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Article XIV.— A CRESTED DINOSAUR FROM THE EDMONTON CRETACEOUS.

By Barnum Brown.

Plates X and XI.

During the past three years expeditions from the American Museum have explored the Edmonton formation exposed on the Red Deer River in Alberta, Canada. As a result of this work a large collection of new or little known vertebrate fossils was secured and the geological horizon in which they occur was determined to be a distinct formation, intermediate in age between the Lance and the Judith River (Belly River) Cretaceous. The collection will be monographed and the geology more fully discussed as soon as the material is completely prepared.

The subject of this preliminary paper is a new genus of the family Trachodontidæ which presents some anatomical features not heretofore known in the Dinosauria.

Saurolophus osborni gen. et sp. nov.

Type of genus and species, No. 5220, a nearly complete skeleton.

Paratype, No. 5221, a disarticulated skull and jaws.

Horizon and locality. Edmonton formation 500 feet below top of beds. Tolman Ferry, Red Deer River, Alberta, Canada.

Skull.

The most characteristic and striking feature of the skull (Plate X and text fig. 1*a* and *b*) is a long median, dorsal crest to which the generic name refers. The form, proportion and relation of other elements of the skull are, with minor differences to be pointed out later, similar to that of the genus *Trachodon*. This crest is a complex one, formed by a backward prolongation of the nasals, prefrontals and frontals. The posterior end is somewhat elevated above the anterior facial angle and judging from the contraction of the bones at the broken point, it was at least four inches longer, extending in life slightly beyond the posterior end of the parietals.

In position this crest is analagous to that of the chameleons but it has a different origin and may have served a different purpose.

The crest of *Chameleo* according to Parker [1] is composed of the inter-

[1] Trans. Zool. Soc. London, Vol. XI, Part III, 1881, pp. 77–105; §15–19.

