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**Title:** A New Extinct Emydid Turtle from the Lower Pliocene of Oklahoma

**Author:** Edwin C. Galbreath

**Release Date:** November 26, 2010 [EBook #34449]

**Language:** English

**Credits:** Produced by Chris Curnow, Joseph Cooper and the Online Distributed Proofreading Team at <https://www.pgdp.net>

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## **A New Extinct Emydid Turtle from the Lower Pliocene of Oklahoma**

BY

**EDWIN C. GALBREATH**

**University of Kansas Publications  
Museum of Natural History**

**Volume 1, No. 16, pp. 265-280, plate 1  
August 16, 1948**

**University of Kansas  
LAWRENCE  
1948**

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UNIVERSITY OF KANSAS PUBLICATIONS, MUSEUM OF NATURAL HISTORY

**Editors: E. Raymond Hall, Chairman; H. H. Lane, Edward H. Taylor**

**Volume 1, No. 16, pp. 265-280, plate 1  
August 16, 1948**

**UNIVERSITY OF KANSAS  
Lawrence, Kansas**

**PRINTED BY  
FERD VOILAND, JR., STATE PRINTER  
TOPEKA, KANSAS  
1948**

**22-3340**

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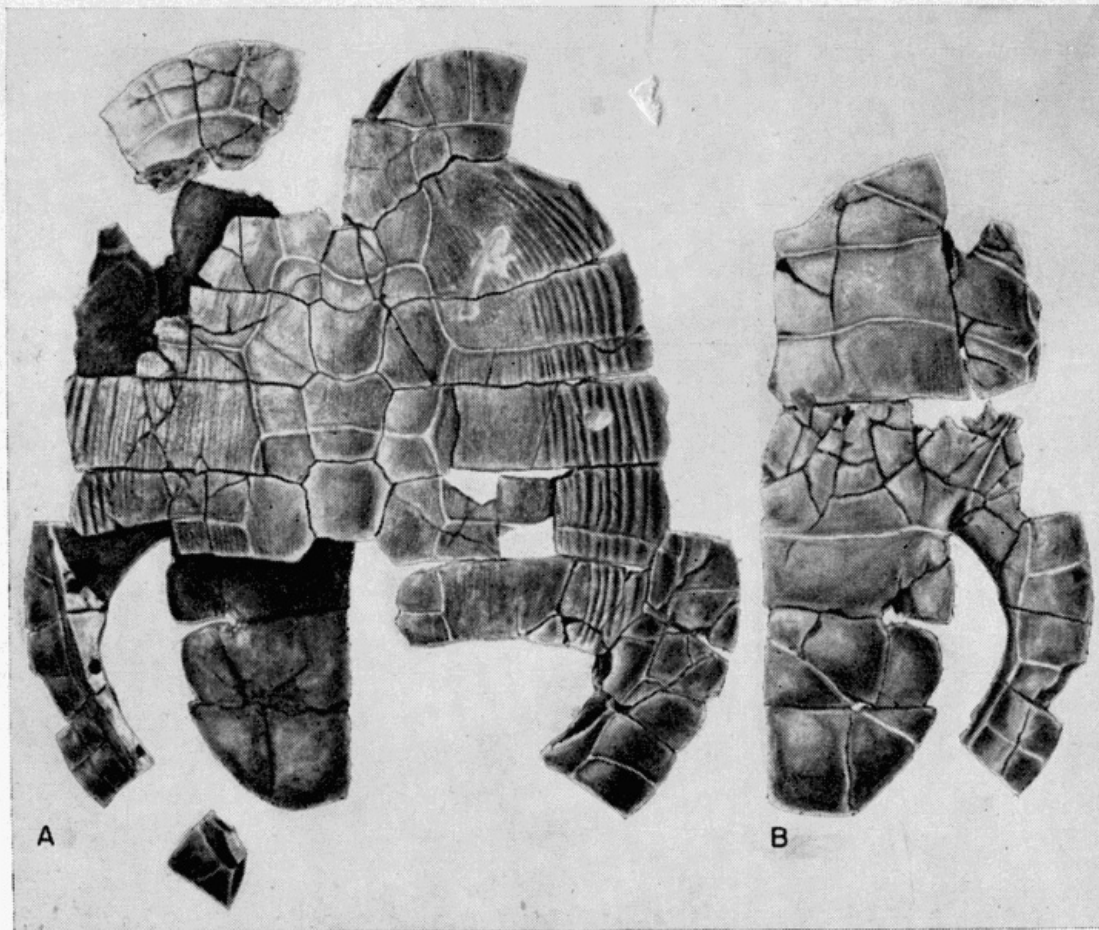


