ANGISTORHINUS, A NEW GENUS OF PHYTOSAURIA FROM THE TRIAS OF WYOMING

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During the summer of 1904 a paleontological expedition from the University of Chicago, under the direction of Dr. S. W. Williston, made some valuable collections of vertebrate fossils from the Trias of Wyoming along the Popo Agie River. From these collections Dr. Williston described *Paleorhinus bransoni* and mentioned three other phytosaurian skulls,[1] all of which were collected by Drs. E. B. Branson and R. L. Moodie. Dr. Williston has very kindly granted the writer the permission to study these phytosaurs and it is from this material that the following notes are drawn. Considerable time and patience have been required of Mr. Paul C. Miller in the preparation of two of these skulls for mounting and the work is not yet completed. In all probability it will be some time before a full description with figures of these specimens is possible and for this reason it seems advisable to give a brief diagnosis of a new form represented by them for the benefit of others that may be studying this group of reptiles.

Angistorhinus grandis, GEN. AND SP. NOV.

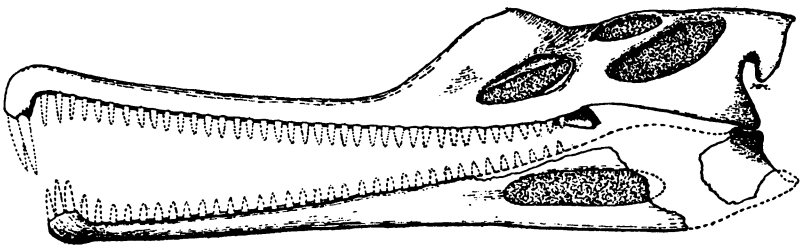
This form is represented by a nearly complete skull and a mandible of which the right ramus, back of the symphysis, is missing, as is a small part of the left ramus. Many limb bones, dorsal plates, and other fragments were found in the same locality with the skull and may belong to this species.

In a lateral view the skull resembles very closely that of *Mystriosuchus* Fraas.[2] The premaxilla, as in *Mystriosuchus*, are

[1] "Notice of Some New Reptiles from the Upper Trias of Wyoming," *Jour. Geol.*, XII (1904), 696.

[2] *Die Schwabischer Trias-Saurier nach dem Material der Kgl. Naturalien-Sammlung in Stuttgart zusammengestellt* (1896), p. 16, Pl. V.

produced into a long, slender, subcylindrical rostrum. Near the anterior end the rostrum expands rather rapidly and is bent abruptly downward at right angles to the axis of the posterior portion. This downward extension reaches a distance of 35 mm. below the ventral plane of the rostrum. The anterior border of the nares is about even with the anterior border of the antorbital vacuity and about 590 mm. from the tip of the rostrum. The nares are elevated on a prominence that extends slightly above the plane of the inter-orbital region. This prominence is accentuated by a saddle-shaped depression immediately back of the nares. The antorbital vacuities are large and are oval in outline, about 130 mm. long and 55 mm. wide. The orbits are separated by an inter-orbital space of 68 mm. They are oval, about 89 mm. long and 55 mm. wide, and their



Skull and mandible of *Angistorhinus grandis*. Lateral view, about one-ninth natural size.

planes are directed outward and a little less upward. The latero-temporal fenestrae are exceptionally large, being about 171 mm. along the greatest diameter. They reach back and upward to such an extent that only a narrow bar of bone separates the supra-temporal and the latero-temporal fenestrae. The supra-temporal fenestrae are large, more or less oval in outline, about 84 mm. long and 46 mm. wide. The posterior border, the parieto-squamosal arcade, is well developed. It is formed by a rather broad, platelike bone (the sutures have not yet been made out) that lies in the plane that extends over the posterior dorsal surface of the skull. The posterior border of the skull, as seen from above, is incised by a broad, rather deep notch. Still, the posterior border of the parietals at the median line extends beyond the occipital condyle fully 11 mm. The downward extension of the postero-lateral portion of the

squamosal of *Mystriosuchus planirostris* has an even greater development in this form. The hooklike process in *A. grandis* extends below the plane of the dorsal surface of the skull a distance of about 104 mm. Although all the teeth but the roots of the anterior ones have dropped from the alveoli, a fairly good idea of the dentition can be gained. The downward extension of the rostrum contains four teeth, sections of the roots of which show a diameter of about 15 mm. The anterior teeth of another specimen (described below), although of less diameter, reach a length of about 78 mm., a fact that would bespeak a still greater length for the anterior teeth of *A. grandis*. Sections through the rostrum disclosed teeth that had not yet been erupted. These, as many others found loose in the matrix, were laterally compressed with anterior and posterior sharp, finely serrate, cutting edges.

The differences between *Angistorhinus* and the forms that it resembles seem evident. From *Mystriosuchus* it differs in possession of laterally compressed posterior teeth with sharp, more or less serrate cutting edges. Quoting Dr. E. Fraas (*op. cit.*, p. 16): "Die Zähne selbst sind auch nicht glatt und mit scharfer Kante versehen, sondern schwach gerieft und von rundem Querschnitt ohne Kante, sie gleichen am meisten den *Nothosaurus*-Zähnen aus den Bonebeds. Dass eine Species mit derartigen Zähnen nicht gut *Belodon* (Pfeilzahn) genannt werden kan, wird man mir zugaben."

McGregor has characterized not only *Mystriosuchus*, but the entire suborder, Phytosauria, as having the parieto-squamosal arcade greatly reduced and depressed.[1] In *Angistorhinus* this is decidedly not the case; the arcade is well developed and lies in the plane of the posterior dorsal surface of the skull.