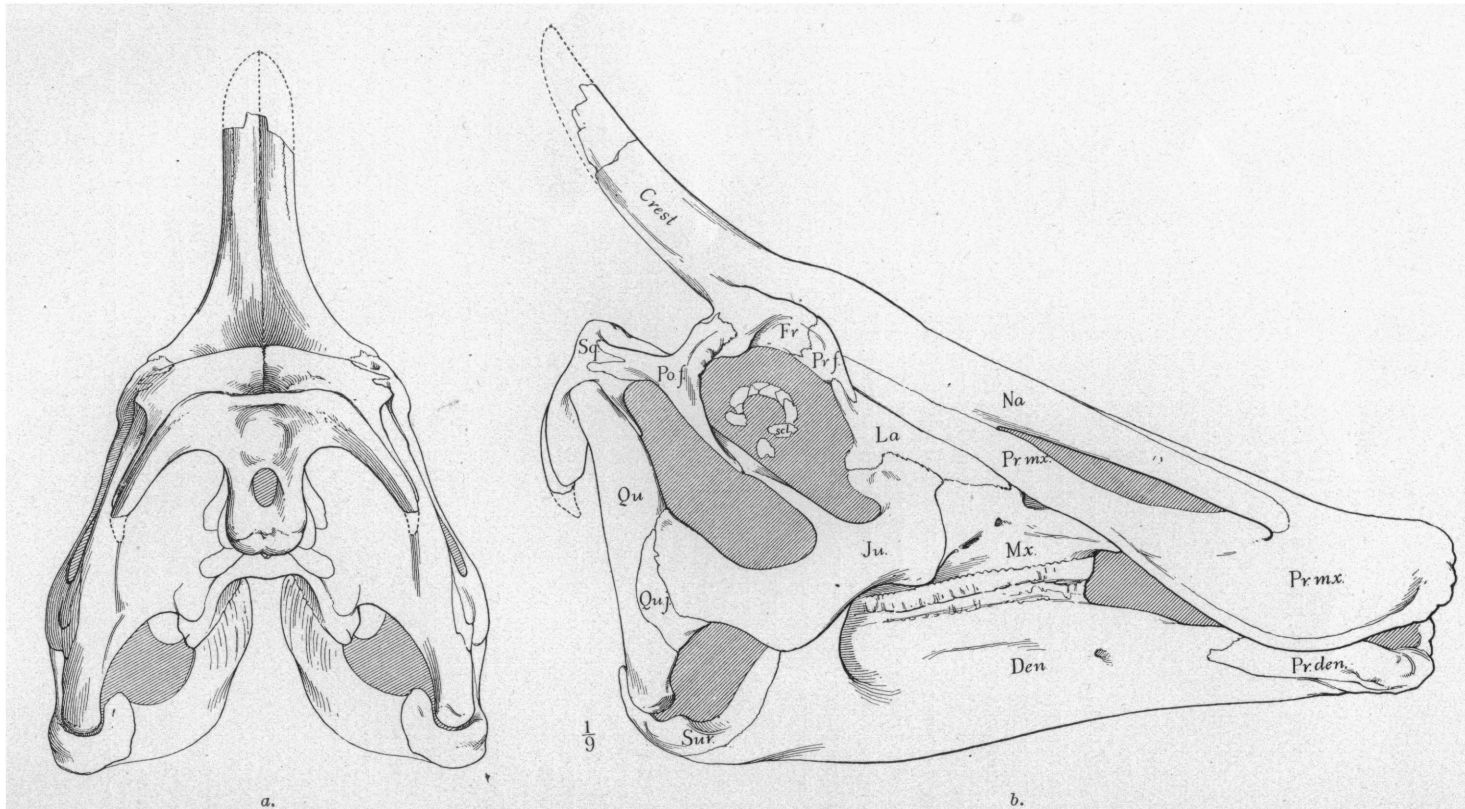


Fig. 1. *Saurolophus osborni.*

a. Occipital view of skull, reconstructed from exposed half.

b. Right side of skull with point of crest restored.

parietal and the posterior end of the frontal and serves chiefly as attachment for the large *temporalis* muscle Mivart.[1] In this new animal the bones in the side of the face, the supratemporal arches and the back of the skull (Fig. 1) below the crest are similar in form and proportion to those of *Trachodon* in which there is no crest.

It is reasoned therefore that the main attachment of the *longissimus dorsi*, and *temporalis* muscles were as in *Trachodon*. To the crest were inserted the upper part of the *complexus*, *digastric* and the *superficial temporalis* muscles.

The crest near the posterior end on the dorsal face carries a series of fine ridges and in life it probably bore a frill as in the living lizard *Basiliscus*. This comparison is further borne out by the high spines of the mid-dorsal vertebræ which, like *Basiliscus*, probably carried a high median dorsal frill.

In profile the skull is triangular. Anteriorly it expanded in a broad duck-like bill similar to *Trachodon*.

Premaxillaries and predentaries alike bear pseudo tooth-like projections, undoubtedly covered by a horny beak in life.

