffered no distortion and can therefore be accurately compared with specimens of equal size of the recent species; its indices are included in the table on page 11. If sufficient numbers of specimens of the recent species are considered, no significant differences can be found between the fossil and the living forms at least in so far as the anterior part of the skull is concerned. Judging from the posterior width of the alveolar surface, which seems to be narrower in females than in males, in the recent form, the fossil remnant appears to have belonged to a female individual at the size when disparity between the sexes begins to increase.

Measurements	mm.
Width of alveolar surface posteriorly	22.6
Height of snout at anterior end	39.5
Least height of snout (just anterior to orbit)	31.8
Width of suborbital bar	10.5
Height of snout at orbit	40.0
Length of orbit	24.6
Width of snout at anterior rim of orbit	43.6
Width of snout at posterior rim of orbit	79.0
Length of prefrontal suture	37.3
Distance between anterior orbital rim and nasal notch	24.6

The discovery of true alligator snapping turtles in the middle Miocene of Nebraska and the Pliocene of South Dakota is highly interesting. The range of distribution of the recent *M. temminckii* is now well restricted to the southern part of the Mississippi drainage basin, but apparently extended far north and west of its present boundaries in Pliocene times. The common snapping turtle *Chelydra serpentina* L. is widely distributed at the present time on the North American continent east of the Rocky Mountains and in Central America, but oddly enough, there are no fossil remains of this animal prior to the Pleistocene time in North America. Instead, the Miocene deposits of central Europe (Oeningen) have furnished a number of skeletons of chelydrid turtles that have been described as *Chelydra murchisoni* Bell, and *C. decheni* H. v. Meyer was described from the upper Oligocene of the Braunkohlengrube Krautgarten near Rott in the Siebengebirge. Unfortunately, the skulls in these skeletons are not sufficiently well preserved to permit accurate

[1] The specimen was found in association with an extensive assemblage of mammalian remains. See J. T. Gregory, Pliocene Vertebrates from Big Spring Canyon, South Dakota, Univ. Calif. Publ., Bull. Dept. Geol. Sci., **26**, (4), pp. 307–446, 1942.

Measurements and Indices

Absolute length measurements and various indices of skull measurements of *Macrochelys temminckii* compared with those of the fossil specimens described in this report. All indices were arrived at in the following manner: Values under A, B, C, D, E, F, and G times 100 divided by total length. A, greatest width of skull; B, width across quadrates; C, width of alveolar surface posteriorly; D, length of orbit; E, width of snout at anterior rim of orbit; F, width of snout at posterior rim of orbit; G, distance between anterior rim of orbit and nasal notch.

Specimen Number	Total Length mm.	Indices						
		A	B	C	D	E	F	G
C.N.H.M. P26014	*72*	*105.5*	*101*	*16*	*24*	*31*	*61*	*12*
U.S.N.M. 03770a	96	91	84	12	19	24.5	45	18
C.N.H.M. 22059	99	90	87	13	17	24	45	17
C.N.H.M. 22111	103.7	96	92	14	18	22	47	17
M.C.Z.-a	108.4	89	87	12	20	25	50	17
U.S.N.M. 03770	114	94	89.5	13	17	24	45	17
M.C.Z. 46617	118	97	89	15	20	25	50	17
U.M.M.Z. S220	123.3	90	85.5	14	16	25	42	17
C.N.H.M. 22412	136.7	98	88.5	15	16	28.5	48	19
C.N.H.M. P15823	*>136 <149*	...	..	*15–16*	*16–17*	*29–32*	*53–57*	*16–18*
C.N.H.M. 39296	149.1	105	84	23	18	27	52	16
M.C.Z.-b	156	112	105	22	19	26	52	15
U.S.N.M. 029355	160	108	98	18	17	31	54	16.5
A.M.N.H. 7182(♀)	164	104	94	21	19	27	54	17
M.C.Z.-c	167	119	95	22	17	32	56.5	17
U.S.N.M. 016224	167	110	90	23	14	29	50	18
A.M.N.H. 7187	169	102	96	16	16	26	46	17
U.S.N.M. 03769	170	117	92	28	18	29	56	16.5
A.M.N.H. 7165(♀)	171	108	93.5	28	18	31	56	17.5
M.C.Z. 46566	173	115	103	24	17	29.5	56.5	16.5
C.N.H.M. 37481	174	115	100	29	17	30	62	16
A.M.N.H. 7720(♀)	177	103	92	16	18	30	54	17
A.M.N.H. 9099	180	117	95.5	24	17	32	60	17
U.S.N.M. 59062(♀)	185	109	93	18	17	30	52	17
M.C.Z. 46567(♀)	189	108	98	20	17	28	48	17
M.C.Z.-d	193	119	93	28	17	30	58	15
M.C.Z.-e	195	114	92	26	16.5	31	58	17

comparison with recent chelydrid turtles, and their generic identity is somewhat doubtful.

In 1852 H. v. Meyer described *C. decheni* and additional specimens of *C. murchisoni*. Meyer compares these specimens with *Chelydra* Schweigger and with the kinosternid *Staurotypus* Wagler, but apparently not with *Macrochelys* Gray. Judging from H. v. Meyer's plates and description and also from illustrations given by Winkler (1869) of further specimens of *C. murchisoni*, it is rather apparent that the fossils under consideration exhibit features of all three genera. The general outlines of the skulls and the dorsal aspect of the mandibles in Meyer (1852, pl. 26) and Winkler (1869, pls. 16 and 19) do not conform well with either *Macrochelys* or *Chelydra*, but rather with *Staurotypus*, and the same must be said of the

anterior lobe of the plastron, if Meyer's reconstructions are correct (op. cit., pl. 30). On the other hand the carapace compares well with *Chelydra*, except for the strong serration of its rear edge, which is a distinctive feature of the shell of *Macrochelys*. In size *C. murchisoni* seems to have surpassed slightly even the largest specimens of *C. serpentina* and might well have reached the size of *Macrochelys temminckii*.

Apparently the chelydrid turtles of the European Oligocene and Miocene cannot be placed in a recent genus as clearly as their more or less contemporary ally *M. schmidti*. A thorough reexamination of the European material seems to be necessary before the question of the ancestry of the genus *Chelydra* can be discussed properly.

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