Description of a new species of crocodile from the Miocene of Virginia / by Joseph Leidy.

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ART. XVII.—*Description of a new species of* Crocodile *from the Miocene of Virginia.* By Joseph Leidy, M. D.

Several representatives of the living crocodiles, or such as possess concavo-convex vertebral bodies, have been discovered in the cretaceous strata of the United States.

Dr. Harlan* characterized a species, to which he gave the name of Crocodilus macrorhynchus, from a fragment of an inferior maxilla having in it eleven alveoli, three of which contained the teeth, found in the Green Sand formation of New Jersey.

A second species was established by Dr. Morton,† which he designated Crocodilus clavirostris, from an almost entire cranium found in the Cretaceous limestone overlying the marl, near Vincentown, New Jersey.

Dr. Dekay‡ has described several fragments of an inferior maxilla of a species of Gavial found in the Green-sand formation of the southern part of New Jersey. It is undoubtedly different from the Crocodilus macrorhynchus, *Harlan*, and also the gavial-like Crocodilus clavirostris, *Morton*. It may probably belong to one of two species of Crocodilus, since characterised by Mr. Owen,§ of London, from several vertebræ found in the same formation, which of course can only be inferred from relations of size. In the present state of uncertainty whether these fragments of fossil jaw belong to an animal different from any before characterised, it will not be improper to apply to it the name Crocodilus Dekayi, in honor to Dr. Dekay, who has so well described the specimens, because a synonyme, should the species on further discovery prove not to be new, would produce much less inconvenience, than a want of a name at present for convenient reference.

The two species of Crocodile referred to, characterised by Mr. Owen from some vertebræ found in the Green Sand of New Jersey, were based upon an important difference presented in the form of the inferior spinous process of the posterior cervical and the anterior dorsal vertebræ. In one species the process is double or divided by a median longitudinal cleft; in the other it is single, broad, flattened and smooth below. "Two species, therefore," Mr. Owen observes, "of Crocodile or Alligator were thus established." To the first the name of Crocodilus basifissus is applied, and to the other, that of Crocodilus basitruncatus, the two specific names indicating the most striking character of the bones upon which the species were founded.

* Journal of the Academy of Natural Sciences, Vol. iv, Pt. 1, p. 15, Pl. 1, figs. 1, 2, 8; Medical and Physical Researches, p 369.

† Proceedings Acad. Nat. Sci., Vol. ii, p. 82.

‡ Annals of the Lyceum of Natural History of New York, Vol. iii. p. 156, Pl. 3, figs. 7—10.

§ Quarterly Journal Geological Society of London, Vol. v, p. 380.

These may or may not be new species of extinct crocodile, for it is by no means established that the vertebræ upon which they were founded do not belong to the Crocodilus macrorhynchus of Harlan and the Crocodilus clavirostris of Morton.

Should, however, all the above species of Crocodile which have been proposed, on further investigation prove to be distinct, which is not probable, then there exist in the cretaceous formation of New Jersey the remains of five species of extinct Crocodile or Alligator constructed upon the existing type, and varying but little in point of size.

The discovery of a single tooth often serves to establish a new species or genus of animals; a vertebra from the same locality in which the tooth was found may characterize a second; a fragment of a rib or a phalanx a third, and so on ad infinitum, until some explorer happily succeeds in finding a whole or the greater part of a skeleton, to different parts of which the descriptions of the previously discovered new species and genera from the same locality so well apply, that all the names succeeding the first fall to it as synonyma.

With these prefatory remarks upon Crocodilian remains of the cretaceous period of the United States, I come next to the particular subject of the present memoir, which is an account of some remains of the Crocodile from the Miocene formation of Virginia.

These remains consist of two teeth, two vertebræ, a fragment of a rib, and an ungual phalanx, which were found in association with some Cetacean bones, part of which I have lately characterized as having belonged to an extinct species of whale with the name Balæna palæatlantica, also with Pecten Jeffersonius, etc.

