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PALATAL SESAMOID BONES AND PALATAL TEETH IN *CNEMIDOPHORUS*, WITH NOTES ON THESE TEETH IN OTHER SAURIAN GENERA.

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In studying the prepared skulls of lizards belonging to *Cnemidophorus* and *Ameiva* I have noted the presence of a pair of small sesamoid bones lying below the pterygoid processes of the basisphenoid, and often extending over the edge of the pterygoid. When the surfaces were moistened the elements were easily movable proving that they were not ankylosed to the palatal bones. A few specimens of preserved alcoholic specimens were dissected and it was found that these bones were imbedded in what appeared to be a muscle tendon which attaches to the inner edge of the pterygoid anterior to the point of contact of the pterygoid process and the pterygoid bone. The dorsal surface of the sesamoid thus moves over the surface of the palatal bones and when dried they adhere to their surfaces. When the tissues are eaten away by dermestid larvae the sesamoids appear to be an integral part of the palate.

These elements, first observed in *Cnemidophorus guttatus* from Guerrero, Mexico, were found to be also present in the skulls of *C. sexlineatus*, *burti*, *tessellatus*, *perplexus*, *gularis*, *grahami*, *deppii*, *melanostethus*, and likewise in many unidentified skulls. They were not absent in any of the 106 skulls examined although occasionally they were detached. They were present in *Ameiva undulata* which is the only species of that genus available to me at present.

I have examined some 200 skulls of lizards belonging to other families, all prepared by the same (dermestid) method and in none do I find sesamoid bones present. In ten alcoholic specimens dissected, I was likewise unable to demonstrate their presence in the palatal region.

In several genera of lizards I find a small ossified element intercalated

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between the end of the pterygoid process of the basisphenoid and the pterygoid bone, which has the appearance of an epiphysis. In some cases this adheres to the process and if, as may occur (*Phrynosoma*) the process does not contact with the lateral groove on the pterygoid but has a free edge exposed, this may assume the appearance of the sesamoid of the *Teiidae*. I do not believe, however, that they are in any sense homologous. In a skull of *Varanus* this element appears to be ankylosed to the pterygoid rather than to the end of the pterygoid process. What the history or significance of this small element is I can not say.

The presence of palatal teeth in modern Sauria has been regarded as being of significance in determining whether a given species or genus was primitive and ancestral, or recent and derivative. Camp (1923) states: "I should consider the simple presence of teeth on the palate as paleotelic. Such teeth would seem to be ancestral owing to lack of development in secondary lines of decent and prevalence of teeth in greater numbers in certain more ancient forms."

Since there are available here at Kansas University two collections of saurian skulls Kansas University Collection[1] KU and the E. H. Taylor-H. M. Smith Collection, EHT–HMS, which together number nearly 400, I have examined them for data on palatal teeth. In the literature dealing with these teeth there are certain contradictory statements and certain errors, which the following data will help to interpret or correct.

TEIIDAE. *Cnemidophorus*. Concerning the Teiidae, Cope (1900) quotes Boulenger as follows: "Pterygoid teeth are but seldom present, and if so but feebly developed." In Cope's osteological description of *Cnemidophorus* he makes no mention of the presence of teeth on the palatal bones. Camp (1923) gives but little concrete information on this point stating that according to authors cited pterygoid teeth are present "in some teiidae"; and later he states that the palate appears to be toothless "in some Teiidae."

Burt (1923) in his description of the genus *Cnemidophorus* states specifically and erroneously that there are no palatal teeth in the genus.

I have 106 *Cnemidophorus* skulls available. These include nine or more species. Teeth are present on the palates of all species and in all individuals save one or two specimens (or where the pterygoid is missing or the teeth have been removed in cleaning the skull). One case where teeth are wanting is that of a very young specimen. The species here listed have the following pterygoid tooth formulae (although all specimens have been examined only formulae of those with certain identifications are included):

Cnemidophorus perplexus (New Mexico and Arizona): 4–4, 2–2, 3–4, 5–6, 7–6, 6–4, 4–4, 4–5. In a very young Texas specimen I found no trace of pterygoid teeth.