The premaxillaries are formed as in *Trachodon* but the anterior recurved

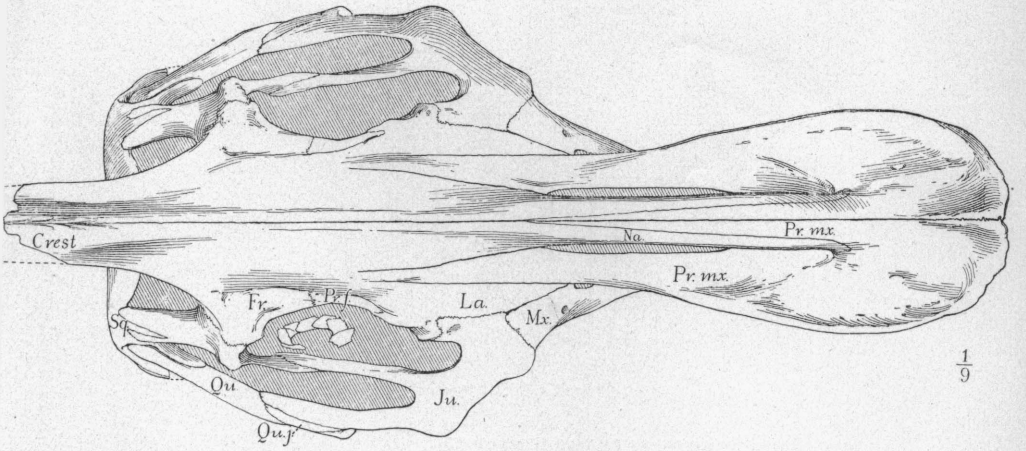


Fig. 2. *Saurolophus osborni.* Top view of skull, reconstructed from right half and viewed at right angles to line from premaxillary to end of crest.

superior border is not so high and the posterior projecting processes are much longer. The superior process is exposed as far back as the posterior border of the narial opening where it disappears under the nasal (Fig. 2). The

[1] Proc. Zool. Soc. London, 1870, pp. 850–890.

inferior process on its lower border unites successively with the maxillary, lachrymal and prefrontal and terminates posterior to the lachrymal. In *Trachodon* it terminates opposite the middle of the lachrymal.

The lachrymal is triangular in form and much longer than in *Trachodon*.

On the side of the maxillary below its union with the jugal there are five large foramina in a line. In *Trachodon* there are usually two large ones, anterior and posterior in position with intermediate smaller ones. In the disarticulated skull No. 5221, the superior of the two anterior processes that unite with the premaxillary is reduced and much shorter than in *Trachodon*.

Jugal, quadratojugal, quadrate, postfrontal, and squamosal are as in *Trachodon* with exception of the end of the postfrontal which is divided

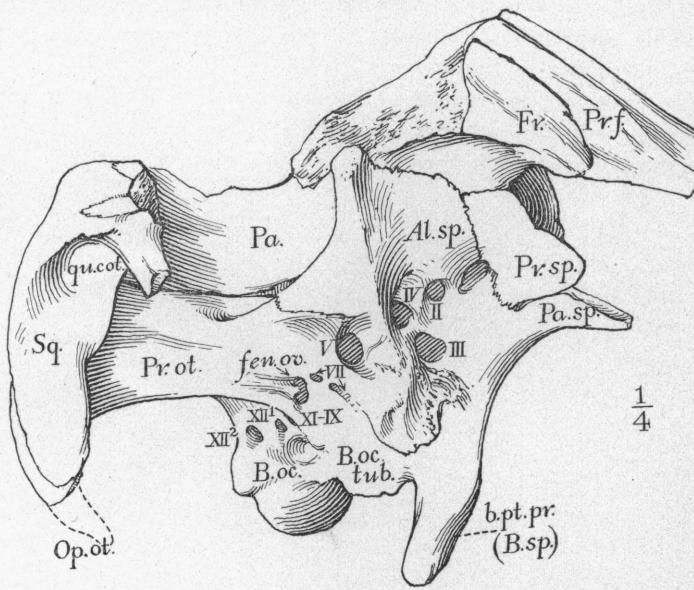


Fig. 3. *Saurolophus osborni*. Braincase of paratype, No. 5221 Am. Mus.

by a wedge-like process of the squamosal. Both skulls show this character whereas in all specimens of *Trachodon* known to me the postfrontal ends in a single rounded point.

The parietals are fused above forming a narrow ridge that divides the supratemporal fossæ as in *Trachodon*.

The frontals are markedly different from any other genus of the family. Instead of continuing the facial angle back to the parietals they rise upward forming an obtuse angle with the parietals. In front each frontal sends off a

broad process that extends backward to unite with the nasals forming the underside of the overhanging crest. This process is covered on the outside by a prolonged process from the prefrontal that forms the angle of the triangular crest and reaches a point near the broken end where it is completely fused with the other elements.

The occipital region is similar to that of *Trachodon*.

The mandible is deeper than in *Trachodon* but its form is similar and the elements that compose it are apparently not distinguishable from that genus.