PLATE 1. *Chrysemys limnodytes*. Univ. Kans. Mus. Nat. Hist., Vert. Paleo. Coll. No. 7676. Fig. A, dorsal view of carapace; fig. B, ventral view of plastron. Both views approximately  $\times .4$ .

PLATE 1. *Chrysemys limnodytes*. Univ. Kans. Mus. Nat. Hist., Vert. Paleo. Coll. No. 7676. Fig. A, dorsal view of carapace; fig. B, ventral view of plastron. Both views approximately  $\times .4$ .

## A New Extinct Emydid Turtle from the Lower Pliocene of Oklahoma

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By

EDWIN C. GALBREATH

In the summer of 1946 a party from the University of Kansas Museum of Natural History visited exposures of the Laverne formation in Beaver County, Oklahoma, at the invitation of Dr. Stuart Schoff of the United States Geological Survey. When examining the marl beds an Emydid turtle was discovered which appears to be an unnamed species of the genus *Chrysemys*. A description of the new species follows.

### *Chrysemys limnodytes*, new species

*Holotype*.—University of Kansas Museum of Natural History No. 7676, vertebrate paleontological collection, a turtle consisting of a fragmental anterior portion of a carapace, left part of the plastron, and several marginals collected by the 1946 paleontological field party of the University of Kansas Museum of Natural History.

*Geological Age and locality*.—Marl beds of the Laverne formation, early Pliocene age, in SW 1/4 Sec. 15, T. 4 N., R. 25 ECM, Beaver County, Oklahoma. The specimen was removed from the marl immediately below the fossil leaf zone (see Chaney and Elias, 1936; Frye and Hibbard, 1940).

*Diagnosis*.—Size large (see measurements) and differing from other species of *Chrysemys* in having: The anterior end of the carapace broadly concave, the posterolateral marginals not greatly flared, the posterior end of the plastron broadly indented, the carapace more sculptured and relatively wider.

*Description of type*.—The specimen had been badly damaged before preservation, and had suffered further damage from exposure before discovery. The anterior and posterior lobes of the plastron had been folded over

the bridge, forming a three-ply thickness of bone. Of the carapace, only the following parts are known: Fragment of the nuchal; right 1st, 7th, 8th, and 9th marginals, left 1st, 2d, 7th, 8th, 9th, and 11th marginals; costals 1-5 on the right side; costals 1-4 on the left side; and 1st, 2d, 3d, and 4th neurals. The left half of the plastron is relatively complete, lacking only the epiplastron and entoplastron. The left 7th, 8th, and 9th marginals are joined to the plastron at the inguinal buttress, and the right 7th, 8th, and 9th marginals are attached to the fifth costal. The carapace has smooth contours with no keel present, but on the lower half of the costals there are seven or eight ridges, and the remaining surface of the costals and neurals are rugose. The marginals lack ridges, and the posterolateral marginals are not serrated. The anterior end of the carapace has a broad shallow notch. The first neural is rounded, and the 2d, 3d, and 4th are hexagonal, with the broad ends forward. Anterior margins of the 2d and 3d neurals are concave, and the anterior margin of the 4th neural is straight.

