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SOME LITTLE-KNOWN FOSSIL LIZARDS FROM THE
OLIGOCENE OF WYOMING

By CHARLES W. GILMORE

AMONG a small collection of Oligocene fossil remains acquired for the United States National Museum in 1931, from George F. Sternberg, were two lizard specimens that contribute to a better understanding of the cranial anatomy of the genera *Aciprion* and *Exostinus*. These specimens were found in a small badland area of the Brule formation that is bisected by U. S. Highway 20, about 8 miles east of Douglas, Converse County, Wyo. A detailed description of them follows. The illustrations were prepared by Sydney Prentice.

Family IGUANIDAE

Genus ACIPRION Cope

ACIPRION FORMOSUM Cope

FIGURES 30, 31

An almost complete skull with both dentaries (U.S.N.M. No. 16566) of *Aciprion formosum* Cope gives for the first time a comprehensive knowledge of the cranium in this little-known genus and species.

Skull.—The skull is complete except for part of the right jugal and fragments of the squamosal of the same side. The anterior half of the palate has been disarranged and some of the elements are missing. The lower jaws both lack their posterior portions.

Most of the sutural contacts are discernible and so make it possible clearly to depict the cranial details as shown in the illustrations. In

size and general structure the fossil skull displays many resemblances to the living lizard *Crotaphytus*. The dentitions of these two forms likewise are very similar.

Viewed from the side (see fig. 31) the profile of the skull at the junction of the parietal and frontal is depressed, as contrasted with the usual convex profile of most of the *Iguanidae*. From the tip of the nose to the posterior end of the squamosal the skull has a greatest length of 27 mm.; the greatest breadth across the jugals is 14.6 mm.

The premaxillary has a long spine that is relatively wider than in *Crotaphytus*. Its posterior end is notably different in being broadly rounded as contrasted with the narrow, sharply pointed extremity in the extant genus. The nasals are short and wide, being shortened

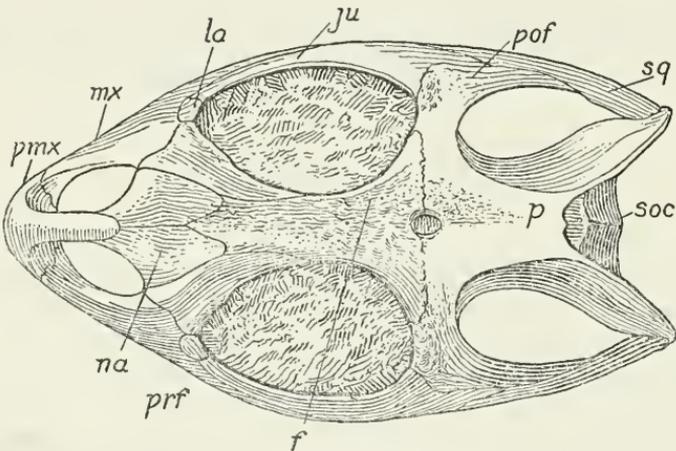


FIGURE 30.—Skull of *Aciprion formosum* Cope (U.S.N.M. No. 16566), superior view: *f*, Frontal; *ju*, jugal; *la*, lachrymal; *mx*, maxillary; *na*, nasal; *p*, parietal; *pmx*, premaxillary; *pof*, postorbital; *prf*, prefrontal; *soc*, supraoccipital; *sq*, squamosal. About three times natural size.

by the large size and partly vertical position of the nostril openings. The frontal is single and relatively wide between the orbits. The pineal foramen is on the frontoparietal suture. The prefrontal is large, but without a preocular boss, which forms such a prominent projection on the *Crotaphytus* skull. The postfrontal is absent, a condition noted by Cope¹ in *Crotaphytus*. Its place is taken by a widening of the frontal on each posterior-external angle. The postorbital is large, uniting inferiorly with the jugal and posteriorly with the squamosal. The dorsal surface of the parietal is relatively narrower between the supratemporal fossa and between the divergent posterior process than in *Crotaphytus*. The left squamosal is missing, and only a small part of the right one is present. In the illustra-

¹ Cope, E. D., Ann. Rep. U. S. Nat. Mus. for 1898, p. 246, 1900.

tions it has been restored following modern iguanids. The lachrymal is very small and in line with the jugal. The large jugal is without a posteriorly directed spur. Only the right quadrate is present, and it is so damaged that its detailed structure is obscured. As depicted in figure 31 it may be too short. It appears to have a nearly straight external border. The top of the supraoccipital is not wholly beneath the overlying parietal but is visible from above as shown in figure 30. A low obtuse vertical ridge extends upward from the top of the foramen magnum. The supraoccipital is fully coalesced with the exoccipital. The occipital condyle is plain and without evidence of participation of the exoccipitals.

