FIRST REPORT OF AN EOCENE REPTILE FAUNA FROM FLORIDA, USA

by

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ABSTRACT

Fossils of the Trionychidae, Bataguridae or Emydidae, *Palaeophis* and Crocodylia from Chattahoochee, NW Florida, USA, represent the first report of an Eocene reptile fauna from Florida.

RESUME

Des fossiles de Trionychidae, Bataguridae ou Emydidae, *Palaeophis* et Crocodylia provenant de Chattahoochee, NO Floride, USA, representent la premiere faune de reptiles de l'Eocene de Floride

INTRODUCTION

A reptile fauna is known from the Florida Oligocene (Patton, 1969; Holman, 1999), several reptile faunas are known from the Miocene of that state (Holman, 2000), and reptile faunas are particularly abundant in the Pleistocene of Florida (Holman, 1995). Nevertheless, as far as I am aware, no assemblage of reptiles has been reported from the Eocene of Florida. One record of a single Eocene reptile from Florida does exist, and that is of *Pterosphenus* cf. *P. schucherti*, a giant marine snake of the extinct family Palaeopheidae. A single vertebra of this snake was found embedded in limestone of Jackson Age (Late Eocene) in a wall of a sinkhole in Alachua County, northern peninsular Florida (Hutchison, 1985). The purpose of the present paper is to call attention to the presence of additional Eocene reptiles in Florida at a locality at Chattahoochee in Gadsden County in NW Florida in the eastern part of the Panhandle.

The reptile remains from this site, which I will call the "Jim Woodruff Dam Local Fauna", represent turtles of the families Trionychidae , Bataguridae or Emydidae (two taxa), the palaeopheid snake *Palaeophis*, and unidentified crocodilians with at least two tooth morphologies. Other ectothermic vertebrates from this fauna are represented by a rather large species of garfish (*Lepisosteus*); and mammalian remains from the site consist of numerous elements of *Basilosaurus*, a primitive Eocene whale.

The fossils were collected on September 10, 1988, by collectors William E. Dunn of Dothan, Alabama, and George Ziegenhine of Headland, Alabama, and shown to paleontologist Gerard R. Case who at once recognized their importance. The vertebrate locality is on the east bank of the Apalachicola River 1000 M SSE of the Jim Woodruff Dam at Chattahoochee, Gadsden County, Alabama (Fig. 1). The Apalachicola River was at a very low water stage at the time of the discovery of the bones which were recovered from the exposed river banks. Although the geology and stratigraphy of the fossil site were not detailed by the collectors, the presence of the snake *Palaeophis* (as well as the primitive whale *Basilosaurus*) indicates an Eocene age for the deposit. Moreover, the presence of *Palaeophis* indicates that the age of the site cannot be Late Eocene. The purpose of this note is to put the Jim Woodruff Dam Local Fauna reptile taxa on record and to alert vertebrate paleontologists of the possibility of important finds of Eocene reptiles in the eastern part of the Florida Panhandle.

