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OSTEOLOGY OF *BYSMACHELYS CANYONENSIS* A NEW TURTLE FROM THE PLIOCENE OF TEXAS

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ABSTRACT

This paper presents a new genus of land turtles from the Upper Pliocene of West Texas. The almost complete skeleton is described, measurements given, and diagnostic characters pointed out.

INTRODUCTION

The specimen to be described in this paper is the almost complete skeleton of a large land turtle (*Bysmachelys canyonensis* gen. et sp. nov., Panhandle Plains Historical Mus. No. 1534) found articulated in a coarse, brown sand of Upper Pliocene age. The type locality is in the center of the west half of Sec. 164, Block 6, Randall County, Texas, where the sand outcrops in the bluffs and cliffs of North Cita Canyon, a branch of the Palo Duro Canyon, and is overlain and underlain by fossil-bearing strata which are also of Upper Pliocene age. In general character these sediments are very similar to the Upper Pliocene of Mount Blanco in Crosby County, Texas. The old river-bed deposits are in both instances typical of many similar deposits to be found in the High Plains region as described by Gidley in 1903.[1] However, the vertebrates so abundant in the upper and lower beds are not found in the intermediate brown-sand stratum in which thus far only turtles have been discovered. These beds and the Upper Pliocene fauna that they contain will be discussed in a forthcoming publication.

DESCRIPTION OF MATERIAL

In the following description and discussion the distinguishing characteristics of this type specimen of a new genus and species will be brought out, and taxonomic relationships and differences made clear.

[1] J. W. Gidley, "The Fresh-Water Tertiary of Northwestern Texas," *Bull. Amer. Mus. Nat. Hist.*, Vol. XIX, Art. XXVI (1903).

THE SKULL

The skull (Figs. 1 and 2) is complete with the mandibles, and there is but slight distortion which can be seen in the region of the pterygoids and the zygomatic arches. This causes an error in measurement of the length between the occipital condyle and the premaxilla of approximately 5 mm. but does not seem to affect the measurement between the anterior end of the prefrontals and the supraoccipital. In other words, the distortion has had the effect of

TABLE 1

MEASUREMENTS OF SKULL

	Mm
Total length of skull anterior end of prefrontals to posterior end of supraoccipital	118
Length measured from anterior end of premaxilla to occipital condyle.	124
Width at the quadrates	129
Interorbital space.	50
Width of palatal fossa	52
Length of mandible	85
Depth of mandible at the symphesis	19
Greatest diameter of orbit	36
Diameter of orbit at right angles to greatest diameter	20
Breadth of condyle	13
Height of foramen magnum	15
Breadth across the external nares	44
Depth of skull anterior to orbits	59
Depth of skull at quadrates	50
Breadth of cranium opposite the vacuities.	33
Breadth of palatal shelf.	19

bringing the maxilla and premaxilla downward and backward in the direction of the quadrates.

It will be noted from the foregoing measurements that the skull is unusually broad in proportion to its length, the ratio of the width to length being 104 per cent as compared to *Testudo impensa* in which the ratio is 70.2 per cent; in *T. orthopygia* it is 72 per cent; and in *T. osborniana*, 68 per cent.

THE PECTORAL GIRDLE

The pectoral girdle (Fig. 3) is complete and undistorted. The elements are strong and so constructed as to constitute a rigid