Cnemidophorus gularis (Southern Texas): 3–3, 2–2, 4–2, 2–1, 3–2, 3–2, 4–3, 4–2.

Cnemidophorus grahami (Western Texas): 3–3, 3–3.

Cnemidophorus sexlineatus (Kansas and Texas): 3–3, 3–3, 1–1, 2–?, 3–2.

[1] I am indebted to Mr. Charles D. Bunker, assistant curator, for privilege of studying material in the Kansas University Collection.

Cnemidophorus tessellatus tessellatus (Western Texas to Arizona): 3–2, 3–2, 2–3, 3–3, 4–5, 3–4, 3–3.
Cnemidophorus melanostethus (Southern Sonora): 3–3, 0–0, 2–2, 2–2, 3–3, 4–3, 4–3, 4–4, 2–2, 2–1.
Cnemidophorus guttatus (Morelos and Guerrero): 3–1, 2–2, 2–2, 3–4, 3–2.
Cnemidophorus deppii (Guerrero and Colima): 2–2, 2–3, 3–?, ?–?, 6–5, 5–6, 3–4, 3–2, 3–3, 2–0.

Ameiva: Only two prepared skulls of *undulata* are available. In one of these the pterygoid teeth are absent (some evidence that teeth have been present), the other has one tooth on one side, and none on the other.

HELODERMATIDAE. *Heloderma.* Boulenger (1885, p. 300) states, concerning this genus, "teeth on the pterygoid and palatine bones." In three skulls of *Heloderma suspectum* Cope examined, I find the pterygoid formulae, 2–2, 2–2, 0–2 (much worn). No palatine teeth are present and there are no indications on the bone that teeth had ever been present. All are adult. A single preserved specimen of *Heloderma horridum* from Morelos has the pterygoid-palatine formula: 5–5, 1–1. The palatine teeth are near the posterior part of the bone and not far from the pterygoid series.

ANGUIDAE. *Ophisaurus.* Hilgendorff (1885) and Camp (1923) report the presence of teeth on prevomers and pterygoids of certain species of this genus. Camp states, (p. 365) "*Ophisaurus*, having the most dentigerous palate of all living lizards, is the only recent genus known to have prevomerine teeth[2] (df. Brühl, 1875–1888.)"

Five specimens of *Ophisaurus ventralis* from Kansas show the following formulae for the pterygoid, palatine and prevomers respectively: 17–19, 5–6, 0–0; 27–24, 3–2, 0–0; 19–16, 3–2, 0–0; 9–11, 3–2, 0–0; 14–16, 3–3, 0–0. The pterygoid teeth are arranged in two or three irregular rows. The limited number of data on the absence of the prevomerine teeth in this species is not conclusive, but suggests strongly that they are absent at least in adults.

IGUANIDAE. *Crotaphytus.* Camp (1923, p. 365) states, "Genera of Iguanidae with such [pterygoid] teeth are given in Boulenger 1885: *Crotaphytus* 1 species with, 1 species without, *Sauromaulus hispidus*, *Dipsosaurus* . . ." The following formulae were found in specimens examined:

Crotaphytus wislizenii. Pterygoid teeth are 4–5; palatine teeth, 1–2. Only a single adult specimen from Boise, Idaho, was examined.

Crotaphytus reticulatus. This has a pterygoid formula of 15–12. I found no trace of palatine teeth in this adult specimen, from Starr Co., Texas.

