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A New Species of *Agnotocastor* (Rodentia, Castoridae) from the Early Oligocene of Wyoming

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ABSTRACT

Two specimens from early Oligocene deposits of the Flagstaff Rim area, Natrona County, Wyoming, represent a new species of beaver, *Agnotocastor galushai*. Although this is the oldest recorded form that can be definitely referred to the Castoridae, it is already similar to later species and sheds very little additional light on the ancestry of the family.

INTRODUCTION

In the Frick Collection, Department of Vertebrate Paleontology, the American Museum of Natural History, are two specimens immediately recognizable as beavers, from the Chadronian (early Oligocene) sediments of the Flagstaff Rim area, Natrona County, Wyoming. These represent a new species of the genus *Agnotocastor* and provide the first unequivocal evidence of beavers in the early Oligocene.

For the opportunity to study the collection of fossil mammals from that area, I thank Dr. Malcolm C. McKenna. Thanks are also due to Messrs. Morris F. Skinner and Ted Galusha, whose field parties collected many of the specimens from that area which are now in the Frick Collection,

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and for including detailed geographic and stratigraphic documentation with the specimens. The illustrations are by Miss Jennifer Perrott.

The abbreviation FAM, as a prefix to specimen numbers, stands for Frick American Mammals, Department of Vertebrate Paleontology, the American Museum of Natural History.

FAMILY CASTORIDAE GRAY, 1821

AGNOTOCASTOR STIRTON, 1935

Agnotocastor galushai,[1] new species

Figures 1 and 2

TYPE: FAM 79310, both mandibular rami, each with P_4–M_3 and parts of incisors, and each lacking the angular and coronoid processes.

TYPE LOCALITY AND HORIZON: From the South Fork of Lone Tree Gulch, in the SE ¼, sect. 27, T. 31 N, R. 83.W, Natrona County, Wyoming. From a small channel just above "ash F" or about 380 feet (116 meters) above the base of the generalized zonation section, which will be published in a report dealing with the stratigraphy of the Flagstaff Rim area. The section is about 720 feet (219 meters) in thickness, all of Chadronian sediments. The part of the section in which *A. galushai* has been found is, on a faunal basis, nearly equivalent to, but perhaps very slightly younger than the Pipestone Springs (Main Pocket) deposits of Montana. Biotite from ash F has given a radiometric date, based on potassium-argon ratios, of 33.7 x 10^6 years, and sanidine and feldspar from the same ash, a date of 35.7 x 10^6 years (Evernden et al., 1964).

REFERRED SPECIMEN: FAM 79311, a fragmentary right ramus with P_4–M_1, from the same locality as the type (above) but at about 405 feet (123 meters) above the base of the generalized zonation section or 25 feet (7.6 meters) stratigraphically above the type specimen.

DIAGNOSIS: Smaller than the other (later) species of *Agnotocastor*; teeth with lower crowns; P_4 relatively more elongate anteroposteriorly; posterior part of metaconid of P_4 with complex enamel pattern; I_1 with convex anterior surface as in other species of *Agnotocastor* and in *Eucastor* Leidy, 1858 and *Stenofiber* Geoffroy, 1833 rather than flat as in *Palaeocastor* Leidy, 1869.

DISCUSSION: There is apparently only one specimen from the early Oligocene that has previously been assigned to the Castoridae (?*Agnotocastor* sp., Wood, 1937, pp. 221–223), but the enamel pattern was completely obliterated so that referral to *Agnotocastor* was questioned. The

[1] The specific term is for Mr. Ted Galusha.

enamel pattern of the medial Oligocene *A. coloradensis* Wilson is quite well known (Wilson, 1949, p. 32; Galbreath, 1953, pp. 66–68), so comparison of the new species will be primarily with *A. coloradensis*. The nomenclature used for tooth parts is that of Wood and Wilson (1936) and follows that of Wilson (1949) in his description of *A. coloradensis*.

This species of early Oligocene castorid differs in size and details of the

TABLE 1

MEASUREMENTS (IN MILLIMETERS) OF *Agnotocastor galushai* COMPARED WITH SIMILAR MEASUREMENTS OF *Agnotocastor coloradensis*[a]

	A. galushai	*A. coloradensis*
Depth of jaw beneath middle of P_4	10.1	14.6
P_4–M_2, anteroposterior length	9.1	11.9
P_4–M_3, anteroposterior length	11.7	—
P_4, anteroposterior diameter	3.4	4.1
P_4, transverse diameter	3.2	4.6
M_1, anteroposterior diameter	2.86	3.65
M_1, transverse diameter	3.55	4.5
M_2, anteroposterior diameter	2.8	3.7
M_2, transverse diameter	3.46	4.3
M_3, anteroposterior diameter	2.8	—
M_3, transverse diameter	2.87	—

[a]Measurements of *A. galushai* taken on left ramus of type; those of *A. coloradensis* from Wilson, 1949, p. 34.

enamel pattern from the later species of *Agnotocastor*, but is still so similar that it yields very little additional information about the primitive castorid enamel pattern. The complexity of pattern, particularly of P_4, lends additional support to a eutypomyid-castorid relationship but leaves the problem of beaver ancestry an unanswered question.

