

A LATE OCCURRENCE OF THE BEAR *AGRIOTHERIUM* FROM THE BLANCAN RINGOLD FORMATION IN SOUTHEASTERN WASHINGTON

James E. Martin

J.E. Martin Geoscientific Consultation

21051 Doral Court

Sturgis, SD 57785

and

University of Louisiana Geology Museum

University of Louisiana, Lafayette, LA

Corresponding author email: Jim.Martin929@gmail.com

ABSTRACT

The Ursinae, “the true bears,” occur first in North America during the early Heminfordian North American Land Mammal Age. Within the Ursinae are three tribes; the least derived of which is the Ursavini, consisting of the three genera: *Ursavus*, *Indarctos*, and *Agriotherium*. These taxa illustrate the divergence from the strictly carnivorous (hypercarnivory) adaptation of their ancestry to the omnivory of extant ursines. Although a sister group to living bears, until recently the Ursavini were thought to last appear in the Hemphillian NALMA. Recently, an occurrence of *Agriotherium* from the Blancan Hagerman assemblage in Idaho was described. The specimen described herein from the Ringold assemblage in Washington, representing the second Blancan appearance, is the first record of this large bear from the Ringold Formation, and may represent a new species. The Washington and Idaho occurrences represent the latest known appearances of the Ursavini in North America during the Blancan NALMA.

Key words

Bears, *Agriotherium*, Ursavini, Blancan NALMA, Washington

INTRODUCTION

The true bears (Ursinae) in North America have been divided into three tribes, the Ursavini, Tremarctini, and Ursini (Hunt 1998). The Ursavini is the least derived of these three tribes and includes three successive genera, *Ursavus*, *Indarctos*, and *Agriotherium*, that exhibit a general size increase and loss of pre-molars through time. Based on the greater morphological similarity to the Asian versus the African species of *Agriotherium* (Hunt, 1998), *Agriotherium* appears to have dispersed to North America from Asia during the late Hemphillian (Hh3) NALMA (Tedford et al. 2004), and until recently, was thought to have become

extinct in North America during the latest Hemphillian NALMA (Hunt, 1998; Bell et al. 2004).

During the 1960-70s, the late Wayne Harrold and his wife, Bess, collected numerous vertebrate fossils from the Ringold Formation exposed in southeastern Washington. The specimens were derived from a ferruginous-stained cobble conglomerate relatively high in the section (Gustafson 1978) along the White Bluffs of the Columbia River. Specimens from the Ringold Formation of White Bluffs were assigned to the early Blancan (Bl of Repenning 1987) NALMA (Gustafson 1978; Bell et al. 2004). The author negotiated donation of these well-documented collections to the Museum of Geology, SD School of Mines and Technology (SDSM). Within these collections were tremarctine bears and one tooth of a very large ursine bear. The tremarctine bears were described as *Plionarctos harroldorum* by Tedford and Martin (2001). At that time, the large tooth was recognized as that of *Agriotherium*, representing the last known appearance of the large bear in North America. However, other duties prevented description of the specimen, and subsequently, Samuels et al. (2009) described specimens of *Agriotherium* from the mid-Blancan portion of the Hagerman assemblage from the Glens Ferry Formation in southern Idaho. The purpose of this communication is to record the second Blancan appearance of *Agriotherium* in North America.

CARNIVORA Bowditch 1821

URSIDAE Gray 1825

URSINAE Swainson 1835

Agriotherium Wagner 1837

Agriotherium n. sp.?

Referred specimen—SDSM 22004, right M2 from the White Bluffs Paleofauna, SDSM locality V8645, Savage Island, Ringold Formation, Franklin Co., WA.

The upper second molar is very large, quadrate (Anteroposterior = 29.6 , Transverse = 35.5 mm), brachydont, cusate, and robust. Its description is very similar to that provided by Miller and Carranza-Castañeda (1996) for an associated upper and lower dentition from the Hemphillian Rinconada Locality of Guanajuato, Mexico. The Ringold tooth is larger, but the measurements from the specimen from Mexico appear to be smaller than those known for other North American specimens (see Samuels et al. 2009, p. 600). The tooth has all four major cusps. The anterior margin of the tooth is wider than the posterior; paracone and metacone as well as protocone and hypocone are closely appressed; and an anteroposteriorly trending medial valley separates the paracone-metacone from the protocone-hypocone. However, accessory cuspules occur posteriorly on the paracone-metacone line, and the ridge posteriorly from the hypocone is very long and ends in a cuspule-like bulge in the enamel. The tooth is nearly surrounded by a cingulum that is most pronounced lingual to the protocone and buccal to the paracone, perhaps more so than that of the specimen from Mexico. All valleys on the Ringold tooth are characteristically crenulated (Figure 1).