They were discovered in the High-Cliffs of the Potomac River, 40 miles above the mouth of the latter, in Westmoreland County, Virginia, by Mr. Robert H. Nash, who kindly presented them to the Museum of the Academy of Natural Sciences.

One of the teeth, represented in figure 1, Plate XVI, is a little less in breadth than the first anterior inferior tooth of the adult Crocodilus biporcatus. In the specimen the lower part of the fang has been broken away, but the tooth appears to have been as long, or nearly so, as that referred to of C. biporcatus. It is slightly less curved than that of the latter, and the crown, though as long, is much less robust, more slender, less curved, and more pointed at the summit. The enamel is more finely and sharply striated and at the apex of the crown is not so rugous, and its lateral carinated ridges are not so elevated and extend but a relatively short distance below the point of the tooth; upon one side disappearing entirely nine lines from the commencement, and on the other after five lines only. The fang is simply cylindrical and invested by a thin lamina of osteo-dentine continuous with the basal edge of the enamel. The large conoidal pulp cavity of the tooth extends to within eight lines of the summit of the crown. Within this cavity, in the specimen which was not at all worn off from use, was already formed a young tooth, represented in figure 2, closely corresponding in form with the half inch of the summit of that which ensheathed it,

a circumstance, however, which is the ordinary one in the living species of Crocodile.

The second specimen of the teeth, represented in figure 3, consists of a crown only, which is as long as that of the former tooth, but slightly more slender, and the enamel is a little smoother, and its ridges, though not so elevated, are longer.

The color of the dentinal substance and osteo-dentine of the teeth is umbreous brown or chocolate; the enamel is lighter colored, glistening, and delicately undulating and interruptedly striate.

Measurements.

First specimen :

Thickness of the broken edge of the pulp cavity, three inches below the summit of the crown,	1¼ lines.
Probable length of the tooth in its perfect condition, if the parietes of the pulp cavity decreased in thickness at the same rate as a corresponding tooth of Crocodilus biporcatus,	5 inches.
Length of crown laterally,	1½ inches.
Lateral diameter of base of crown,	10 lines.
Transverse " " "	9¼ lines.
Lateral diameter of fang,	12 lines.
Transverse " "	10½ lines.

Second specimen :

Length of crown laterally,	1½ inches.
Lateral diameter at base of crown,	9 lines.

Dr. Wyman* has described and figured the crown of a tooth of a Crocodile from the Miocene, at Richmond, Virginia, which corresponds to the above descriptions, and probably belongs to the same species.

In relation to the specimens of the concavo-convex vertebræ, their size indicates a species of crocodile probably no less than eighteen feet in length.

One of the specimens represented in figure 4, I judge to be an anterior dorsal, probably the second; the other is a posterior dorsal, or a lumbar vertebra.

In the former, the spinous process excepting its base, the transverse processes, the articular or oblique processes excepting part of the right anterior and left posterior, and the right anterior margin of the body, with the corresponding lateral tubercle, are broken away. In form and general proportions, it bears a great resemblance to the corresponding vertebra of the Crocodilus gangeticus, and the most striking difference is observable in the spinal canal, which in the former is cordiform or trilateral with rounded angles and the apex downwards, while in the latter it is reversed. Judging from its base, the inferior spinous process has been relatively thicker and not so broad as in Crocodilus gangeticus or Alligator lucius. The junction of the body with the neural arch is still indicated by suture in the specimen. The posterior convex head of the body is hemispherical. The lateral tubercle for the head of the rib is formed upon a relatively broad base.

* Amer. Journ. of Science and Arts, Vol. x, 1850, p. 233, figs. 8a and 8b.

Measurements.

Length of the body from the bottom of the concavity to the summit of the convexity,	3 inches
Length laterally, exclusive of the convexity,	3 "
Depth of concavity,	10 lines.
Vertical diameter of concave extremity has been about,	3 inches.
Transverse " "	3 "
Vertical diameter of convexity at base,	2 in. 2 l.
Transverse " "	2½ inches.
" " body at middle from one suture to the other,	3 "
Antero-posterior breadth of base of spinous process,	22 lines.
Vertical diameter of spinal foramen,	14 "
Transverse " "	1 inch.