Brain Case.— The brain case (Fig. 3) of No. 5221 is with exception of the frontals not distinguishable from *Trachodon* and the nerve openings

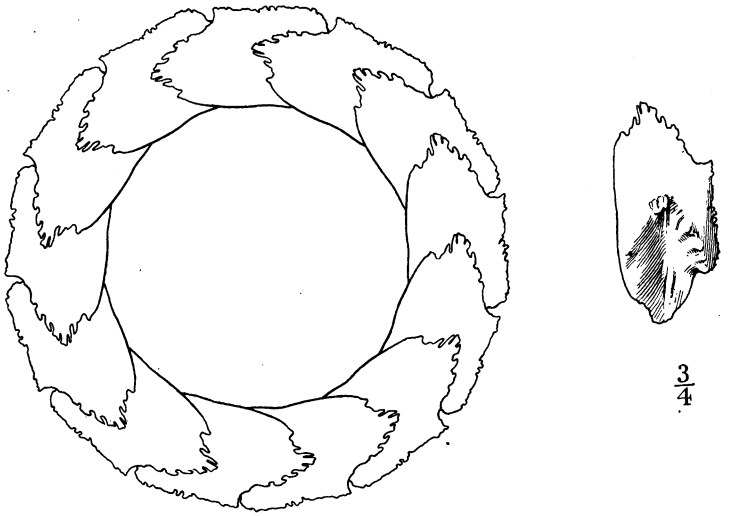


Fig. 4. *Saurolophus osborni*. Sclerotic ring, restored, and single plate.

are similar in size and position. A cast of the brain, however, will probably show a greater development in the cerebral portion.

Eye.— As in the other genera of Trachodontidæ the eye was much smaller than the orbital opening and scelerotic plates were present. This specimen permits of an exact restoration of the ring as ten plates are preserved, eight of which are in position. Restoring the missing parts by this perfect half circle as a guide there were thirteen plates in the complete ring (Fig. 4). Each individual plate is thin, flat and oblong. Both surfaces are smooth and the outer free border is finely denticulate while the inner border is smooth. In form they more nearly resemble the sclerotals of *Pteranodon* and are unlike those of Ichthyosaurs, Plesiosaurs, Mosasaurs or birds. Each plate may be

divided into thirds of which one-third underlapped the preceding plate, the middle third is free, and the remaining third overlapped the succeeding plate. The vertical diameter of the plates is constant and the V-shaped overlap is on the long axis of each plate along the arc of the circle. Thus by slipping one plate over the other it was possible to dilate the pupil to twice its normal size while the width of the sclerotic ring remained the same.

This mechanical adjustment is different in *Ichthyosaurus* where the sclerotic ring fills the orbital opening. In *Ichthyosaurus* the plates are attached at their base on the outside of the ring which remains the same diameter while the plates passed over each other in dilation or contraction similar to the movement of an iris diaphragm camera shutter.

Teeth.— Characters of the teeth are derived from the disarticulated skull No. 5221 in which maxillaries and dentaries are preserved (Pl. XI).

They closely resemble those of *Trachodon* in composition, implanation and succession, and probably in number.

In the maxillary there are sixty vertical-transverse rows. In the dentary forty-four rows are preserved, and probably not more than six rows are missing. It cannot be stated how many teeth in each row were functional at the same time on the triturating surface.

In this species the enamel face of a dentary tooth is elongate vertically with median carina, low and lateral sides nearly flat. The apex is gently rounded and borders are smooth and arched, not angulate. The outline of the enamel surface resembles that of *Kritosaurus* Brown [1] from the Cretaceous of New Mexico. In *Trachodon* the enamel face of a dentary tooth is diamond-shaped in outline and sharply angulate. The median carina is high with lateral sides sloping.

