A Pleistocene Herpetofauna Near Orange Lake, Florida

By J. ALAN HOLMAN

This report is based upon specimens collected from a new Pleistocene locality, discovered by Dr. Pierce Brodkorb of the Department of Biology of the University of Florida, July 31, 1957. The locality is of special interest because vertebrate bones occur not only in clays of Illinoian age, but also in the overlying Wicomico terrace.

The fossil deposit is situated in a solution sink in a limestone quarry near the center of sec. 33, T 12 S, R 21 E, Marion County, Florida, two miles south of the town of Orange Lake at a surface elevation of approximately 100 feet. Dr. Brodkorb measured the following section at the bone bed at the time of its initial excavation.

Bed 1: Pleistocene series, Wicomico formation; dark reddish brown, massive sandy clay; with vertebrate bones occurring near middle of bed; 16 feet.

Bed 2: Pleistocene series, Wicomico formation, Arredondo member; blue clay streaked with yellow; contains fresh water snails, scutes of *Dasypus bellus,* and vertebrate bones; 13 feet.

Bed 3: Eocene series, Ocala formation; white, soft, friable limestone; contains fossils of marine invertebrates.

The Wicomico terrace represents a marine formation deposited during the Sangamon interglacial stage of the Pleistocene (Cooke, 1945). The underlying Arredondo clay presumably represents the Illinoian glacial stage of the Pleistocene (Brodkorb, 1959).

The Pleistocene animals were trapped in the sink which evidently filled with sediments during Illinoian time. Later in the Pleistocene epoch the sediments and bones were covered by the Wicomico sea. I do not believe that the bones from the Wicomico terrace represent animals of Sangamon age, but rather they were reworked from the top of the Illinoian bed by the encroaching sea. Substantiating this are numerous turtle remains from the Wicomico terrace, so fragmentary that generic identification is impossible.

The associated fauna consists of rather small birds and mammals, including: *Colinus* sp. (extinct quail), Passeriformes indet., Soricidae indet., *Sylvilagus floridanus*, *Neofiber alleni*, *Pitymys* sp., *Sigmodon hispidus*, *Peromyscus* sp., and *Dasypus bellus.*

The following reptilian and amphibian fossils have been deposited in the vertebrate collections of the Florida Geological Survey, Tallahassee, Florida. With the exception of one *Ambystoma* vertebra, all are from the Arredondo clay member. I would like especially to thank Miss Jane Larson for making the drawing.

Ambystoma tigrinum Green

Nine vertebrae (FGS V-5824). Although the vertebrae of the species of *Ambystoma* are exceedingly similar, the above vertebrae are assigned to the species *A. tigrinum* on the basis of size. The length of the fossil vertebrae through the zygapophyses ranges from 4.5-5.6 mm. In Recent adult *A. tigrinum,* the length through the zygapophyses ranges from 4.9-5.3 mm. In Recent adult *A. texanum, A. talpoideum,* and *A. cingulatum,* the length through the zygapophyses ranges from 3.1-3.4 mm. One of

these large vertebrae is from the Wicomico formation.

Ambystoma sp.

Seventeen vertebrae (FGS V-5825). Because of their small size, they may represent either young *tigrinum* or a smaller species of *Ambystoma.*

Plethodon glutinosus Green

Seven vertebrae (FGS V-5826). *Plethodon glutinosus* is known also from a Wisconsin deposit in Florida (Holman, 1958).

Scaphiopus holbrooki Harlan

Five left and two right ilia (FGS V-5827).

Bufo terrestris Bonnaterre

Three right and six left ilia (FGS V-5828).

Microhyla carolinensis Holbrook

One left and one right ilium (FGS V-5829).

Rana sp.

Twelve right and 18 left ilia, and one fragmentary sacral vertebra (FGS V-5830). Tihen (1954) has pointed out that the sacral vertebra is useful in determining the species groups of *Rana.* The fossil sacral, however, is so fragmentary that it cannot be utilized. The overlap among ilial characters in the species of *Rana* is very great. There is a tendency for the dorsal angle of the acetabular expansion to be more anteriorly directed in the *pipiens-clamitans-palustris* group than in the *catesbeiana-grylio-hecksheri* group. Most of the fossils fall into the former group in this character, but the difference is subtle. Since the fossils are small, it seems possible that they represent *pipiens,* in consideration of its Recent distribution.