Fig. 1

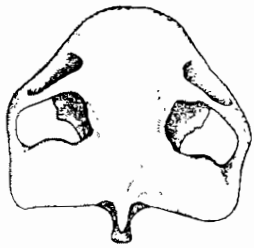

Fig. 2

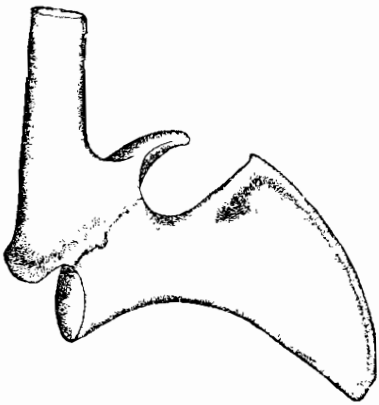

Fig. 3

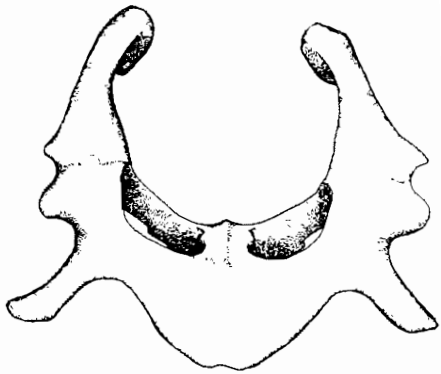

Fig. 4

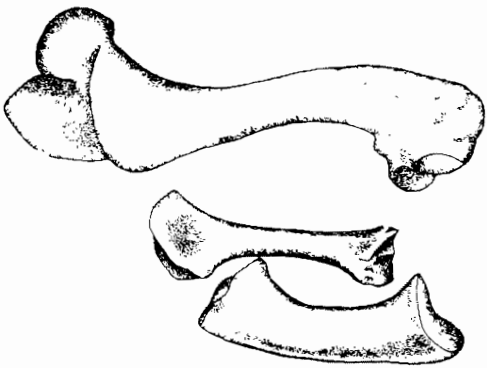

Fig. 5

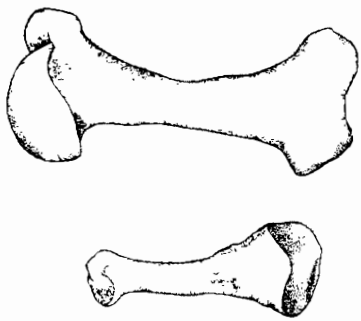

Fig. 6

FIGS. 1-6. — *Bysmachelys canyonensis*, gen. et sp. nov. FIG. 1, side view of skull. ×0.3; FIG. 2, dorsal view of skull. ×0.3; FIG. 3, dorsal view of left side of pectoral girdle. ×0.3; FIG. 4, anterior view of pelvic girdle. ×0.3; FIG. 5, humerus, radius, and ulna. ×0.3; FIG. 6, femur and tibia. ×0.3.

supporting member between the carapace and the plastron. The dorsal and ventral portions of the scapula are broad, strong, and round to elliptical in cross section, while the coracoid to which the scapula is solidly ankylosed is broad, thin, and fan-shaped.

TABLE 2

MEASUREMENTS OF THE PECTORAL GIRDLE

	Mm
Length of scapula from center of glenoid cavity to dorsal extremity	145
Diameter of scapula 6 cm. below dorsal extremity	29
Length of ventral blade of scapula from center of glenoid cavity	133
Length of coracoid from ventral margin of glenoid cavity to posterior extremity	165
Greatest breadth of coracoid	155
Narrowest diameter of coracoid	42
Diameter of glenoid cavity	58

THE PELVIC GIRDLE

There appears to be no distortion in the pelvis (Fig. 4); and the bones are all solidly ankylosed into a single unit which is thickest and strongest in the region of the acetabulum.

TABLE 3

MEASUREMENTS OF THE PELVIC GIRDLE

	Mm.
Vertical height of pelvis when resting in a normal position	205
Anterior edge of symphesis pubis to posterior margin of ischium on the midline	162
Width between exterior margins of pubis	237
Anteroposterior diameter of ischiopubic fenestra	62
Transverse diameter	63
Length of illium dorsal to center of acetabulum	127
Breadth of pelvis across the margins of the acetabulae	269
Greatest diameter of acetabulum	63
Diameter transverse to above	49