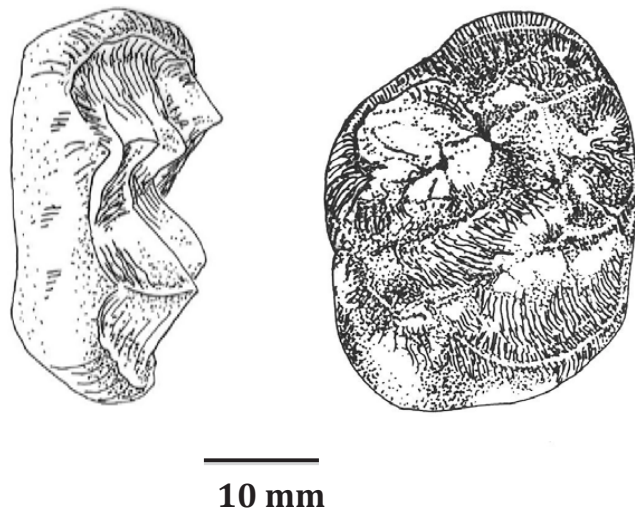


Figure 1. Posterior and occlusal (anterior to right) views of right M2 of *Agriotherium* from the Ringold Formation of Washington.

DISCUSSION

Miller and Carranza-Castañeda (1996) synonymized all North American representatives of *Agriotherium* with *A. schneideri* and provided excellent descriptions of the dentition. Based on a single molar, the Ringold specimen is similar to that from Mexico; however, it appears larger, exhibits cuspsules posterior to the metacone, exhibits a more prominent ridge from the hypocone to the posterior of the tooth where it ends in a cuspsule-like enamel bulge, and appears to possess a more robust peripheral cingulum. Whether these differences warrant a separate species or represent intraspecific variation cannot be determined at this time. To emphasize its differences, the tooth is questioned as a new species but remains unnamed until additional material is discovered.

This specimen represents the first recognized occurrence of *Agriotherium* from the Ringold Formation and from the state of Washington. Much of the White Bluffs assemblage from which the specimen was derived appears to represent a forested paleodepositional environment (Gustafson 1978). Such paleoenvironments are seldom preserved in the stratigraphic record, perhaps indicating why bears are not more commonly found among Blancan assemblages. Samuels et al. (2009) also suggested that the Hagerman occurrence of *Agriotherium* could have been preserved in such an unusual paleodepositional environment.

ACKNOWLEDGMENTS

I wish to sincerely thank Wayne and Bess Harrold for their many contributions to vertebrate paleontology, and particularly to Wayne for his advice over

the years, especially about looking back. Dr. Richard Tedford was instrumental in our research concerning the Ursidae. Ms. Sarah Flick kindly produced the renderings for the figure, and Dr. Robert Tatina produced fine editorial comments. Dr. Robert Hunt, Jr., Dr. Gary Johnson, and Mr. David C. Parris reviewed the manuscript, resulting in a much better product.

LITERATURE CITED

- Bell, C.J., E.L. Lundelius, Jr., A.D. Barnosky, R.W. Graham, E.H. Lindsay, D.R. Ruez, Jr., H.A. Semken, Jr., S.D. Webb, and R.J. Zakrzewski. 2004. The Blancan, Irvingtonian, and Rancholabrean Mammal Ages. IN Late Cretaceous and Cenozoic Mammals of North America, M.O. Woodburne (ed.), Columbia Univ. Press, New York, NY.
- Miller, W.E. and O. Carranza-Castañeda, 1996. *Agriotherium schneideri* from the Hemphillian of central Mexico. Jour. Mammalogy 77:568-577.
- Gustafson, E.P. 1978. The vertebrate faunas of the Ringold Formation, south-central Washington. Univ. Oregon, Mus. Nat. Hist. Bull. 23:1-62.
- Hunt, R.M., Jr. 1998. Ursidae. IN Evolution of Tertiary Mammals of North America. Vol.1: Terrestrial Carnivores, Ungulates, and Ungulate-like Mammals, (Janis, C.M., K.M. Scott, and L.L. Jacobs (eds.), Cambridge Univ. Press, Cambridge, Great Britain.
- Repenning, C.A. 1987. Biochronology of the Microtine Rodents of the United States. IN Cenozoic Mammals of North America, Geochronology and Biostratigraphy, M.O. Woodburne (ed.), Univ. California Press, Berkeley and Los Angeles, CA.
- Samuels, J.X., J.A. Meachen-Samuels, and P.A. Ginsler. 2009. The first mid-Blancan occurrence of *Agriotherium* (Ursidae) in North America: a record from Hagerman Fossil Beds National Monument. Jour. Paleont. 83(4):597-603.
- Tedford, R.H. and J.E. Martin. 2001. *Plionarctos*, a tremarctine bear (Ursidae: Carnivora) from western North America. Jour. Vert. Paleont. 21(2):311-321.
- Tedford, R.H., L.B. Albright, III, A.D. Barnosky, I. Ferrusquia-Villafranca, R.M. Hunt, Jr., J.E. Storer, C.C. Swisher, III, M.R. Voorhies, S.D. Webb, and D.P. Whistler. 2004. Mammalian biochronology of the Arikarean through Hemphillian interval (late Oligocene through early Pliocene epochs). IN Late Cretaceous and Cenozoic Mammals of North America, M.O. Woodburne (ed.), Columbia Univ. Press, New York, NY.