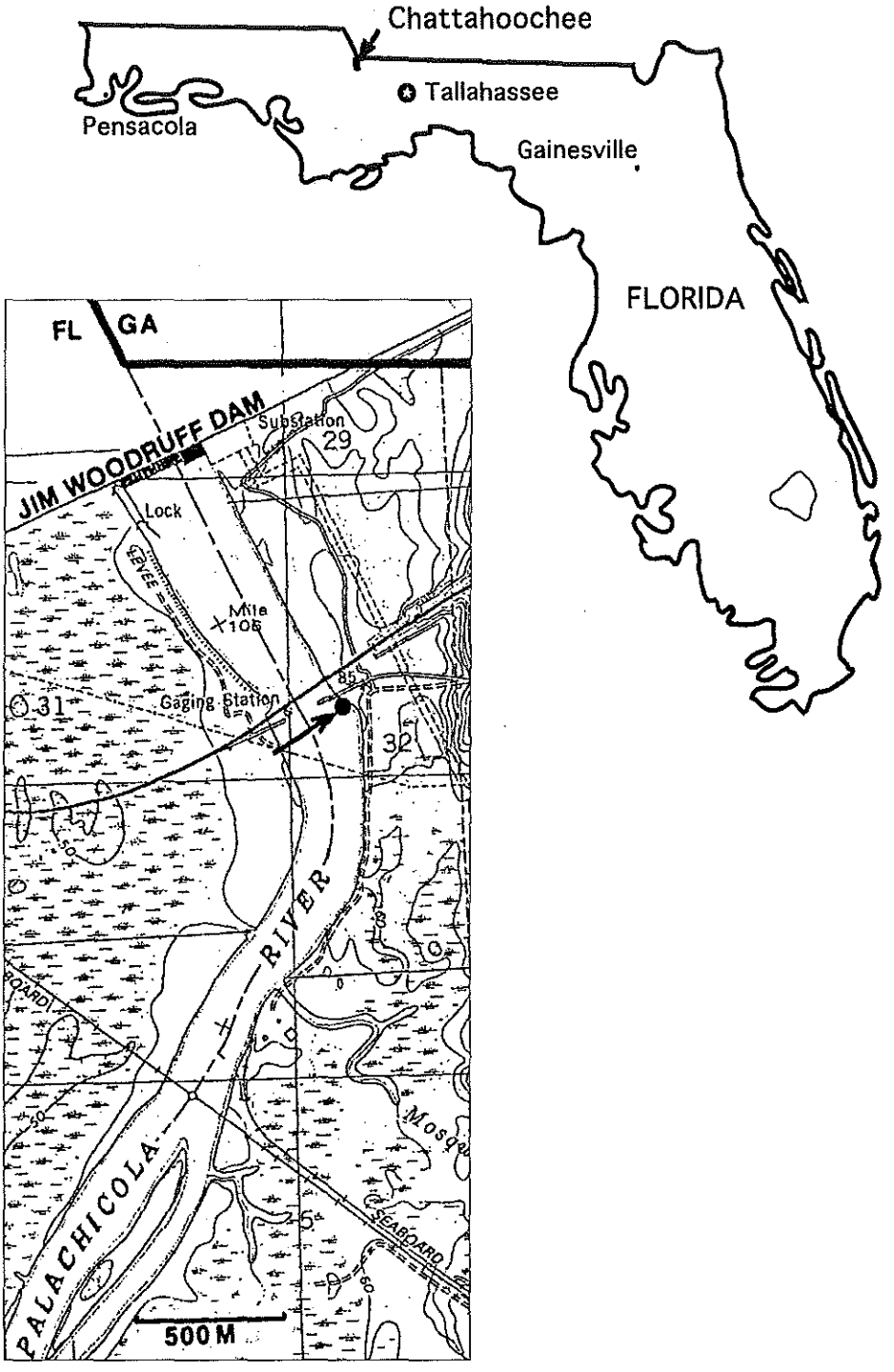

Figure 1.— Location map of the Eocene Jim Woodruff Dam Local Fauna at Chattahoochee, Gadsden County, Florida. The lower arrow points to the approximate location of the Eocene reptile fossils.

SYSTEMATIC PALEONTOLOGY

The classification system used here follows Mlynarski (1976) for turtles, Rage (1984) for snakes, and Steel (1973) for crocodilians. All measurements are in millimeters (mm). The fossils reside in the Michigan State University Museum Vertebrate Paleontology Collection (MSUVP).

Class **REPTILIA** LAURENTI, 1768
Order **TESTUDINES** TREVIRANUS, 1802
Family **TRIONYCHIDAE** FITZINGER, 1826

Trionychidae indet.
(Fig. 2)

Material: Two costal bones, MSUVP 1960A (unfigured) and MSUVP 1960B (Fig. 2A and B); five shell fragments, MSUVP 1961 (unfigured); terminal portion of costal plate rib, MSUVP 1962 (Fig. 2C); and terminal portion (Fig. 2D) and medial portion (unfigured) of distal costiform (rib-like) proccesses of the hyo- or hypoplastron, MSUVP 1963.