THE LIMBS

The humerus and femur.—The length of humerus (Fig. 5) from proximal extremity of head to distal end is 229 mm. The length of

femur (Fig. 6) from proximal extremity of head to extremity of distal end is 169 mm. The ratio of length of femur to length of humerus is 73 per cent. In *Testudo orthopygia* this ratio is 75 per cent. In *Gopherus polyphemus* it is 74 per cent. The humerus is a stout bone with but little curvature. The diameter of the head is 47 mm. The anteroposterior diameter of the shaft in the midsection is 30 mm. Maximum width across the distal end is 94 mm. Maximum thickness of the great trochanter is 30 mm. Greatest width of head of femur is 58 mm.; greatest width at the distal end, 73 mm. Anteroposterior diameter of shaft at the midsection is 29 mm. There is a sharp ridge on the distal end which definitely marks the separation of the articular surface for the tibia and fibula.

The tibia.—Width across the distal end of the tibia (Fig. 6) is 31 mm.; greatest diameter of the shaft at the midsection, 19 mm.; proximal, transverse breadth of tibia, 46 mm.; anteroposterior breadth, 40 mm. Total length of tibia is 113 mm. This is a very stout bone proximally and as may be seen from the measurements it tapers rapidly to the distal end, being marked by numerous rugosities and muscle attachments.

The fibula.—This bone (Fig. 7) is slender and slightly curved in the middle, being larger distally than proximally. Length is 103 mm.; transverse diameter of distal end, 29 mm.; anteroposterior diameter, 24 mm. The greatest diameter of shaft at midsection is 14 mm.; greatest diameter at proximal end, 20 mm.

The ulna.—This is a strong bone (Fig. 5), somewhat curved and more or less wedge-shaped in cross section. Length is 135 mm.; transverse diameter at proximal end, 35 mm.; anteroposterior diameter at this end, 50 mm. Greatest diameter of shaft at midsection is 28 mm.; transverse diameter at distal end, 19 mm.; anteroposterior diameter at this end, 46 mm.

The radius.—This is relatively longer than the ulna, more slender in build, and tends to be more slender in cross section (Fig. 5). At the distal end it widens into a thick, flat, bladelike extremity. At the proximal end it widens into a broad, concave, semicircular articular surface. Length is 129 mm.; greatest diameter at the proximal end, 40 mm. Transverse diameter at this end is 30 mm.;

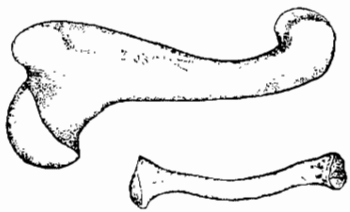

Fig. 7

Fig. 8

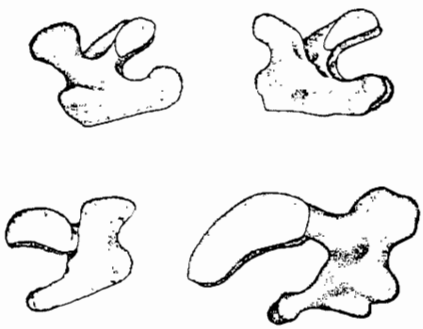

Fig. 9

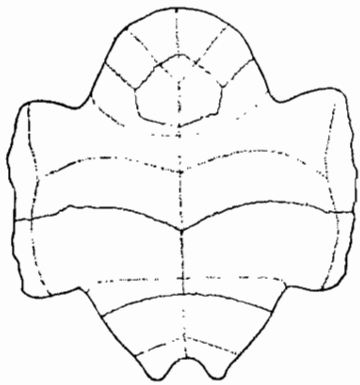

Fig. 10

FIGS. 7–10.—*Bysmachelys canyonensis*, gen. et sp. nov. FIG. 7, side view of femur and fibula, ×0.3; FIGS. 8 and 9, cervical vertebrae, ×0.3; FIG. 10, ventral view of plastron, ×0.0685.

greatest diameter of shaft at midsection, 16 mm. Transverse diameter at distal end is 18 mm.; greatest diameter at distal end, 44 mm.

