A NEW SPECIES OF PALEOCENE MULTITUBERCULATE (MAMMALIA: ALLOTHERIA) FROM THE HANNA BASIN, SOUTH-CENTRAL WYOMING

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The Hanna Basin, south-central Wyoming (Fig. 1) has proven to be an excellent field area for study of the faunal transitions of mammals from the latest Cretaceous through the early Tertiary (Eberle and Lillegren, 1998a, b; Lillegren and Eberle, 1999). The transition from the Torrejonian (To) to the Tiffanian (Ti) North American Land Mammal “Ages” (Paleocene) is preserved in the northeastern corner of the Hanna Basin, where the Hanna Formation is exposed in an area of badlands called The Breaks (Fig. 1; Lillegren and Snoke, 1996; Higgins, 2000). Seventy-two mammalian species have been recognized thus far from the section in The Breaks, of which only one is new. The rest are all well described species, previously known from many localities throughout western North America. It is on the basis of the 71 previously described species that high-resolution biostratigraphy across the To-Ti boundary was developed (Higgins, 2000). Seventeen of the 72 recognized species from The Breaks (about 25%) are multituberculates; however, multituberculates represent more than 50% of the individual specimens, identified to the level of genus or species (426 specimens out of a total of 811). The new species, Fractinus palmorum, gen. et sp. nov., an unusual multituberculate, is described here.

PALEONTOLOGICAL METHODS USED IN THIS STUDY

All specimens are housed in the Collection of Fossil Vertebrates, Departmental Scientific Collections, Department of Geology and Geophysics, The University of Wyoming (UW). All listed specimens were collected from University of Wyoming localities designated by “V-.” Underwater screen-washing and surface crawling were the primary techniques for specimen collection.

Figure 2 illustrates standard measurements taken during this study. Terminology and measurements for multituberculate teeth follow Krause (1982; Fig. 2). All measurements are reported in millimeters and are recorded to the nearest hundredth of a millimeter through use of an Ehrenreich Photo-Optical Industries Shopscope®. Images of specimens in this report were taken using a JEOL 5800LV scanning electron microscope at the University of Wyoming. All are backscattered electronic images taken under partial to full vacuum. Specimens were not carbon coated.

Abbreviations and Terminology

Abbreviations L and R denote left and right teeth, respectively. Measurement terms (Fig. 2): Length = greatest anteroposterior length, L1 = length from the anterior-most point of multibuccite p4 to first true serration, W = greatest width, H = height above baseline (extends from the apex of the anterior projection of the crown to where the postero-lateral ledge intersects the posterior margin of multibuccite p4; Krause [1982]), h = height of first serration of multibuccite p4 above “base-line,” Serr = number of serrations on a multibuccite p4, * = estimated measurement required by fracture or excessive wear.

The known distributions of mammalian species provided include age, horizon, and geographic position. To3 and TH denote divisions of the Torrejonian and Tiffanian North American Land Mammal “Ages,” respectively, as defined by Archibald et al. (1987).

SYSTEMATIC PALEONTOLOGY

Class MAMMALIA Linnaeus, 1758
Infraclass ALLOTHERIA Marsh, 1880

Etymology—Fractus, Latin, broken into pieces, in reference to The Breaks locality from which the type specimen was collected.

Diagnosis—As for the type and only species.

FRACTINUS PALMORUM, sp. nov.

Holotype—UW 27063, L p4.


Hypodigm—From V-90043: UW 27063, L p4; from V-96010: UW 28389, L p4 fragment.

Localities—V-90043 and V-96010.


Etymology—The specific epithet, palmorum, is in honor of Burt and Kaylyn Palm, who own the land where the type specimen was collected and have been kind enough to allow me access to their property.

Diagnosis—A medium-sized multituberculate. Differs most platodont- id, cimolodontid, and eucosmosodontid multituberculates in having fewer (approximately five), more rounded serrations and having the first serration begin more posterior than the exodaenodont lobe. The only platodontid multituberculate that it is similar to is Xanclomyos mcgrawi (Rigby, 1980) from which it differs by having fewer serrations and having all serrations lie along a single line (Fig. 3). Differs Microcosmodon, Pentacocosmodon, and Taeniolabidids in possessing a prominent exodaenodont lobe, and having all serrations lie along a single line. Differs Microcosmodon and Pentacocosmodon also by being much larger. Superficially, Fractinus palmorum resembles the overall shape of Jurassic multituberculates, such as Psalodon, but lacks external cusps.

Description—UW 27063 is a complete L p4 (measurements: Length = 4.92, W = 2.02, L1 = 3.04, H = h = 2.74, D = 1.07, 5 serrations, 1 pseudoserration, present). The tooth can be described as a four-sided polygon when examined in lateral view. The bottom of the enamel over the posterior root is a straight, nearly horizontal line, which forms the base of the polygon. On the labial surface of the tooth, the enamel deviates slightly above this line between the posterior root and the an- terolabial bulge. The anterolabial bulge extends below this line, and rejoins it at about the anterior-most point of the tooth. A concavity for a p3 may be present but is difficult to distinguish. The edge from the anterior-most point on the tooth to the pseudoserration forms the slightly convex front edge of the polygon. Five true serrations are all about the same size and lie along a straight line, which is inclined posteriorly about 45 degrees relative to the horizontal base. A ridge extends on the labial surface from each serration roughly paralleling the anterior surface of the tooth. On the lingual surface of the tooth, ridges are seen only from serrations 1, 2, and 3. The pseudoserration is the highest point on the tooth, but it lies in a position slightly below the line along which the other serrations are located. Posterior to the fifth serration is a possible (reduced) sixth serration immediately followed by the nearly vertical posterior margin of the tooth.
FIGURE 1. Location map of Wyoming, showing location of the Hanna Basin and The Breaks.

FIGURE 2. Standard dental measurements used in this study.

Multituberculate Rp4


UW 28389 is the anterior part of a Lp4 (measurements: W = 1.8*; L1 = 2.5*; h = 2.8*; D = 1.6*). It preserves the tooth anterior to the second true serration. Two pseudoserrations are present, which make the anterior surface of this tooth appear more vertical than that of UW 27063. The enamel along the lower edge of this tooth is broken away.

The first serration is present, as are the ridges that extend from serrations 1 and 2.

Discussion—This rare species is known only from two specimens found approximately 25 meters (85 feet) apart stratigraphically. These teeth are unlike any multituberculate previously described from late Torrejonian or early Tiffanian faunas, warranting the naming of a new
genus. Superficially, they resemble the overall shape of Jurassic multituberculates, such as *Psalodon*, but lack external cusps.

DISCUSSION

The total fauna from The Breaks includes specimens collected from 136 localities within 550 meters of section. Seventy-two species collected from these localities, most of which are already well known, were used to formulate a high-resolution biostratigraphy across the To–Tiffanian boundary (Higgins, 2000). *Fractinus palmorum* is unique among the multituberculates found from Paleocene localities in western North America. Though represented by only one and a half teeth, it is clearly distinct from all other multituberculate taxa known from the late Torrejonian and early Tiffanian. Within The Breaks, its stratigraphic range is narrow (about 25 meters), and restricted to the earliest Tiffanian (T11), suggesting that it may be of use as a biostratigraphic indicator. However, its infrequency in the total fauna from The Breaks (two specimens out of 811) indicates that this was a very rare animal, which is not desirable in an index species.

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LITERATURE CITED


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