The sulci bounding the scutes are moderately impressed. The width of the first vertebral scute, anteriorly and posteriorly, is less than the width of the second vertebral scute. The costal scutes join the marginal scutes on the marginal plates.

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The plastron, broadly indented at the posterior end, does not have the posterior lobe flared laterally as it is in Recent species of *Chrysemys*, and lacks any pronounced notch at the femoro-anal suture. The humero-pectoral sulcus crosses the plastron behind the entoplastron in a straight line, and reaches the border anterior to the axillary notch. The pectoro-abdominal suture is anteriorly convex at the sides and concave at the midline.

A comparison of this carapace and plastron with a series of specimens of Recent *Chrysemys picta* and *Pseudemys scripta* of approximately the same size reveals characters indicated in the following chart:

RECENT <i>Chrysemys</i>	<i>Chrysemys limnodytes</i>	RECENT <i>Pseudemys</i>
Not serrated.	Posterolateral marginals not serrated.	Serrated.
Not notched.	Carapace with broad shallow notch at anterior end.	Notched.
Occasional faint notch at femoro-anal suture.	Plastron does not have a pronounced notch at femoro-anal suture.	Distinct notch at femoro-anal suture.
Posterior lobe of plastron flares laterally.	Posterior lobe of plastron does not flare laterally.	Posterior lobe of plastron does not flare laterally.
Carapace smooth.	Carapace has smooth contours.	Carapace has depressions and elevations.
Old specimens occasionally have five or six ridges near border of costals.	Seven or eight ridges on lower half of costals. Remaining surface of costals and neurals rugose.	Ridges cover costals.
No ridges on marginals.	No ridges on marginals.	May or may not have ridges on marginals.
Nuchal smooth.	Nuchal smooth. Probably arched less than in <i>Pseudemys</i> , but more than in any Recent <i>Chrysemys</i> .	Nuchal has ridges.
Carapace not greatly arched.	Probably arched less than in <i>Pseudemys</i> , but more than in any Recent <i>Chrysemys</i> .	Greatly arched.
Keel often present at birth, but soon lost.	No keel present.	Keel often present.
Anterior and posterior widths of first vertebral scute approximately same as width of second vertebral scute.	Anterior and posterior widths of first vertebral scute less than width of second vertebral scute.	Anterior width of first vertebral scute less than posterior width, or both dimensions less than width of second vertebral scute.
Ribs do not tend to be prominent on costals.	Ribs not prominent on costals.	Ribs tend to be prominent on costals.

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Hay attached considerable taxonomic importance to the characters of the nuchal and I find its characters to be fairly constant in the specimens of Emydidae examined. Although the nuchal of *Chrysemys limnodytes* is incomplete, it can be distinguished from the nuchals described by Hay as types of his several fossil Emydids. Differences in the nuchal, together with those in the carapace and plastron, serve to distinguish the species from other genera of the Emydidae.

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When the specimen is compared with *Chrysemys timida* Hay, of the Nebraska Pleistocene, many similarities, mostly of generic rank, are seen. *Chrysemys limnodytes* is broader in relation to length than is either *C. timida* or any Recent specimen examined of the same size. The greatest allowance possible in estimating the length of *C. limnodytes* fails to bring the ratio of its breadth to length within the range of Recent specimens of similar size. Data from 96 specimens of Recent *Chrysemys picta* show that the ratio of length to width is not affected by sex, but that the ratio does vary with the age of the specimen. In young animals the length and width are approximately equal, but with further growth the length becomes relatively greater. Specimens in the length group of 135 to 144 mm. have the widths ranging from 71 to 81 per cent of the lengths. In all specimens larger than this, the ratio is in the low seventies, and the largest specimen, 177 mm. in length, has the width of the carapace amounting to only 74 per cent of the length. The fossil species, *C. timida*, with a length of 160 mm., has the width amounting to 75 per cent of the length, and *C. limnodytes*, with an estimated length of 180 mm., has the width amounting to 80.5

per cent of the length. *C. timida* is widest anteriorly, whereas *C. limnodytes* and the other species of the genus are widest posteriorly. Less obvious differences between the two fossils are the narrower anterior margin of the nuchal, the concave anterior end of the carapace, the sculptured surface of the carapace, and the relatively wider neurals and longer vertebrales of *C. limnodytes*.

