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SPATHORHYNCHUS NATRONICUS, A NEW SPECIES OF RHINEURID AMPHISBAENIAN (REPTILIA) FROM THE EARLY OLIGOCENE OF WYOMING

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ABSTRACT—A new species of rhineurid amphisbaenian, Spathorhynchus natronicus, is described on the basis of well preserved skull material from the Early Oligocene White River Formation of Wyoming. Many of the characters separating it from Spathorhynchus fossorium of the Middle and Early Eocene Bridger and Wind River Formations of Wyoming, the only other known species of this genus, are related to general structural trends of the skull that members of the Rhineuridae as a whole have undergone from the Eocene to the Recent. Spathorhynchus fossorium and S. natronicus also exhibit a number of cranial features that suggest a divergence from this history and indicate that Spathorhynchus may have become established as a separate evolutionary line during the Early Eocene.

INTRODUCTION

From their first appearance in the Paleocene, North American fossil amphisbaenians are represented in each of the epochs of the Cenozoic except the Pliocene. Presently, 10 genera of North American amphisbaenians are recognized and can be grouped into three families. The least known of the fossil amphisbaenians is Oligodontosaurus wyo-mingensis. First described (Gilmore, 1942) as a lizard on the basis of a lower jaw from the Paleocene Polecat Bench Formation of Wyoming, it was later reassessed (Estes, 1965, 1975) as an amphisbaenian. Though Oligodontosaurus displays many amphisbaenian characters, it is considered quite different from other amphisbaenians, fossil or Recent, and deserving of separate family status (Estes, 1975). Better known is the monotypic family Hyporhinidae, comprising three species of the genus Hyporhina from the Oligocene (Berman, 1972). All three species are extremely rare, collectively known by only four specimens, but are represented by excellent skull material. The vast majority of fossil amphisbaenians are placed in the family Rhineuridae (Berman, 1973). Published accounts give the rhineurids a range from the Early Eocene to the Recent and it is suspected that they were widespread in North America during much of this time. The extant Rhineura floridana, restricted to peninsular Florida, is considered the sole survivor of this group. In a review of the evolution and taxonomy of the Rhineuridae (Berman, 1973), Spathorhynchus fossorium from the Early and Middle Eocene of Wyoming was described in detail and considered of particular importance because it represents the most primitive level of structural organization of any rhineurid based on complete skull material. The description here of a second species of Spathorhynchus, S. natronicus, from the Early Oligocene of Wyoming is of value in greatly expanding the known temporal range of this genus. Many of the specific differences between S. fossorium and S. natronicus are believed to be in accord with general evolutionary trends previously recognized in the rhineurids. Further, other characters seen in these two species suggest that Spathorhynchus may represent a distinct and divergent offshoot from the main evolutionary line, or closely paralleling lines which comprise the other Eocene to Recent rhineurids.

Museum collection abbreviations used here are: AMNH, American Museum of Natural History; CM, Carnegie Museum of Natural History; USNM, United States National Museum of Natural History.

SYSTEMATIC PALEONTOLOGY

Class Reptilia
Order Amphibiaenia
Family Rhineuridae
Genus Spathorhynchus Berman, 1973
SPATHORHYNCHUS NATRONICUS n. sp.

Diagnosis.—Differs from the Eocene Spathorhynchus fossorium in the following ways: postorbital more stoutly constructed and...
may exclude maxilla from orbit; maxilla does not extend beneath ectopterygoid to reach canthus rostralis or measurably along the medial margin of prefrontal; squamosal narrower and extends along entire posterolateral border of supraoccipital, reaching V-shaped notch in its posterior border; parietal-squamosal contact reduced; slightly broader pleurosphenoid extends directly, rather than curving posterolaterally to a slightly greater contact with the squamosal; absence of posteriorly directed, medial process of premaxilla; absence of an angular process of lower jaw.

Etymology.—Name refers to county where specimens were found.

Holotype.—AMNH 8677, an almost complete skull with attached mandibles.