Crotaphytus collaris collaris. Both pterygoid and palatine teeth are present in this form. A series from a single locality in Greenwood Co., Kansas, has the following formulae for the pterygoid and palatine teeth respectively (arranged from young to old): 3–3, 0–0; 6–6, 0–0 ♀; 6–7, 1–0 ♀; 7–7, 0–0; 10–7, 3–2; 8–10, 4–3; 12–11, 1–1; 12–14, 2–1. In the last two specimens some of the palatine teeth apparently have been lost, as

[2] Prevomerine teeth have been reported by Kingman (1932) as occurring in *Eumeces* (Scincidae). "At the posterior end of the plate near the median groove is found a pair of tooth-like processes that may be considered the homologue of prevomerine teeth."

evidenced by the presence of shallow grooves. Certain other specimens from various Kansas localities have the following formulae: 17–14, 3–3; 12–6, 0–0 ♂, 16–16, 0–0 ♂; 16–10, 2–0 ♀; 24–21, 2–5; 13–19, 2–3.

Crotaphytus collaris baileyi. The formulae for a young specimen is, 4–4, 0–0; for an adult 13–13, 2–1. Camp, *loc. cit.*, lists this form as lacking teeth. This statement may be true of some younger specimens.

In this genus it appears that the pterygoid teeth are acquired gradually from youth to adult age. The palatine teeth appear to be acquired at a later time and in some cases seem to be partially or totally lost with old age.

Dipso-saurus. A single form, *dorsalis sonoriensis*, lacks all trace of palatine teeth. The pterygoid teeth are as follows, in a series of skeletons from the type locality: 3–2, 0–0, 2–1, 4–2.

Sauromaulus. Camp reports pterygoid teeth present in *Sauromaulus hispidus.* In an old specimen of *Sauromaulus townsendi* from Guaymas Sonora, I find the following pterygoid formula: 1–0. *Sauromaulus obesus.* Three specimens from Arizona have the following pterygoid formulae: 6–8, 8–7, 0–1.

Holbrookia. Fifteen specimens belonging to seven forms of this genus show no trace of pterygoid or palatine teeth.

Uta. Twenty-nine specimens examined belonging to 11 species show no trace of any palatal teeth.

Sceloporus. Eighty-two specimens belonging to twenty-six species show no trace of palatal teeth.

Phrynosoma. Six specimens belonging to five species lack all trace of palatal teeth.

Basiliscus. Specimens of *Basiliscus vittatus* examined have no palatine teeth. The pterygoid teeth are, 6–1+ ♂; 5–7 ♀; 5–5.

Iguana. A single skull of *Iguana rhinolopha* has the pterygoid teeth in a short, transversely curved group, 5–6. No palatine teeth are present.

Ctenosaurus. Bailey (1928) states in his diagnosis of this genus, "pterygoid teeth present." Two specimens of *C. acanthura* have the following formulae: 12–4; 21–23. These are arranged in a double row. There are no palatine teeth.

Anolis. This genus is reported by Boulenger and Camp as having some forms with pterygoid teeth, some without. Two Mexican species examined, *nebulosus* and *nebuloides*, show no pterygoid or palatine teeth.

SCINCIDAE. *Eumeces.* Kingman (1933), has recorded the presence, and given figures, of the occurrence of pterygoid and vomerine teeth in this genus, based largely on the collections mentioned in this paper. I can add another species (*Eumeces copei*) which has a formula 2–2 for the pterygoid, and 1–1 for the vomerine teeth (in this specimen the processes do not appear to be enamel covered).

Mabuya. I have examined only the Mexican species, *Mabuia agilis*, of this genus. In this single specimen there is no trace of palatine teeth.

Leiolopisma. In a single skull of *L. unicolor*, I find no trace of palatine teeth.