## DIMENSIONS OF THE TYPE SPECIMEN

(In millimeters)

Total length of carapace, 180 (estimated); greatest width of carapace, 145 (estimated); height of carapace, more than 50.

Length of plastron, 165 (estimated); width of plastron, 130 (estimated); length of anterior lobe, 45 (estimated); width of anterior lobe, 75 (estimated); length of posterior lobe, 62; width of posterior lobe, 82; length of bridge from axillary to inguinal notch, 60.

### PLATES OF THE CARAPACE AND PЛАSTRON

Nuchal: Width of anterior margin, 12 (estimated); greatest width, 37 (estimated); length at midline, 35 (estimated).

First neural: Greatest width, 13; length at midline, 17. Second neural: Greatest width, 16; length at midline, 14. Third neural: Greatest width, 18; length at midline, 16. Fourth neural: Greatest width, 18; length at midline, 16.

Costals: Thickness at proximal end, 3-5; thickness at distal end, 2. First costal: Length of margin bordering nuchal, 23 (this and the following measurements of the costal and marginal plates are of plates from the right side of the animal except those indicated by an "L"); length of margin bordering neurals, 17; length of margin bordering marginals, 38; length of margin bordering 2d costal, 51. Second costal: Length of margin bordering 1st costal, 53; length of margin bordering neurals, 16; length of margin bordering marginals, 25; length of margin bordering 3d costal, 56. Third costal: Length of margin bordering 2d costal, 55 (L), 56; length of margin bordering neurals, 19; length of margin bordering marginals, 18; length of margin bordering 4th costal, 58. Fourth costal: Length of margin bordering 3d costal, 58; length of margin bordering neurals, 16; length of margin bordering marginals, 22; length of margin bordering 5th costal, 55. Fifth costal: Length of margin bordering 4th costal, 52; length of margin bordering neurals, 16; length of margin bordering marginals, 20; length of margin bordering 6th costal, 41.

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First marginal: Length of margin bordering nuchal, 23 (L), 21; length of outer margin, 23 (L), 23; length of inner margin, 12 (L), 12; length of margin bordering 2d marginal, 22 (L), 21. Second marginal: Length of margin bordering 1st marginal, 22 (L); length of outer margin, 22 (L); length of inner margin, 15 (L); length of margin bordering 3d marginal, 16 (L). Seventh marginal: Length of margin bordering 6th marginal, 18 (L), 17 (estimated); length of outer margin, 25 (L), 23 (estimated); length of inner margin, 18 (L), 18; length of margin bordering 8th marginal, 22 (L), 22. Eighth marginal: Length of margin bordering 7th marginal, 22 (L), 23; length of outer margin, 22 (estimate of L), 22; length of inner margin, 18 (L), 18; length of margin bordering 9th marginal, 24 (estimate of L), 23. Ninth marginal: Length of margin bordering 8th marginal, 24 (L); length of outer margin, 20 (L), 19; length of inner margin, 19 (L); length of margin bordering 10th marginal, 23 (L), 23. Eleventh marginal: Length of margin bordering 10th marginal, 22 (L); length of outer margin, 16 (L); length of inner margin, 12 (L); length of margin bordering pygal, 18 (L).

Entoplastron: Width, 24 (estimated).

Hyoplastron: Length of margin bordering epiplastron, 25; length of margin on midline, 37; length from junction of epiplastral border and outer border to point on posterior border equidistant from midline, 53; width from midline to axillary notch, 39; distance between axillary notch and posterior border, 31.