The basioccipital and sphenoid surfaces are confluent. Basipterygoid processes are large, with spatulate ends directed strongly for-

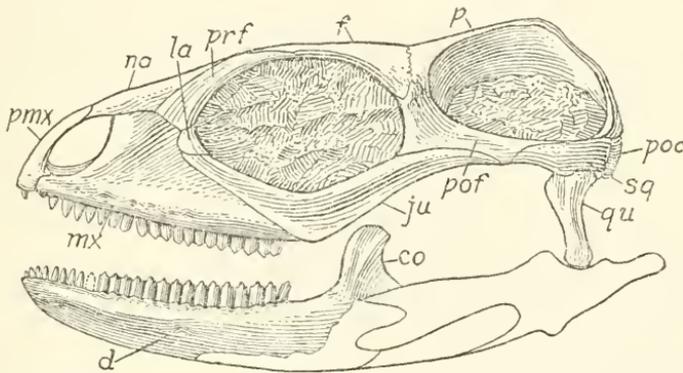


FIGURE 31.—Skull and lower jaw of *Aciprion formosum* Cope (U. S. N. M. No. 16566), viewed from the left side: *co*, Coronoid; *d*, dentary; *f*, frontal; *ju*, jugal; *qu*, quadrate; *la*, lachrymal; *mx*, maxillary; *na*, nasal; *p*, parietal; *pmx*, premaxillary; *poc*, paraoccipital; *pof*, postorbital; *prf*, prefrontal; *sq*, squamosal. About three times natural size.

ward. There is no evidence of teeth on the pterygoids. The other palatal elements are so badly disarranged as to furnish no reliable information regarding the true structure of the palate.

Lower jaw.—The mandible in specimen U.S.N.M. No. 16566 is represented by the right dentary, with full dentition posterior of the coronoid process and the greater portion of the left dentary lacking most of the teeth. These contribute but little new information, and since the lower jaw has been described in a previous publication there is no reason to repeat it here. The dentary carries 25 closely set teeth in the complete series. In the restoration of the missing part of the ramus in figure 31, the very complete ramus forming part of the type of *Aciprion majus* was used as a guide.

Dentition.—The dentition is pleurodont, the dental formula being premaxillary 6, maxillary 20, dentary 25. The teeth are closely placed, cylindric with compressed crowns. The latter support a large

median and two small lateral cusps. These lateral cusps are most prominently developed on the teeth of the posterior two-thirds of both upper and lower series. From this point forward the teeth gradually diminish in size, and the lateral cusps become smaller and smaller, disappearing altogether on the first few teeth that have simple pointed crowns. Upper and lower teeth appear indistinguishable. Crowns in lower jaw project farther above the alveolar border than in the maxillary.

Specimen U.S.N.M. No. 16566 in total number of teeth in maxillary and dentary is in perfect accord with the type of *Aciprion majus* Gilmore, but its smaller size clearly shows it to pertain to the earlier described *Aciprion formosum* Cope.

Remarks.—In 1928² this genus was referred to the family Iguanidae on rather meager evidence, but after a study of these new materials the propriety of that assignment now seems assured. The resemblances found in skull structure and character of dentition to those of extant members of the family leave little doubt as to the correctness of this family assignment.