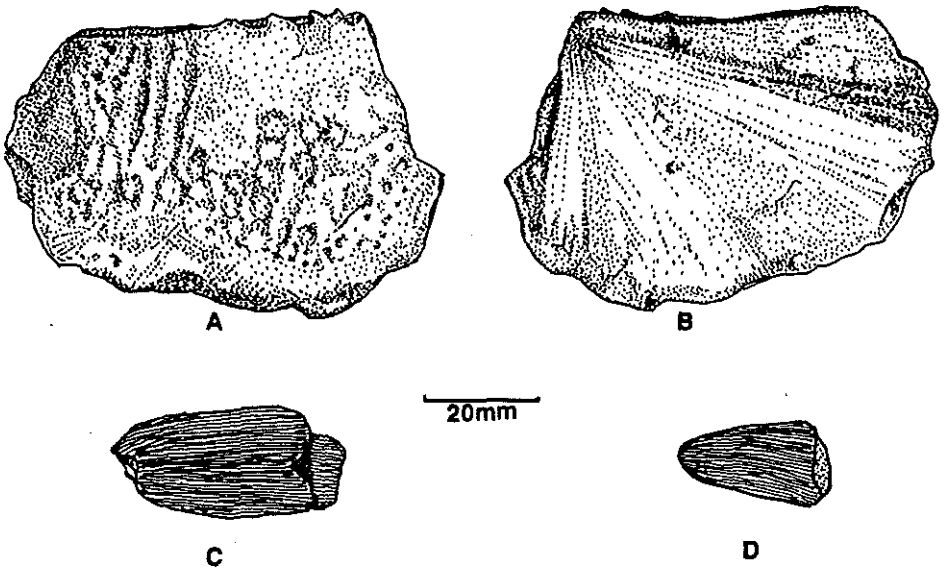

Figure 2.— Tryonychid bones from the Jim Woodruff Dam Local Fauna. A, distal end of costal bone (MSUVP 1960B) in dorsal view; B, in ventral view. C, terminal portion of rib portion of costal bone (MSUVP 1962) in dorsal view. D, terminal costiform process (MSUVP 1963) of plastral plate. The scale bar applies to all figures.

Remarks: The sculpturing pattern on the two costal bones of single, elongate ridges and closed, circular ridges (see Fig. 2A) is remarkably similar to that in a trionychid referred

to as "*Amyda*? *virginiana* (CLARK)" by Hay (1908, see Plate 96, Fig. 8), a taxon that probably should be referred to the modern genus Apalone. According to Hay (1908) all of the known material of "*Amyda*? *virginiana*" was found at Aquia Creek, Virginia, in deposits that belonged to the Early Eocene Aquia Creek horizon. This was a large softshell species with costal plates reaching a width of up to 80 mm (Hay, 1908). Of interest, considering that *Palaeophis* sp. is a part of the Jim Woodruff Dam Local Fauna, is that the Aquia Creek horizon in Virginia also produced the holotype of *Palaeophis virginianus* (HOLMAN, 2000).

Family BATAGURIDAE GRAY, 1869 or EMYDIDAE RAFINESQUE, 1815

Bataguridae or Emydidae indet.

(Fig. 3)

Material: Third neural bone, MSUVP 1964 (Fig. 3A); posterior level left costal, MSUVP 1965 (Fig. 3B); anterior level right peripheral, MSUVP 1966 (Fig. 3C); right xiphiplastron, MSUVP 1967 (Fig. 3D); and five costal fragments, MSUVP 1968 (unfigured).

