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ON THE PALATE, OCCIPUT AND HIND FOOT OF *BAURIA CYNOPS* BROOM

BY R. BROOM, F.R.S.

Bauria cynops, the type of the suborder Bauriamorpha of Watson, is at present known by only two specimens, the type skull in the South African Museum, Capetown, and a specimen found by me a few years later at Winnaarsbaken, which consists of a good skull with some associated limb bones and which is now in The American Museum of Natural History (A. M. No. 5622). Watson in 1912 discovered a considerable part of the skull of a closely allied form, *Baurioides watsoni* and this skull shows much of the palate, but in an unsatisfactory state of preservation.

Two years ago Dr. Boonstra when in New York cleaned out the palate and the foot of the Winnaarsbaken specimen, and these are well worthy of being described.

Though Watson's description of the palate of *Baurioides* is approximately correct, no sutures could be made out, and this new specimen enables us to clear up a lot of points that were in doubt.

There seems to be little doubt that the Winnaarsbaken specimen belongs to *Bauria cynops*. There are four incisors which measure 16.5 mm. This is followed by a diastema of 14.5 mm. The canine is relatively small, its greatest diameter being 5.2 mm. There appear to be ten postcanine teeth, which together measure 35.5 mm. Behind the first and second teeth are parts of other teeth, which are probably the remains of teeth of an earlier set that have been replaced.

There is a well-developed secondary palate which is quite unlike that of any Therapsid previously described. The premaxillaries have each a rather large broad palatine process, which passes back to articulate with the prevomer and the secondary palatal plate of the maxilla, as shown in the figure. There is a small foramen between the palatine process and the prevomer, probably for the duct of Jacobson's organ. The united prevomers form a small part of the anterior part of the palate.

The maxillary teeth form a crescent. The anterior half of the max-

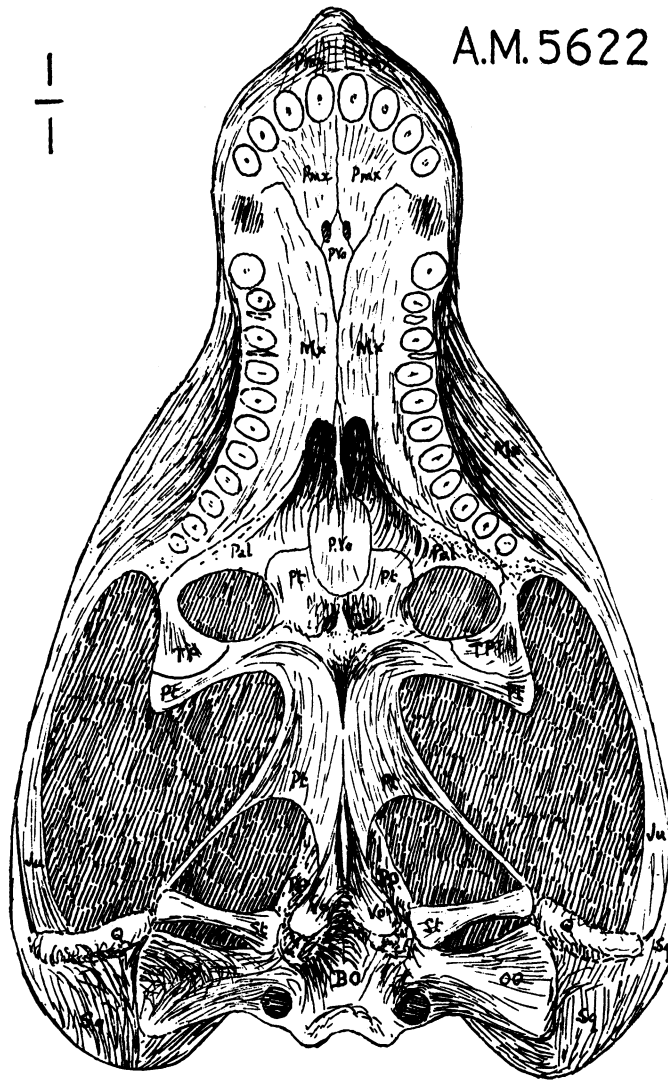

Fig. 1. Under side of the skull of *Bauria cynops*, Broom. Natural size.

B. O., basioccipital; E. O., exoccipital; Ju., jugal; Mx., maxilla; O. O., opisthotic; Pa., parietal; Pal., palatine; Pmx., premaxilla; P. O., proötic; Pt., pterygoid; P. Vo., prevomer; Q., quadrate; S. O., supraoccipital; Sq., squamosal; St., stapes; Tb., tabular; T. P., transpalatine; Vo., vomer (= parasphenoid)

illa has a secondary palatal plate which meets its neighbour, as shown in the figure. It will be seen that the secondary palate is much shorter than in cynodonts, and the posterior nares thus much farther forward. Then there is a more noteworthy character which distinguishes *Bauria* from both the cynodonts and the mammals—the palatine bones take little part in the formation of this secondary palate, and do not meet.