Measurements of Skull, U. S. N. M. No. 16566

	<i>mm.</i>
Greatest length of skull, over all.....	27.0
Greatest length of skull at middle.....	22.3
Greatest width of skull across jugals.....	14.6
Greatest width parietals at center.....	3.5
Greatest length frontals between orbits.....	2.3
Greatest length nasal.....	3.6
Greatest length frontal.....	7.0
Greatest length parietal.....	7.1
Greatest width occipital condyle.....	1.2

Genus **EXOSTINUS** Cope

EXOSTINUS SERRATUS Cope

FIGURE 32

An anterior portion of a skull and a left dentary (U.S.N.M. No. 16565) is clearly identified as pertaining to *Exostinus serratus* Cope. It is the first specimen found that displays the complete structure and osseous scutellation of this part of the cranium, and thus it contributes to a better understanding of this little-known species.

The entire outer surfaces of the premaxillary, nasal, and maxillary bones, with the exception of a smooth narrow band parallel to the dentigerous border, is covered by the characteristic osseous prominences, as shown in figure 32. These are coalesced to the underlying skull elements and thus hide all trace of the cranial sutures. For that

² Gilmore, C. W., Mem. Nat. Acad. Sci., vol. 22, p. 18, 1928.

reason the extent of the underlying skull bones cannot be accurately determined. The maxillary of the left side is complete and from end to end has a length of 8.5 mm. The complete dental series of the maxillary consists of 12 pleurodont, subcylindric teeth. The premaxillary has eight teeth in the complete series, as in *Peltosaurus*.

The spine of the premaxillary is ornamented with three longitudinal rows of osseous tubercles, the central row having the largest ossifications. The nasal region is covered with tubercles of varying sizes and without definite arrangement. Those above the prefrontal are the largest tubercles on this portion of the skull and form a distinct row along the orbital border. Although the frontals are missing in this specimen, it is quite evident that the prefrontal strongly laps this bone and that its posterior termination reaches nearly to the center of the orbit.

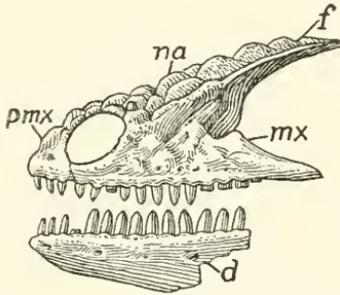


FIGURE 32.—Anterior part of the skull of *Exostinus serratus* Cope (U.S.N.M. No. 16565), viewed from left side: *d*, Dentary; *f*, prefrontal; *mx*, maxillary; *na*, nasal; *pmx*, premaxillary. About three and one-half times natural size.

The type³ on which this genus and species is based consists of the frontals, left zygomatic, and a portion of the dentary with a few teeth. The frontals are also covered with bony tubercles, a series along each supraorbital border, longitudinal at the front, quadrate at the back. A single median row separates them. On the posterior end of the frontals, they are arranged in three transverse rows of 5, 4, and 3 tubercles, respectively. On the zygomatic there are two longitudinal rows of flat quadrangular tubercles.

The incomplete dentary carries 14 teeth, and it appears that two or more may be missing from the posterior end of the series. In the article cited I stated that "the upper teeth [are] similar to the lower"; this is true only so far as both are pleurodont, with subcylindric shafts and simple crowns. The lower are more robust than the upper and their crowns project farther beyond the parapet of the jaw, as clearly shown in figure 32. In this specimen there are nine teeth

³ Gilmore, C. W., Mem. Nat. Acad. Sci., vol. 22, p. 22, pl. 25, figs. 4-6, 1928.

in 5 mm., whereas in the type dentary eight teeth occupy a similar space. The teeth of both upper and lower series decrease in size toward the front, and the transversely compressed crowns of the lateral teeth change to simple, rounded, sharp-pointed teeth in front.

The dental formula of *Exostinus serratus* may now be stated as follows:

$$\frac{\text{Maxillary } 14 + \text{premaxillary } 8}{\text{dentary } 14^*} = \frac{36}{28^*}$$

This genus and species were tentatively referred in my 1928 review of the lizards of North America to the family Iguanidae. Although this new material contributes but scant information on this important question, the subequal size of the pleurodont teeth, the constantly long cylindrical shafts, and the gradual change taking place between the lateral and anterior teeth are all features in accord with its assignment to the Iguanidae. The osseous ornamentation of the skull is highly suggestive of the horny tubercular ornamentation of the *Phrynosoma* skull. For the present, therefore, *Exostinus* will be regarded as an extinct representative of the Iguanidae.