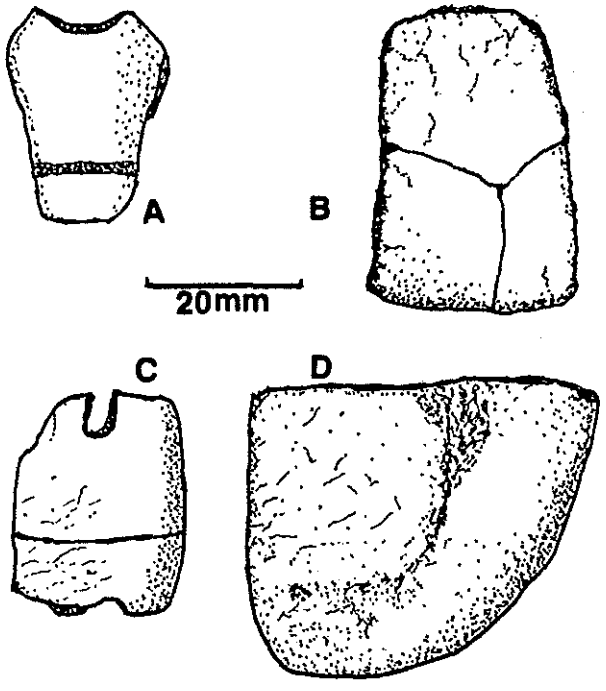

Figure 3.— Testudinoid (Bataguridae or Emydidae) turtle bones from the Jim Woodruff Dam Local Fauna. A, third neural bone (MSUVP 1964); B, proximal part of a right costal (MSUVP 1965) probably from the posterior part of the shell - the top of the figure represents the medial border, the right side of the figure represents the anterior border; C, fragmentary right peripheral bone (MSUVP 1966) probably from the anterior part of the shell - the right side of the figure represents the lateral border; D, right xiphiplastron (MSUVP 1967). All bones in dorsal view. The scale bar applies to all figures.

Remarks: The morphology of the above turtle material from the Florida Eocene site is most similar to the testudinoid families Batiguridae and Emydidae, both of which have been rather recently (e.g. King and Burke, 1989) considered to be subfamilies of the Emydidae. Both of these families contain aquatic species.

The Florida third neural bone (Fig. 3A) is hexagonal as in both the Bataguridae and the Emydidae, but it differs from most species of the dominant Eocene batagurid genus *Echmatemys* in that the Florida bone is more posteriorly constricted; has the impression of the anterior edge of the third vertebral scute more posterior in position; and in that it has this impression straight, rather than produced anteriorly as a point (compare Fig. 3A with *Echmatemys* figs. 375, 392, 394, 402, 404, 407, 411, 415, 423, 428, 432, 439, 440, 442, and 446-447 in Hay, 1908). The structure of the third neural in the Florida fossil is very closely approached by several emydid turtles (e.g. Hay, 1908, fig. 451 of *Trachemys hilli* of the Miocene of Kansas).

On the other hand, the third neural of a few species of *Echmatemys* do resemble those of various emydids and the Florida fossil somewhat (see *Echmatemys* figs. listed above in Hay, 1908). Moreover, the third neural, as well as other shell bones of *Echmatemys* are smooth and unsculptured (Hutchison, 1996), a character that occurs in the Florida third neural.

A feature that is very prominent in the Florida third neural, that I have not observed in modern batagurid or emydid turtles, is the very wide and deep impression of the anterior third vertebral scute on the third neural (Fig. 3A). This would indicate to me that the bone may represent as undescribed batagurid or emydid taxon.

Turning to other batagurid or emydid Florida Eocene shell bones, the proximal part of a right costal, probably from the posterior part of the shell, is smooth and unsculptured (Fig. 3B) as in the Bataguridae. Moreover, a fragmentary right peripheral, probably from the anterior part of the shell (Fig. 3C) is also very smooth and unsculptured. Of interest is that this bone has a smoothly rounded puncture penetrating it. This puncture is about the size of the tips of the crocodilian teeth collected from the Florida Eocene site. I have observed similar punctures in modern emydid turtles in Florida.

Finally, the right xiphiplastron (Fig. 3D) possibly may belong to another genus or species of batagurid or emydid than the turtle bones above. This xiphiplastron, although somewhat more eroded than the other Florida Eocene turtle bones, is much more robust and much thicker than in these other elements. The lack of an anal notch may be of taxonomic importance when more complete testudinoid material is collected at the site as well-developed anal notches are more common in the Bataguridae than in the Emydidae.

Order **SQUAMATA** OPPEL, 1811
Family **PALAEOPHEIDAE** LYDEKKER, 1888
Genus ***PALAEOPHIS*** OWEN, 1841

Palaeophis sp. indet.
(Fig. 4)

Material: A relatively complete vertebra, MSUVP 1969 (Fig. 4) and three less complete ones, MSUVP 1970 (unfigured).

