THE FIRST LATE PLEISTOCENE RECORD OF KINOSTERNON (CRYPTODIRA: KINOSTERNIDAE) TURTLES FOR NORTHERN SOUTH AMERICA, PUBENZA LOCALITY, COLOMBIA.

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ABSTRACT: The first fossil record of Kinosternon turtles in South America, from the late Pleistocene (16500 years before present) at the Pubenza locality, Department of Cundinamarca, in the Bogotá River basin of Colombia is described. The fossil material is composed of an epiplastron, a hypoplastron, a peripheral, two costals, and a neural bone, which suggest an affinity to the Kinosterninae subfamily based upon the absence of an entoplastron and an abdominal scale. The presence of a hinge in the anterior and posterior plastral lobe and a large epiplastron longer than wide indicate an affinity to the genus Kinosternon. The presence of a marked scar for the insertion of the cervico-plastral ligament on the visceral surface of the epiplastron indicates a close relationship to Kinosternon leucostomum and Kinosternon scorpioides. More shell and cranial material must be found in order to define precisely if the Kinosternon of Pubenza corresponds to some extant species, or if it is a new extinct species.

KEYWORDS: Kinosternidae, Kinosternon, late Pleistocene, Colombia.

INTRODUCTION

The turtle family Kinosternidae is endemic to the New World and its fossil record comes principally from North America and Mexico (Fichter 1969; Hutchison, 1980; Hutchison and Bramble, 1981; Bramble et al., 1984; Hutchison, 1991; Holman, 1998). Modern members of the family are grouped into two subfamilies (Staurotypinae and Kinosterninae), known as mud or musk turtles, which inhabit semiaquatic environments from Canada to South America (Ernst and Barbour, 1989; Bonin et al., 2006). The subfamily Kinosterninae is represented by Kinosternon, which is composed of at least twenty different species and many subspecies (Bonin et al., 2006). Only three species of Kinosternon inhabit the fluvial systems of Colombia: Kinosternon dunni Schmidt, 1947, endemic to the Baudo and Sinu River basins; Kinosternon leucostomum (Duméril and Bibron, 1851), widespread in the Baudo, Sinu and Magdalena rivers, the Pacific coast, and the west Atlantic coast; and Kinosternon scorpioides (Linnaeus, 1766), from San Andres island, the Atlantic coast, the Llanos Orientales and Colombian Amazonia (Iverson, 1992; Ceballos, 2000).

The phylogeny of Kinosternidae has been defined using molecular and morphological data (Bramble et al., 1984; Seidel et al., 1986; Iverson, 1991). Recent studies of its phylogenetic relationships to other cryptodires (hidden-neck turtles) have determined that it is closely related to the family Dermatemydidae (Shaffer et al., 1997; Krenz et al., 2005; Joyce, 2007). However, its past diversity and biogeography are still poorly understood due to the lack of fossils, especially from Central and South America.

We describe here the first fossil record of Kinosternidae turtles from South America, consisting of shell elements found in a late Pleistocene (16500 years before present) colluvial deposit (Van Der Hammen and Correal, 2001) at Pubenza, Cundinamarca, Colombia.

Geographic Setting, Geology and Age

Turtle shell elements described here were recently discovered by a field commission of INGEOMINAS (Instituto Colombiano de Geología y Minería) Pubenza locality, Department of Cundinamarca, Bogotá River basin, Colombia, 4°24’21”N, 74°42’12”W (Fig. 1). The fossil record of the Pubenza locality includes various specimens of Haplomastodon waringi (Mayorga, 1996), fragmentary elements of Megatherium, armadillos, rodents, turtles (described in this work), gastropods, crabs and also archeological obsidian elements that suggest the presence of human activity (Van Der Hammen and Correal, 2001).

All fossil vertebrates were found in a colluvial deposit composed of gray paleosoils rich in clay, plant remains, gypsum, volcanic ash and peat. Radiocarbon dating put the age of the deposit at approximately
The first late Pleistocene record of *Kinosternon* 17000 to 13000 years before present (20000 to 16000 years before present calibrated). A more precise age was determined for the mastodon layer, where the *Kinosternon* material also originated. The age of this layer is 16500 years before present (19500 years before present calibrated), suggesting a late Pleistocene age (Van Der Hammen and Correal, 2001).

Systematic Paleontology

Testudines Linnaeus, 1758 or Batsch, 1788
Cryptodira Cope 1868
Kinosternidae Baur, 1893
*Kinosternon* Spix, 1824
*Kinosternon* sp. indet.

Referred material – MGJRG (Museo Geológico José Royo y Gómez, paleontological collection INGEOMINAS, Bogotá, Colombia). MGJRG G-165-01, a right epiplastron (Fig. 2 A, B, C); MGJRG G-165-02, a left hypoplastron (Fig. 2 D, E); MGJRG G-165-03, a right IX peripheral bone (Fig. 2 I); MGJRG G-165-04, a second left costal bone (Fig. 2 F); MGJRG G-165-05, a sixth left costal bone (Fig. 2 H) and MGJRG G-165-06, a neural bone (Fig. 2 G). More fragmentary costal, neural and peripheral bones were also collected and stored as MGJRG G-165.