Terrapene carolina Linnaeus

Left humerus (FGS V-5831). The humerus of *Terrapene* is characteristic. Auffenberg (1958) reports that all box turtles from the Pleistocene of Florida belong to the species *T. carolina.* The longest humerus of any Recent *carolina bauri* I have examined is 34.0 mm. and of Recent *carolina major* is 44.3 mm. The length of the fossil humerus is 38.8 mm., falling between the extremes of the Recent Florida subspecies. Shell and skull elements are needed for subspecific allocations.

Geochelone sp.

Right femur (FGS V-5832). The femur is that of a small *Geochelone.* It is distinct from the femur of *Gopherus,* its closest generic relative in the Pleistocene of Florida. At the proximal end, the trochanteric fossa is rounded, long, and very deep in *Gopherus.* In the fossil *Geochelone* it is oval, short, and very shallow (Table I). The head of the femur is much smaller and more flattened from side to side in *Gopherus* than in the *Geochelone* fossil. At the distal end the condyles are much more expanded and angular in *Gopherus* than in *Geochelone.* The entire bone is shorter and stouter in *Geochelone.*

Williams (1950) points out that Hay's species of *Testudo* from Florida (*distans* and *luciae*) are represented by such fragmentary remains that they should remain indeterminate until more material is accumulated. He recognizes the giant species *sellardsi* and *crassiscutata* as valid. A very small testudinid (*Floridemys nanus*) from the Pleistocene of Florida is considered incertae sedis by Williams. Loveridge and Williams (1957) propose that all Tertiary and Pleistocene tortoises of North America formerly considered *Testudo* should now be separated as *Geochelone.*

Bones of small tortoises are very numerous in Pleistocene deposits of Florida, and I tend to believe that they do not represent the young of the giant species, but a distinct smaller form of the genus *Geochelone*.

Alligator mississipiensis Daudin

One small tooth (FGS V-5835).

Anolis carolinensis Voigt

Five left and six right dentaries, and two right maxillae (FGS V-5836).

Ophisaurus ventralis (Linnaeus)

Fifteen vertebrae (FGS V-5837).

NATRICINAE indet.

Three fragmentary vertebrae (FGS V-5838).

COLUBRINAE indet.

Twenty fragmental and inseparable vertebrae (FGS V-5840).

Farancia or *Abastor*

One vertebra (FGS V-5839). Represents a medium sized individual.

Drymarchon corais Daudin

Fifty-nine vertebrae (FGS V-5844). Of such uniform size that they may represent a single individual.

Elaphe sp.

Four vertebrae (FGS V-5841). Indeterminate at the species level.

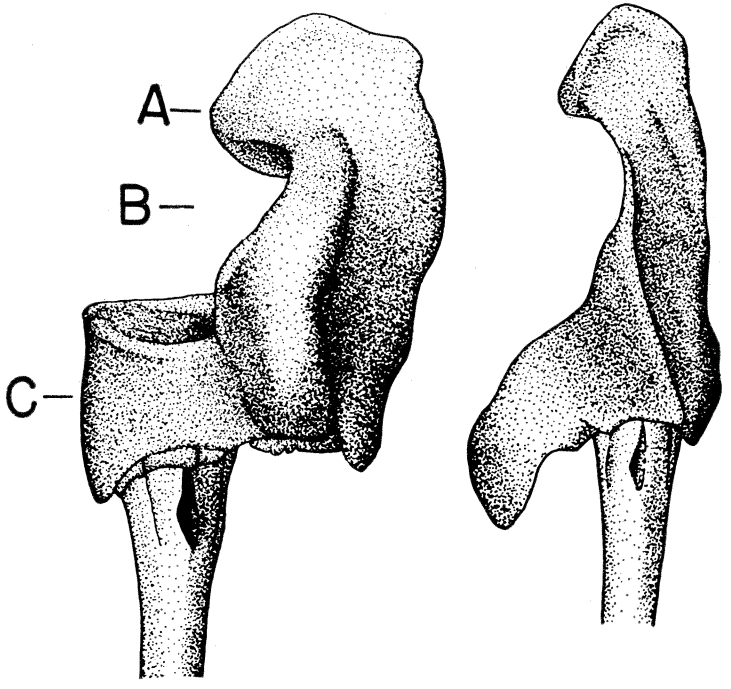

Fig. 1. Anterior aspect of right maxilla of *Crotalus adamanteus* (left), and *Ancistrodon piscivorus* (right). A, dorsal process; B, loreal fossa; C, ventrolateral process.