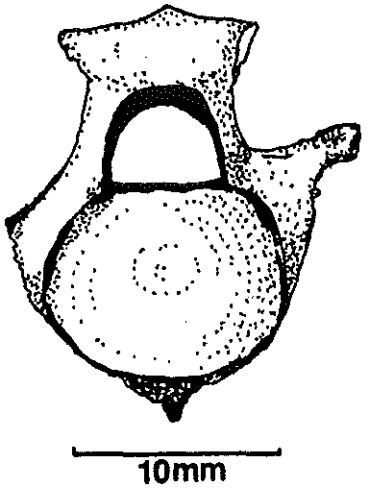

Figure 4.— *Palaeophis* sp. indet. vertebra (MSUVP 1969) in anterior view from the Jim Woodruff Dam Local Fauna.

Remarks: I was able to identify the relatively complete vertebra (MSUVP 1969, Fig. 4) on the basis of generic characters given by Parmley and Case (1988, see fig. 1) that separate *Palaeophis* from the other North American palaeopheid genus *Pterosphenus*. These differences are that the vertebrae of *Palaeophis* are wider in shape; the zygosphene is not strongly triangular in anterior view; and the planes of the prezygapophyseal articular facets lie above the floor of the neural canal (unlike *Pterosphenus* with a narrower vertebra, a strongly triangular zygosphene from the front, and prezygapophyseal facets level with the neural canal). Another major character of *Pterosphenus*, the very high pterapophyses, cannot be used in the identification, as these structures are broken in MSUVP 1969.

The three other palaeopheid vertebrae (MSUVP 1970) from the Jim Woodruff Dam Local Fauna are more fragmentary than MSUVP 1969, but are assigned to *Palaeophis* rather than *Pterosphenus* on the basis of their very wide, depressed cotyla. I consider all of the Florida *Palaeophis* material too fragmentary to identify to the specific level. Hopefully, more palaeopheid vertebrae from the area will rectify this situation

In North America, *Palaeophis* is known from beds in Mississippi that are questionably assigned to the uppermost Paleocene (but that are very likely to be Early Eocene) and well-established Early and/or Middle Eocene deposits from coastal areas ranging from New Jersey to Texas (see Holman, 2000 for specific localities). The presence of *Palaeophis* as well as the numerous remains of *Basilosaurus* confirm the Eocene age of the Jim Woodruff Dam Site Local Fauna. A further refinement of the age

of the site is that *Palaeophis* does not occur in the Late Eocene (Holman, 2000).

Order CROCODYLIA GMELIN, 1788

Crocodylia indet.

(Fig. 5)

Material: Three "crunch type" teeth (see Massare, 1987), MSUVP 1971 (Fig. 5); 15 "crunch type" teeth, MSUVP 1972 (unfigured); 10 "general type" teeth (see Massare, 1987), MSUVP 1973 (unfigured); four morphologically uncatagorized teeth, MSUVP 1974 (unfigured).

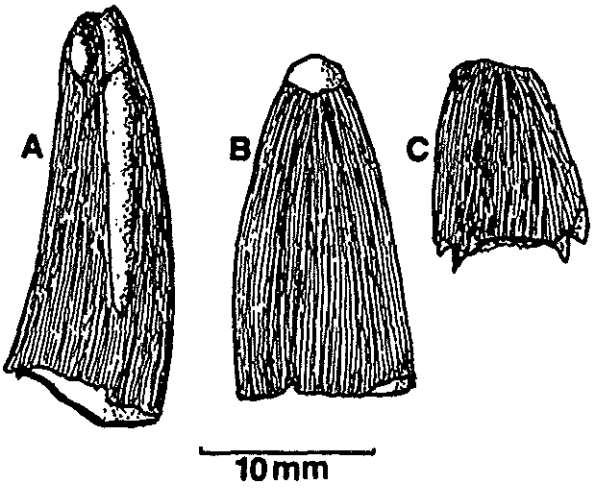

Figure 5.— Crunch type crocodylian teeth (MSUVP 1971) from the Jim Woodruff Dam Local Fauna. A, somewhat elongate tooth in anterolateral view, showing elongate wear marks on its lingual surface. B, blunter tooth, in anterior view, showing apical wear. C, tip of larger tooth in, anterior view, with a truncated apex. The scale bar applies to all figures. 7

Remarks: Of the 32 crocodilian teeth from the Chatahoochee Local Fauna, 18 are of the "crunch type" of Massare (1987), being relatively short and thick with rounded apices with wear patterns (see Fig. 5). Ten of these teeth are the "general type" of Massare (1987), being slender and striated with pointed apices. Four teeth are small, relatively hollow, newly erupted teeth that I am unable to morphologically define.