DESCRIPTION: The jaw of *A. galushai* is quite characteristically castorid, being very stout, the dorsal border markedly depressed between the incisor and P_4, and with the symphyseal area produced downward into a definite angulate "chin" process (see fig. 1B). The symphysis is not complete but was quite large and at least the ventral part was very rugose. Immediately behind the symphysis, on the inner surface of the ramus, is a flat depressed area much like that described by Wilson (1949, p. 33) in *A. coloradensis* and considered by him to represent the area of attachment for geniohyoid and geniohypoglossal musculature. The outer

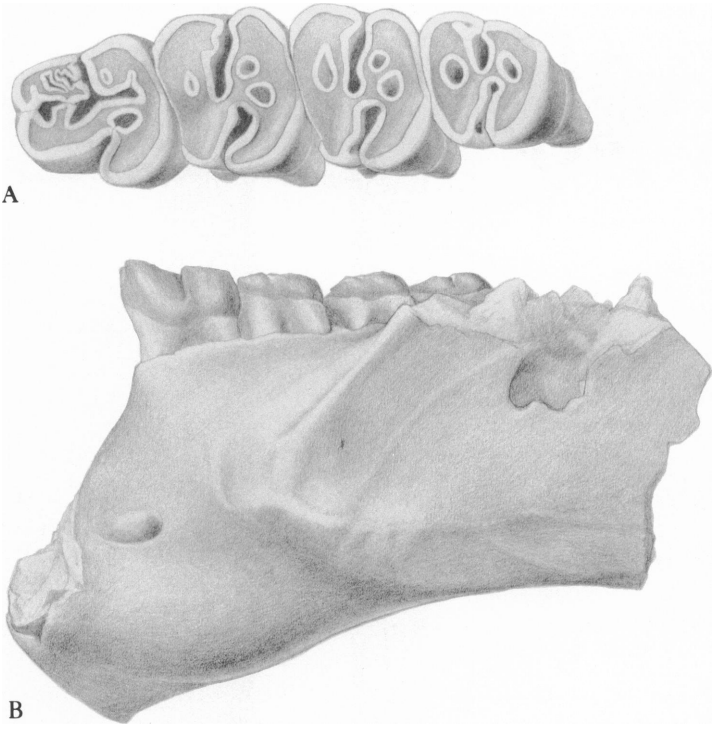

FIG. 1. *Agnotocastor galushai*, FAM 79310, type. A. Occlusal view of left P_4–M_3, ×6. B. Lateral view of left ramus, ×4.

surface of the "chin" process has a sculptured surface with many small pits and sulci.

The mental foramen is about half the distance from the ventral border of the jaw to the alveolar border of P_4, much the same as in *A. coloradensis*. The masseteric fossa is large and well defined. The major part of this fossa ends below the anterior part of M_1, and immediately anterior to this is a small, shallow, but well-defined pit, presumably for the insertion of the anterior part of the masseter lateralis. Within the area of the masseteric fossa are other low, rounded crests or ridges that probably mark edges of insertion of different divisions of the masseteric musculature (see fig. 1B). The anterior edge of the ascending ramus passes the alveolar border by the posterior part of M_2.

The lower incisor is somewhat longer than wide in cross section and has a convex anterior enamel face. The enamel is relatively thin and is carried around for a short distance on the inner and outer surfaces (see