**DESCRIPTION**

In order to refer to the elements described here we have taken as a Kinosternid model the figures of the carapace (see Fig. 2 J) and plastron (see Fig. 2 K) of *Kinosternon leucostomum* as presented by Joyce (2007).

*Kinosternon* sp. (MGJRG G-165-01) is a complete right epiplastron lacking an entoplastron. The specimen is longer (38 mm) than wide (25 mm), tapering anteriorly and with the posterolateral corner slightly oblique and bearing an evident surface of the hinge posteriorly. The visceral surface has a marked scar for the insertion of the cervico-plastral ligament at the position of the gular and on the ventral surface the plastral scales are recognized by their sulci and lateral margins. The intergular is small and triangular; it projects slightly to the exterior along its anterior margin, and posteromedially contacts the gular. The gular is long, almost reaching the posteromedial margin of the epiplastron. Anteromedially the gular is in contact with the intergular and posteromedially with the humeral, which is triangular and very short medi ally.

The size of the epiplastron (length near 70 mm along the midline of the shell) suggests that the specimen is from a very young animal. It has a mean thickness of 4 mm, and on the ventral surface shows microvermiculation, which is more finely spaced in the intergular area.

*Kinosternon* sp. (MGJRG G-165-02) is a left hypoplastron that by its size probably corresponds to the same specimen as the epiplastron described above. Wider than long, it bears a longer lateral extension at the carapace-plastron bridge. Its posterior margin is slightly shorter than the anterior, showing a hinge surface slightly broken laterally. The inguinal notch is shallow and V-shaped. The ventral surface has no scale sulcus, indicating the lack of abdominal scales. Also on ventral surface the microvermiculation is present but less marked than in the epiplastron.

![Figure 1. Location of the Pubenza locality, Department of Cundinamarca, Bogotá River basin, Colombia.](image)
*Kinosternon* sp. (MGJRG G-165-03) is a right peripheral probably IX. On the dorsal surface the sulcus between marginals is clearly recognized as well as the presence of a microvermiculation pattern similar to that described above for the plastron.
Kinosternon sp. (MGJRG G-165-04) is a second left costal bone, with the sulcus between the pleurals and the first vertebral scale clearly marked on the dorsal surface. On this surface a poorly marked microvermiculation can be recognized. On its lateral margin the costal bone preserves the distal portion of the rib, which ends in a cone shape, showing deep longitudinal channels.

Kinosternon sp. (MGJRG G-165-05) is an almost complete sixth left costal bone with part of its anterolateral margin and posterolateral corner broken. On the dorsal surface the sulcus between the third and fourth pleural scales is positioned close to the posterior lateral margin. The contact of these pleurals with the fourth vertebral scale is posterior, at the central part of the costal. The microvermiculation pattern is also present in this costal.

Finally, we describe a neural bone of Kinosternon sp. (MGJRG G-165-06), probably the third, if the neural series is as in K. leucostomum. The bone is trapezoidal in shape, and its convex anterior margin and slightly oblique posterolateral corners are evidence of its contact with the posterolateral pair of costals. On the dorsal surface the sulcus between the second and the third vertebral scale is convex for the second vertebral. The microvermiculation pattern is well marked on the dorsal surface, including the sulcus between the scales (Fig. 2 L).

**DISCUSSION**

The absence of an entoplastron and abdominal scales in the Pubenza turtle is indicative of their position within Kinosterninae (Bramble et al., 1984; Iverson, 1991; Joyce, 2007). The presence of a hinge in the anterior and posterior plastral lobe and a large epiplastron longer than wide are indicative of the genus Kinosternon (Bramble et al., 1984; Iverson, 1991). Bramble et al., (1984) noted a marked scar for the insertion of the cervico-plastral ligament on the dorsal surface of epiplastron as a peculiarity of K. leucostomum and K. scorpionoides (Linnaeus, 1766). All these features are also present in the Pubenza turtle. The hypoplastron with a long posterior margin for the hinge and small inguinal notch, and without a marked internal entrance on it, is another Kinosternon character (Bramble et al., 1984; Fig. 1).

The position of the scale sulcus in the dorsal view of the costal bones is very similar to that in Kinosternon leucostomum, suggesting a possible relationship between the Pubenza material and this species, which is widespread in the lowland region of Colombia today. However, more complete shell and cranial material should be recovered from the Pubenza locality before assessing a precise determination at the species level.

Finally, this late Pleistocene record of Kinosternon in Pubenza, in the Bogotá River basin, where extant Kinosternon species do not live today, is evidence that this genus had a broader distribution in the recent past. The probable causes of its local extinction are still unknown.

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