The pes.—While all the feet were not found complete, a number of bones of each was found in an articulated position, the right front and the right rear being most nearly complete. In the right front foot four ungual phalanges were found. They are short, broad, and heavy, and more or less spatulate in shape. They vary in length from 43 to 46 mm., in width from 21 to 27 mm., and in thickness from 17 to 24 mm. The phalanges proximal to these are 10 mm. and less in length, and the carpals and tarsals are likewise shortened and compressed. Thus the foot must have been very short, stubby, and elephant-like in general appearance.

The bones of the hind foot have about the same general proportions as those of the front. The phalanges, with the exception of the ungual phalanges, are very short. These latter, however, are similar to those just described. A few round, flat dermal ossicles were found associated with the feet. These averaged about 20 mm. in diameter.

THE VERTEBRAE

Cervical vertebrae.—The cervical vertebrae (Figs. 8 and 9) are large, broad, and strong. They are eight in number and have a combined length of 335 mm. The atlas and axis, although not figured, were present.

Dorsal vertebrae.—As the dorsals enter into the structure of the carapace, a large part of which was lost, not much can be said of them except that they are slender and elongate.

Caudal vertebrae.—Most of the caudals were preserved, and it is estimated that the tail did not exceed 20 cm. in length. These vertebrae are short and relatively broad. There was, however, no indication that dermal ossicles were present in this region as is true in some other members of the Testudinidae.

THE PLASTRON

The plastron (Fig. 10) has a total length of 805 mm. Width of plastron along suture between the hyo- and hypoplastra is 545 mm. The anterior end of the plastron is round, with no sign whatsoever of a notch or projections. Indeed, if the sulcae between the gular and

humeral scutes be taken as radii with their intersection as the center of a circle, the arc described by them would coincide with the anterior margin of the plastron. Posteriorly, however, there is a deep notch between the hypoplastra 50 mm. in depth, which is circular in outline. The entoplastron is roughly hexagonal with an antero-posterior diameter of 160 mm., and a transverse diameter of 195 mm. The carapace as well as the plastron is thin, averaging approximately 10 mm. in thickness, and in many places being not more than 5 mm.

THE CARAPACE

The carapace, as already stated, was mostly missing due to the fact that part of it had been exposed and was very badly weathered. Nevertheless, its general contour could be determined, and it may be said that it was relatively broad and low in comparison to its length. It was highest in the mid-section and sloped gently toward the anterior and more rapidly toward the posterior. The posterior margin projected slightly beyond the limits of the hypoplastra, while in front the epiplastra projected slightly beyond the anterior margin of the carapace.

RELATIONSHIPS

The specimen is closely related to the genus *Testudo* as defined by Hay (1908),[2] but differs from that genus in several important respects: (1) the circular outline of the epiplastron; (2) the broad, short head; (3) the extreme thinness of the carapace and plastron; and (4) the large size of the animal as compared to members of the genus *Testudo*.

The specimen most closely approaches the *Testudo hexagonata* described by Cope (1892)[3] from the Rock Creek beds of Briscoe County, Texas (Lower Pleistocene). In Cope's specimen the epiplastron seems to have been lost, but in the figure it is shown with an outline similar to that of the *Bysmachelys canyonensis*. The skull and other skeletal elements were not found so it is impossible to

[2] O. P. Hay, "The Fossil Turtles of North America," *Publ. Carnegie Inst. Washington* (1908).

[3] E. D. Cope, "The Fauna of the Equus Beds," *4th Ann. Rep. Geol. Surv. Texas* (1892).

make as close a comparison as would be desired. The fact that the entoplastron in the two forms is similar is not thought to be sufficient evidence that they are the same species.

CONCLUSION

It is the author's conclusion, therefore, that the specimen herein described should be placed in a new genus, *Bysmachelys*, so named because of the very broad head (from Greek *bysma*, meaning plug, and *chelone*, tortoise). The species name, *canyonensis*, is for the town of Canyon, Texas, near which it was found.