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A NEW CROCODILIAN FROM THE LANCE FORMATION

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In some vertebrate remains recently prepared for study at The American Museum of Natural History is a well-preserved crocodilian skull. This skull was collected by the American Museum Expedition of 1892 from the Lance Formation exposures on the Cheyenne River, Niobrara County, Wyoming.

The skull exhibits clearly typical eusuchian characters. In addition to these it also exhibits characters suggestive of true crocodiles of the genus *Crocodylus*, of *Diplocynodon*, of *Alligator*, and of *Caiman*. If all these characters are considered as directly indicative of relationships the form represented might well be considered as ancestrial to the above genera, which are now assigned to two distinct families of crocodilians. Some of the characters noted are undoubtedly secondary and resemble those of some of the living genera by evolutionary convergence rather than by close affinities.

Eusuchian crocodiles from the Lance are rather rare and the clear-cut characters of this skull definitely indicate a new genus and species. The resemblance of its characters to *Diplocynodon* of the Eocene of Europe appears greater and more significant than the resemblances to other known genera and the genus is therefore called *Prodiplocynodon*. The specific name *langi* is designated in honor of Mr. Charles Lang, of the Department of Vertebrate Paleontology, of The American Museum of Natural History, who has prepared and mounted many specimens of fossil vertebrates, including crocodiles, at the American Museum and elsewhere.

PRODIPLOCYNODON, NEW GENUS

TYPE.—*Prodiplocynodon langi*, new species.

DIAGNOSTIC CHARACTERS.—Typical eusuchian characters, skull short, broad, and triangular; fourth and fifth maxillary alveoli of equal size and larger than other alveoli; teeth stout; interorbital plate somewhat above level of base of snout, and separated from it by a bony wall much as in the caimans.

Prodiplocynodon langi, new species

TYPE.—Skull, Amer. Mus. No. 108. Collected by Amer. Mus. Exp. of 1892.

TYPE LOCALITY AND LEVEL.—Lance Formation, Cheyenne River, Niobrara County, Wyoming.

DIAGNOSTIC CHARACTERS.—Characters enumerated for the genus; five alveoli in each premaxillary, with none of them diminutive in size or crowded close to another; supratemporal fenestrae considerably broader than long; distal end of quadrates high in position; external narial aperture very large; supraoccipital forming part of cranial table; orbits large, and distinctly acuminate anteriorly.

DESCRIPTION OF CHARACTERS

PRESERVATION.—The skull is unusually complete except for the region of the left quadrate, quadratojugal, jugal, and postorbital, these elements being largely missing. The anterior tips of the nasals are also missing. There is a slight lateral compression toward the right on the superior surface so that a plane passing through the center of the Eustachian pit would dip definitely toward the left. Seven teeth are more or less completely preserved on the left side and a few incomplete teeth are present on the right side. The sutures in some cases are clearly marked but are often indistinguishable or obscured by cracks.

GENERAL FORM.—The skull is relatively short and broad at the posterior end and triangular in outline. The tip of the snout, however, is broadly rounded and not sharp. The snout is distinctly constricted at the premaxillary-maxillary contact but the constriction is not deep. There is a riding surface for the inner side of the large mandibular tooth, this occlusion being intermediate in character between the condition in *Crocodylus* and that in *Alligator*. The snout is low in vertical direction and the posterior region is moderately low. The distal ends of the quadrates are high in position. The surface pitting is moderately rough, but is not distinctive. The lateral festooning of the jaw

[1] Contributions to the Osteology, Affinities and Distribution of the Crocodilia, No. 34.