The other vertebra, represented in figure 5, consists of the body only with the abutments of the neural arch and a small portion of the right anterior articular process. It is more compressed at the sides than in Crocodilus gangeticus, and therefore appears relatively deeper and narrower.

Measurements.

Length of the body from the bottom of the concavity to the summit of the convexity,	3¼ inches.
Length laterally, exclusive of the convexity, has been about,	3¼ "
Vertical diameter of convexity has been about	3 "
Transverse " " "	3 "
" diameter of body at middle from one lateral suture to the other,	2¼ "

The fragment of rib consists of the vertebral third of one of the posterior ribs. It is thick and strong in accordance with the size of the animal, but presents nothing peculiar.

The ungual phalanx appears, so far as I can ascertain from comparison with those of Alligator lucius, to be the first of the thumb. It is of large size and very robust. Its base is trilateral with rounded angles, and presents a transverse concave articulating surface. The depressions for the lateral ligaments just above the condyles are remarkably deep. Just postero-superiorly to one of the depressions is an oval tubercle for tendinous attachment.

Measurements.

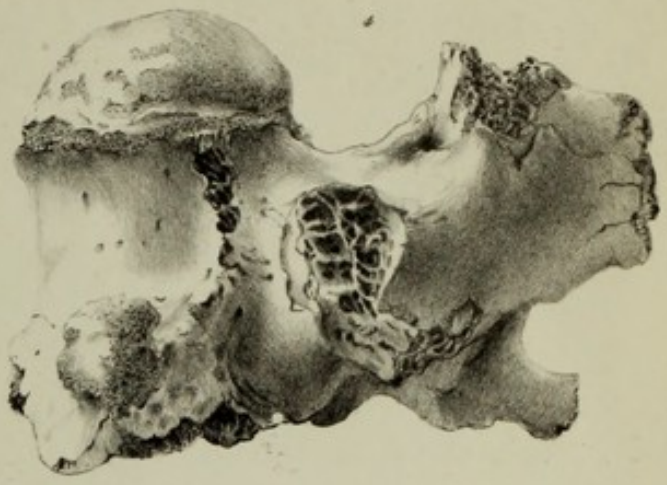
Length of the phalanx,	2¼ inches.
Greatest breadth at base,	15 lines.
" depth of base,	13 "
Breadth of condyles,	10½ "

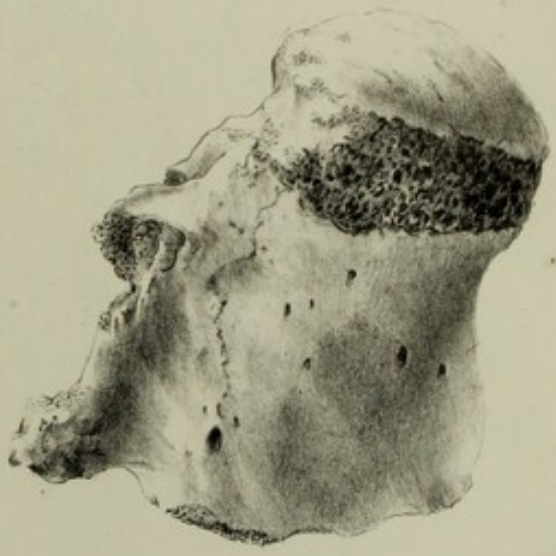
For the species to which the fragments of the skeleton described belonged, I propose the name of Crocodilus antiquus.

REFERENCE TO PLATE XVI.

Figs. 1, 2, 3, represent teeth of Crocodilus antiquus of the natural size.

Figs. 4, 5, vertebræ of do., half the size of nature.





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Sinclairs Lith. Phil.

CROCODILUS ANTIQUUS, *Leidy*