Hypoplastron: Length of margin bordering midline, 42; length of posterior (xiphoplastron) margin, 40; distance from junction of xiphoplastron margin and outer margin to point on anterior border equidistant from midline, 49 (estimated); distance between inguinal notch and anterior border, 29.

Xiphoplastron: Length of anterior (hypoplastron) margin, 38; length of margin along midline, 43; distance from extreme posterior extension of xiphoplastron to midline, 14.

### SCUTES OF CARAPACE AND PЛАSTRON

First marginal scute: Length of margin bordering 2d marginal, 15 (L), 14; length of anterior margin, 15 (L); length of posterior margin, 14 (L); length of inner margin, 13 (L); length of outer margin, 23 (L). Third marginal scute: Length of anterior margin, 14 (L). Eighth marginal scute: Length of anterior margin, 15 (L), 15; length of posterior margin, 16 (estimate of L), 16; length of inner margin, 20 (L), 20; length of outer margin, 25 (estimate of L), 25. Ninth marginal scute: Length of anterior margin, 17 (L), 16; length of posterior margin, 17 (L), 17; length of inner margin, 18 (L), 20; length of outer margin, 21 (L), 21. Tenth marginal scute: Length of anterior margin, 17 (L), 17. Eleventh marginal scute: Length of posterior margin, 14 (L).

First costal scute: Length of margin bordering vertebrales, 45. Second costal scute: Length of margin bordering vertebrales, 35 (L), 35; length of margin bordering 3d costal scute, 52.

First vertebral scute: Length of anterior margin, 24 (estimated); greatest width, 32 (estimated); length at midline, 35 (estimated). Second vertebral scute: Length of anterior margin, 27; greatest width, 42; length at midline, 29. Third vertebral scute: Length of anterior margin, 33; greatest width, 42; length at midline, 40 (estimated).

Pectoral scute: Length of humero-pectoral sulcus from midline to outer border, 38; length of margin of pectoral scute on midline, 18; distance between junction of humero-pectoral sulcus and outer border and point on pectoro-abdominal sulcus equidistant from midline, 19; distance from axillary notch to point on pectoro-abdominal sulcus equidistant from midline, 17.

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Abdominal scute: Length of margin of scute on midline, 43; width of posterior border of abdominal scute from

midline to inguinal notch, 41; distance from inguinal notch to a point on pectoro-abdominal sulcus equidistant from midline, 44.

Femoral scute: Length of border of scute on midline, 24; width of anterior border of scute from midline to inguinal notch, 41; width of posterior border of scute from midline to outer border (along sulcus), 40; length of outer margin of scute from inguinal notch to femoro-anal sulcus, 46.

Anal scute: Length of margin at midline, 36; length of femoro-anal sulcus, 40.

*Remarks.*—Noteworthy is the intermediate nature of *C. limnodytes* when compared with species of the genera *Chrysemys* and *Pseudemys*. However, any resemblance to *Pseudemys* is not to be considered as evidence that *C. limnodytes* is in any way ancestral to the genus *Pseudemys*. The fossil specimens of *Pseudemys* from the Pliocene are too poorly known to allow the student certainly to place them in their correct systematic positions. The fossil Emydids from Western Europe, listed as species of *Chrysemys*, differ very much from this species, or belong to other genera of the family.

Only a few turtles are known from the Laverne formation. Hesse (Chaney and Elias, 1936) reported a small *Testudo* from the Laverne of Beaver County, Oklahoma, but neglected to state whether it was among the material borrowed by him from the University of Kansas Museum of Natural History. The Museum has an incomplete carapace and plastron (No. 3101) of a small *Testudo* from that locality and formation. In Harper County, Oklahoma, the field party from the University recovered a large number of fragments of a large *Testudo*. Although this specimen is as yet unprepared, enough fragments have been pieced together to reveal that the tibia is 127 mm. long. This dimension and those of some of the fragments indicate that the animal may have been four to five feet long.

Mrs. Bernita Mansfield of the Geology Department, University of Kansas, prepared the plate.

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