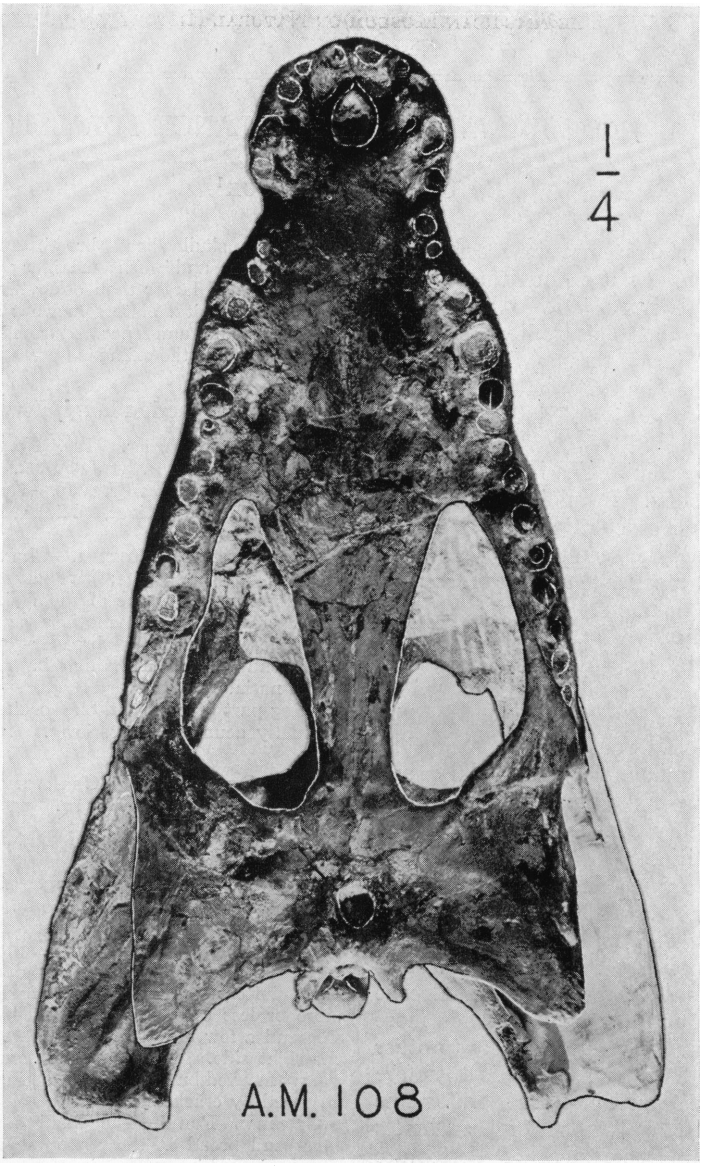

Fig. 1. *Prodiplocynodon langi*, new species. Type, skull, Amer. Mus. No. 108, inferior view, one-fourth natural size.

is moderate. The median excavation at the base of the snout, separating the snout from the interorbital plate, is moderately sharp, instead of being broadly rounded, as in the caimans.

OPENINGS OF THE SKULL.—The external narial aperture is relatively large. It extends backward almost to the level of the premaxillary constriction. Its posterior border is at the same level as the anterior end of the fifth premaxillary tooth. It is broadly rounded anteriorly and at points about one-third of the total length posterior to the extreme anterior margin the lateral borders become straight and converge decidedly until they come in contact with the anterior extensions of the nasal bones into the aperture.