From *Rhytidodon carolinensis* Emmons[2] *Angistorhinus* differs considerably in the development and position of the parieto-squamosal arcade, for *Rhytidodon* and *Mystriosuchus* seem to be very similar in this respect. To quote Dr. McGregor (*op. cit.*, p.

[1] *Memoirs of the Amer. Mus. of Nat. Hist.*, IX, Part II (1896), 92.

[2] This is the genus and species recognized by McGregor (*ibid.*, p. 95). F. von Huene (*Beiträge zur Kenntnis und Beurteilung der Parasuchier*, 1911, p. 42) has included *Rhytidodon* in the genus *Mystriosuchus*, but Emmons' genus seems to stand, as the teeth are shown by McGregor to be laterally compressed, some with cutting edges, whereas, as pointed out above, the teeth in *Mystriosuchus* are all round in cross-section.

58): "In this specimen [a specimen of *R. carolinensis* from the U.S. Nat. Mus.] the broad superficial portion of the post-fronto squamosal arcades is broken away, exposing the supratemporal fenestra and the parieto-squamosal arcade. If uninjured this portion of the skull would closely resemble that of *Mystriosuchus*. . . . ."

There is no good basis for the comparison of *Angistorhinus* with *Phytosaurus* (*Heterodontosuchus*) *ganei* Lucas,[1] as until recently only the anterior part of an imperfect mandible of the latter form was known. In this, according to Lucas, the teeth were separated by a thin film of bone only, while in *Angistorhinus* they are separated by a distance of from 4 mm. to 8 mm. Furthermore, the examination of more recently obtained material suggests, at least, that *Heterodontosuchus* belongs to the genus *Phytosaurus* (McGregor, *op. cit.*, p. 94). In this case the differences in the posterior border of the skulls would exist as pointed out above.

Angistorhinus differs from *Paleorhinus bransoni* Williston[2] in many minor points such as the greater posterior width of the skull in the former, the greater lateral extent of the opisthotics, the larger openings in the skull, the abrupt downturning of the anterior end of the rostrum, and the much more massive build of the skull throughout. Most important of the differences, however, is the more primitive, that is, the more anterior position of the external nares in *Paleorhinus*. In that form the posterior border of the nares lies fully 30 mm. in front of the anterior borders of the antorbital vacuities, while in *Angistorhinus* the anterior border of the nares is about even with the anterior borders of the antorbital vacuities.

While *Angistorhinus* resembles *Mesorhinus Fraasi* Jaekel[3] in the form and development of the parieto-squamosal arcade, the two forms differ markedly in that the latter possesses a parietal foramen, according to Jaekel, and has the external nares more anterior in position. The downward process from the upper posterior side of the squamosal seems to be lacking in *Mesorhinus*, and the basi-

[1] *Amer. Jour. Sci.* (4), VI (1898), 399.

[2] J. H. Lees, *Jour. Geol.* XV, No. 2 (1907).

[3] "Uber einen neuen Belodonten aus dem Buntsandstein von Bernburg," *Sitzungsberichten der Gesellschaft Naturforschender Freunde*, No. 5, Jahrgang 1910.

cranial region seems to extend back much farther than in *Angistorhinus;* to such an extent, in fact, that the basioccipital is plainly visible in a dorsal view in the former. The following table of measurements of *Angistorhinus grandis* may be found useful in comparing it with other forms.

Greatest length of skull	977 mm.
Length of skull from quadrates to tip of rostrum	909
Length from nares to tip of rostrum	590
Length from anterior borders of orbits to tip	755
Inter-orbital width	68
Greatest width of skull about	390

Another specimen of *Angistorhinus* is represented by a skull, the mandible, and apparently a nearly complete skeleton. The posterior end of the mandible and the upper posterior part of the skull are missing, but these may be contained in the unpacked slabs. In general appearance this specimen is the counterpart of *A. grandis* though smaller and more slenderly built. It can hardly be considered a young individual of *A. grandis*, however, as some of the following differences in the rostrum will show. In the second specimen the slender rostrum starts much more abruptly in front of the antorbital vacuity than in *A. grandis*. While the smaller skull is considerably compressed laterally, and lateral measurements are, therefore, of less value than longitudinal ones, the rostrum seems but little affected by this compression and the following measurements seem to show the differences well. At a point 140 mm. in front of the antorbital vacuity the width of the rostrum is about 56 mm. (some allowance is here made for compression), while at the same distance in front of the antorbital vacuity in *A. grandis* the width is about 94 mm. This is exactly the opposite of what one would expect if the former specimen were but the young and the latter the adult of the same species. In *A. grandis* the terminal expansion is just back of the downward extension and the expanded portion includes but four teeth. In the smaller specimen, however, the expansion takes place suddenly just back of the second tooth behind the downward extension and from this point to the extremity the lateral outlines of the rostrum are approximately parallel. Eight teeth are included in the anterior expanded part

of this rostrum, four on each side. On the right side three of these are preserved. The first, the posterior one of these, reaches a length of 69 mm. The second is missing. In the downward extension the lateral tooth is 78 mm. long and the inner one, probably a young tooth, is about 35 mm. long.

The anterior end of the mandible is expanded in a horizontal plane, while in that of *A. grandis* the sides of the anterior expansion are turned up, thus forming a deep, rounded groove along the median line. The terminal expansion in each form bears three large teeth with approximately circular section. Immediately back of these large terminal teeth the diameter of the teeth in *A. grandis* is from 7 mm. to 9 mm., while in the second specimen the diameter is from 5 mm. to 7 mm. In much probability further study will show that the skulls belong to two different species.