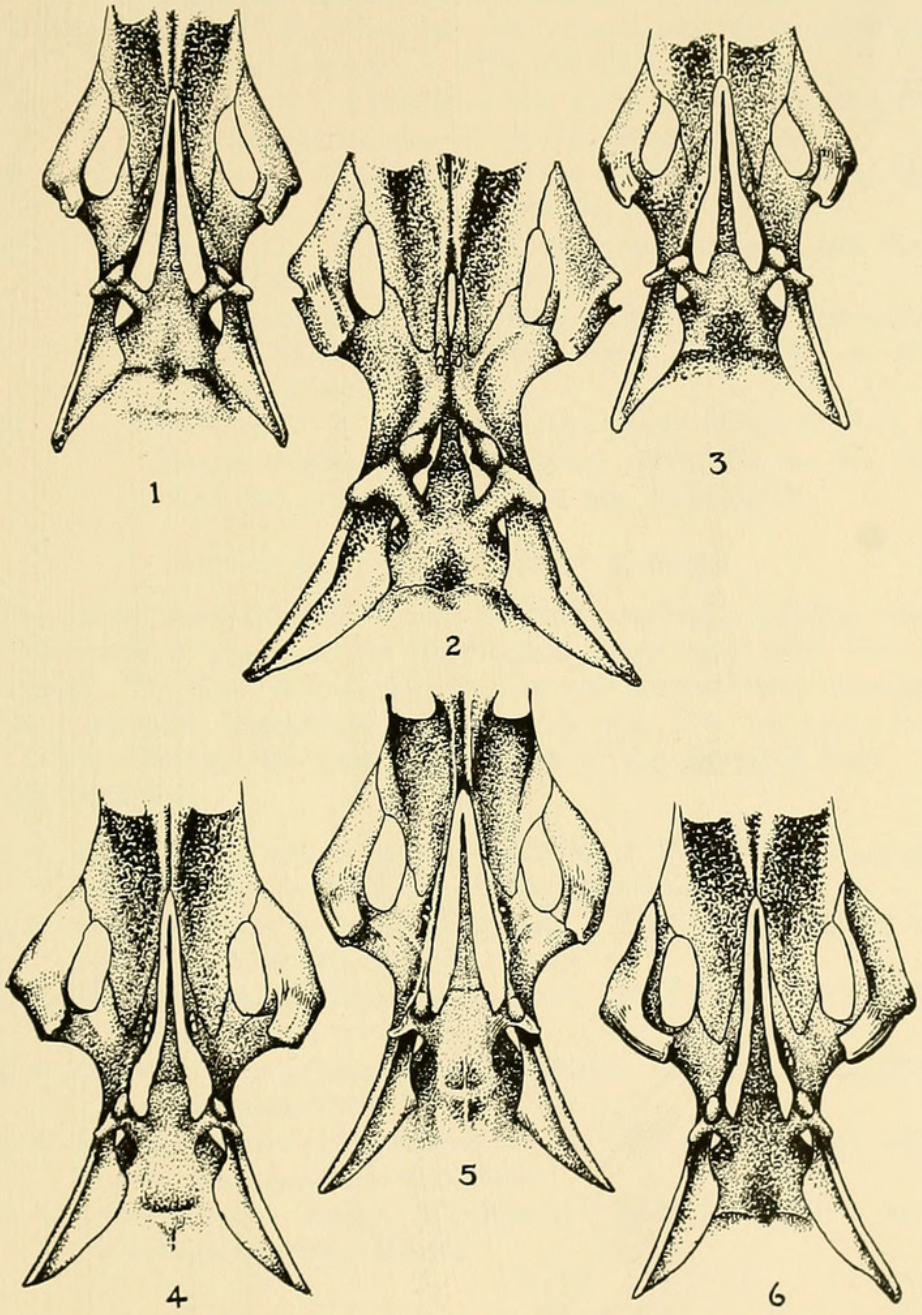

Plate II.—Taylor, Palatal sesamoids and palatal teeth in *Cnemidophorus*.

Taylor, Edward Harrison. 1940. "Palatal sesamoid bones and palatal teeth in Cnemidophorus, with notes on these teeth in other saurian genera." *Proceedings of the Biological Society of Washington* 53, 119–123.

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