The middle part of the palate is unlike that of any therapsid hitherto described. There is, as Watson has shown in *Baurioides*, a fair sized suborbital vacuity. As in therocephalians, it is bounded by the palatine, the transpalatine and the pterygoid, as shown in the figure. The palatine abuts against the inner side of the posterior part of the maxilla

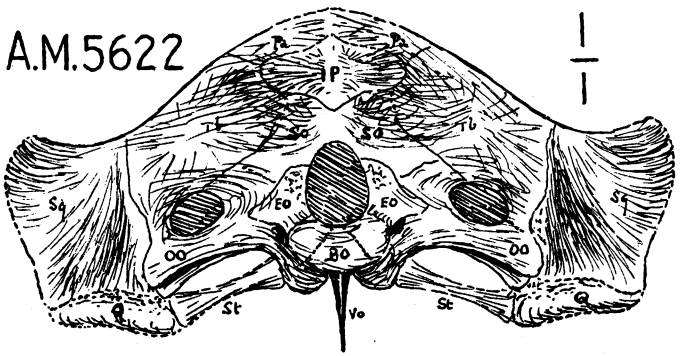

Fig. 2. Occiput of *Bauria cynops*, Broom. Natural size.

and forms most of the outer wall of the posterior nasal passage. In the middle line is a deep vomer-like plate formed by the prevomers. A little behind the opening of the posterior nares the prevomers form a small part of the palatal roof. Behind the prevomers are the large pterygoids. These have the usual broad transverse developments, with long posterior processes and short anterior processes. In the middle line in the plane of the transverse developments is a well-marked median boss, and in front of it two deep pits. Behind the median boss is apparently a very small interpterygoid vacuity. Behind this vacuity the pterygoids send down deep plates, which clasp the descending plate of the true vomer (parasphenoid of most authors).

The vomer (parasphenoid) resembles very considerably that of therocephalians. There is a deep median plate partly clasped by the pterygoids, from which posteriorly thin plates run back on the anterior sides of the tubera. On the outer sides of the tubera are the foramina ovales. The

stapes are fairly long and appear to be imperforate. As the articulars are in articulation with the quadrates, the articular surfaces of these latter are not satisfactorily shown but are probably as indicated in the figures.

The occiput is well preserved. It agrees fairly closely with that of such a therocephalian as *Hofmeyria*. The tabulars are large, and the interparietal very small and entirely confined to the occiput. The exoccipitals, basioccipital and opisthotics are typically therocephalian. The stapes are a little displaced in the specimen, but they probably agree essentially in relations with those of therocephalians. The occipital condyle though broad is single.

The left hind foot is nearly perfectly preserved but the tarsal elements are slightly displaced. There are two large proximal elements—the astragalus or talus, and the os calcis or calcaneum of human anatomy. The astragalus has a large articulation for the tibia and a small outer articulation for the fibula. In front it articulates with the scaphoid or navicular.

The os calcis is considerably larger than the astragalus. It has a convex articulation for the fibula, and a large outer and anterior part, as shown in the figure. The anterior part clearly gives articulation to the fourth and fifth distal tarsals, and it has an outer process. Behind the posterior end of the bone there is a small element which may be a detached part of the os calcis. I cannot decide with certainty whether this is a broken-off portion of the bone or is an extraneous element. It is small and not quite in articulation with the os calcis. If it were originally part of the bone, it would be exactly where a heel should be. I incline to think it is a heel process broken off in crushing. I have given a side view of it as preserved. Watson in his paper on *Ericio lacerta* (1931, Proc. Zool. Soc., p. 1163) shows that this bauriamorph or higher therocephalian has a heel process not unlike that of *Bauria*, assuming the detached fragment to be part of the calcaneum.

There is a fairly well-developed scaphoid or navicular but owing to crushing it is difficult to say exactly how large it is. Most probably it is as shown in the figure.

There are clearly five distal tarsals. The first is a quadrangular bone, as shown. The second is very much smaller, and the third slightly larger than the second. The fourth is much larger than any of the others, and the fifth about the size of the second.

The metatarsals increase in size from the first to the fourth, and the fifth is only a little smaller than the fourth. The first is only a little

longer than the first tarsal. The first phalanx of this digit is also short and the distal phalanx forms a well-developed claw.

The second metatarsal is nearly twice as long as the first. Its upper end articulates with the second tarsal and fits in between the first tarsal and the third almost exactly as does the second metatarsal in man. It

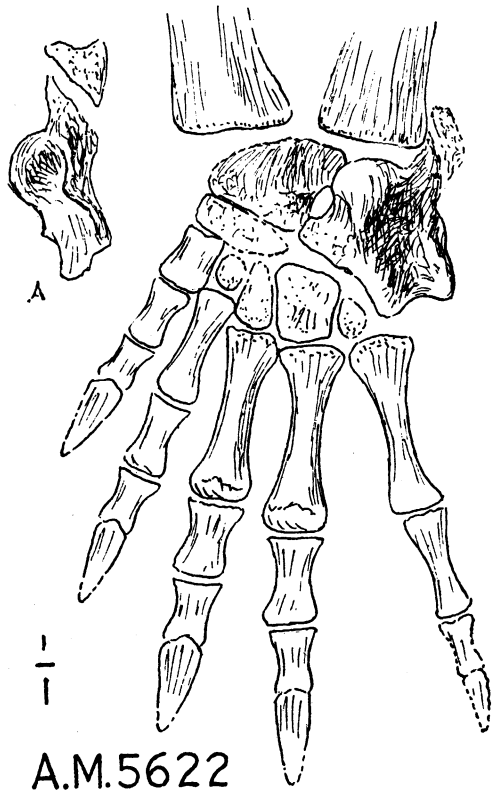

Fig. 3. Left pes of *Bauria cynops*, Broom. Natural size. A. Outer view of calcaneum as preserved.

is remarkable how this peculiar character has persisted from Triassic times until today. There are three phalanges in the second toe.

The third metatarsal is very much larger than the second and the phalanges considerably wider. There are also in this toe three phalanges. The fourth toe is a little larger than the third, and the fifth is almost as long as the fourth but more slender.

It is unnecessary to discuss here the question whether the bauriamorphs should be regarded as a distinct suborder from the therocepha-

lians, or, if Bauriamorpha be retained as a suborder, where the line dividing the two suborders should be drawn. Clearly the bauriamorphs are descended from a therocephalian ancestor, and only to be distinguished by a few characters.