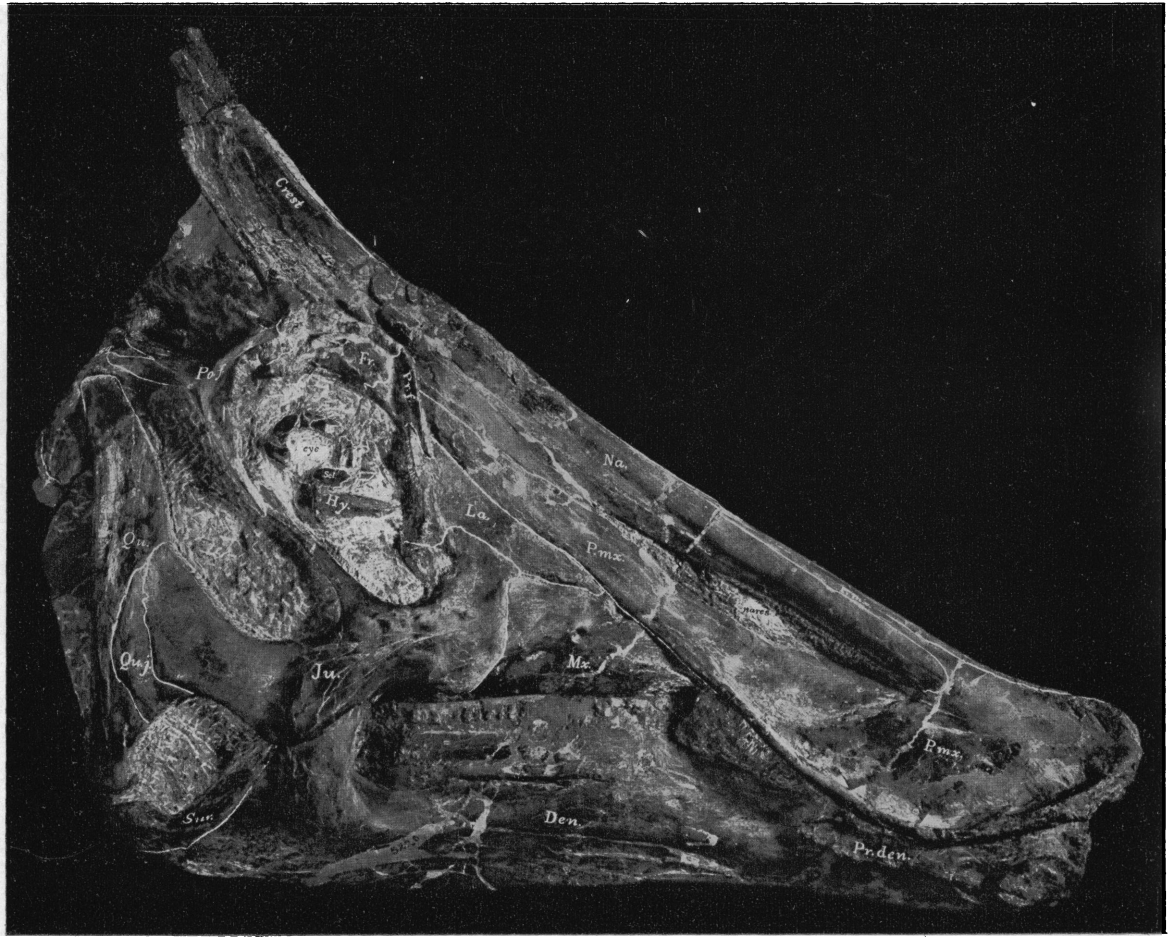
The maxillary teeth are poorly preserved and the characters not well defined. They apparently have smooth borders with the carina low.

The skeleton throughout shows characters by which it may be distinguished from other genera, but at the present writing only a part of the vertebral column has been freed from the matrix. It will be fully described in the monograph.

Measurements.

Length of skull, distal end of quadrate to premaxillary	1000 mm.
Depth of dentary, mid-section	160 "
Length, end of crest to premaxillary	1170 "
Height, end of crest to end of dentary	887 "

[1] Bull. Am. Mus. Nat. Hist., Vol. XXVIII, Art. XXIV, 1910, pp. 267–274.



SAUROLOPHUS OSBORNI. $\frac{1}{5}$.

SAUROLOPHUS OSBORNI. $\frac{3}{5}$.
Lower jaw, inside view. Paratype, No. 5221 Am. Mus.