Both crunch and general types of teeth are presently found in modern alligators, caimans, and crocodiles. But crunch type teeth are much more numerous in the mouths of alligators than in caimans and crocodiles. Based on the relatively large number of both crunch and general type teeth, one might suggest the presence of both alligators and crocodiles in the fauna. Further collecting in the Jim Woodruff Dam area may elucidate the problem of the family or families of crocodilians represented.

DISCUSSION AND SUMMARY

A fauna composed of a garfish (*Lepisosteus*, MSUVP 1975), a softshell turtle (Trionychidae), testudinoid turtles (representing the family Bataguridae or Emydidae or possibly both), a palaeopheid snake (*Palaeophis*), crocodilians (possibly both alligators and crocodiles), and archeocete whales (*Basilosaurus*) is reported from a geologically and stratigraphically unstudied deposit, the Jim Woodruff Local Fauna, at Chattahoochee in the eastern panhandle of Florida. The presence of *Palaeophis* and *Basilosaurus* is consistent with an Eocene age for the fauna. In fact, based on similar Eocene faunas in coastal sites in adjacent southern states, one would suspect an Early or Middle Eocene age consistent with *Palaeophis*. This is the first Eocene reptile fauna from Florida, and the only previous Florida Eocene reptile record is that of the marine snake *Pterosphenus* cf. *P. schucherti* from Late Eocene limestones in the north-central peninsular Florida (Hutchison, 1985).

The most logical habitat for the herpetological assemblage of the Jim Woodruff Dam Local Fauna would be a tidal, riverine system along a tropical or semitropical coastline. At present, softshelled (trionychid) turtles (*Amyda ferox*) and river cooters (emydid) turtles (*Pseudemys floridanus*), which are typically freshwater turtles, commonly occur in gulf coastal rivers of Florida (e.g. Suwannee, Waccasassa, Withlacoochee) today, where sharks, rays, weakfishes, sheepshead, croakers, drum, porpoises, and garfish are found in abundance, especially at high tides (pers. obs.) This would explain the softshelled and river turtle remains associated with the archeocete whale, *Basilosaurus*, and the snake *Palaeophis*, an estuarine genus. Alligators in North America and crocodiles in various tropical situations, are presently abundant in such situations.

An Eocene reptile fauna, taxonomically very similar, and in an exceedingly similar physical setting to the Jim Woodruff Dam Local Fauna, was reported by Holman & Case (1988) northwest of Andalusia in Covington County, Alabama.. The site, known as the Point "A" Dam Site, is about 93 airline miles (about 150 KM) WNW of Chattahoochee. The fossils there were collected from the banks of the Conecuh River at low water level, just behind the Point "A" Dam. The reptile fauna consisted of tryonichid and batagurid and emydid turtles, *Palaeophis*, and crocodilians with crunch type and general type teeth as in the Jim Woodruff Dam Local Fauna. The only other reptile in the Alabama reptile fauna was the boid snake *Tallahattaophis dunni*, a taxon that was absent in the Florida Eocene fauna. As in the case of the Jim Woodruff Dam Local Fauna, it was suggested that the Point "A" Dam Site reptile fauna existed in a tidal, riverine situation (Holman & Case, 1988).

The Alabama Point "A" Dam Site reptile fauna was recovered from the sands, sandstone, clays, and claystone of the Tallahatta Formation which is equivalent in time to the Bridgerian Land Mammal Age (Late Early to early Middle Eocene), and it is not impossible that a roughly similar age is represented by the Chattahoochee Local Fauna of Florida. Hopefully, studies of the geology and stratigraphy of the fossil-bearing rocks in the banks of the Apalachicola River near the Jim Woodruff Dam will help elucidate the exact Eocene age of the first known Florida Eocene reptile fauna.

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