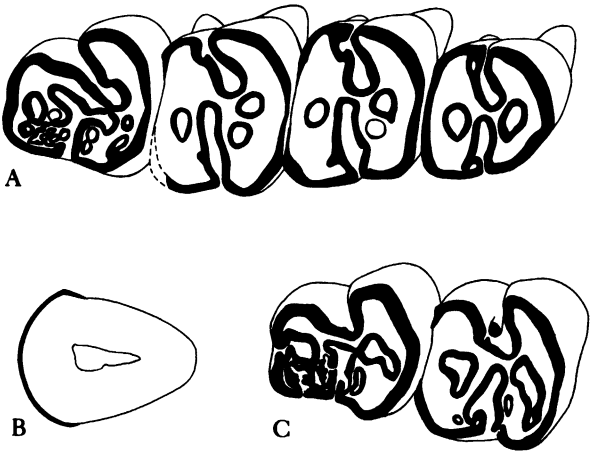

FIG. 2. *Agnotocastor galushai*. A. Occlusal view of right P_4–M_3 of type, FAM 79310. B. Cross section of left I_1 of type, FAM 79310, ×6. C. Occlusal view of right P_4–M_1 of referred specimen, FAM 79311, both ×6.

fig. 2B). The incisor lacks the bright yellow or orange pigmentation seen in many of the later castorids.

The cheek teeth are all quite low crowned; when unworn, they would probably have exhibited a crown height similar to that of *Ischyromys* Leidy, 1856. The length (anteroposterior) of P_4 is greater than the width (transverse); the first two molars are slightly wider than long; the anteroposterior and transverse dimensions of M_3 are nearly equal.

The premolar, although somewhat longer than wide and certainly relatively longer than in later species of *Agnotocastor*, does not yet show the characteristic elongation shown in later beavers. The proportions of P_4 are more reminiscent of the same tooth of *Eutypomys* Matthew, 1905. The enamel pattern is quite complex (see figs. 1A, 2A, 2C), also somewhat reminiscent of that of *Eutypomys*, and certainly more complex than that of the later Oligocene *Agnotocastor* species and Arikareean *Palaeocastor* species. The protoconid and metaconid of P_4 would be completely separate in an unworn tooth, so that the parafossetid of Stirton (1935, p. 392) or trigonid pit would open both anteriorly and posteriorly. At the present stage of wear of the two known specimens, however, the protoconid and metaconid are just at the point of being joined by the anterior cingulum (metalophulid I) and metalophid (metalophulid II), and the parafossetid is closing into an enamel lake. The posterior part of the metaconid of P_4 is produced backward and complexly folded into rows of small

connected columns separated by valleys, giving a complex enamel pattern with wear. The mesoflexid opens lingually and was connected to the parafossetid or trigonid pit when the tooth was unworn. With slight additional wear, the mesoflexid would be closed lingually. The hypolophid and mesolophid of P_4 are incomplete at the present stage of wear, so that the mesoflexid also extends into the rear part of the tooth. With additional wear, however, the hypolophid would appear and the metafossetid would be separated from the mesoflexid. The metafossetid is already separate in the right P_4 of the type and consists of two small enamel lakes. It can be seen that when the tooth was unworn, the posterolophid did not connect to the entoconid and the metafossetid opened lingually through a low gap. The anterior part of the entoconid has a complication of the enamel so that in the left P_4 of the type there is a small enamel lake and in the right P_4 two small lakes in this area. The referred specimen, FAM 79311, has a small transversely elongate lake here (compare figs. 1A, 2A, 2C).

The first two molars of *A. galushai* are very much alike and do not differ significantly from the same teeth of *A. coloradensis*, except of course for their smaller size. In the available specimens of *A. galushai*, the parafossetid is slightly transversely elongate and when unworn may have been divided into two basins as in *A. coloradensis*. In all the molars, the posterior edge of the metaconid extends backward as a metastylid which, with a slight amount of additional wear, would unite with the entoconid to isolate the mesoflexid. The metastylid is not as prominent as in *A. coloradensis* and in the type, FAM 79310, is developed into a cusp only in M_3; M_1 of the referred specimen, FAM 79311, however, does have a distinct metastylid cusp. The posterior part of the protoconid is also produced backward into a sharp crest that approaches but does not unite with the anterior end of the hypoconid, except during very late stages of wear. On M_2 and M_3 this crest has a short inward spur that connects to the posterior surface of the protoconid and isolates a small basin in the posterior part of this cusp. The posterior parts of both M_1 and M_2 have two subcircular lakes, one slightly more posterior than the other. The stage of wear precludes ascertaining whether these two lakes represent the metafossetid or are isolated between the mesolophid and hypolophid.

M_3 is smaller than the other two molars and the posterior half of this tooth is narrower than the anterior half. As noted before, a definite metastylid cusp is present at the posterointernal corner of the metaconid, and the protoconid has a posterior crest with an internal spur, isolating a small basin at the posterior edge of the protoconid. The posterior part of M_3 has a transversely elliptical lake but the homology of this lake cannot be

definitely determined; it is possibly the metafossetid but is equally likely a basin isolated between the mesolophid and hypolophid.

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