Lampropeltis getulus Linnaeus

Four vertebrae (FGS V-5842).

Micrurus fulvius Linnaeus

Six vertebrae (FGS V-5843).

Crotalus adamanteus Beauvois

Right maxilla (FGS V-5845). The vertebrae of *Crotalus* and *Ancistrodon* are extremely similar, but the maxillae of the two genera are distinct. In anterior aspect, the border of the loreal fossa is square in outline in *Crotalus*, but broadly rounded in *Ancistrodon* (Fig. 1). This is a reflection of the more downswept ventrolateral process. The dorsal process, which articulates with the prefrontal, exhibits a truncate ventrolateral border in *Crotalus*; this border is more acute in *Ancistrodon*. In *Crotalus* the dorsal process is large, robust, and has a broad neck, but in *Ancistrodon* it is much smaller, slender, and with a constricted neck.

The maxillae of *Crotalus* and *Sistrurus*, however, are similar, except for larger size in *Crotalus*. At the specific level, *adamanteus* may be separated from *horridus* by the notch on the ventrolateral border of the neck of the dorsal process. In *adamanteus* it is a roughened knob, but in *horridus* it forms a hook. The fossil agrees with *adamanteus* in the above character.

TABLE I

Femoral measurements (mm.) and ratios (per cent) of *Gopherus* and *Geochelone*.

	Gopherus polyphemus (five specimens)		*Geochelone* (Pleistocene) (one specimen)
	Range	Mean	
Length through head	41.4-51.3	43.74	43.0
Greatest width through head	7.3-14.2	11.5	14.4
Greatest length subtrochanteric fossa	4.0- 7.6	6.44	3.7
Greatest wides head ÷ greatest length through head	23.2-30.7		33.5
Greatest length subtrochanteric fossa ÷ greatest width head	52.0-60.8		25.7

DISCUSSION

It seems likely that in the Pleistocene the above fossil locality was a fairly large sink which was probably only intermittently filled with water since the sandy clay of the bone bed is well stratified and there are no fossil fish. Considering the ecology of present day Florida reptiles and amphibians, the fossil animals were derived partially from a marshy situation and partially from a better drained area. Perhaps the sink was on a gently rising knoll at the edge of a marshy prairie. *Rana* sp., *Alligator*, the natricines, *Farancia* and *Lampropeltis getulus* could have lived in this prairie, whereas *Ambystoma tigrinum*, *Plethodon glutinosus*, *Scaphiopus*

holbrooki, *Bufo terrestris*, *Microhyla carolinensis*, *Ophisaurus ventralis*, *Micrurus fulvius*, *Terrapene carolina*, *Elaphe* sp., *Drymarchon corais* and *Crotalus horridus* could have lived on the better drained area. Such an area can be seen today at Bolen Bluff at Paynes Prairie, south of Gainesville, Florida.

It has been postulated by Brodkorb (1957) that the Illinoian climate of Florida was similar to the present climate of North Carolina or Virginia. The above fossil fauna does little to prove or disprove this thesis. In fact, all the amphibians and reptiles are found in the same area of Florida today, with the exception of *Geochelone* which now has a more southerly distribution. This substantiates the growing evidence that the herpetofauna of Florida has been a rather stable unit, at least since the Illinoian stage of the Pleistocene. Evidently the distinct southwestern element in the Florida herpetofauna had reached Florida before this period. The herpetofauna also substantiates the evidence that the rate of extinction among Florida reptiles and amphibians has been much lower than among birds and mammals since the Illinoian stage.

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TICK INFESTATION OF WESTERN SPUR-THIGHED TORTOISES.—Last spring I inspected 94 recently imported *Testudo graeca graeca* from N. Africa (no exact collection data), of which 14 were adults and subadults, others juveniles and younger. Altogether 82 ticks were removed, 4 ticks escaping. The remaining 78 were all identified as *Hyalomma aegyptium* by Glen M. Kohls of National Institute of Allergy and Infectious Diseases. About three fourths of the collected arachnids were removed from the 14 larger tortoises, the top number of ticks on one specimen being 14.—*Arsene Eglis, 41-72 Denman, Elmhurst, N.Y.*