Type horizon and locality.—South Fork of Lone Tree Gulch of the Flagstaff Rim area, SE1/4 sec. 27, T31N, R83W, Natrona Co., Wyoming, White River Formation, 30 ft below Ash G (see Emry, 1973, for detailed stratigraphic and locality data).

Age.—Chadronian, Early Oligocene.

Paratype.—AMNH 8678, a nearly complete skull with mandibles attached, NE1/4 sec. 27, T31N, R83W, Middle Fork of Lone Tree Gulch, Natrona Co., Wyoming, White River Formation, 20 ft below Ash F, Early Oligocene (Chadronian).

DESCRIPTION AND COMPARISON

The recent description of Spathorhynchus fossorium (Berman, 1973) provides a basis for distinguishing the skull of the species S. natronicus. There can be no question as to its generic assignment; its possession, for example, of a postfrontal bone and the outward flaring of the lateral edges of the snout tip to form an exaggerated spatulate structure are features unique to this genus. Differences from the skull of S. fossorium, however, are too great to be considered as individual variations and the recognition of a new species is warranted. Structural terminology used here follows that of the description of S. fossorium (Berman, 1973).

The skull and lower jaws of the holotype are nearly perfectly preserved (Text-fig. 1). The only important losses to this specimen are the quadrates, the epiphyseal bones that cap the ends of the paroccipital and ventrolateral processes, and a small portion of the tip of the snout. Most of the right quadrate and the epiphyseal elements of the ventrolateral processes are preserved in the paratype AMNH 8678. The holotype measures 28 mm in restored length (posterior margin of occipital condyle to tip of snout), 14 mm in greatest width (across paroccipital processes), and 11 mm in height (greatest vertical distance from a horizontal plane connecting anteroventral margin of premaxilla with ventral surface of occipital condyle). AMNH 8678 is approximately the same size.

There are small differences between the two species of Spathorhynchus in the sizes and relationships of the bones of the lateral surface of the facial region (Text-fig. 2). Immediately noticeable is that the postorbital of S. natronicus is much more stoutly constructed and excludes, or nearly excludes, the maxilla from the orbit. Its maxilla also differs from that of S. fossorium in not extending posteriorly beneath the ectopterygoid to reach the canthus rostralis and in not extending measurably along the medial border of the prefrontal.

Differences in the bones roofing the posterior portion of the skull are also useful in separating the two species (Text-fig. 2). Noteworthy is the greater encroachment of the somewhat narrower squamosal of S. natronicus onto the surface of the supraoccipital to reach the posterolateral margin of the V-shaped notch in the supraoccipital roof of the foramen magnum. The squamosal also has a much narrower contact with the parietal. It should be noted that the apparent greater anterolateral extent of the squamosal in S. fossorium is due to its fusion with an epiphyseal bone that caps the lateral end of the paroccipital process; in the description of S. fossorium (Berman, 1973) the presence of the epiphyseal bone of the paroccipital process was not recognized. The positions the epiphyseal bones would have occupied in S. natronicus are indicated by the roughened surfaces at the ends of the paroccipital and ventrolateral processes (Text-fig. 1). A last difference between these two species in this region is seen in the pleurosphenoid. In S. natronicus this bone in dorsal view appears to be broader, have a greater contact with the squamosal, and to extend directly, rather than curve smoothly posterolaterally (Text-figs. 2D, 2E).

In lateral view the angle subtended between the anterior, flattened, shovel-shaped, facial surface and the dorsal midline of the parieto-
OLIGOCENE RHINEURID AMPHISBAENIAN

TEXT-FIG. 2—A–C, Outline drawings of lateral views of facial surfaces. A, Spathorhynchus natronicus AMNH 8677, B, Spathorhynchus fossorium USNM 26317, and C, Rhineura hatcherii CM 423 (Middle Oligocene, Nebraska). D–F, Outline drawings of dorsal views of parieto-occipital regions of same specimens. Figures not to scale. See Text-fig. 1 for abbreviations.