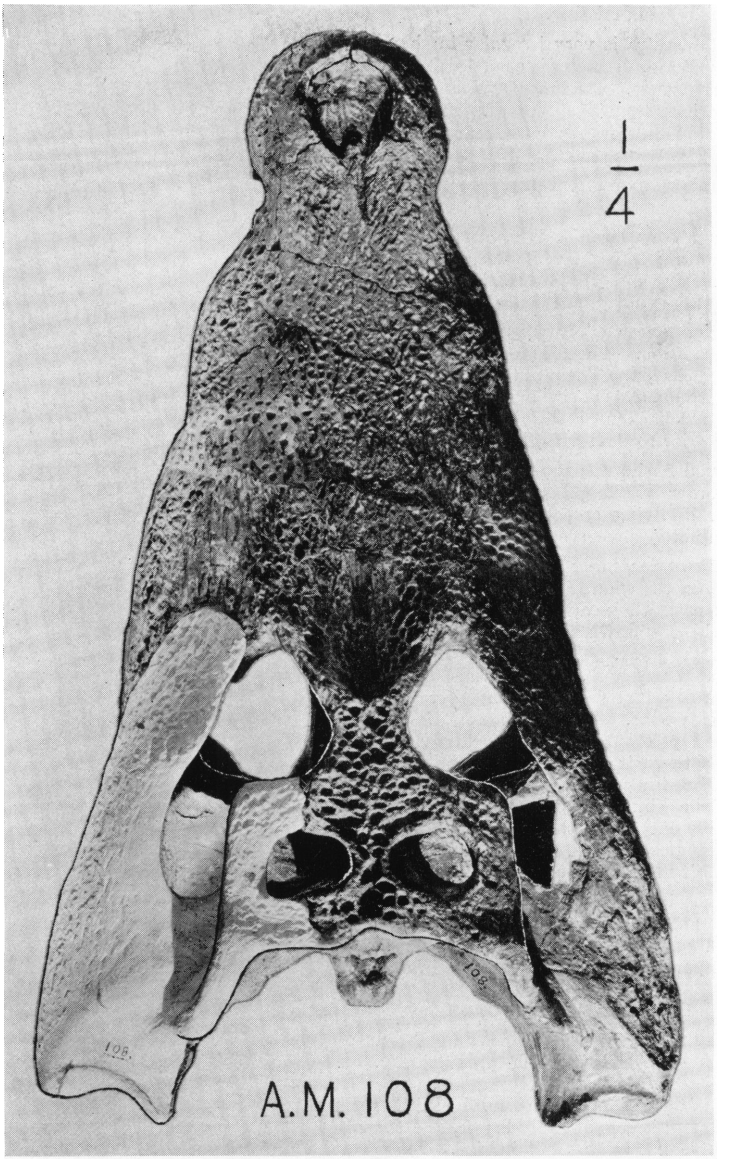

Fig. 2. *Prodiplocynodon langi*, new species. Type, skull, Amer. Mus. No. 108, superior view, one-fourth natural size.

The orbits are large and are subtriangular in outline. They are roundly pointed but not acute anteriorly. The lateral borders are nearly straight, the external border of each for its entire length and the internal border for about two-thirds of its length. Most of the posterior border is straight, and extends inward and slightly backward from the fairly sharp postero-external corner to the rounded postero-internal corner. The interorbital plate is moderately broad and is flat. The two orbits face almost directly upward, with very little forward or lateral components of position. This appears to be due only slightly to compression of the specimen.

The supratemporal fenestrae are represented

by the right unit only, the entire outer border of the left side being missing.

The right fenestra is very irregular in shape. Its antero-posterior diameter is considerably less than the transverse. Its inner half is shorter antero-posteriorly than its outer half. The interfenestral plate is moderately narrow and is only slightly uprolled at the edges.

The lateral temporal fenestrae are not distinctive.

The premaxillary foramen is unusually large. It is moderately broad for its length. It is acute anteriorly and it is broadly rounded posteriorly, its posterior half being semicircular.

The palatine fenestrae are very large and distinctive in outline. Their inner margins are only slightly curved. Their outer margins are somewhat irregular. Their axes of greatest breadth lie far back near their posterior ends, entirely posterior to the level of the last teeth.

The internal narial aperture is back near the posterior border of the pterygoids but not so far back as in living crocodiles. Its margins are not completely preserved.

Bones of the Skull on Superior Aspect.—The sutures on the snout are not clearly visible but in some cases they can be made out in part at least. The premaxillaries apparently do not extend very far back. The maxillaries do not show special characters. The nasals extend definitely into the external narial aperture as a conspicuous wedge. The outlines of the lacrimals and prefrontals are not clearly discernible, but there is no doubt but that they follow the crocodilid rather than the alligatorid relations. The characters of the frontal are not distinctive except for the median pit noted above. The postorbitals, squamosals, and parietal exhibit no striking characters.

The supraoccipital occupies a small area on the cranial table. This area is comparatively broad laterally and very short antero-posteriorly, making this part of the bone distinctive in outline.

Bones of the Skull on Palatal Aspect.—The premaxillary region is broad and short. There are five alveoli in each premaxillary. They are spaced almost equally apart. The first and second are of moderate size, the third is larger, the fourth is considerably larger, and the fifth is about equal to the first in size. There is a large pit which received the first mandibular tooth, which must have been very large, posterior to the first two premaxillary teeth and antero-external to the premaxillary foramen. This pit overlaps the foramen considerably. In the living alligators and crocodiles the corresponding pit is decidedly anterior to the foramen. Another pit, small in size, is located internal to the space between the third and fourth alveoli, and another small pit is internal to the fourth alveolus.

The premaxillo-maxillary suture extends backward only to the level of the second maxillary teeth.

The maxillary portion of the palate is comparatively short. The maxillo-palatine suture is obscure. The first maxillary alveolus is small; the second and third are progressively larger, the fourth is much larger than the third, being approximately equal in size to the fifth. Nine moderately large, subequal alveoli are situated posterior to the fifth and one small alveolus is posterior to these.

