Museum of Natural History
University of Colorado **Boulder**

Early Cenozoic Survivors: Puercan Metatheria In The Western Interior

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Introduction

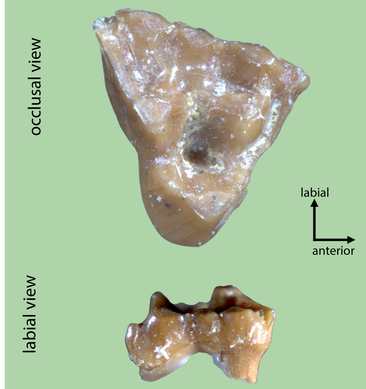
Survival across the Cretaceous-Paleogene (K-Pg) boundary was difficult for most terrestrial life. Mammals alone are estimated to have lost 75% of faunal diversity[1]. In the latest Cretaceous, Metatheria (marsupials and their closest fossil relatives) dominated the mammalian fauna. At least 25 species of Metatheria have been recovered from the Maastrichtian (Lancian) of North America with evidence of significant diversification and growth; however, exceedingly few crossed the K-Pg boundary[2]. In earliest Paleocene (Puercan) time, only *Thylacodon pusillus*, *T. montanensis*, and *Peradectes minor* are currently known in North America, with five additional species in later Puercan strata [2,3]. Here we describe three Metatherian fossils: two from the Great Divide Basin in Wyoming and one from the Denver Basin in Colorado.

Materials and Methods

We compared the UCM specimens to characteristics of *T. pusillus*, *T. montanensis*, and *P. minor*. After recognizing a substantial size difference in UCM 48598, we compared it to loaned specimens and measurements in published literature of *T. pusillus* and *T. montanensis* from the Denver[4], San Juan[3], and Williston Basins[5, 6, 7]. Measurements of UCM 48598 followed Clemens[8]. Tooth nomenclature follows Williamson[3].

UCM 103314:

Thylacadon pusillus, Right M2

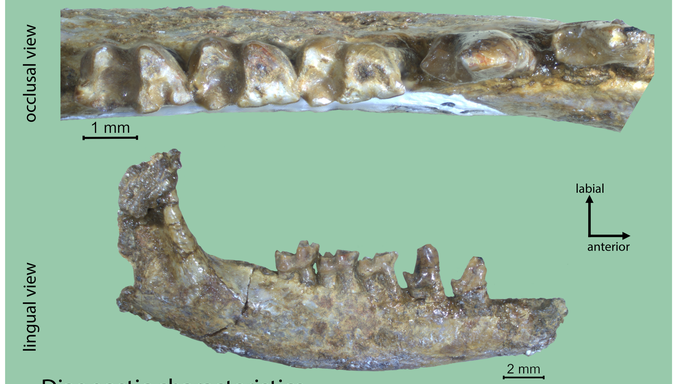


Diagnostic characteristics

- Straight ectoflexus
- Stylar cusps A-E, with the widest cusp B
- Metacone is taller and wider than paracone
- Centrocrista is parallel to apices of para- and metacones
- Metaconule is larger than paraconule and both are lingually placed

UCM 103091:

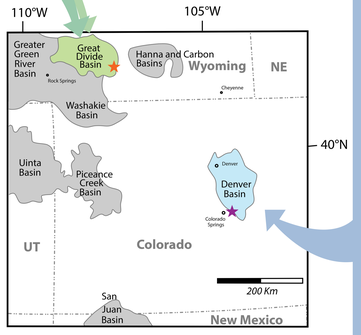
Thylacadon pusillus, Right dentary with p2-m3



Diagnostic characteristics

- Talonid and trigonid are subequal widths
- No keel on the mesiolingual face of the paraconid
- Paraconid, metaconid, and ectoconid line up mesiodistally
- Entoconid is buccolingually compressed and blade-like
- Hypoconulid and entoconid are distinct
- Crista obliqua meets the distal trigonid wall buccal to post-cristid notch

Sedimentary Basins in the Western Interior

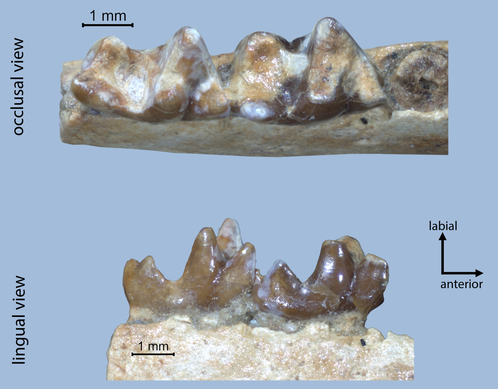


★ UCM Loc. 2011035
★ UCM Loc. 77281

Figure 1: Map modified from Halverson and Eberle [4] showing geographic locations of basins of the Western Interior and fossil localities from this study. UCM locality 2011035 is considered early Puercan (Pu1)[5] in age and UCM locality 77281 is considered middle Puercan (late Pu2)[6].

UMC 48598:

Thylacadon n sp. Left dentary with m2-m3



Diagnostic characteristics

Similar to UCM 103091 except:

- Molar length is approximately 30% longer

Lower molar (m2 and m3) measurements

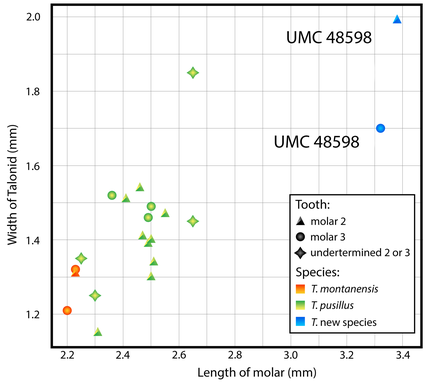


Figure 2: Length and maximum width measurements of molars of *T.montanensis* and *T. pusillus* specimens from published literature compared to UCM 48598.

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Scan me to view UCM 103314 in 3D

Results and Conclusions

We identified UCM 103091 as a right dentary and UCM 103314 as an upper right M2 of *T. pusillus*. Furthermore, UCM 48598 is morphologically similar to *Thylacodon* species with differences mostly seen in size. Based on these conclusions, we propose that UCM 48598 is a new species within the *Thylacodon* genus. While the Puercan quarry in the Great Divide Basin has produced many other eutherian and multituberculate jaws and teeth, UCM 103091 and UCM 103314 are the first *Thylacodon* specimens to be described from that basin. While a few specimens have been described from the nearby Hanna Basin, most *Thylacodon* specimens are found further north in Montana's Williston Basin or further south in New Mexico's San Juan Basin. Notably, UCM 48598 from the Denver Basin, is a larger species of *Thylacodon* than previously known. This specimen increases the known diversity of metatherians in earliest Paleocene time. Further, it supports the hypothesis that mammalian body sizes increased within the first few hundred thousand years after the K-Pg extinction as ecosystems recovered and new niches opened for adaptation[11].