The general evolutionary trends of the rhineurid amphisbaenians have been discussed at length in an earlier paper (Berman, 1973). Their evolutionary history was characterized as very conservative. Most of the more...
phological changes the rhineurids have undergone since the Early Eocene, the earliest they are represented by good cranial material, have been restricted to the skull and lower jaw. Almost all of these changes were interpreted as the result of a general tendency toward greater streamlining, strengthening and simplification of the skull structure. These trends appear to have affected nearly all members of the Rhineuridae equally and in parallel, making it nearly impossible to recognize distinct lineages. There is one notable exception to this generalized picture. A new genus of rhineurid, Dyticonastis rensbergeri, has recently been described from the Oligocene-Miocene John Day Formation of Oregon (Berman, 1976). It is unusual in its possession of cranial features normally seen only in Eocene rhineurids. The John Day amphisbaenian is the first North American fossil amphisbaenian to be reported west of the Rocky Mountains and its greater primitiveness is explained as the result of isolation from the well known contemporary populations of the midcontinent.

Most of the structural differences noted between the Eocene Spathorhynchus fossorium and the Oligocene S. natronicus are judged in accord with the general evolutionary trends of the rhineurids and the latter, therefore, exhibits a somewhat more advanced level of structural organization. The most noticeable advancements of S. natronicus over S. fossorium in cranial structure (Text-fig. 2) by comparison of both species with the more advanced Oligocene to Recent genus Rhineura include: 1) maxilla does not extend beneath the ectopterygoid to reach the canthus rostralis, 2) squamosal extends along the entire posterolateral border of the supraoccipital, just reaching the V-shaped notch in its posterior margin, 3) pleurosphenoid extends directly posterolaterally to contact the squamosal, 4) parietal-squamosal contact is reduced, and 5) absence of the narrow, posteriorly directed medial process of the premaxilla. These features occur only in Oligocene to Recent rhineurids where they are seen in all genera known by adequate material, including three or four genera which comprise the majority of eight species described from this time span. Unfortunately, S. fossorium is the only Eocene rhineurid sufficiently known with respect to these characters to be fully compared with these later genera. None of these changes in cranial structure were commented on in the earlier discussion of the rhineurid trends (Berman, 1973).

In contrast to these features indicating a conformity to the evolutionary trends of the rhineurids, Spathorhynchus fossorium and S. natronicus possess a number of other features suggesting that they represent a distinct lineage divergent from the main evolutionary line, or closely paralleling lines, comprising the other known Eocene to Recent rhineurids. Most obvious in this regard is the postorbital which in S. natronicus is considerably more stoutly constructed than in S. fossorium and may exclude the maxilla from the orbit (Text-fig. 2). This bone is lost in all Oligocene to Recent rhineurids (Text-fig. 2C) except the Oligocene-Miocene John Day amphisbaenian (Berman, 1976), where it is far less developed than in S. natronicus. As noted in the description of S. fossorium (Berman, 1973), the exaggerated, spatulate-shaped snout of this genus is unique among the rhineurids. Only in Spathorhynchus do the edges of the snout expand laterally before converging on the tip of the snout. Also setting Spathorhynchus apart from all other adequately known rhineurids is its possession of a postfrontal bone. This is undoubtedly a primitive character that was almost certainly present in pre-Eocene rhineurids. Its retention in the Oligocene S. natronicus is unusual in light of the tendency toward loss or reduction of the orbital series in post-Eocene forms. It also can be noted that the dental series of S. natronicus retain the primitively higher Eocene counts of three premaxillary, seven maxillary and eight dentary teeth. In Oligocene and Miocene forms these series are characteristically reduced to three or one, six, and seven or six teeth respectively. These counts are further reduced to one, five, and five in the living Rhineura floridana. Further, the paroccipital and the ventrolateral processes of the occiput of S. natronicus are as well developed as those of Eocene rhineurids, rather than exhibiting the far lesser degree of development that is typical of post-Eocene forms.

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