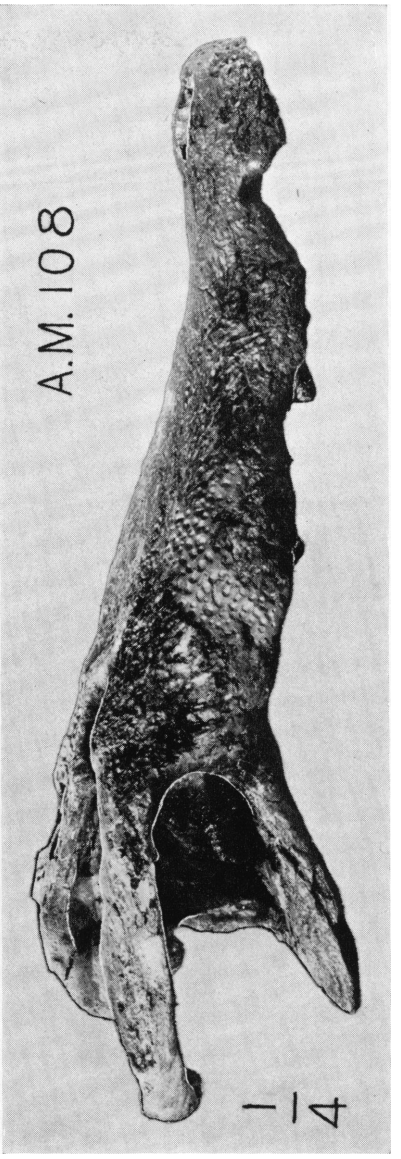

Fig. 3. *Prodiplocynodon langi*, new species. Type, skull, Amer. Mus. No. 108, lateral view, right side.

The palatines apparently do not extend forward very far beyond the level of the anterior ends of the palatine fenestrae. Near these ends they are very broad. Near the posterior ends of the fenestrae they are narrow. The palatopterygoid suture is distinctly anterior to these posterior ends; the pterygoids consequently participate in the inner as well as the posterior borders of the fenestrae. The posterior processes of the pterygoids, near the mid-line, are unusually large and prominent.

The last premaxillary tooth of the left side is well preserved. It is short and stout, but is also sharp, both on its tip and on its anterior and posterior edges. It is faintly striated. The third left maxillary tooth is incompletely preserved, the sixth left tooth is completely and the sixth right incompletely preserved. The ninth and tenth left teeth are incompletely preserved. The tenth left tooth shows the tips appearing in the matrix in the alveolus and the tenth right tooth is well worn. The eleventh and twelfth left maxillary teeth are all well preserved. All of these teeth are similar in character, being stout, moderately sharp, and short. They show less variation according to location in the jaw than do most crocodilian teeth. They are somewhat similar to the teeth of *Goniopholis* except that the striations are weaker.

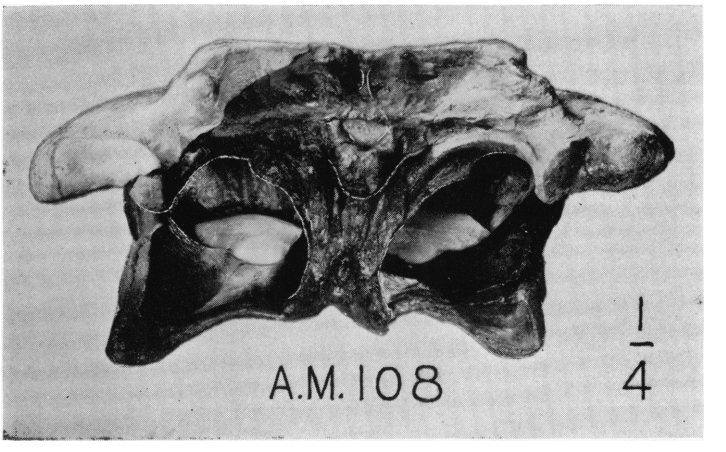

Fig. 4. *Prodiplocynodon langi*, new species. Type, skull, Amer. Mus. No. 108, posterior view, one-fourth natural size.

Measurements

	mm.
Length, tip of snout to supraoccipital border	466
Length, tip of snout to occipital condyle	496
Length, tip of snout to base of snout	312
Length, tip of snout to notch	80
Length, tooth row, right side	352e
Length, tooth row, left side	348
Length, external narial aperture	54
Length, right orbit	71
Length, left orbit	68
Length, right supratemporal fenestra	33
Length, premaxillary foramen	30
Length, right palatine fenestra	158
Length, left palatine fenestra	155
Breadth, premaxillaries, maximum	107
Breadth, premaxillaries at constriction	89
Breadth, snout at 5th maxillary teeth	165
Breadth, snout at base	238
Breadth, external narial aperture	45
Breadth, right orbit, maximum	61
Breadth, left orbit, maximum	69
Breadth, interorbital plate	38
Breadth, right supratemporal fenestra	47
Breadth, interfenestral plate	39
Breadth, cranial table	160e
Breadth, premaxillary foramen	23
Breadth, right palatine fenestra	71
Breadth, left palatine fenestra	73
Breadth, between palatine fenestra, minimum	39
Breadth, pterygoids at tips	232
Breadth, between articular processes of quadrates	190
Breadth, across quadrates, estimated	310